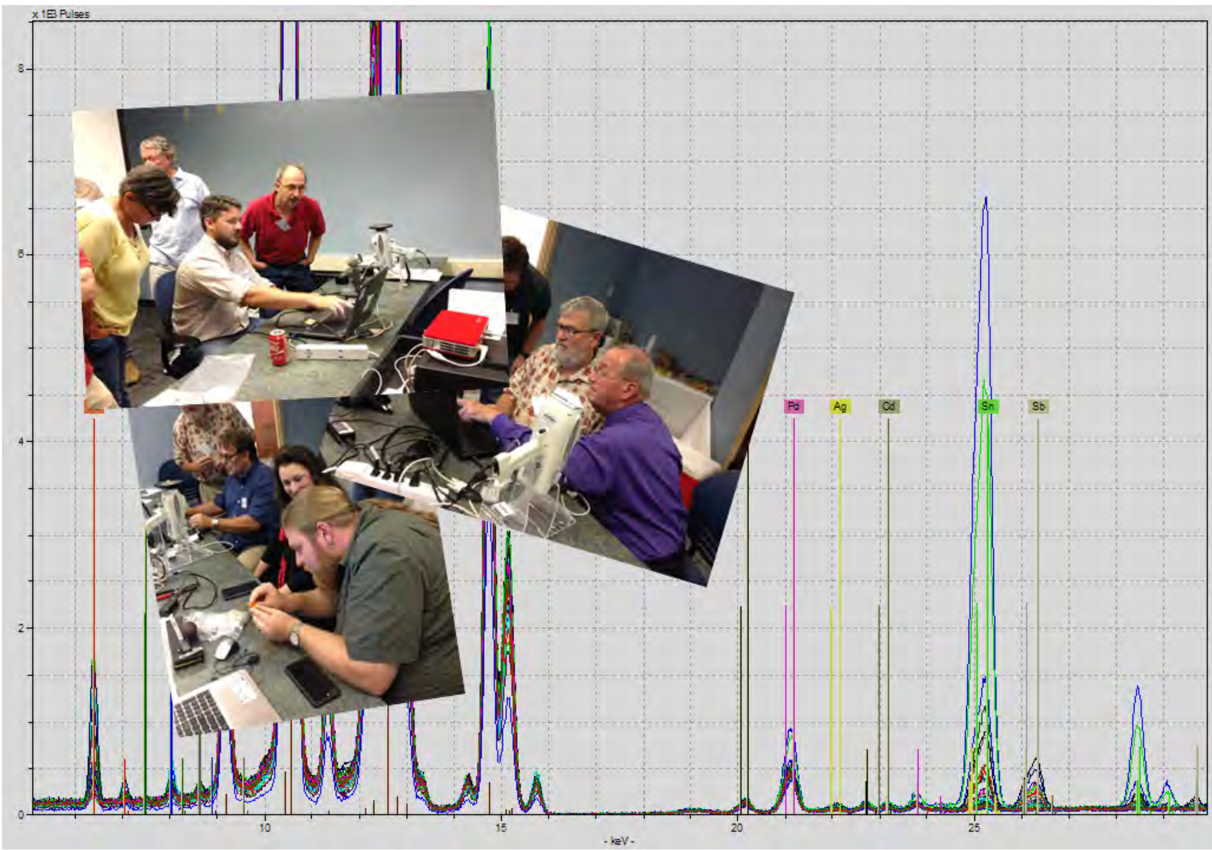
Get the Lead Out:

Towards Identifying Ammunition on Eighteenth- and Early Nineteenth-Century Battlefields and Settlements



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Executive Summary

This report details the results of the 2017 Get the Lead Out! Workshop that was conducted by the LAMAR Institute and National Park Service in June, 2017. It also incorporates data from an earlier 2015 workshop, as well as elemental data collected by researchers since 2012. Small arms ammunition in America, throughout the eighteenth- and early nineteenth-centuries, consisted of round soft-metal balls. These were mostly lead, although archaeologists have documented other metals such as pewter and silver as additives. Available small arms and related ammunition varied by military unit, and included pistols, rifles, trade guns, carbines, fowlers, and large caliber wall guns, as well as American, French, Spanish and English weapons. Macroscopic identification of associated bullets alone limits battlefield interpretations. Seibert and Elliott present a formalized regimen of lead ball analyses that combines elemental characterization (portable X-Ray Fluorescence, or pXRF) along with traditional descriptions and quantitative measurements. Traditional analysis documents diameter, weight, firing condition (impact evidence, rifling, worming, ramrod impact, casting evidence), alterations (chewing, cutting, carving), other post-depositional damage (rodent gnawing), and archaeological context. The elemental information collected by pXRF shows promise in identifying ore sources, contaminants introduced, firing condition, age, and military association. If combined with other data from lead ore sources, including isotope studies, baseline information can be developed for comparison among battlefield assemblages and incorporated into a global dataset with the purpose of better understanding the geographic distribution of military supplies and military strategy at macro global and regional levels, as well as at micro-battlefield levels.

Acknowledgements

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I. Introduction

This monograph presents the findings from early work and two Portable X-Ray Fluorescence (pXRF) workshops that addressed the elemental composition of round ball ammunition from early sites in North America.

Previous study of Eighteenth-century lead (round ball) artifacts from archaeological sites have explored various physical aspects of these objects (Sivilich 1996, 2004, 2016; Branstner 2008).

A December 2015 pXRF Workshop explored the elemental composition of round ball ammunition from several archaeological contexts in the southeastern United States (Elliott 2016a). Preliminary investigations on this topic by researchers with the National Park Service, Southeast Archeological Center and the LAMAR Institute demonstrated the potential for pXRF to distinguish bullets within battlefields and between different archaeological sites. Using a Bruker Tracer III handheld unit in 2015, archaeologist Daniel Elliott (LAMAR Institute) sampled several hundred round balls gathered from Revolutionary War battlefields in Georgia and South Carolina, from Colonial and Early Federal fortifications in Georgia and from Native American village sites in Georgia. This preliminary work also has shown that pXRF technology works well when applied to older museum collections. Bruce Kaiser processed Elliott's data and determined that significant elemental differences were manifest in the various assemblages. The cultural meaning of these differences remains an active discussion and the proposed workshop will build on this early work. For example, was the addition of tin and antimony intentional to improve the ballistic performance, or was it simply done of necessity in the absence of reliable and abundant lead sources? Are non-lead additives linked to specific military groups or armies, or to specific weapon types? Larger samples from a variety of sites were required to assess the full utility of this technology, however, and participants recognized that another workshop was a logical step in pursuing this research.

The LAMAR Institute organized a larger workshop that was funded by a 2016 PTT Grant (Grant Number P16AP00371) from the National Center for Preservation Technology and Training (NCPTT), which was entitled, "Get the Lead Out: Elemental analysis of 18th and early 19th century ammunition in eastern North America." This workshop was held on June 29 and 30, 2017.

The NCPTT workshop, which was held at the Coastal Georgia Center in Savannah, Georgia brought together archaeologists, museum curators, and physicists to explore the elemental composition of small arms ammunition of the eighteenth and early nineteenth centuries in North America. Workshop attendees employed portable X-Ray fluorescence (pXRF) technology on small samples from their respective archaeological study sites or museum collections. Attendees were guided by physicists who are highly trained in the theory and expectations, methods and data processing of these pXRF datasets in the analysis of their collections. The results from the workshop form the basis of a continuing elemental database on early ammunition. This database is intended to distinguish between the elemental composition of ballistic artifacts. As the dataset grows in its variety and sophistication, other topics, such as sourcing, may be approached using this information.

The Problem

Small arms ammunition from the eighteenth and early nineteenth centuries is difficult to identify since it consists of round metal balls of varying sizes. Unlike later ballistics from the Civil War, few attributes serve as clues to the people who possessed the ammunition. While attributes such as bullet diameter (caliber) and weight offer some indication of the weapon types from which the bullets were fired, many gaps remain in defining these enigmatic metal artifacts. Furthermore, bullets that have been fired and heavily impacted are often rendered unrecognizable for traditional analysis. With pXRF researchers are offered a significant advance in artifact identification which, when combined with other artifact attributes, can greatly enhance the understanding of a bullet assemblage and its historical context on the battlefields and military encampments.

Archaeologists' expectations for pXRF in the study of round ball ammunition were great, albeit naïve. We had hopes of using this technology as a sourcing tool. That task is better served by isotope analysis, which is not covered by pXRF. Elemental analysis with Bruker technology does provide useful information, however, about the composition of lead ball assemblages from various sites that eventually may provide important insights into human behavior not available by other means.

II. Background

History of Lead Mining in Europe

Lead occurs at many locations throughout Europe. Lead mining has ancient roots with the Romans, Egyptians and other former civilizations. The Romans explored many lead deposits throughout Europe. Lead isotope analysis of Roman lead objects from several archaeological sites in German revealed that these objects came from ores in Germany and Britain (Durali-Mueller et al. 2007).

Great Britain

Great Britain abounds in major lead deposits, which have been mined since at least Roman times. Great Britain led the world in lead production from the seventeenth through nineteenth centuries. Many mines were active in Great Britain in the eighteenth century. England contained several areas where lead was extensively mined in the 1700s. In his 1774 study on lead poisoning physician Thomas Percival noted, "The river Derwent flows through a large tract of Derbyshire, which abounds with Lead mines" (Percival 1774:33). In his 1789 history of Derbyshire, James Pilkington (2007:95-130) described the lead mines of Derbyshire in greater detail. Percival (1774:36) also mentioned the white and red lead works in Sheffield, England. In a 1778 treatise on mining William Pryce refers to lead mining practices in Cornwall, England (Pryce 2010:243). Shropshire, England was another area where lead was extensively mined and smelted in the eighteenth and nineteenth centuries (Shropshirehistory.com 2017). Lead was mined at Tyndrum, Stirling District, Scotland beginning about 1741 (Moreton 2015). Lead was mined in Strontian, Scotland in the early nineteenth century (Good et al. 1813). Ireland also had lead mines in the 1700s. Sir William Petty (2007:vi) discussed the lead mines in Kerry, Ireland in 1769, which were first opened in 1667. Lead was also mined at Knocaderry, County Tipperary from ancient times until at least 1803 (O'Halloran 1803:205). Lead was mined at numerous locations in Wales in the early nineteenth century. These include mines at Holywell, Llanrwst in North Wales, Llangynnog, and Anglesea, Wales (Kauffman 1803:200).

France

Lead was mined at several localities in France in the eighteenth and nineteenth centuries. Lead was mined in Brittany [Bretagne], northwestern France in the early eighteenth century (Baker and Warner 1732:24; Duhamel 1780). Lead was mined in the Limosin region of central France in the late eighteenth century (Robinson and Robinson 1793). Lead was mined in Le Pesay, eastern France in the early nineteenth century (Williams 1807:73; Taylor and Peuchet 1815:186).

Spain

Lead mining in Spain dates to Roman times. Early mining districts in southern Spain are known (Heriot 1914:358-361). Lead isotopes from these mines have been identified in Greenland Ice dating from 600 B.C. to A.D. 300 (Rosman et al. 1997:3413-3416). As late as 1914, Spain was the second largest lead-producer in the world. Lead production in Spain in the 1860s was second only to Great Britain among European countries (Fletcher 1991:200). Spain also obtain quantities of lead from mines from its colonies in Central and South America.

History of Lead Mining in North America

Lead mining in North America in the colonial and Revolutionary War eras was extremely limited. Mines in eastern North American that operated in the eighteenth century have been documented in Connecticut, New York, Pennsylvania, Virginia and West Virginia. Production statistics for these eighteenth century mines are lacking. Suffice it to say that geological knowledge of North America was quite limited in that period and the mining activity was dwarfed in comparison to that of Europe. A boom in lead mining in the Mississippi River valley followed the Louisiana Purchase. By 1830 miners in the United States of America produced approximately 7,260 metric tons of lead. By the following decade that amount had increased to 15,420 metric tons, and by 1850, it produced 19,960 metric tons. By 1860, on the eve of the American Civil War, the U.S. produced 14,150 metric tons of lead (U.S. Geological Survey 1990:Table 1). By 1900, approximately 343,000 metric tons of lead were produced in the U.S., which was approximately 45 percent of the world’s lead supply (U.S. Geological Survey 2017). The United States led the world in lead production for most of the twentieth century. Today, China is the world’s leading producer of lead, followed by Australia and the United States.

Connecticut

A Revolutionary War-era lead mine operated on Butler Creek near Middletown, Connecticut (Morse 1794:359; Ingalls 1908:87-88). Geologist J. Z. De Boer noted that, “the Middletown mine was originally opened to mine lead - one of only two sites in New England that produced the metal for the Continental Army during the early stages of the Revolutionary War. The operation began in earnest in 1775 when smelting works were built along the river to provide lead for ammunition, including cannonballs. Records show that the mine produced 15,563 pounds of lead and even helped defeat British Gen. John Burgoyne - and 6,000 British troops - during the Saratoga Campaign in 1777. The mine was opened periodically over the years after the Revolution, including a stint as a silver mine in the mid-1800s when huge stampers crushed tons of rock laden with silver” (Marteka 2009).

Georgia

Our research has been unable to locate any references to lead mines in Georgia dating prior to the nineteenth century. By the nineteenth century miners had identified lead deposits in Georgia and several mines were opened. Pre-Civil War mining of lead is documented by the Canton Mining Company in Cherokee County (Shepard 1856). Additional lead mines in Georgia that developed in the later nineteenth and early twentieth centuries include: Rich mine and Evalee Richards prospect, Cherokee County; Magruder mine and Seminole/Magruder/Wardlaw/Jackson veins, Lincoln County; Landers, Tatham and Woodall mines, McDuffie County; Earnest Galena prospect, Murray County; Mcgarrity Prospect, Paulding County; Shiloh Church prospect, Polk County; McKenzie Mine, Quitman County; Habersham County occurrences[?], Rabun County; H. Amason prospect, Troup County and Chambers mine, Wilkes County.

Massachusetts

Lead mining began at Southampton, Massachusetts in 1765. These operations were suspended by the Revolutionary War (Ingalls 1908:88). Lead was mined in Hampshire County in the early nineteenth century (Nash 1827:238-270). Lead also was reportedly mined at Worcester (Ingalls 1907:980).

New Jersey

We were unable to locate any record of lead mining in New Jersey from the eighteenth century. Bristed (1818:62) notes that there were lead mines in New Jersey about 1818, although no specific locations were identified. The Sussex Lead Mine in Sussex County, New Jersey is the only identified lead mine. This mine was active in the mid-nineteenth century prior to 1893 (New Jersey Geological Survey 1893:426).

New York

Lead was mined at Northeast in Dutchess County, New York as early as 1740. The Board of War wrote to Elias Boudinot in 1777 regarding Congress' desire to have New York Governor Clinton procure workmen to "work the Lead Mines in that Sate for Continental Use", and, "if Workmen cannot otherwise be procured your are to furnish him on request with such Numbers of Prisoners as he shall require" (Board of War 1777). Ingalls (1908:88) notes that, "attempts to obtain lead here were also made during the Revolutionary War, but the quantity available was too small to admit of profitable development".

North Carolina

Our research has been unable to locate any references to lead mines in North Carolina dating prior to the nineteenth century. By 1838 lead was mined in four counties in North Carolina, which were: Lead mine, Alexander County; Morganton, Burke County; Rocky River mine, Cabarrus County; and Silver Hill, Davidson County (1838),

Pennsylvania

Fort Roberdeau was constructed by the patriots in 1778 near Birmingham in present-day Blair County, Pennsylvania to protect a lead mine and an associated smelting operation. The lead mine only operated for a few years (FortRoberdeau.org 2014; Ingalls 1908:88; Stapleton 1971:361-371). Daniel Roberdeau wrote to General George Washington on June 4, 1778 describing the fort at the lead mine, "To prevent the Evacuation of the frontier of Bedford County and, for the general defence against Indian incursions I have built with Logs at the Mine in Sinking Spring Valley at the foot of Fisher Mountain, a Fort, Cabbin fashion, 50 yds square with a Bastion at each Corner. The Fort consists of 48 Cabbins about twelve feet square exclusive of the Bastions." (Roberdeau 1778). The Continental Congress recorded in its journal for October 10, 1778 concerning a letter from General Armstrong, which stressed the "Importance of the Lead Mines upon the Frontiers of Pennsylvania', and Congress discussed the option to recommend to the State of Pennsylvania call out 100 militia, "to be stationed at or near the said Lead Mines" (Continental Congress 1778).

By the nineteenth century lead sources in eastern Pennsylvania were being exploited. Lead was mined at the Perkiomen Lead Mine in the early nineteenth century (Wetherill et al. 1826). Lead also was mined in Lancaster County about 1855 (Mitchell 1855).

South Carolina

Our research has been unable to locate any references to lead mines in South Carolina dating prior to the nineteenth century. Tuomey (1848:127) debunks legends of lead mines in York County, which were secretly used in the American Revolution by concluding, "I invariably examined all such localities…I found no indications of lead at any of these places". Bristed (1818:63) notes the existence of lead mines in South Carolina about 1818, but no specific locations were identified. Lead was mined at the Cameron and Morgan lead mines in Pickens and Spartanburg counties prior to 1865 (Leiber 1860:69, 86; South Carolina General Assembly 1866:27). Lead deposits are reported more recently for three South Carolina counties, which include: an unnamed barite mine, Cameron, Kings Creek, Lavender Place, Silver Mine Ridge, The Big Incline, Wallace Gold Mine and West Hill mines and Northeast Barite Pit and Kings Creek Barite Southwest Area, Cherokee County; Barite Hill mine, McCormick County; and the Wright mines and Castles and McKnight prospects, York County.

Virginia

Virginia served as the major source of lead in eastern North America in the eighteenth century. Whisonant (1996) summarized the early lead mining industry in southwestern Virginia: "The Wythe County lead mines that later came to be known variously as the mines on Cripple Creek, the Austinville mines, or the Wytheville mines …were opened in 1756 by Colonel John Chiswell, a British officer who was a native of Wales and an early adventurer in southwestern Virginia…During the Revolutionary War, the lead mines produced significant amounts of ammunition for George Washington's Colonial Army" (Austin, 1977).

Wood (2014) notes that the lead mining operations near the New River in Montgomery County (now Wythe County), Virginia were started by William Herbert. The operation was shut down prior to the war but then reactivated during the war, again by William Herbert. Other modern sources note that Colonel Charles Lynch was in charge of the mines from 1777-1787 and that the, "lead was mined by slaves and guarded by the militia because this resource was an attractive target to the British" (avocamuseum.org 2014). These mines were near Fort Chiswell, Virginia and records pertaining to the mines are contained in the special collections at William & Mary College (McGavock Papers 1760-1888).

Kentucky and West Virginia

Lead was mined in the Kanawha River valley in the American Revolution (Morse 1794:534). In 16780 Tories from North Carolina and Virginia attempted to capture these mines but were repulsed by the Americans. Leadmine run is a stream in Tucker County, West Virginia. Filson (2017:16) noted in 1784, "South of Green River, in the lands reserved for the continental and state troops of Virginia, an exceedingly valuable lead mine has lately been discovered". Imlay (2013:21, 53) noted in 1793, "A lead mine has been worked many years with considerable profit, which lies in the county of Montgomery, upon the waters of Great Kanhaway. There is another between the Cumberland and Tenasee rivers which is said to be very valuable, and its ore is more pure than any other which has been discovered in America", and, "The country between Green and Cumberland rivers is in general rich, and finely watered. There is in it a most valuable lead mine…"

Illinois, Iowa, Missouri and Wisconsin

Lead mines were established by the French and Indians in the upper Mississippi River watershed as early as the 1680s. By the early nineteenth century lead mines were established at many locations in Illinois, Iowa and Wisconsin (Chandler 1829). The Fever River was one area where quantities of lead were mined as early as 1690.

Lead was mined in French Louisiana, now known as the Old Lead Belt of southeast Missouri, as early as 1721, when French explorer Phillipe Francois Renault began mining near present-day Potosi, Missouri. Early mining operations also were established at Mine La Motte, near present-day Frederickstown, Missouri. Lead ore was taken from the mines down the Mississippi River to Ste. Genevieve and eventually to France. Seeger notes that the French mining activity in the Old Lead Belt had tapered off by the 1750s (Seeger 2008:5, 10). No records have been found to indicate that the Old Lead Belt deposits in Missouri contributed significantly to the ammunition used in the American Revolution, although little or no primary research has been done on the topic.

The lead mining operations at Mine La Motte ceased in 1769, when it was destroyed by Chickasaw Indians. Mining there did not resume until 1780 or 1782 (Ingalls 1907:981). Imlay (2013:121) noted in 1792, "the lead mine on the Mississippi must prove inexhaustible. It extends from the mouth of Rock river more than 100 miles upwards. Besides these there are several others, some of which lie on the Spanish side of the Mississippi, and have been used for years past."

With the signing of the Louisiana Purchase in 1803, the U.S. government took a heightened interest in the lead mines of the Mississippi River region. Moses Austin provided a description of the lead mines in Upper Louisiana that was read before Congress in 1804. It included descriptions of ten mining areas (Austin 1804).

By 1810 the lead deposits in the Fever River region were used by local U.S. Army troops (Thwaites 1895:271-292). By the 1830s, lead production in the Fever River region had outstripped that of Missouri. Production estimates for the period from 1823-1829 list more than 31 million pounds of lead produced from the Fever River mines, versus slightly more than 5 million pounds from the Missouri mines (Hinton et al. 1852, Volume 2:172). By 1844 an estimated 30 million pounds of lead were produced annually in this region (Murray 1844:209-210). It is not presently known if lead from this region made it to market in the Eastern Seaboard prior to 1810 or in the following few decades.

By the late nineteenth century Missouri was a global leader in lead production. It remains a major producer of lead in the twenty-first century (Missouri Department of Natural Resources 2017).

Lead Ball Production

Lead (Pb) is a chemical element with the atomic number 82. It has several properties that make useful to mankind. It is a dense, heavy metal that is soft and malleable (Mohs hardness of 1.5) and it melts at a relatively low temperature (621.43 degrees F) (Thornton et al. 2001).

The production of lead begins with the mining and smelting process. Lead rarely occurs as pure lead ore so it must be extracted through smelting. Smelting involves heating the ore in a furnace to separate the lead from other minerals. The molten lead solidified into blocks, called "pigs". Lead occurs in many forms in the earth's crust. Galena, or lead sulphide (PbS), is the principal lead-bearing ore but lead carbonates, lead oxides and various other lead sulphates also were exploited for their lead content. Arsenic, antimony, bismuth, gold, silver and tin are common impurities in lead minerals.

Lead has been mined for many thousands of years. Early archaeological evidence for lead use is found in China, Egypt, Tunisia and throughout the Roman Empire. Techniques from the Middle Ages are documented by Agricola (1556) and his treatise served as a guidebook for miners and smelters for several centuries after it was published (Figure 1). Lead mining in Great Britain dates to Roman times but it flourished in the eighteenth and nineteenth centuries (Figure 2).

Figure 1. Woodcut Showing Smelting of Ores (Agricola 1556).

Figure 2. Bower Yard Smelter, Ironbridge, Shropshire, England (Chesham 1788).

With the invention of firearms in the Middle Ages lead soon became the preferred ammunition. Its softness was less damaging to iron gun barrels, its high density allowed for better velocities and its low melting point facilitated bullet production using wood fires.

Lead round ball munitions were produced by three different methods. The most familiar method is casting. Balls were cast individually or in gang molds. Many lead balls were cast at a munitions laboratory, while others were cast in the field by the troops. Bullet molds were made from stone or metal.

Rupert shot were produced by pouring molten lead through graduated screens from a high shot tower. The size of the ball was determined by the gauge of the screen. The balls cooled as they fell through the air before landing in a pool of water at the base. The resulting impact left a tell-tale dimple on many of these Rupert shot. Rupert shot were first produced in the 1600s and their invention is attributed to Prince Rupert. This shot tower technology was improved following the erection of the Bristol tower in England and the 1782 patent issued to its builder William Watts (Pssatrap.org 2017). One of the earliest documented shot towers in America was the Sparks Shot Tower, which was built in 1808 in Philadelphia, Pennsylvania (Spivak 2007). J. Macklot erected a shot tower in St. Louis, Missouri and was producing shot by 1809 (Thwaites 1895:284-285).

A third and uncommon method is lead balls produced by hammering. Small chunks of lead were beaten with harder objects until they were roughly spherical.

Bullet molds for field use took a variety of forms and were made from several types of material. Figures 3-5 show three types of early round ball molds. Figure 3 is made from soapstone and it produced a series of balls all the same caliber. Figure 4 is a brass bullet gang mold that produced balls of four sizes, approximately .68, .58, .55 and .47 caliber. Figure 5 is an early brass gang mold that produced 10 balls, all approximately the same diameter (24.5 mm) (Trömner 2017). Other bullet molds were made of iron. Many molds produced a single ball, while others produced ten or more.

Figure 3. Soapstone Bullet Mold (Omanisilver.com 2017).

Figure 4. Brass Gang Bullet Mold (Gunsinternational.com 2017).

Figure 5. Brass Gang Bullet Mold, Circa A.D. 1500 (Trömner 2017).

III. Chemical Characterization and Sourcing of Lead

X-Ray Fluorescence (XRF) and Portable X-Ray Fluorescence (pXRF) are modern techniques for examining the chemical composition of material objects (Beckhoff et al. 2007; Shackley 2011). This technology has attracted archaeologists, who seek its useful application for various materials. Previous studies that involved the use of XRF, pXRF and other scientific methods in characterizing lead isotopes in archaeological specimens (Farquhar et al. 1995; Lockman 2006; Wilson et al. 2006; Huntley et al. 2007; Craig et al. 2007; Hall et al. 2011).

The application of XRF and pXRF technology in characterizing weapons-related lead (bullets, lead balls, etc., production sprue, etc.) is in the early stage of research. Seibert and his colleagues at the Southeast Archaeological Center conducted pXRF analysis on ammunition recovered by NPS in their archaeological study of the Palo Alto, battlefield in Texas (Seibert et al. 2015). The battle took place on May 8, 1846 and was a United States victory. Battlefield evidence consisted of artillery and small arms ammunition. In that study Seibert was able to differentiate between some of the Mexican and United States small arms round balls based on the presence/absence of copper. The Mexican ammunition contained copper, while the United States examples did not.

Data Collection Methods

One of the goals of the Elemental workshop was to develop a standardized research method for collecting data on round ball ammunition. Ten different methods for collecting data have been used from 2014-2017. These are described below.

Method 1

Method 1 was used by Seibert on data collected from the Cowpens battlefield in 2012. Data were collected for each specimen with a Bruker Tracer for 500 seconds, green filter (Ti/Al), 40 kV (kilovolts) voltage, and 14 µA (microamps) of current.

Method 2

Method 2 was used by Elliott, Seibert and Watters in 2015 prior to December. Data were collected for each specimen with a Bruker Tracer for 180 seconds, green filter, 45 kV voltage, and 20 µA of current. This method was used for collections from Brier Creek (2015), Carrs Fort, Estatoe, Fahm Street, Fort Hawkins, Guilford Courthouse, Kings Mountain, Madison Square, Minuteman Park, Moores Creek, Mount Pleasant, Ninety-Six, Okfuskenena, Purysburg and Spring Hill Redoubt.

Method 3

Method 3 was used by Elliott in December 2015. Data were collected for each specimen with a Bruker Tracer for 180 seconds, black filter (Ti/Al), 48 kV voltage, and 29 µA of current. This method was used for collections from Mount Pleasant.

Method 4

Method 4 was used by Elliott beginning in December 2015. Data were collected for each specimen with a Bruker Tracer for 180 seconds, black filter (Ti/Al), 45 kV voltage, and 20 µA of current. This method was used for collections from the Battle of Beaufort (2016), Kettle Creek and a small portion of the Cowpens sample.

Method 5

Method 5 was used in the 2017 workshop for the 22OK1172 sample. Data were collected for each specimen with a Bruker device for 180 seconds, black filter, 45 kV and 30 µA of current.

Method 6

Method 6 was used for some samples in the 2017 workshop. Data were collected for each specimen with a Bruker Tracer for 60 seconds, black filter, 45 kV voltage, and 30 µA microamps of current. This method was used for collections from Fort Daniel, Fort Necessity, Charlesfort/Santa Elena, Savannah River Carved ball, Stark Farm, most of the New York Historical Society samples and a portion of the Battle of Beaufort samples.

Method 7

Method 7 was used in the 2017 workshop for the Brier Creek Battlefield samples provided by Brockington & Associates, and portions of the Battle of Beaufort sample. Data were collected for each specimen with a Bruker Tracer for 60 seconds, black filter 48 kV voltage and 15 µA of current.

Method 8

Method 8 was used in the 2017 workshop for the En Bas Saline site, Fort Frederica, Spanish Florida sites, Galphin, Hanging Rock, New Jersey sites, Tar Bluff and portions of the Camden and Fort King samples. Data were collected for each specimen with a Bruker Tracer for 60 seconds, black filter, 48 kV voltage and 29 µA of current.

Method 9

Method 9 was used in the 2017 workshop for Fort Motte, Fort Watson, British Arsenal Nepal, Shubrick plantation and a portion of the Camden samples. Data were collected for each specimen with a Bruker Tracer for 180 seconds, black filter, 48 kV and 30 µA of current.

Method 10

Method 10 was used in the 2017 workshop for the Fort Moore sample. Data were collected for each specimen with a Bruker device for 50 seconds, black filter, 50 kV and 25 µA of current.

Potentially Important Elements for Study

The Bruker Tracer series is unable to identify elements with Atomic Numbers of 12 (Magnesium, Mg) or lower. Seven elements have been identified thus far, which may have relevance for cultural meaning in early round ball ammunition. These include Antimony (Sb), Cadmium (Cd), Copper (Cu), Hafnium (Hf), Nickel (Ni), Silver (Ag), Tin (Sn), and Zinc (Zn). Lead (Pb) is ever present in round balls and it masks the presence of other elements. Bruce Kaiser developed a special filter for the Bruker Tracer, which reduces the effect of lead in the observed spectra. Rhodium (Rh) and Palladium (Pd) are present in the Bruker Tracer hardware, so their presence in the spectral readings should be largely ignored.

IV. Study Samples

This study examined a wide range of metallic round balls from numerous archaeological sites. While this collection is dominated by archaeological examples recovered from sites in southeastern North America, it also includes examples from Haiti, Nepal and several sites in northeastern North America. Appendix 1 contains tabular data on 953 samples included in the elemental analysis. These data include 245 samples collected during the 2017 workshop, as well as 708 previously collected samples. These data were generated as a report in Bruker's software program Artax. These are placed into 51 groups, as summarized in Table 1.

En Bas Saline, Haiti

En Bas Saline was a Taino town located on the northeastern coast of Haiti. A lead ball was excavated from the burned remains of a large structure, which was destroyed in the late 1400s. This settlement is considered to have been visited by Christopher Columbus. Thus, the En Bas Saline example likely represents the earliest lead ball in this elemental analysis project (Figure 6). It was intended for use in an arquebus. It also likely represents an example cast from European lead sources, since American lead deposits were not being exploited yet. Cobb provided the round ball for analysis in the 2017 workshop. This sample is included as Group 10 in Appendix 1. Figure 7 shows a close-up of the spectra of the En Bas Saline example. It reveals the presence of Tin (Sn) but no Antimony (Sb).

Figure 6. Lead Ball Excavated from En Bas Saline, Haiti (Photograph courtesy of Florida Museum of Natural History 2017).

Table 1. Summary of Samples Examined.

Group	Location	State	Type	Age	Samples	Method	Previous	Total
1	Beaufort/Grays Hill	SC	Battle	1779		4	27	27
2	Beaufort/Grays Hill	SC	Battle	1779	12	6		12
2	Beaufort/Grays Hill	SC	Battle	1779	23	7		23
3	Brier Creek, 9SN254	GA	Battle	1779		2	90	90
4	Brier Creek, 9SN254	GA	Battle	1779	24	7		24
5	Royal Arsenal, Nepal	Nepal	Arsenal	Unk.	1	9		1
6	Okfuskenena, 9TP9	GA	Town/Battle	1793		2	10	10
7	Camden	SC	Town/Battle	1780	3	9		3
7	Camden	SC	Town/Battle	1780	8	8		8
8	Carrs Fort, 9WS396	GA	Fort/Battle	1778-1779		2	19	19
9	Charlesfort/Santa Elena, 38BU162	SC	Fort/Town	1500s	12	6		12
10	EBS TT8-SEC9 (En Bas Saline)	Haiti	Fort	1492	1	8		1
11	Cowpens	SC	Battle	1781		1	30	30
11	Cowpens	SC	Battle	1781		4	6	6
12	Estatoe, 9ST3	GA	Town	1700s		2	6	6
13	Fahm St., Savannah	GA	Battle	1779		2	2	2
14	Fort Daniel, 9GW623	GA	Fort	1813-1814	4	6		4
15	Fort Frederica, 9GN177	GA	Town	1736-1760	13	8		13
16	Fort King, 8MR60	FL	Fort	1827	33	8		33
17	Fort Moore, 38AK4	SC	Fort	1715	9	10		9
18	Fort Motte	SC	Fort/Battle	1780-1781	11	9		11
19	Fort Necessity	PA	Fort/Battle	1754	16	6		16
20	Fort Watson, 38CR1	SC	Fort/Battle	1781	2	9		2
21	Fort Hawkins, 9BI28	GA	Fort	1806-1821		2	43	43
22	Galphin's Trading Post, 38AK7	SC	Fort/Battle	1781	17	8		17
23	Guilford Courthouse	NC	Battle	1781		2	50	50
24	Hanging Rock	SC	Battle	1780	6	8		6
25	Kettle Creek, 9WS370	GA	Battle	1779		4	62	62
26	Kings Mountain	SC	Battle	1780		2	66	66
27	Madison Square, Savannah	GA	Battle	1779		2	14	14
28	Minuteman	MA	Battle	1775		2	30	30
29	Moores Creek	NC	Battle	1776		2	29	29
30	Mount Pleasant, 9EF169	GA	Town/Fort	1720-1763		2	27	27
31	Mount Pleasant, 9EF169	GA	Town/Fort	1720-1763		3	13	13
32	Ninety-Six	SC	Fort/Battle	1781		2	29	29
33	Purysburg	SC	Town/Battle	1732-1779		2	128	128
34	SR-Carved Ball (Savannah River)	SC	Isolated find	unk.	1	6		1
35	Shubrick's Plantation	SC	Battle	1781	4	9		4
36	Craig Road Site	NJ	Battle	1778	1	8		1
36	Petticoat Bridge	NJ	Battle	1776	1	8		1
36	Belle Terre Farm	NJ	Battle	1778	5	8		5
37	Spring Hill Redoubt, 9CH703	GA	Fort/Battle	1779		2	10	10
38	Stark Farm, 22OK778	MS	Battle	1500s-170	2	6		2
39	Tar Bluff	SC	Battle	1779	6	8		6
40	De Hita-Gonzales Site, 8SA7	FL	Town	1600s	3	8		3
41	Ximenez Fatio Site, 9SA34	FL	Town	1600s	2	8		2
42	Palm Row Site, 8SA36	FL	Town	1600s	1	8		1
43	Ximenez Fatio Site, 9SA34	FL	Town	1600s	1	8		1
44	22OK1172	MS	Town	1500s	1	5		1
45	Fountain of Youth, 8SJ31	FL	Fort	1565	1	8		1
46	King George Statue	NY	Statue	1776		6	17	17
47	Blackshear Prison, 9PR26	GA	Prison	1864	6			6
48	Camp Lawton Prison, 9JS1	GA	Prison	1864	3			3
49	Fort James Jackson, 9CH689	GA	Fort	1808-1905	2			2
50	Experimental artillery	N/A	Experiment	Modern	7			7
51	Brier Creek Modern	N/A	N/A	Modern	2			2
51	Replica Minie Ball	N/A	N/A	Modern	1			1
	TOTAL				**245**		**708**	**953**

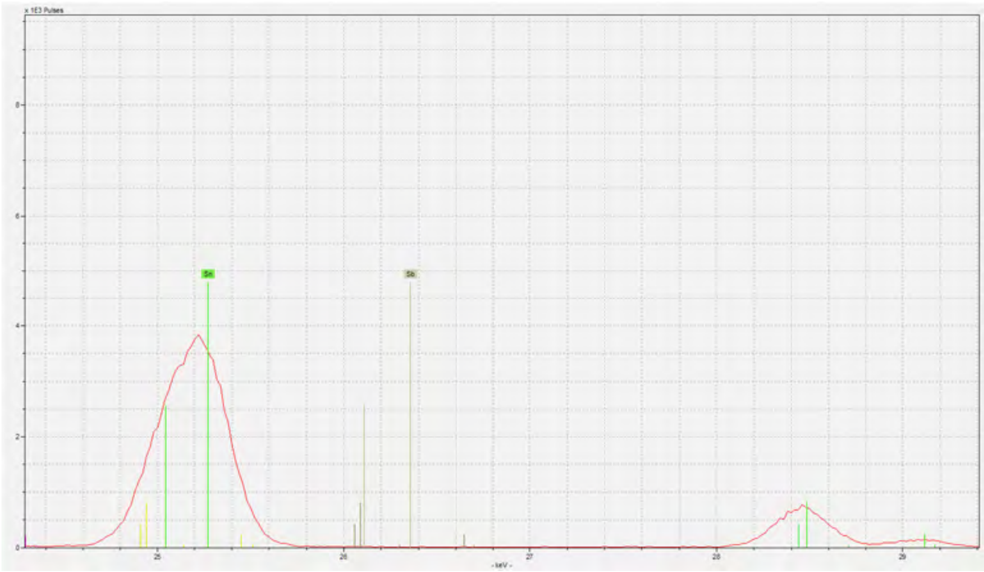


Figure 7. Spectra of Tin (Sn) and Antimony (Sb) En Bas Saline Sample.

Fountain of Youth Site

The Fountain of Youth Site (8SJ31) is an early Spanish contact period site in St. Augustine, Florida. Cobb provided a single sample from the fountain of Youth Site for the 2017 workshop. This specimen is from the Menendez-era context, which dates from 1560-1570 (Deagan 2009:261, Table 6.7). It was intended for use in an arquebus and probably was made from imported European lead. This sample is included as Group 45 in Appendix 1. Figure 8 shows a portion of the spectra for this sample, highlighting Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb)values. It reveals very slight traces of Cadmium (Cd)and Tin (Sn), virtually no Silver (Ag), and slightly elevated Tin (Sn) values.

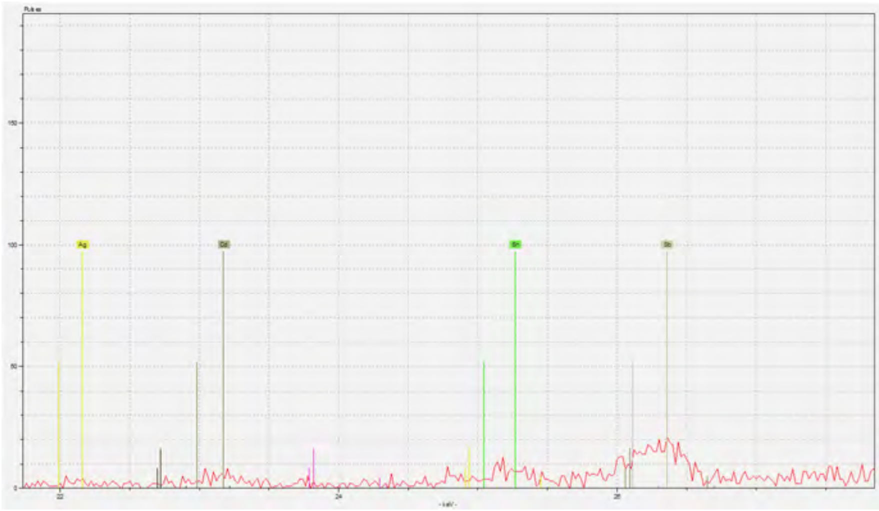


Figure 8. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fountain of Youth Site Sample.

De Hita-Gonzales Site

The De Hita-Gonzales Site (8SA7) is a Spanish colonial domestic site located in St. Augustine, Florida. Cobb provided three round ball specimens from this site for the 2017 workshop. These examples are from Spanish or Creole contexts (Shepherd 1938). This sample is included as Group 40 in Appendix 1. Figure 9 shows a close of their spectra, which reveals a very slight presence of Tin (Sn) and Antimony (Sb) and no Silver (Ag) or Cadmium (Cd).

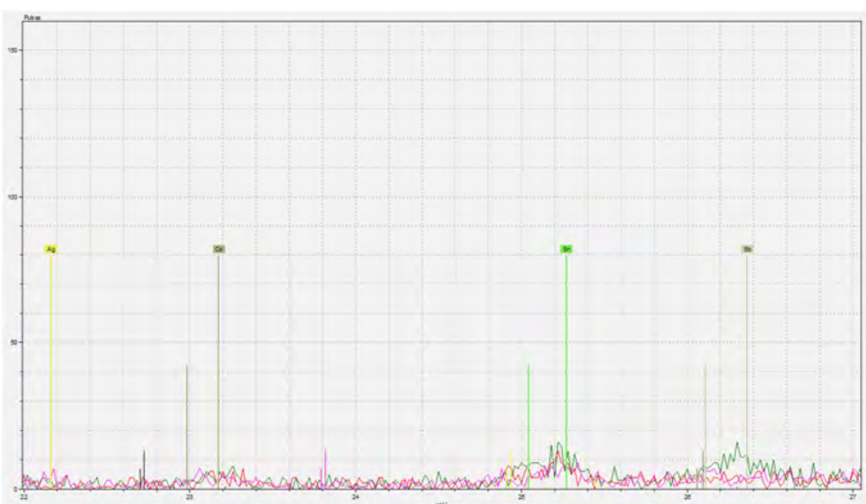


Figure 9. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) De Hita-Gonzales Site Sample.

Ximenez Fatio Site

The Ximenez Fatio Site (9SA34) is a Spanish colonial domestic site located in St. Augustine, Florida. Cobb provided three round ball samples from this site for analysis in the 2017 workshop. This sample is included as Group 41 in Appendix 1. Figure 10 shows a close of their spectra, which reveals a very slight presence of Tin (Sn) and Antimony (Sb) and virtually no Silver (Ag) or Cadmium (Cd).

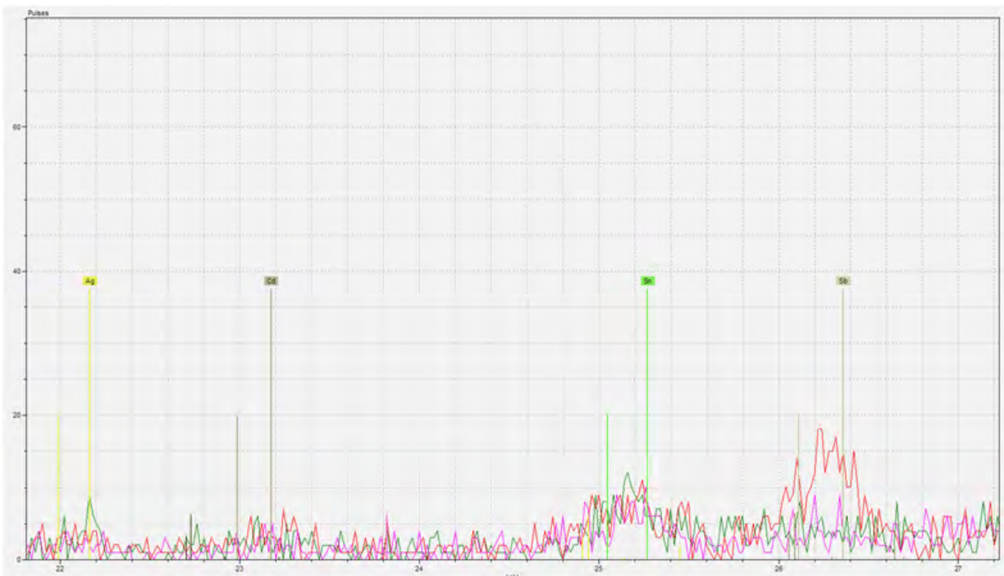


Figure 10. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Ximenez Fatio Site Sample.

Palm Row Site

The Palm Row Site (9SA36) is a Spanish colonial domestic site located in St. Augustine, Florida. Cobb provided one round ball sample from this site for analysis in the 2017 workshop. This sample is included as Group 42 in Appendix

1. Figure 11 shows a close of their spectra, which reveals the presence of Tin (Sn), very slight Antimony (Sb) values and no Silver (Ag) or Cadmium (Cd).

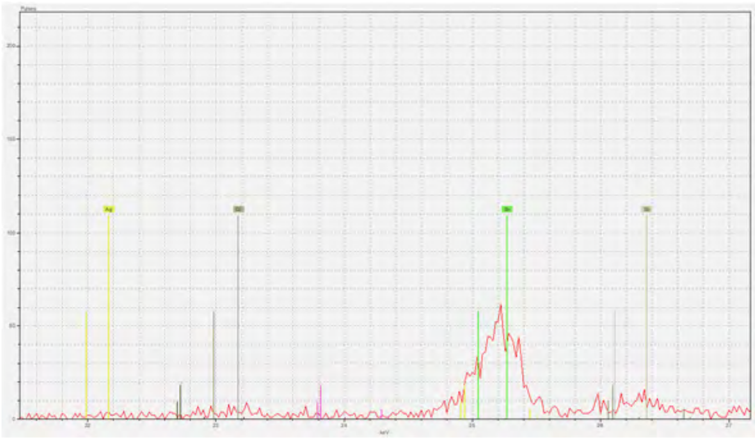


Figure 11. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Palm Row Site Sample.

Spanish Florida Sites Combined

Figures 12 and 13 show close ups of the combined spectra from all of the Spanish Florida St. Augustine area examples. Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) are present in low frequencies. Tin (Sn) and Antimony (Sb) are present in low frequencies. Silver (Ag) and Cadmium (Cd) are barely perceptible in this assemblage.

Figure 12. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Combined Spanish Florida Samples.

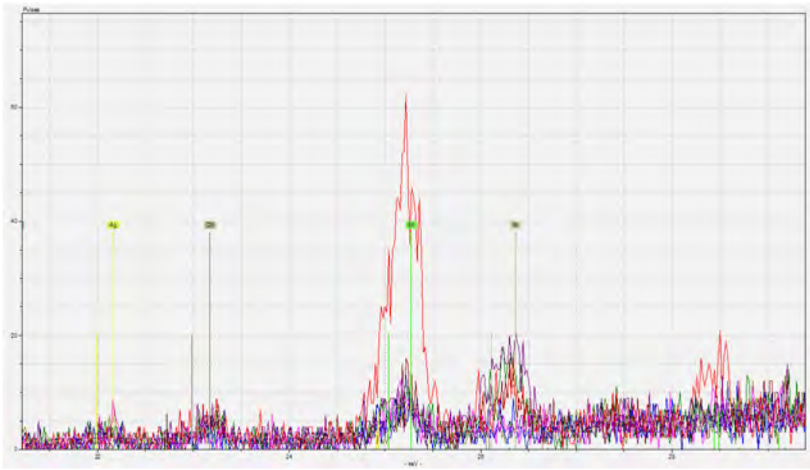


Figure 13. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Combined Spanish Florida Samples.

Charlesfort/Santa Elena

The French Charlesfort and subsequent Spanish settlement of Santa Elena are located in present-day Beaufort County, South Carolina. Both occupations date to the mid-Sixteenth Century. Archaeologists with SCIAA have explored this site. Smith and Legg provided 12 round ball examples from the site for analysis in the 2017 workshop. This sample is included as Group 9 in Appendix 1.

Figures 14 and 15 show portions of the spectra for the Charlesfort/Santa Elena sample. Nickel (Ni), Cadmium (Cd) and Antimony (Sb) are absent in the assemblage. Copper (Cu) and Zinc (Zn) values reveal traces of these two elements in all of the samples. Tin (Sn) is present in two samples and elevated Silver (Ag) values are evidenced in one sample.

Cluster analysis was performed on Antimony (Sb), Tin (Sn) and Silver (Ag) ratios for the Charlesfort/Santa Elena sample. Five clusters were identified (Table 2 and Figures 16 and 17). The dominant cluster (Segment 1) contained five of the 12 specimens (41.7% of the assemblage). Clusters 3 and 5 each contained single specimens. Cluster 5 has significantly elevated Tin (Sn) values compared to the rest of the assemblage. Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 1.57, Tin (Sn)/Rhodium (Rh), 3.21 and Silver (Ag)/Rhodium (Rh), 1.05.

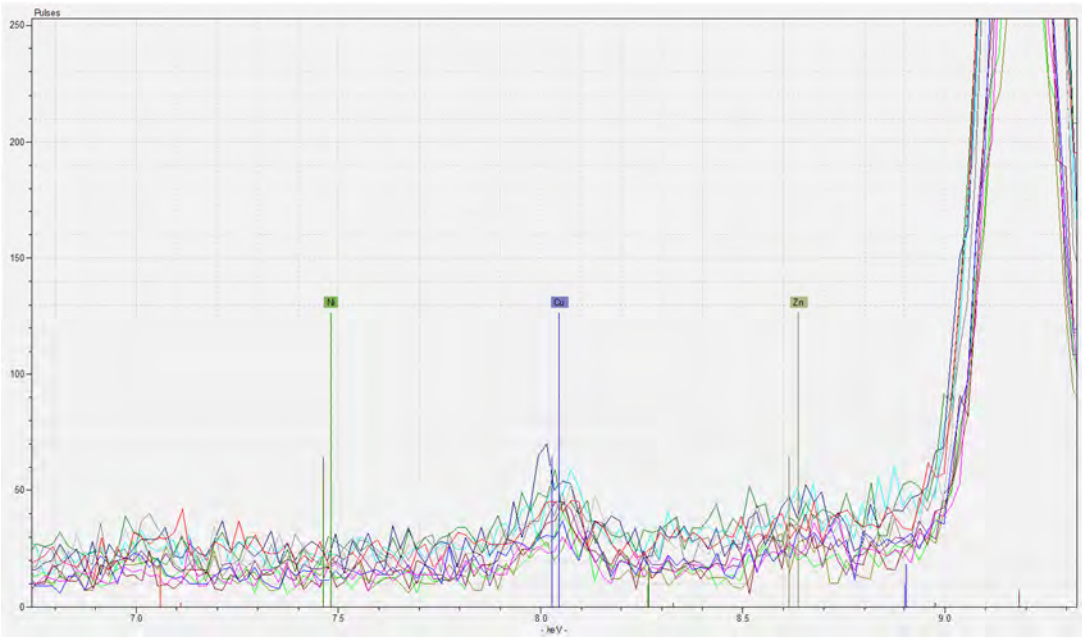


Figure 14. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Charlesfort/Santa Elena Sample.

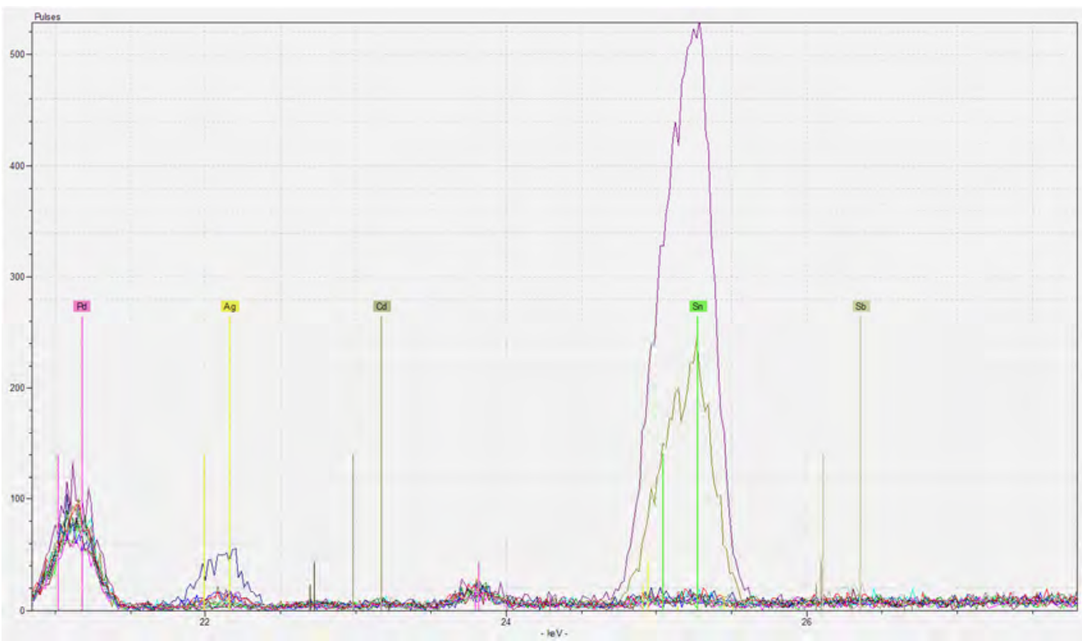


Figure 15. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Charlesfort/Santa Elena Sample.

Table 2. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Charlesfort/Santa Elena Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	1.57	3.21	1.05		
Segment 2	1.66	4.46	17.44		
Segment 3	8.64	4.86	3.18		
Segment 4	1.19	62.45	3.40		
Segment 5	0.80	528.60	10.30		
AVERAGE	2.01	62.15	5.32		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	5	41.7%	6.9		
Segment 2	2	16.7%	32.6	**SSE Total**	**3.7**
Segment 3	1	8.3%	0.0		
Segment 4	3	25.0%	21053.0		
Segment 5	1	8.3%	0.0		
TOTAL	12	100.0%			

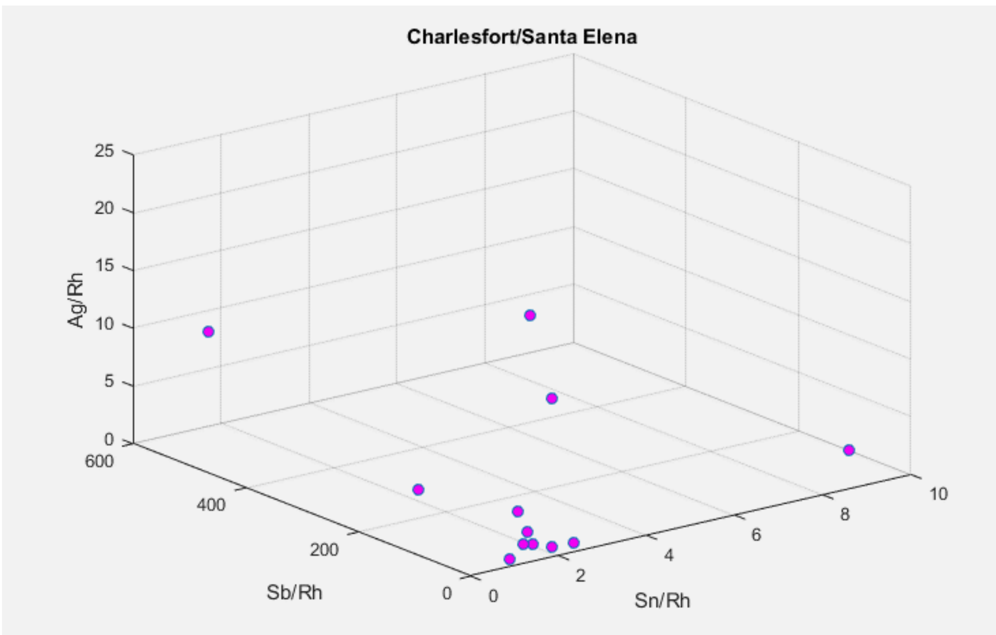


Figure 16. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in Charlesfort/Santa Elena Samples.

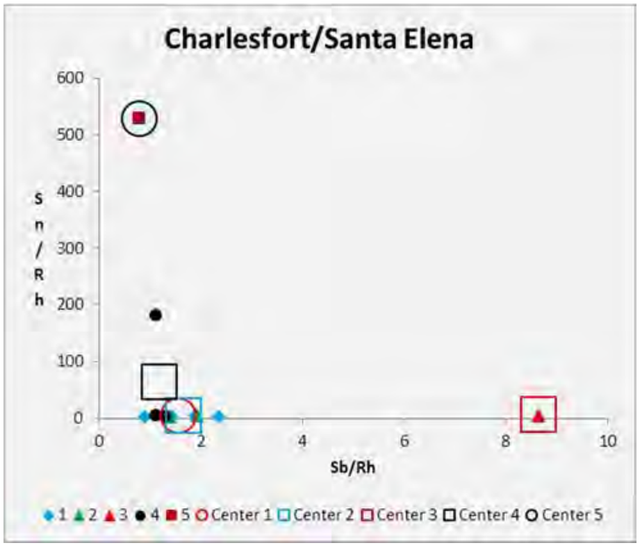


Figure 17. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Charlesfort/Santa Elena Sample.

Stark Farm

Stark Farm (22OK778) is an early Contact Period site, possibly associated with Hernando de Soto's troops and their encounter with the Chickasaw, located in northeast Mississippi. Archaeologists from the University of Mississippi and SCIAA recently have studied the site (Boudreaux et al. 2016;Legg 2015, 2016). Smith and Legg provided one round ball from their metal detector survey of the Stark Farm site, as well as one round ball from a related site (22OK1172) in Mississippi. This sample is included as Group 38 in Appendix 1. Figures 18 and 19 show the spectra for the two Mississippi site for the elements Nickel (Ni), Copper (Cu), Zinc (Zn) and Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb). Both samples exhibit traces of Copper (Cu), but only the Stark Farm sample shows any trace of Tin (Sn) or Antimony (Sb).

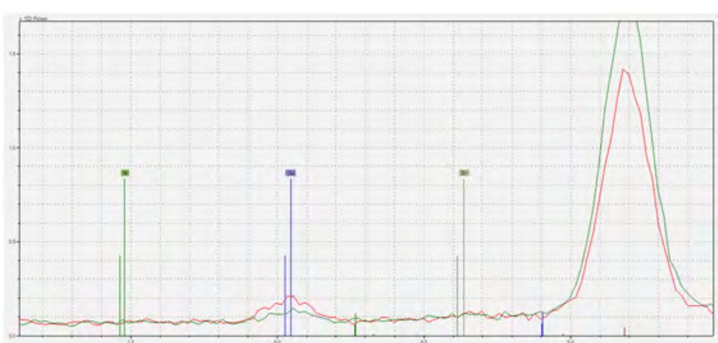


Figure 18. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) 22OK778 and 22OK1172 Samples.

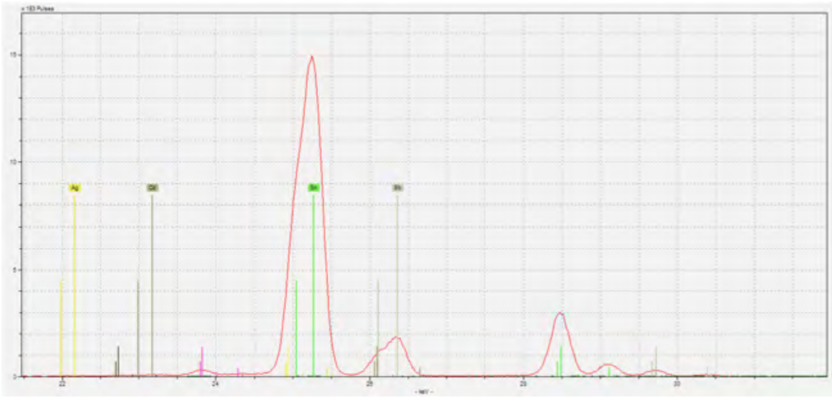


Figure 19. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) 22OK778 and 22OK1172 Samples.

Fort Moore

Fort Moore was a British fort located on a bluff above the Savannah River in present-day Aiken County, South Carolina. It was constructed in 1716 and was used by the British military until 1763 (Maness 1986). No military engagements were ever reported at Fort Moore. Fort Moore was recorded as archaeological Site 38AK4 by Richard Polhemus in 1971 and listed in the NRHP in 1973. Archaeologists with the University of South Carolina conducted limited study of the site in the early 1970s. Archaeologists with SCIAA returned to the site in 2001 and conducted more work (Groover 2003). Archaeologist Tammy Herron provided a sample of nine round balls for the 2017 workshop. This sample is included as Group 17 in Appendix 1. Figures 20 and 21 show portions of the spectra for the Fort Moore samples. Nickel (Ni) and Copper (Cu) are present in in low frequencies but Zinc (Zn) is not recognized. Cadmium (Cd), Tin (Sn) and Antimony (Sb) are present, but Silver (Ag) is barely evident.

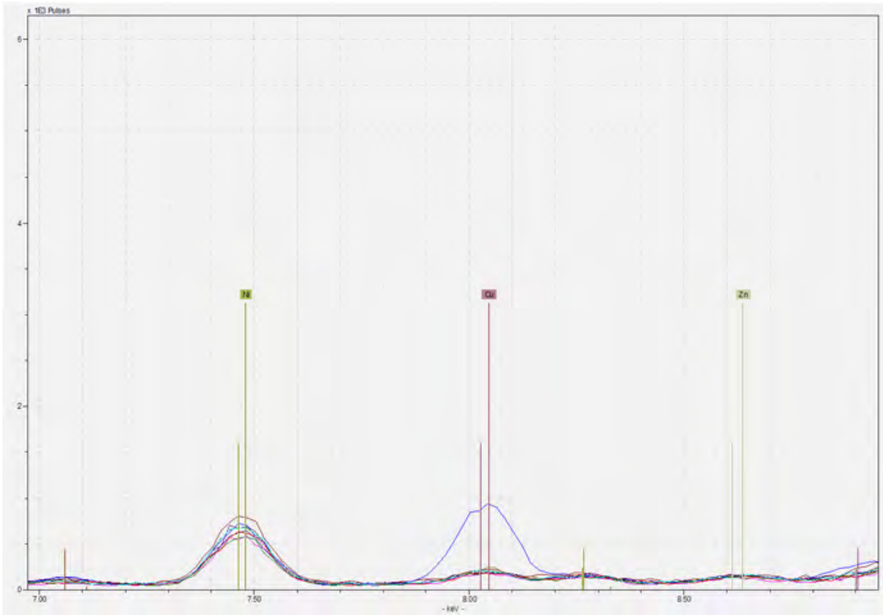


Figure 20. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Fort Moore Sample.

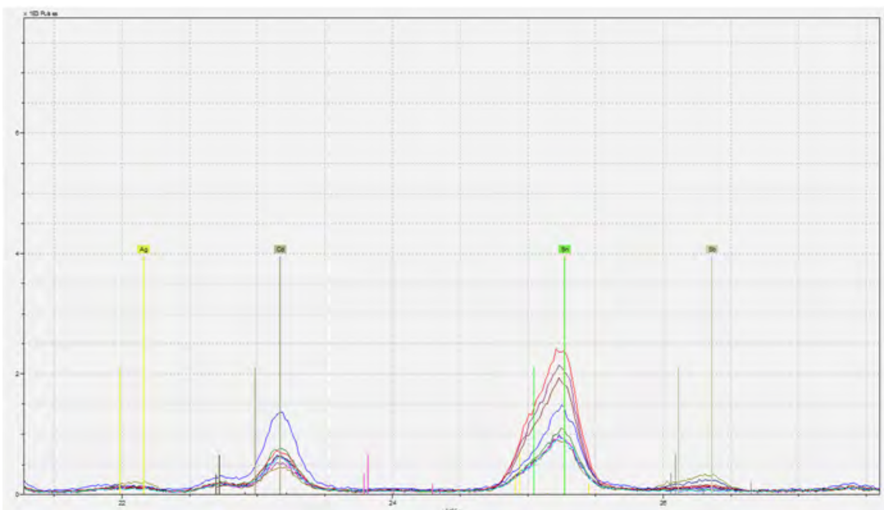


Figure 21. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Moore Sample.

Mount Pleasant

Immediately after the end of the Yamasee War (about 1720) a tribe of Yuchi Indians settled on a prominent bluff above the Savannah River in present-day Effingham County, Georgia. Their town attracted British deerskin traders, who established a post there. In 1739, these same deerskin traders were designated Georgia Rangers by General James Oglethorpe. The Yuchi warriors were designated a Yuchi Troop of Foot and these men served as allies to Georgia in their war with Spain. By 1751, the Yuchi had left the Savannah River region. The Georgia Ranger fort at Mount Pleasant remained until about 1760. No military engagements were ever reported at Mount Pleasant. Archaeologists located and defined the Mount Pleasant settlement (Site 9EF169) in the late 1980s (Elliott 1991). Archaeologists returned to Mount Pleasant in 2010 to conduct additional survey work, which included intensive metal detector survey on a portion of the site.

Elliott sampled 27 round balls and related gang mold sprue from the Mount Pleasant collection in 2015. This sample is included as Group 30 in Appendix 1. Elliott provided another 13 round balls from Mount Pleasant for analysis in the 2015 workshop. These samples were analyzed using the "Black filter". This sample is included as Group 31 in Appendix 1. Figures 22 and 23 show portions of the spectra for the Mount Pleasant (2015 green filter) samples. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Mount Pleasant (2015 green filter) samples. Five clusters were identified (Table 3 and Figures 24 and 25). The dominant cluster (Segment 3) contained 11 of 27 samples. Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.73, Tin (Sn)/Rhodium (Rh), 5.96 and Silver (Ag)/Rhodium (Rh), 0.18.

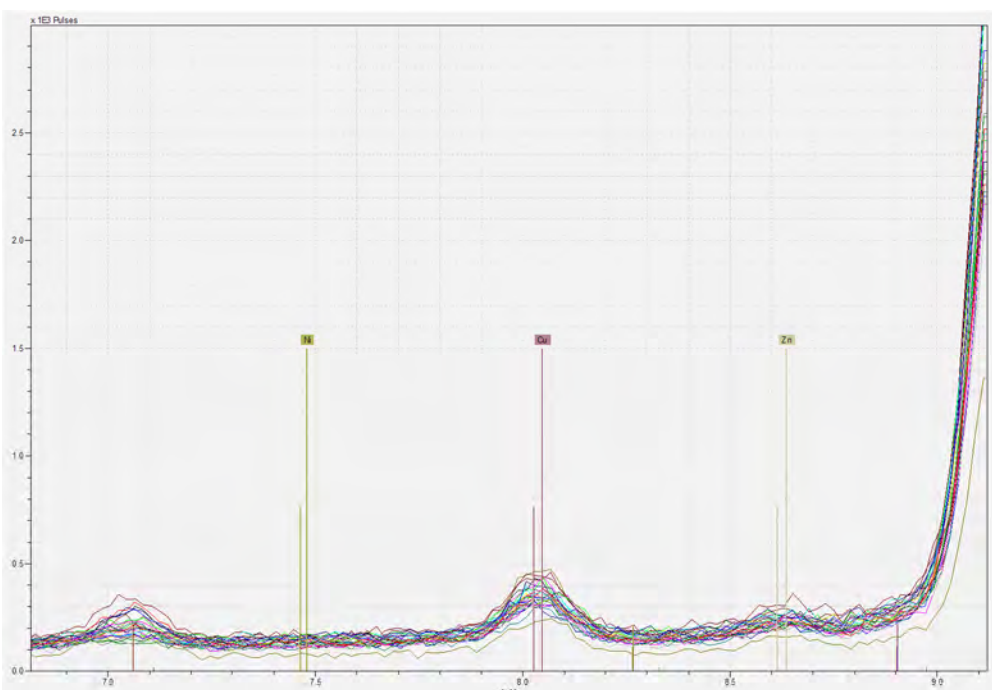


Figure 22. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Mount Pleasant 2015 (Green Filter) Sample.

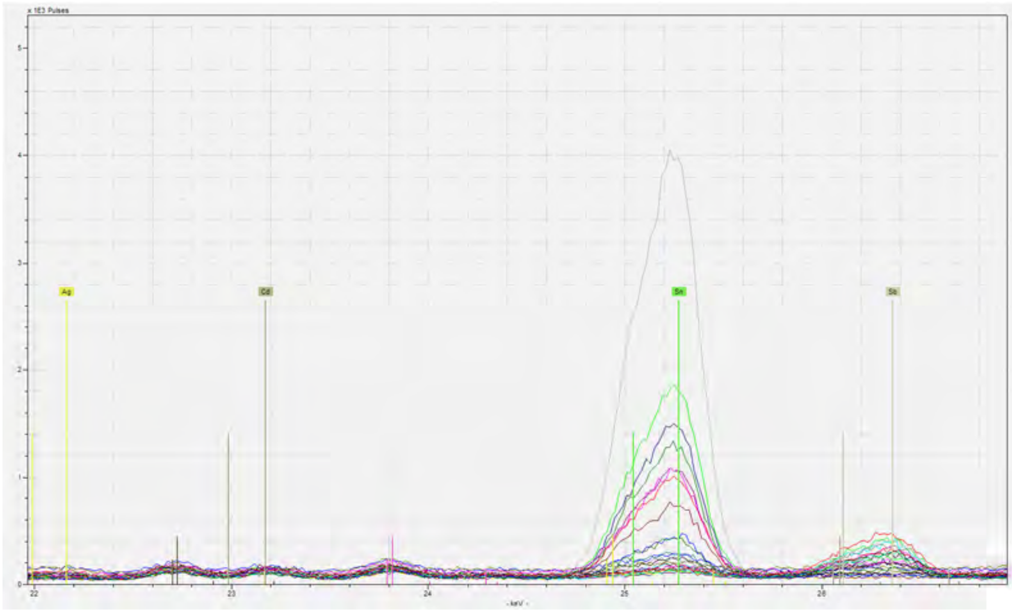


Figure 23. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Mount Pleasant 2015 (Green Filter) Sample.

Table 3. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Mount Pleasant 2015 (Green Filter) Sample.

Mean/Centroid	***Sb/Rh***	***Sn/Rh***	***Ag/Rh***	***0***	***0***
Segment 1	0.29	1.20	0.07		
Segment 2	3.35	38.42	0.30		
Segment 3	0.73	5.96	0.18		
Segment 4	0.24	0.61	0.49		
Segment 5	2.62	1.19	0.16		
AVERAGE	1.27	4.47	0.18		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	5	18.5%	8.9		
Segment 2	1	3.7%	0.0	**SSE Total**	**26.2**
Segment 3	11	40.7%	0.0		
Segment 4	2	7.4%	0.1		
Segment 5	8	29.6%	16.6		
TOTAL	27	100.0%			

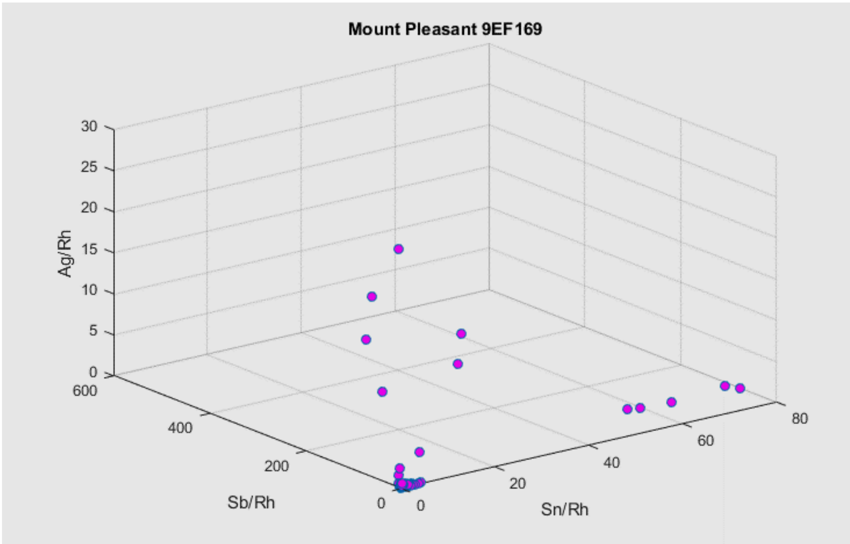


Figure 24. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in Mount Pleasant Composite 2015 (Green and Black Filter) Samples.

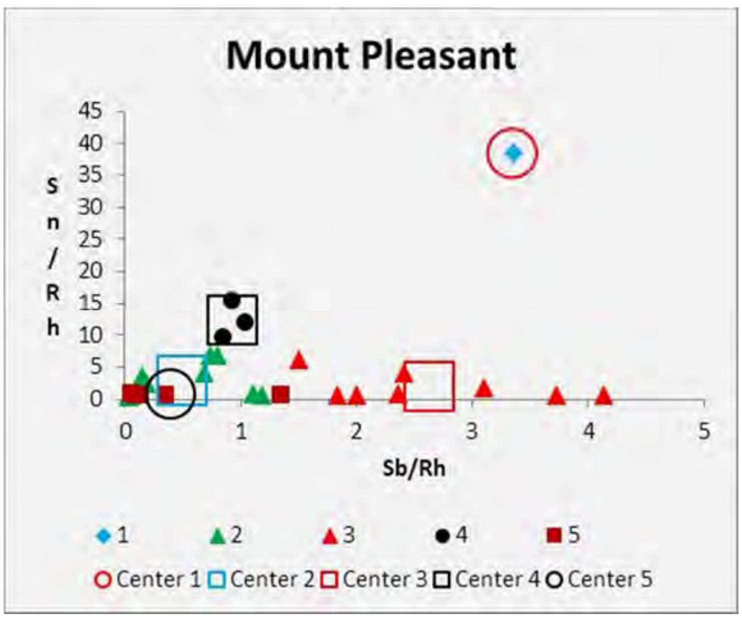


Figure 25. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Mount Pleasant 2015 (Green filter) Sample.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Mount Pleasant (2015 black filter) samples. Five clusters were identified (Table 4 and Figure 26). The dominant cluster (Segment 3) contained five of 13 samples. Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 61.66, Tin (Sn)/Rhodium (Rh), 20.41 and Silver (Ag)/Rhodium (Rh), 2.37.

Table 4. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Mount Pleasant 2015 (Black filter) Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	40.62	370.41	5.09		
Segment 2	2.97	11.98	2.80		
Segment 3	61.66	20.41	2.37		
Segment 4	7.50	79.25	26.38		
Segment 5	20.19	236.00	3.73		
AVERAGE	38.80	147.92	5.22		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	4	30.8%	37680.7		
Segment 2	2	15.4%	29.7	**SSE Total**	**3.8**
Segment 3	5	38.5%	0.0		
Segment 4	1	7.7%	0.0		
Segment 5	1	7.7%	0.0		
TOTAL	13	100.0%			

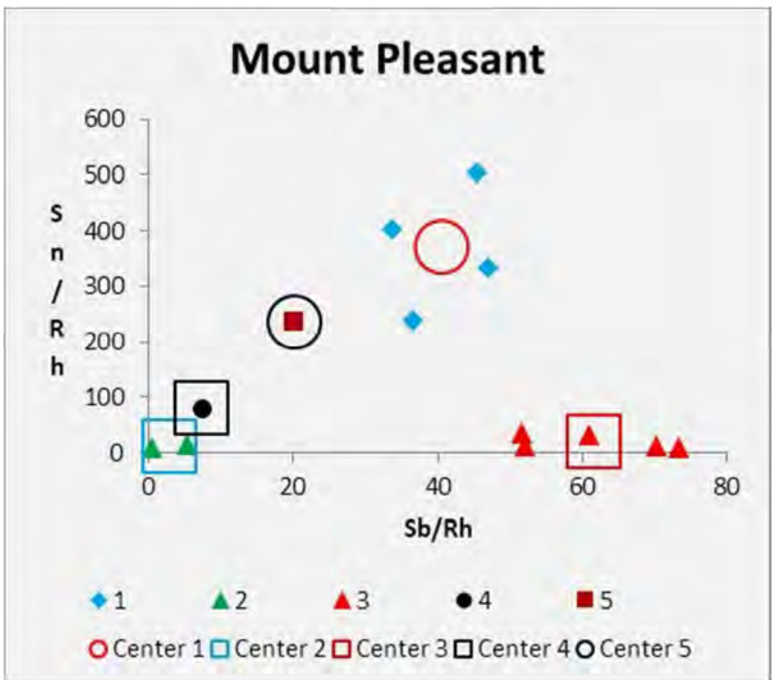


Figure 26. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Mount Pleasant 2015 (Black filter) Sample.

Fort Frederica

Fort Frederica was a fortified British town located on St. Simons Island, Georgia. Seibert provided 11 round balls and two other lead items for analysis in the 2017 workshop. This sample is included as Group 15 in Appendix 1.

Figures 27 and 28 show portions of the spectra for the Fort Frederica samples. Nickel (Ni), Hafnium (Hf), Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs. One specimen displayed markedly higher Copper (Cu) and Zinc (Zn) photon values than did the rest of the samples.

Cluster analysis was performed on Sb, Tin (Sn) and Silver (Ag) ratios for the Fort Frederica round ball sample. Five clusters were identified (Table 5 and Figures 29 and 30). The dominant cluster (Segment 4) contained six of the 11 round balls (54.5% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 2.18, Tin (Sn)/Rhodium (Rh), 4.77 and Silver (Ag)/Rhodium (Rh), 1.44.

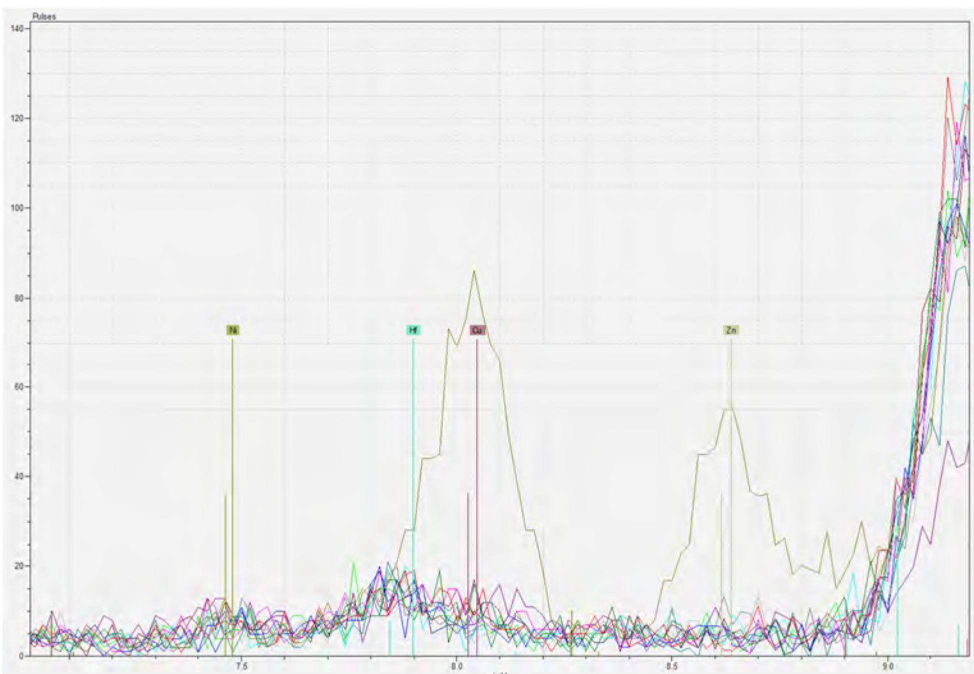


Figure 27. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Fort Frederica Sample.

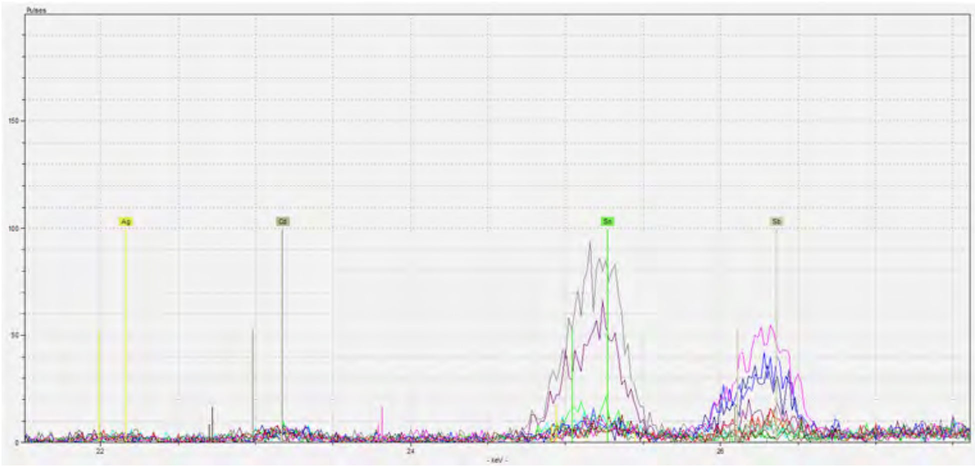


Figure 28. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Frederica Sample.

Table 5. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Frederica Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	28.67	5.14	2.76		
Segment 2	6.94	31.59	1.62		
Segment 3	36.98	5.47	1.53		
Segment 4	2.18	4.77	1.44		
Segment 5	2.00	69.40	1.24		
AVERAGE	11.33	13.24	1.57		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	1	9.1%	0.0		
Segment 2	1	9.1%	0.0	SSE Total	4.5
Segment 3	2	18.2%	0.0		
Segment 4	6	54.5%	32.0		
Segment 5	1	9.1%	0.0		
TOTAL	11	100.0%			

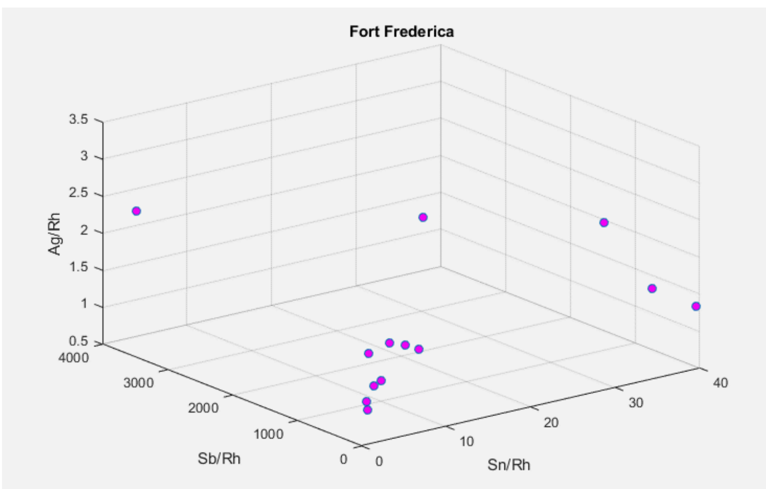


Figure 29. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort Frederica Sample.

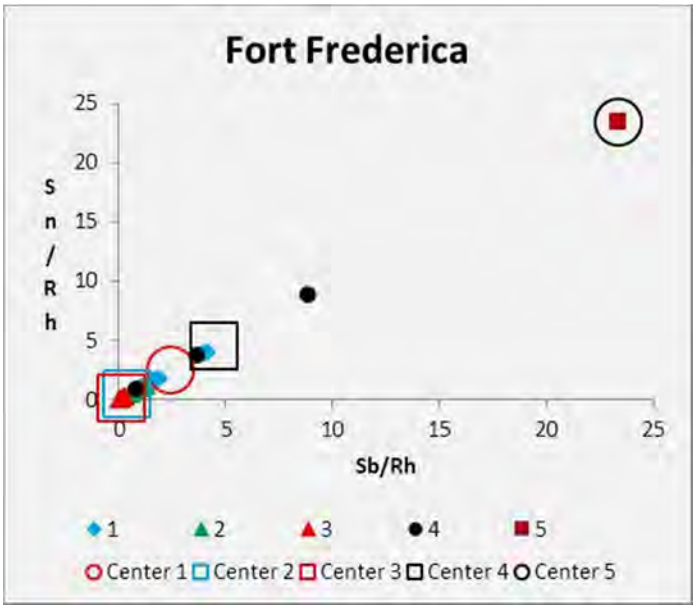


Figure 30. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Frederica Sample.

Galphin's Trading Post

George Galphin was a deerskin trader whose base of operation was a fortified trading post located at Silver Bluff, South Carolina. His trading post possibly dates from the 1730s and was used until the end of the American Revolution. It was known as Fort Dreadnaught in the American Revolution, when it was the scene of a military engagement. Archaeologists with SCIAA have conducted excavations at38AK7 since the 1970s. For the 2017 workshop archaeologist Tammy Herron provided a sample of 17 round ball ammunition excavated from Galphin's fortified site, which is recorded as Site 38AK7. This sample is included as Group 22 in Appendix 1. Figures 31 and 32 show portions of the spectra for the Galphins samples. Nickel (Ni), Hafnium (Hf), Copper (Cu), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Galphins sample. Five clusters were identified (Table 6 and Figures 33 and 34). The dominant cluster (Segment 2) contained eight of 17 specimens (47.1%). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 2.07, Tin (Sn)/Rhodium (Rh), 7.15 and Silver (Ag)/Rhodium (Rh), 1.86.

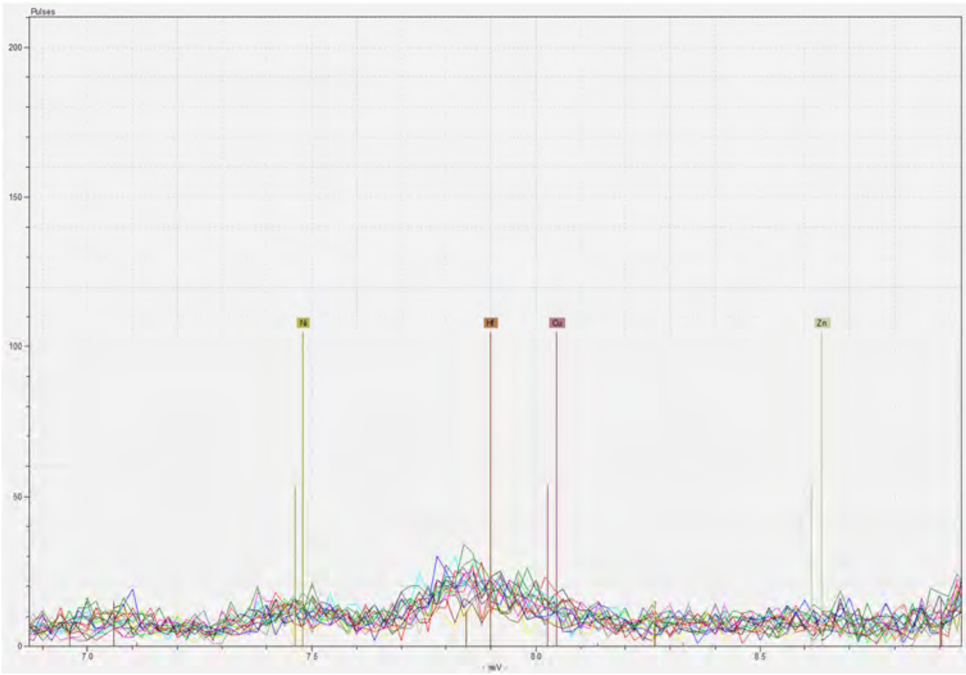


Figure 31. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Galphins Sample.

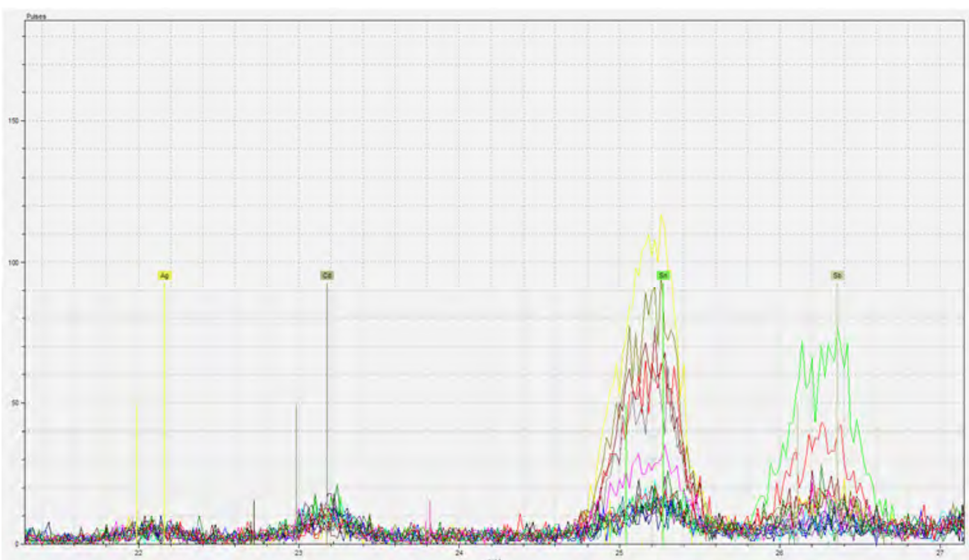


Figure 32. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Galphins Sample.

Table 6. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Galphins Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	18.30	6.84	1.70		
Segment 2	2.07	7.15	1.86		
Segment 3	33.33	4.37	1.09		
Segment 4	9.83	67.32	5.50		
Segment 5	7.04	41.43	2.76		
AVERAGE	7.24	24.13	2.50		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	1	5.9%	0.0		
Segment 2	8	47.1%	58.2	**SSE Total**	**10.6**
Segment 3	1	5.9%	0.0		
Segment 4	2	11.8%	107.1		
Segment 5	5	29.4%	2299.8		
TOTAL	17	100.0%			

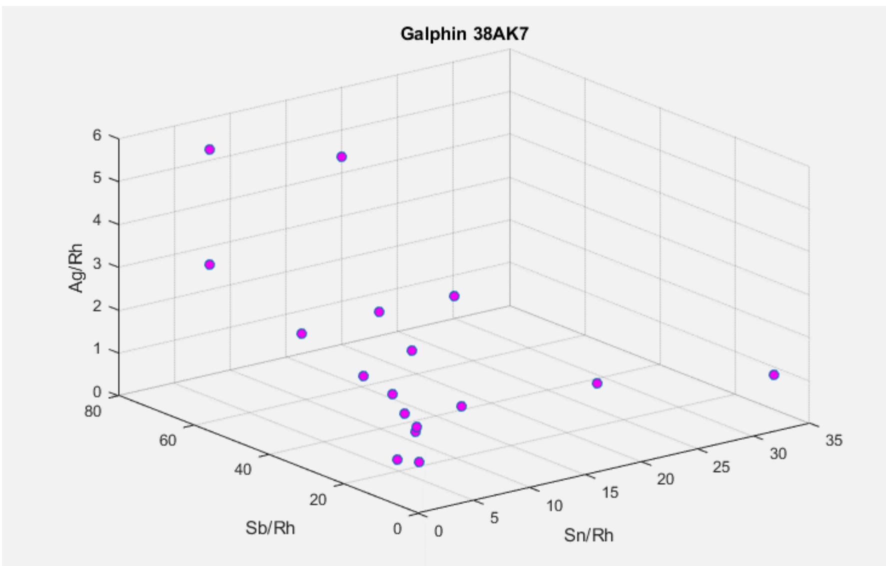


Figure 33. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Galphins Sample.

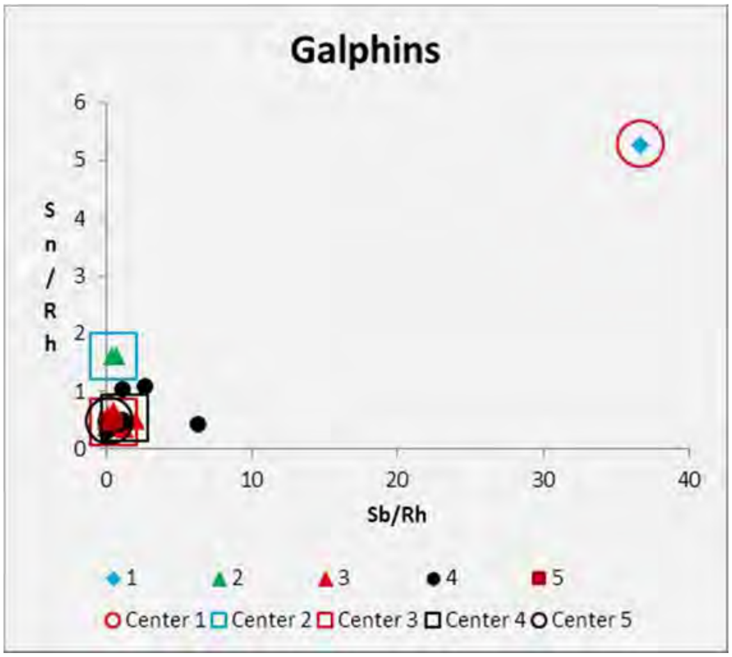


Figure 34. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Galphins Sample.

Battle of Fort Necessity

Fort Necessity was an American French and Indian War-period fort and battle site located in western Pennsylvania. It is currently maintained by the National Park Service as a historical park. Frankum provided a sample of 16 round ball ammunition from the Fort Necessity battleground for analysis in the 2017 workshop. This sample is included as Group 19 in Appendix 1. Figures 35 and 36 show portions of the spectra for the Fort Necessity samples. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Fort Necessity sample. Five clusters were identified (Table 7 and Figures 37 and 38). The dominant cluster (Segment 2) contained six of 16 specimens. Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 2.62, Tin (Sn)/Rhodium (Rh), 17.93 and Silver (Ag)/Rhodium (Rh), 5.58.

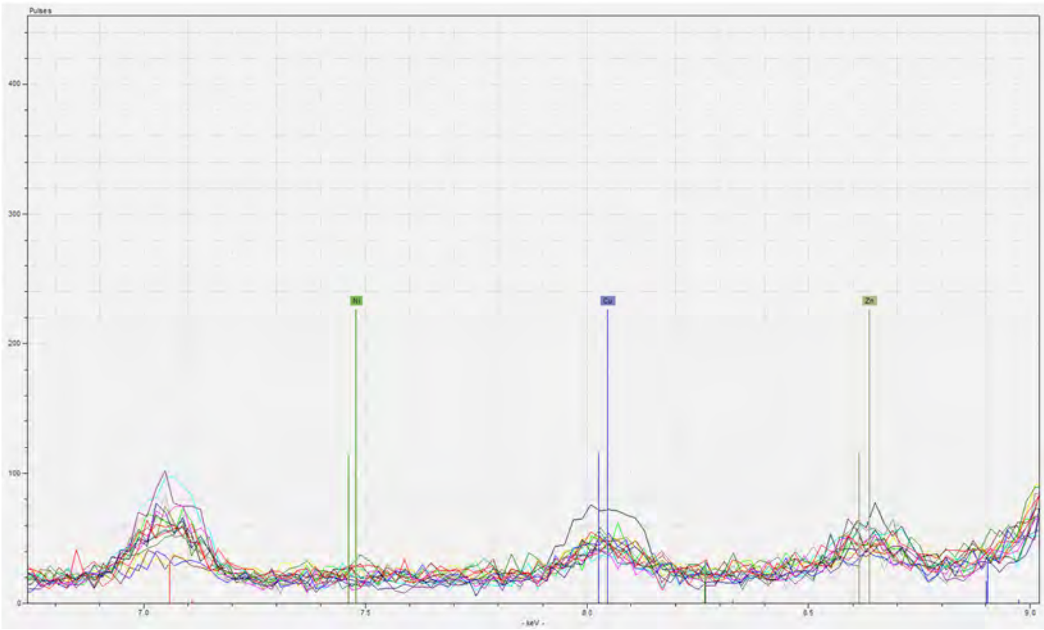


Figure 35. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Fort Necessity Sample.

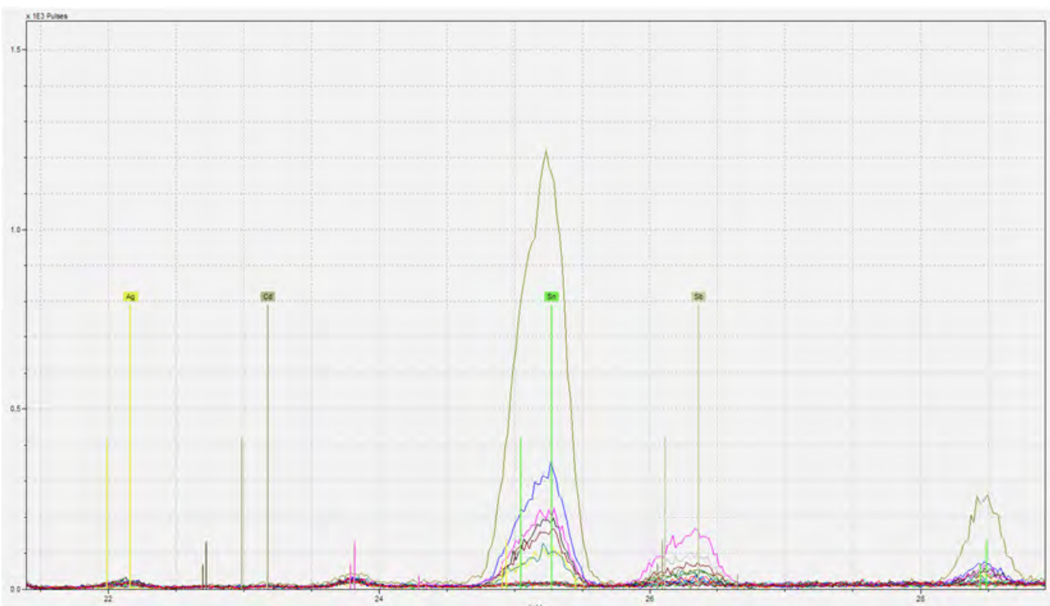


Figure 36. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Necessity Sample.

Table 7. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Necessity Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	13.30	64.70	6.58		
Segment 2	2.62	17.93	5.58		
Segment 3	17.76	533.13	4.91		
Segment 4	5.65	16.24	1.63		
Segment 5	51.65	48.07	2.32		
AVERAGE	14.85	61.20	4.06		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	2	12.5%	7829.4		
Segment 2	6	37.5%	6388.8	**SSE Total**	**7.2**
Segment 3	1	6.3%	0.0		
Segment 4	4	25.0%	924.0		
Segment 5	3	18.8%	3499.3		
TOTAL	16	100.0%			

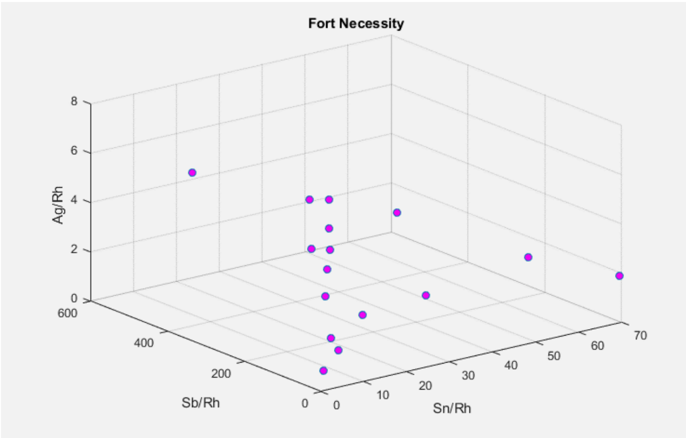


Figure 37. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort Necessity Sample.

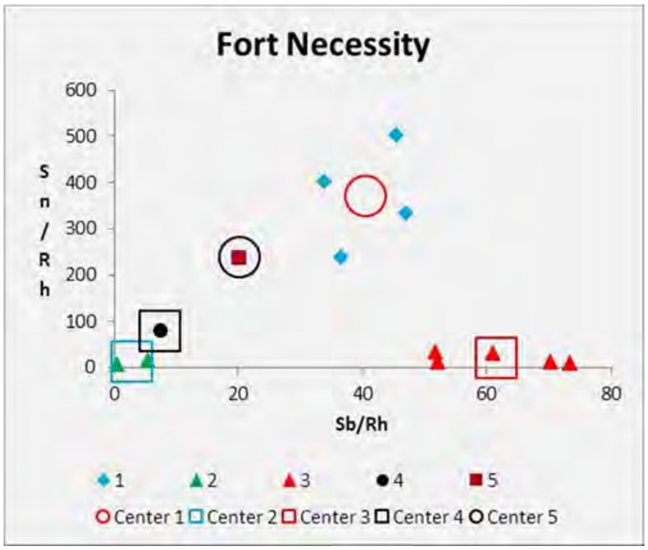


Figure 38. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Necessity Sample.

Parker's Revenge, Minuteman National Park

Parker's Revenge is a battle in Massachusetts that took place on April 19, 1775. Conflict archaeology was conducted on the battlefield and Watters (2016) reported on the that study. Watters provided pXRF data on this collection for the 2015 workshop. This sample is included as Group 28 in Appendix 1. Figures 39 and 40 show portions of the spectra for the Minuteman samples. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figure 41 contains two graphs showing the distribution of Tin (Sn) and Antimony (Sb) in the Minuteman samples.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Minuteman Park sample. Five clusters were identified (Table 8 and Figure 42 and 43). The dominant cluster (Segment 4) contained 16 of 30 samples (53.3%). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.26, Tin (Sn)/Rhodium (Rh), 1.40 and Silver (Ag)/Rhodium (Rh), 0.14.

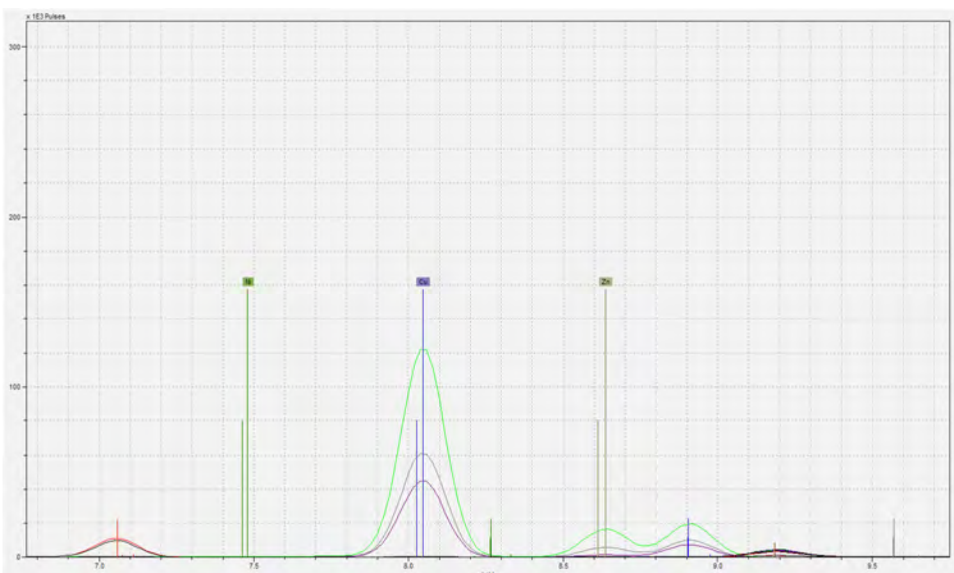


Figure 39. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Minuteman Sample.

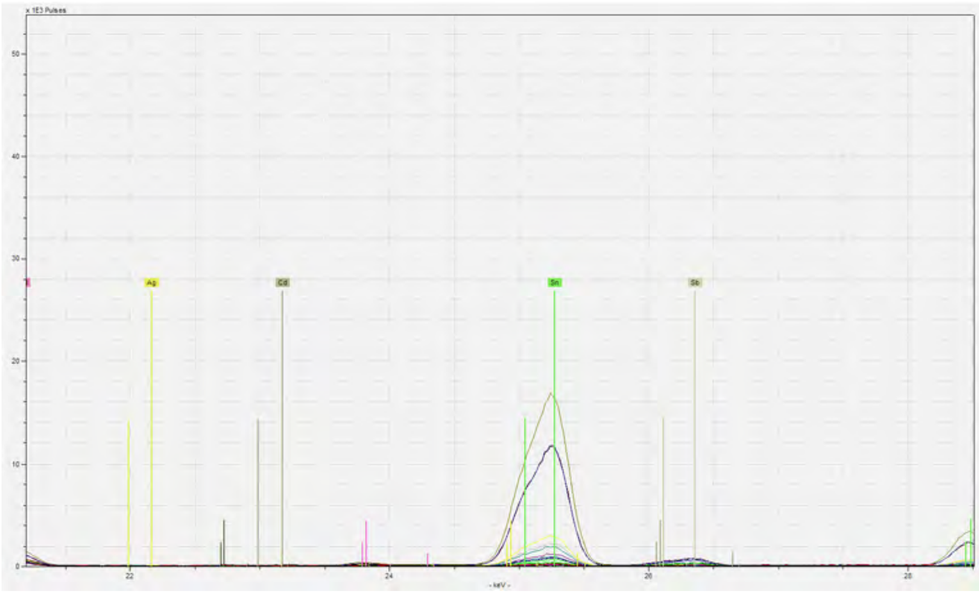


Figure 40. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Minuteman Sample.

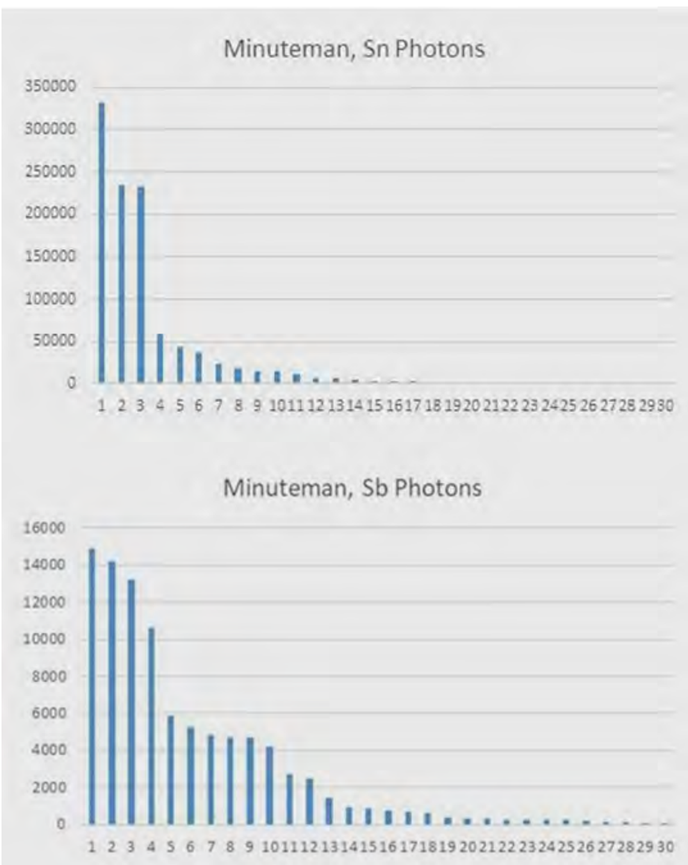


Figure 41. Distribution of Tin (Sn) and Antimony (Sb) Photons in Minuteman Sample.

Table 8. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Minuteman Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	5.20	144.46	0.35		
Segment 2	2.43	13.96	0.34		
Segment 3	7.15	7.49	0.17		
Segment 4	0.26	1.40	0.14		
Segment 5	1.58	34.02	2.20		
AVERAGE	1.78	21.89	0.41		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	3	10.0%	1840.8		
Segment 2	6	20.0%	890.5	**SSE Total**	**11.0**
Segment 3	2	6.7%	0.0		
Segment 4	16	53.3%	59.3		
Segment 5	3	10.0%	1911.8		
TOTAL	30	100.0%			

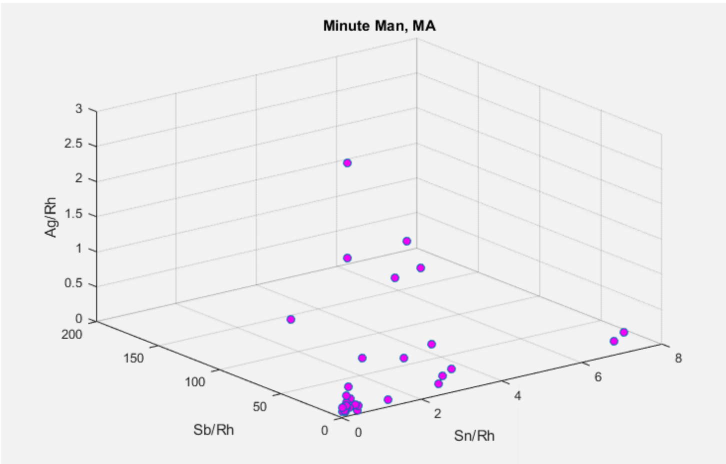


Figure 42. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in Minuteman Sample.

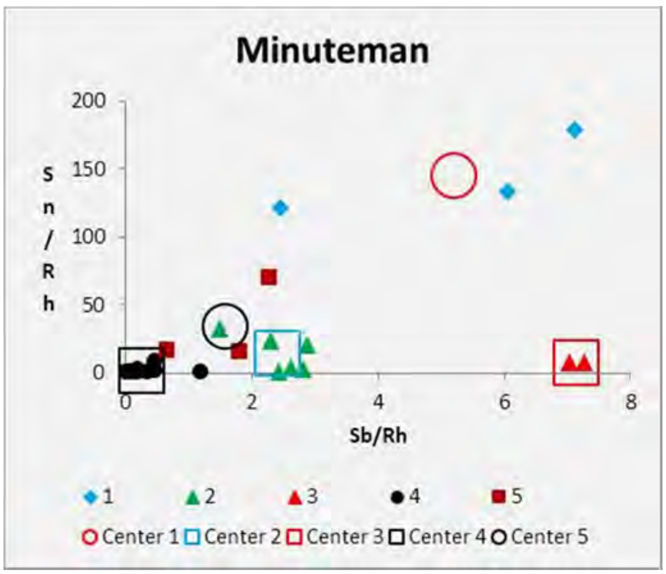


Figure 43. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Minuteman Sample.

King George III Statue

A large metal statue of British King George III, which had been erected at the Bowling Green in New York City was torn down by a crowd of American Patriots on July 9, 1776 (Figure 44). Fragments of the statue were transported to Litchfield, Connecticut by Patriots where they were cast into bullets for the American troops. Other pieces of the statue, such as the two specimens in the New York Historical Society (Object Numbers 1878.4 and 2001.185) were taken by Loyalists, who hid them in their homes.

The New York Historical Society (NYHS) possesses several fragments of the King George statue that were not melted down for bullets. One metal fragment of the King George III statue in the NYHS collection was acquired in 1878 (Figure 45). It measures 14 x 33 x 44.4 cm. Another metal fragment in the NYHS collection was acquired in 2001 (Figure 46). It measures 22.9 x 35.6 x 20.3 cm. Seibert analyzed these two specimens in September 2014. Seibert and Sivilich (2016) then compared these data to archaeologically recovered bullets from northeastern battlefields. The elemental data from these two artifacts are included as Group 46 in Appendix 1. Figures 47 and 48 show portions of the spectra for the King George Statue samples. Nickel (Ni), Copper (Cu), Zinc (Zn), Silver (Ag), Cadmium (Cd) and Tin (Sn) display peaks in these graphs.

Figure 44. Circa 1913 Watercolor of Equestrian Statue of King George III, Bowling Green, New York City (NYHS 1923.118).

Figure 45. King George III Statue Fragment (NYHS 1878.4).

Figure 46. King George III Statue Fragment (NYHS 2001.185).

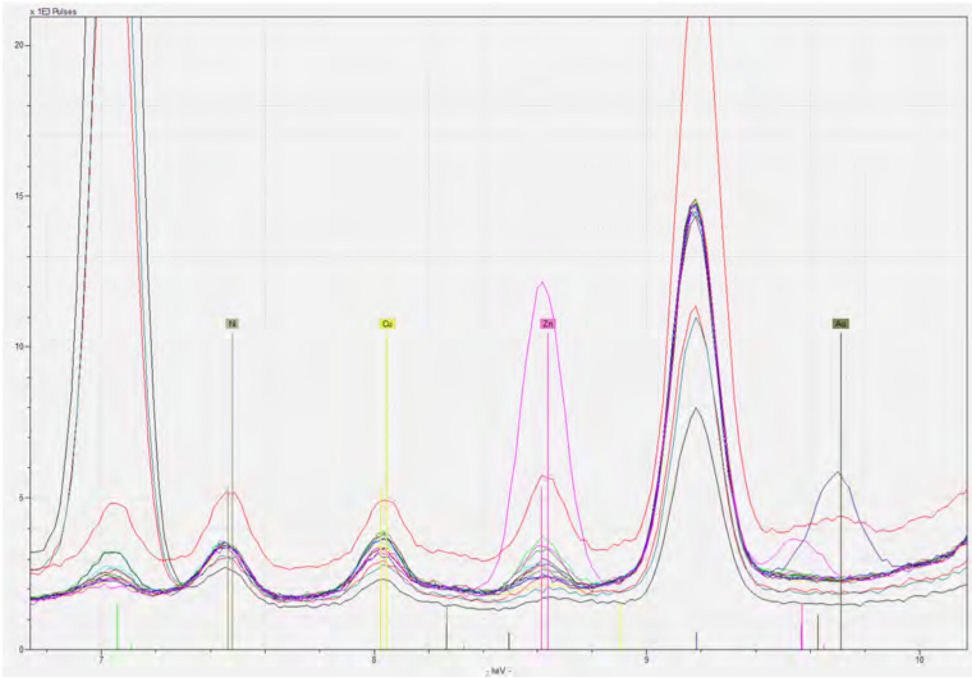


Figure 47. Spectra of Nickel (Ni), Copper (Cu), Zinc (Zn) and Gold (Au) King George Statue Sample.

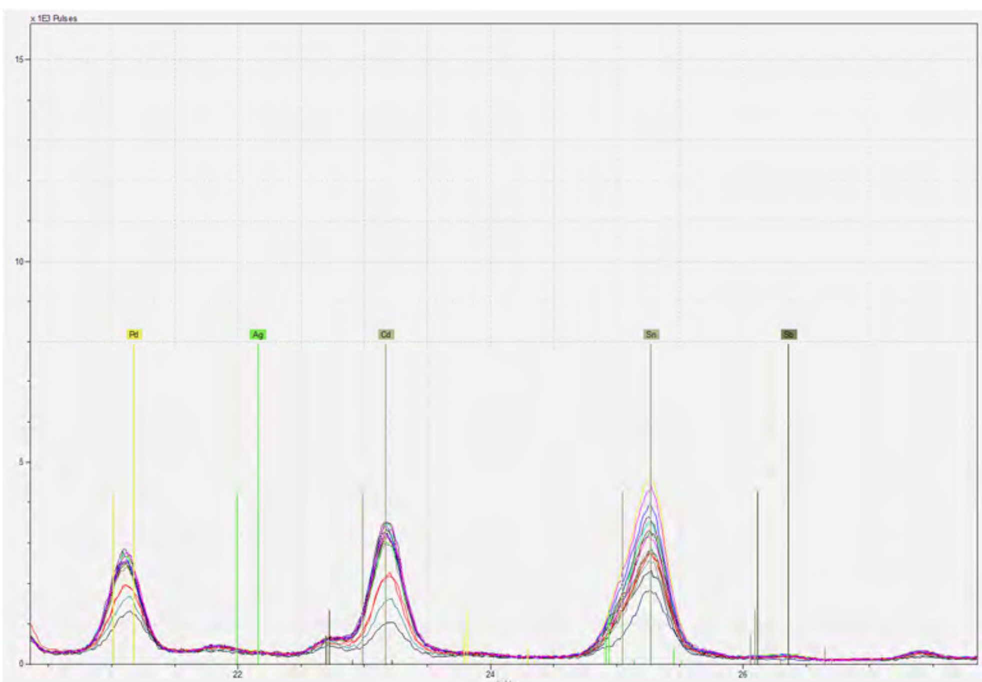


Figure 48. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) King George Statue Sample.

Battle of Moores Creek Bridge

Moores Creek Bridge, located near Wilmington in present-day Pender County, North Carolina, was the site of military engagement in the American Revolution on February 27, 1776. The battle, which was an American victory, pitted about one thousand North Carolina Patriots against 750 North Carolina Loyalists. The battle site is currently operated by the National Park Service as the Moores Creek National Battlefield. Michael Seibert provided elemental data on a sample of 29 round ball ammunition from the Moores Creek Bridge battle site for the 2015 Workshop. This sample is included as Group 29 in Appendix 1. Figures 49 and 50 show portions of the spectra for the Moores Creek samples. Copper (Cu), Silver (Ag), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios from the Moores Creek sample. Five clusters were identified (Table 9 and Figures 51 and 52). The dominant cluster (Segment 4) contained 15 of 29 specimens (51.7% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.67, Tin (Sn)/Rhodium (Rh), 0.44 and Silver (Ag)/Rhodium (Rh), 0.35.

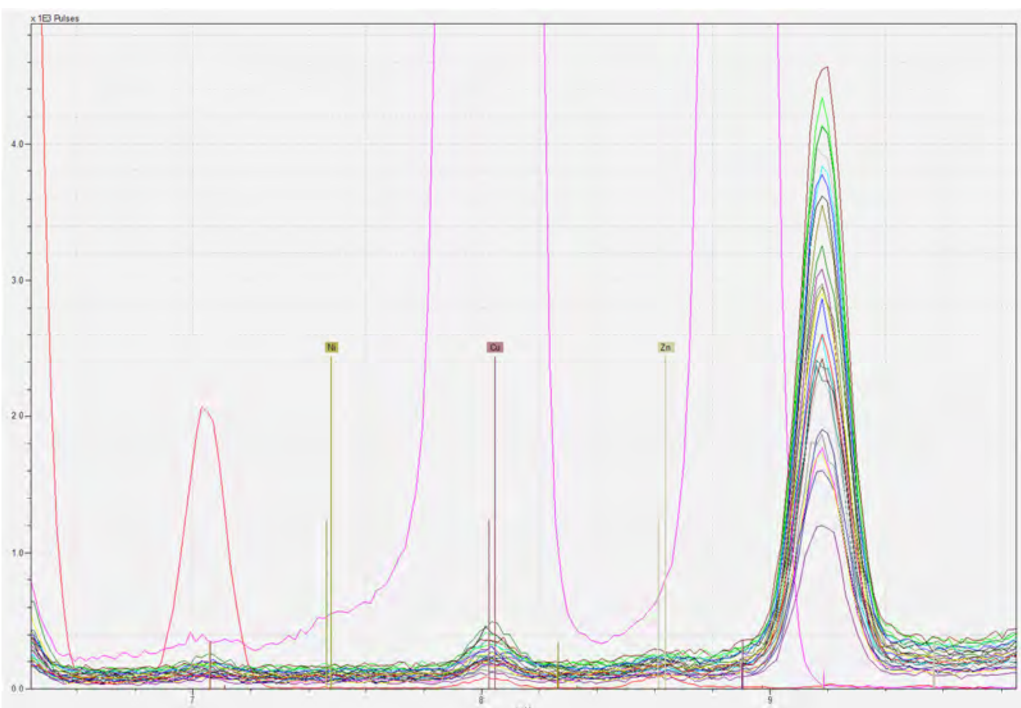


Figure 49. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Moores Creek Sample.

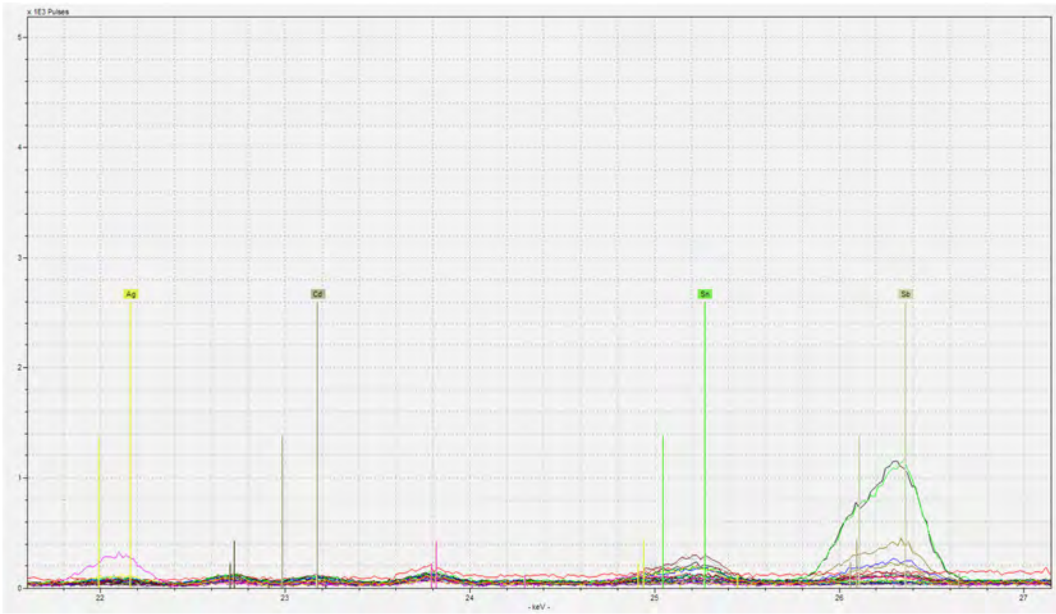


Figure 50. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Moores Creek Sample.

Table 9. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Moores Creek Sample.

Mean/Centroid	***Sb/Rh***	***Sn/Rh***	***Ag/Rh***	***0***	***0***
Segment 1	1.21	0.86	5.19		
Segment 2	12.34	1.50	0.18		
Segment 3	0.55	0.41	1.22		
Segment 4	0.67	0.44	0.35		
Segment 5	0.84	1.86	0.52		
AVERAGE	1.53	0.92	0.64		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	1	3.4%	0.0		
Segment 2	2	6.9%	0.6	**SSE Total**	**11.7**
Segment 3	3	10.3%	0.0		
Segment 4	15	51.7%	20.1		
Segment 5	8	27.6%	5.3		
TOTAL	29	100.0%			

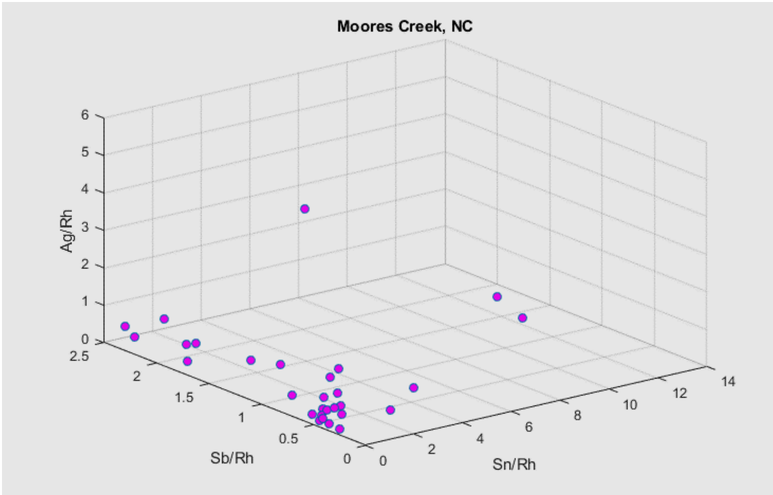


Figure 51. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Moores Creek.

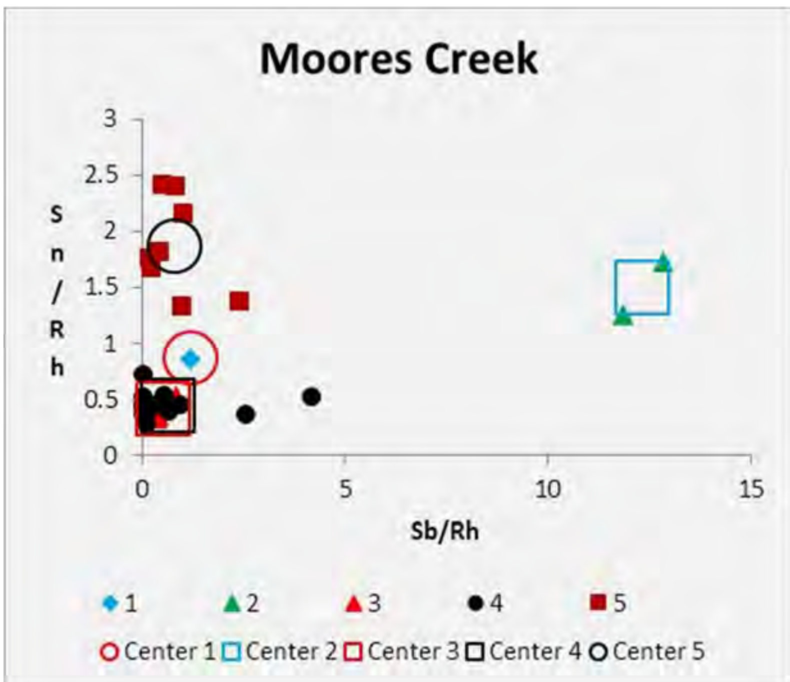


Figure 52. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Moores Creek.

New Jersey Battle Sites

Sivilich provided seven round balls from three Revolutionary War period battle sites in New Jersey. These include Petticoat Bridge, the Craig Road Site and Belle Terre Farm. The Petticoat Bridge skirmish took place on December 23, 1776 when

British and Hessian forces invaded New Jersey (Goos and Cain 2014). The other two sites are associated with the Battle of Monmouth, which took place on June 28, 1778 in Monmouth County (Frazza 2017). Belle Terre Farm, now incorporated into Monmouth Battlefield State Park (Avin 2011). The Craig Road Site is located at the Battle of Monmouth in Manalapan, New Jersey (Sivilich 2013). This sample is included as Group 36 in Appendix 1. Figures 53 and 54 show portions of the spectra for the Moores Creek samples. Hafnium (Hf), Copper (Cu), Tin (Sn) and Antimony (Sb) display peaks in these graphs. The Craig Road Site specimen (Sivilich 9LS26-1) was a Fusil-sized ball that displayed substantially higher content of Tin (Sn) and Antimony (Sb) than did any of the other New Jersey specimens.

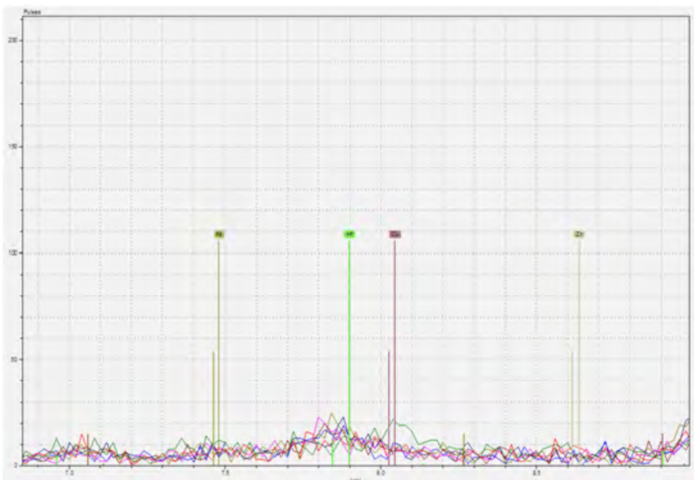


Figure 53. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) New Jersey Sites Sample.

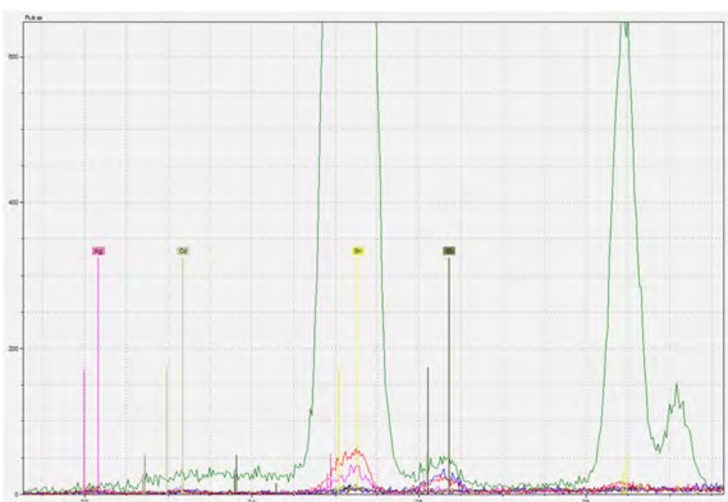


Figure 54. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) New Jersey Sites Sample.

Battle of Beaufort

The Battle of Beaufort, also known as the Battle of Gray's Hill, was a military engagement of the American Revolution that took place on February 3, 1779 in Beaufort County, South Carolina. The Battle of Beaufort site was recently located by archaeologist Daniel Battle. Battle and Elliott analyzed a sample of 27 balls from the battlefield in 2016, and these data are included in this report. Battle provided a sample of 35 round ball ammunition from the Beaufort Battlefield for the 2017 workshop. These represent a combined total of 62 balls. Numerous examples from this assemblage are interpreted by Battle as representing fired American artillery case shot. Other specimens in this assemblage likely represent single shots from long arms. This sample is included as Groups 1 and 2 in Appendix 1.

Figures 55 and 56 show portions of the spectra for the Beaufort (2016) samples. Nickel (Ni), Hafnium (Hf), Copper (Cu), Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figures 57 and 58 show portions of the spectra for the Beaufort (2017) samples. Copper (Cu), Zinc (Zn), Silver (Ag), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on the Silver (Ag), Antimony (Sb) and Tin (Sn) ratios in the Battle of Beaufort combined samples. Five clusters were identified (Table 10 and Figures 59 and 60). The dominant cluster (Cluster 3) contained 23 of 62 specimens (37.1% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 7.39, Tin (Sn)/Rhodium (Rh), 12.72 and Silver (Ag)/Rhodium (Rh), 4.09.

Cluster analysis also was performed on the Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh) ratios in the Beaufort sample. Five clusters were identified (Table 11 and Figure 61). Two clusters (Segments 3 and 5) dominated the assemblage both containing nine specimens out of 27 total specimens (33.3%). Mean/centroids for Segment 3 were Nickel (Ni)/Rhodium (Rh), 2.79, Copper (Cu)/Rhodium (Rh), 7.20 and Zinc (Zn)/Rhodium (Rh), 0.41. Mean/centroids for Segment 5 were Nickel (Ni)/Rhodium (Rh), 4.31, Copper (Cu)/Rhodium (Rh), 10.92 and Zinc (Zn)/Rhodium (Rh), 0.55.

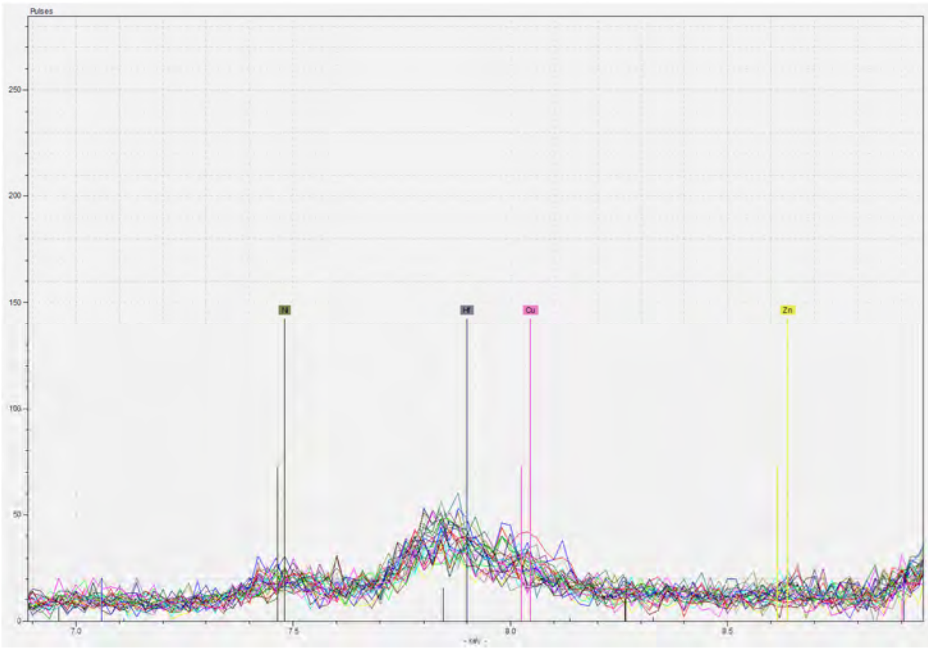


Figure 55. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Beaufort 2016 Sample.

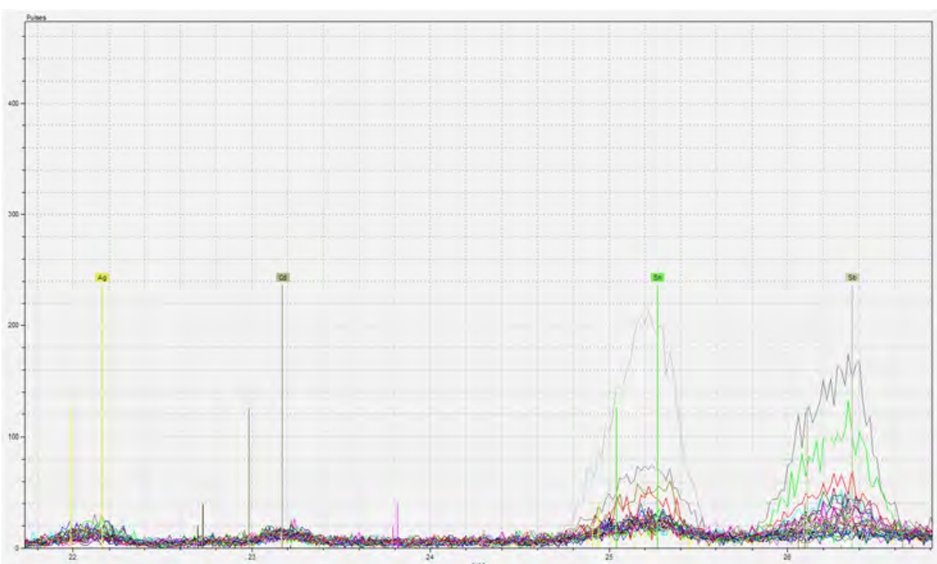


Figure 56. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Beaufort 2016 Sample.

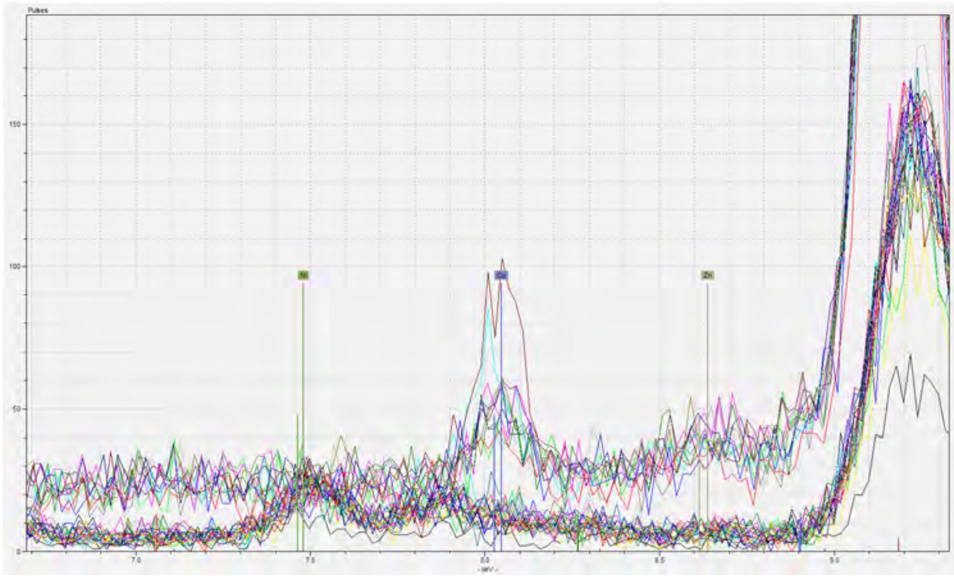


Figure 57. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Beaufort 2017 Sample.

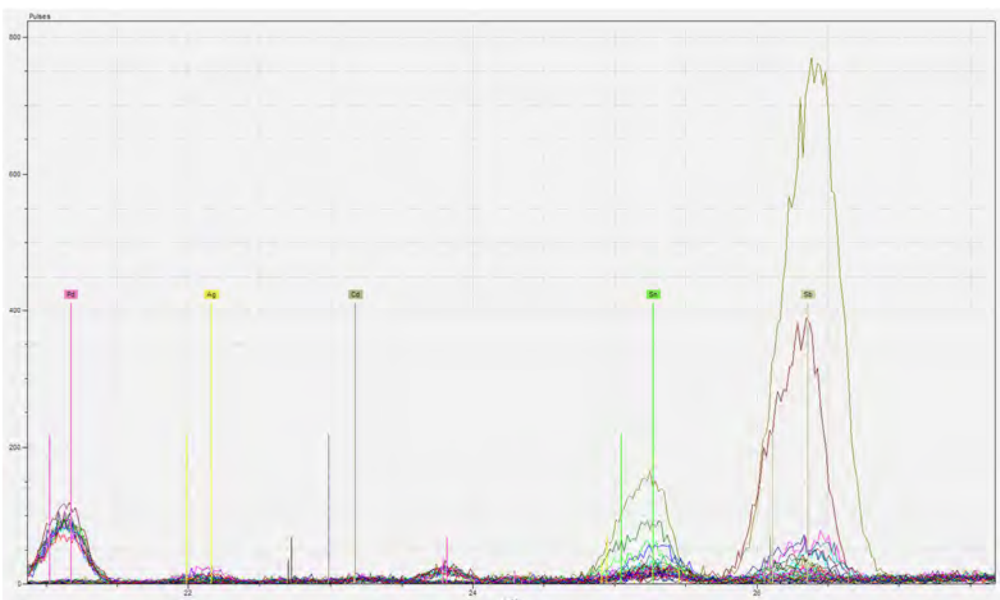


Figure 58. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb)) Beaufort 2017 Sample.

Table 10. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Battle of Beaufort Composite Sample.

Mean/Centroid	Sb/Rh	Sn/Rh	Ag/Rh	0	0
Segment 1	15.74	8.45	1.71		
Segment 2	13.49	7.97	6.94		
Segment 3	7.39	12.72	4.09		
Segment 4	16.51	43.99	2.25		
Segment 5	506.29	11.94	1.66		
AVERAGE	20.15	13.43	3.74		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	19	30.6%	13584.9		
Segment 2	13	21.0%	8313.9	**SSE Total**	**59.1**
Segment 3	23	37.1%	0.0		
Segment 4	6	9.7%	4527.5		
Segment 5	1	1.6%	0.0		
TOTAL	62	100.0%			

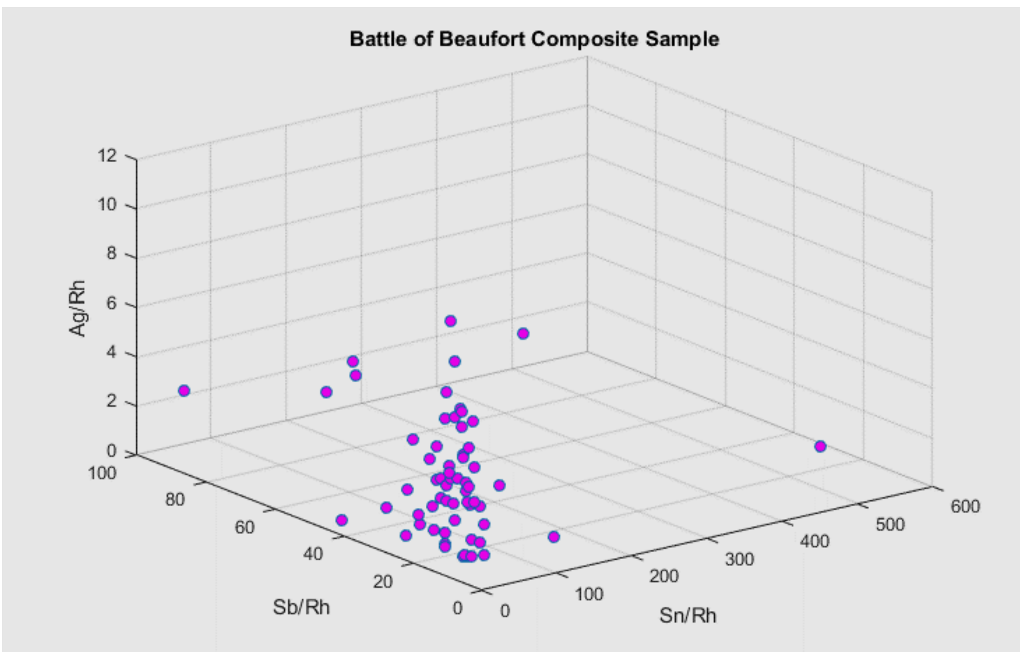


Figure 59. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in Battle of Beaufort Samples (2016 and 2017 Combined).

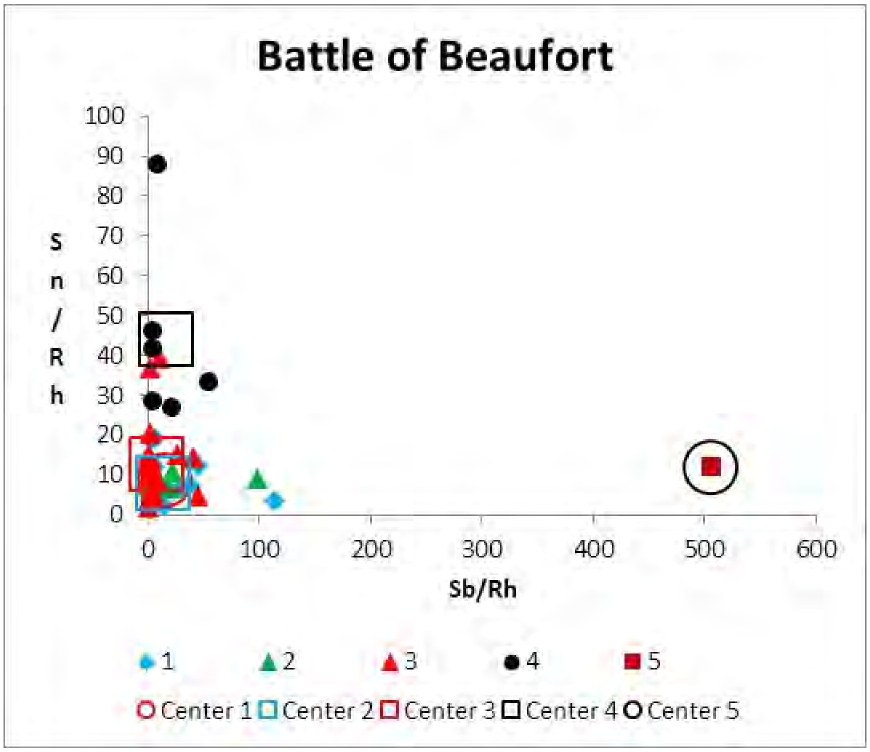


Figure 60. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Battle of Beaufort Composite Sample.

Table 11. Output for Five Clusters/Segments, Nickel (Ni), Copper (Cu) and Zinc (Zn) Ratios, Beaufort (2016) Sample.

Mean/Centroid	*Ni/Rh*	*Cu/Rh*	*Zn/Rh*	*0*	*0*
Segment 1	6.58	15.61	0.37		
Segment 2	6.33	24.10	2.76		
Segment 3	2.79	7.20	0.41		
Segment 4	5.19	12.52	1.80		
Segment 5	4.31	10.92	0.55		
AVERAGE	4.45	11.33	0.64		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	6	22.2%	56.2		
Segment 2	1	3.7%	0.0	**SSE Total**	**19.0**
Segment 3	9	33.3%	0.0		
Segment 4	2	7.4%	0.8		
Segment 5	9	33.3%	18.6		
TOTAL	27	100.0%			

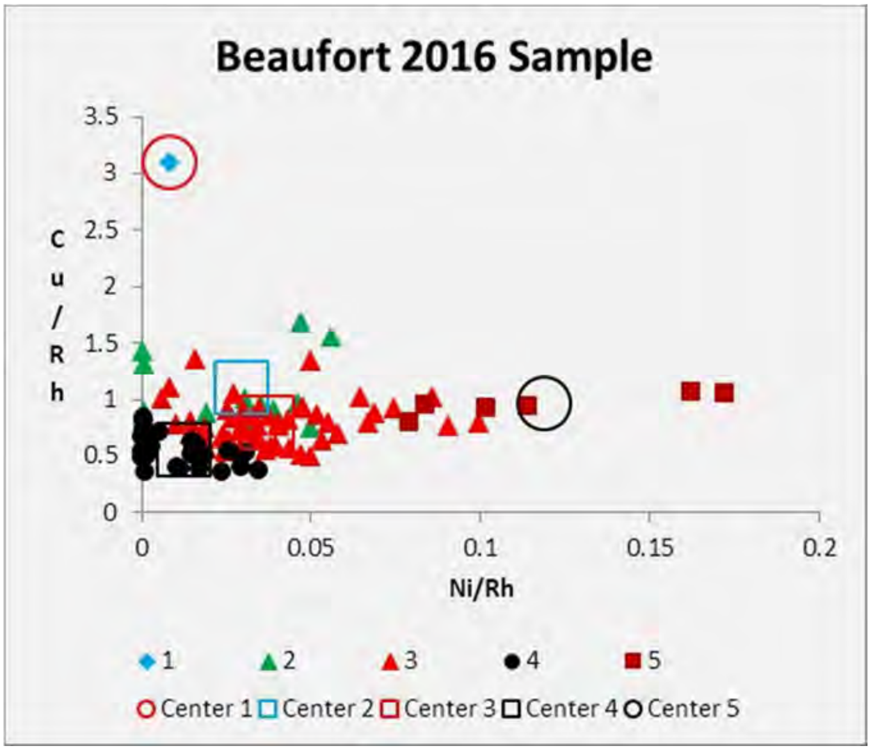


Figure 61. Central Means Chart for Five Segments, Nickel (Ni), Copper (Cu) and Zinc (Zn) Ratios, Beaufort (2016) Sample.

Battle of Carr's Fort

Captain Robert Carr commanded a company of Wilkes County militia and he maintained a fort at his home in the eastern Georgia piedmont. The fort was used in 1778 and early 1779. On February 10, 1779, the nearly-empty fort was taken over by British and Loyalist recruits. The fort was quickly surrounded by Georgia and South Carolina militia and a short siege ensued. The Americans called off the siege when the received word of an approaching larger British force. The battle is considered an American victory. The following month Carr's Fort was attacked by Creek Indian Loyalists, Captain Carr was killed and the fort was likely burned. The Carr's Fort Battlefield was located and studied in 2013 by archaeologists (Elliott and Davis 2014). In 2015 Elliott sampled 19 round balls from the Carr's Fort Battlefield collection at the Laboratory of Archaeology, University of Georgia. This sample is included as Group 8 in Appendix 1. Figures 62 and 63 show portions of the spectra for the Carr's Fort samples. Copper (Cu), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was conducted on Silver (Ag), Antimony (Sb) and Tin (Sn) ratios in the Carrs Fort sample. Five clusters were identified (Table 12 and Figures 64 and 65). The dominant cluster (Segment 5) contained 6 of 19 specimens (31.6% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 1.16, Tin (Sn)/Rhodium (Rh), 30.50 and Silver (Ag)/Rhodium (Rh), 0.14.

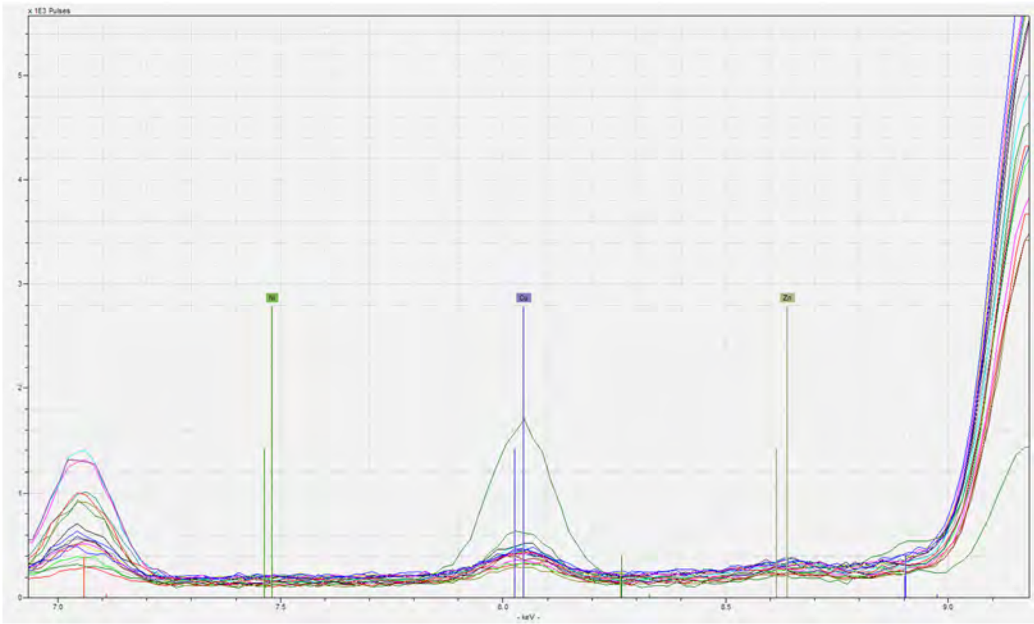


Figure 62. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Carrs Fort Sample.

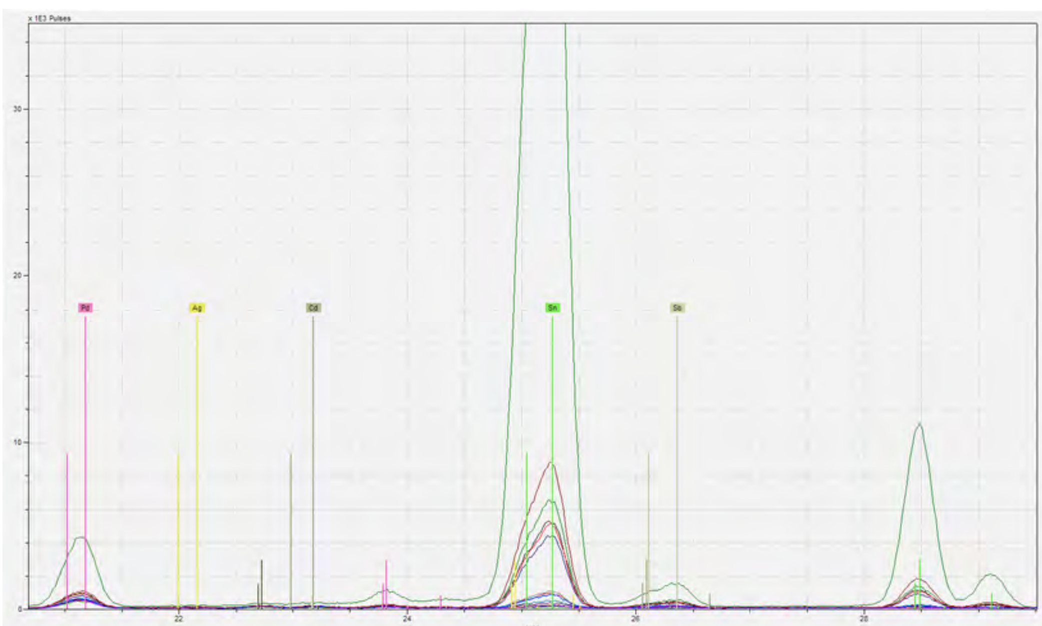


Figure 63. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Carrs Fort Sample.

Table 12. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Carrs Fort Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	0.28	0.94	0.20		
Segment 2	1.06	12.29	0.12		
Segment 3	9.36	411.92	0.12		
Segment 4	1.87	34.38	0.19		
Segment 5	0.23	1.77	0.07		
AVERAGE	1.16	30.50	0.14		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	5	26.3%	1.6		
Segment 2	4	21.1%	303.8	**SSE Total**	**2.9**
Segment 3	1	5.3%	0.0		
Segment 4	3	15.8%	289.1		
Segment 5	6	31.6%	23.0		
TOTAL	19	100.0%			

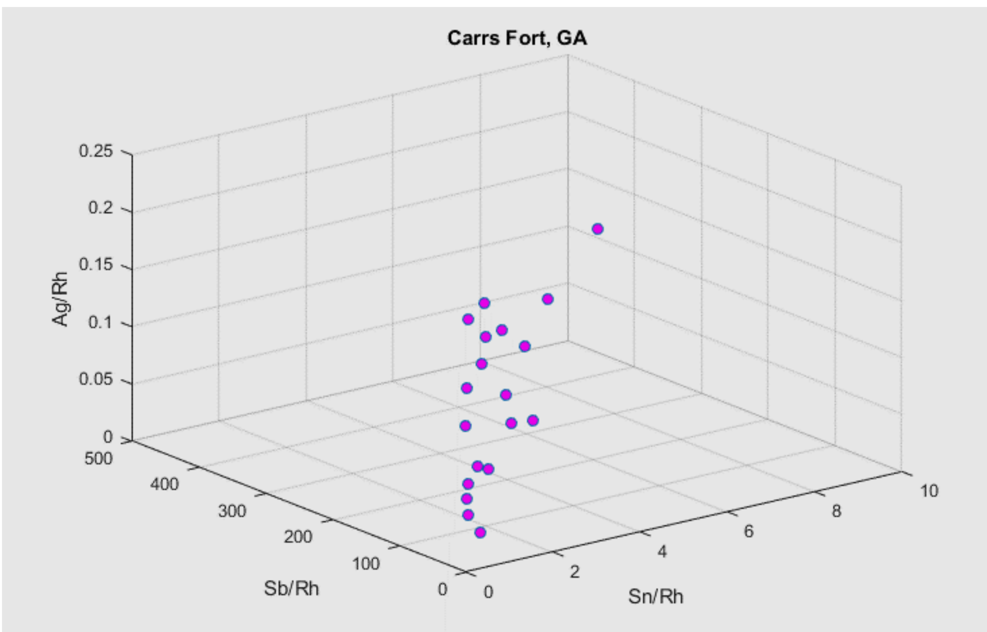


Figure 64. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Carrs Fort Sample.

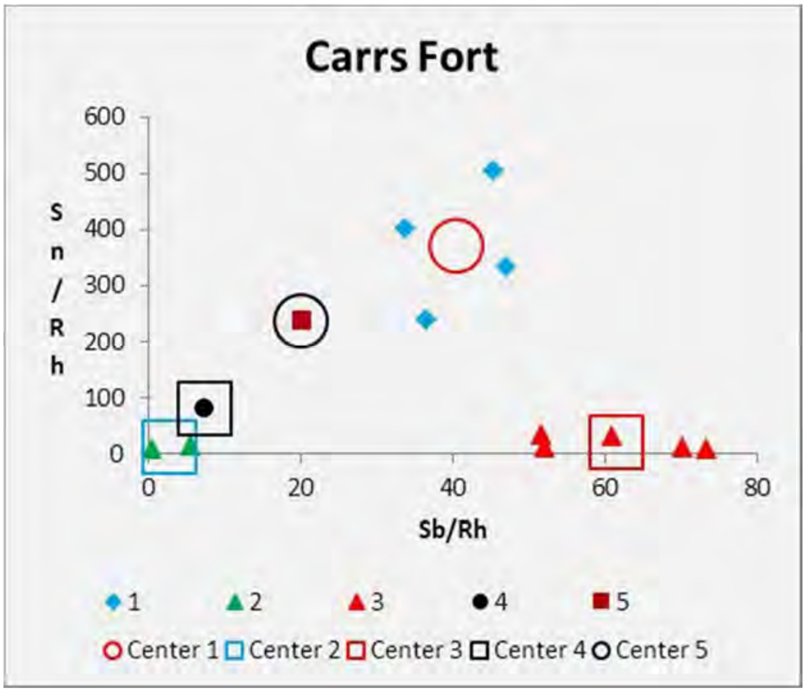


Figure 65. Central Means Charts for Five Segments, Silver (Ag), Tin (Sn) and Antimony (Sb) Ratios, Carrs Fort Sample.

Battle of Kettle Creek

Archaeologists located and defined the Kettle Creek Battlefield in 2008 (Elliott 2009). This site is located in rural Wilkes County, Georgia in the piedmont region. In 2017 Elliott sampled 63 round balls from the Kettle Creek Battlefield collection at the Washington-Wilkes History Museum in Washington, Georgia. This sample is included as Group 25 in Appendix 1. Figures 66 and 67 show portions of the spectra for the Kettle Creek samples. Nickel (Ni), Hafnium (Hf), Copper (Cu), Zinc (Zn), Silver (Ag), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figures 68 and 69 show graphs of the distribution of Tin (Sn) and Antimony (Sb) in the Kettle Creek sample.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Kettle Creek sample. Five clusters were identified (Table 13 and Figures 70 and 71). The dominant cluster (Segment 2) contained 35 of 63 total items (55.6% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 6.66, Tin (Sn)/Rhodium (Rh), 22.93 and Silver (Ag)/Rhodium (Rh), 2.11.

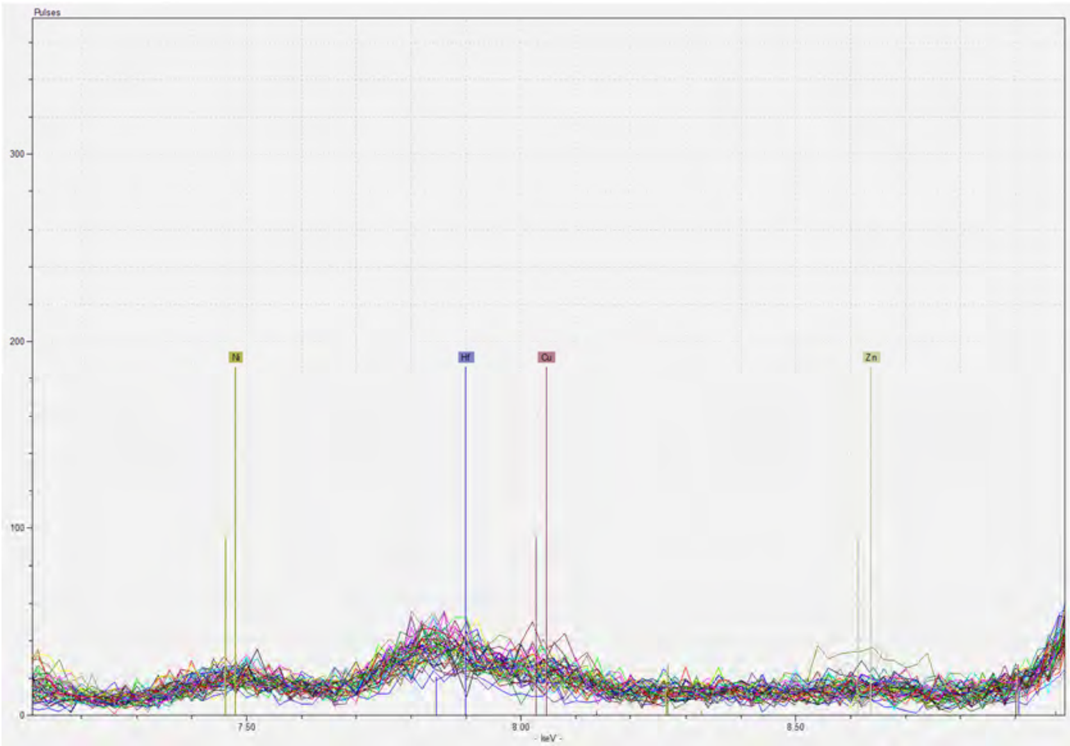


Figure 66. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Kettle Creek.

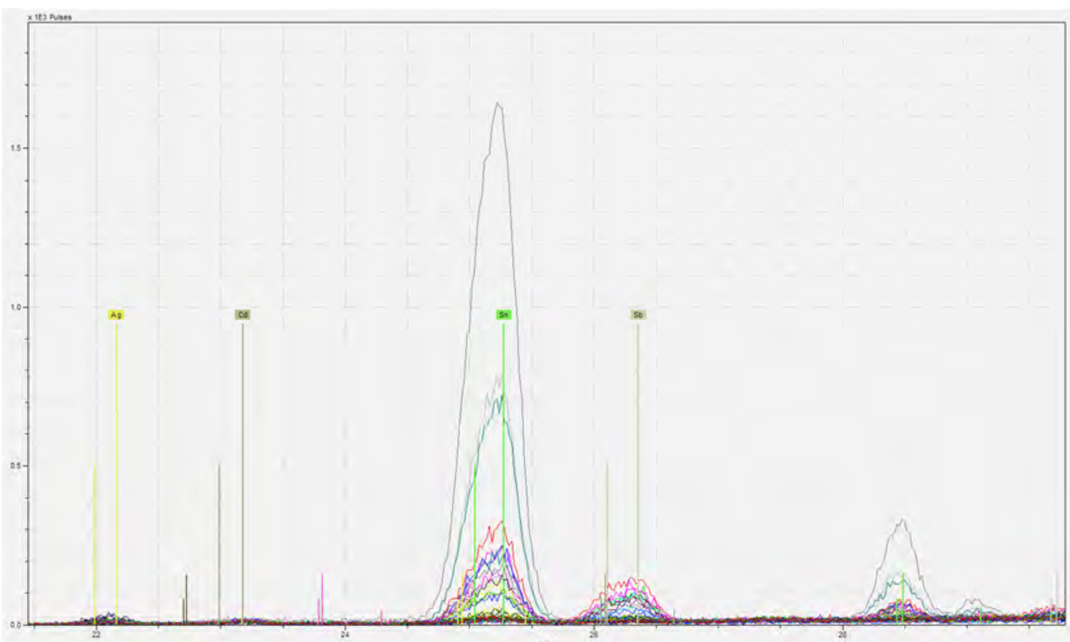


Figure 67. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Kettle Creek Sample.

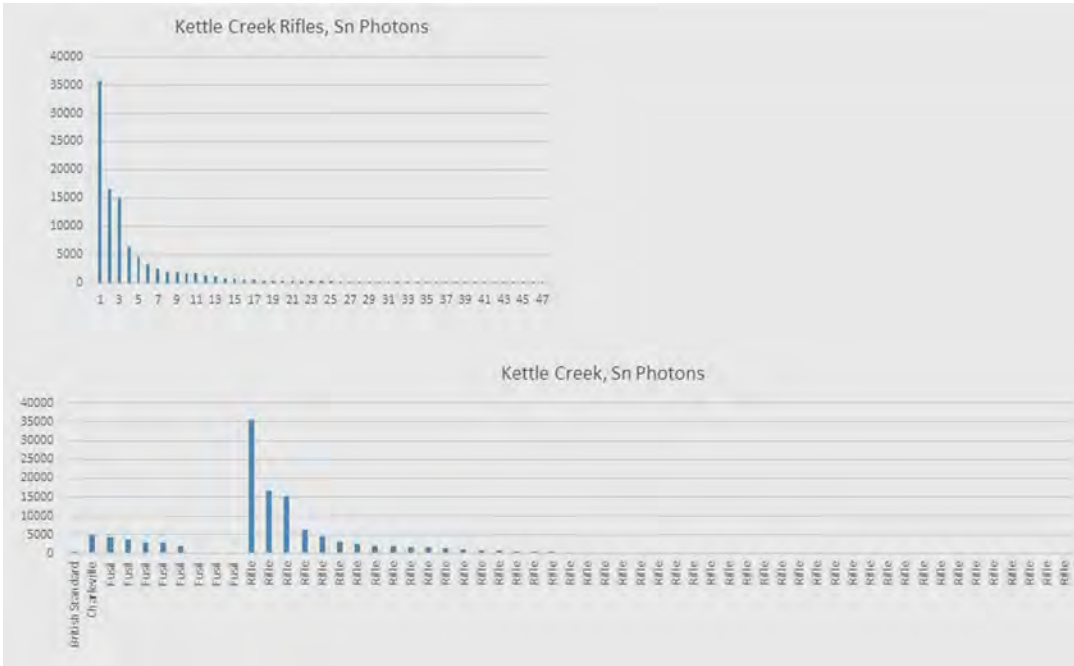


Figure 68. Tin (Sn) Photons in Kettle Creek Sample.

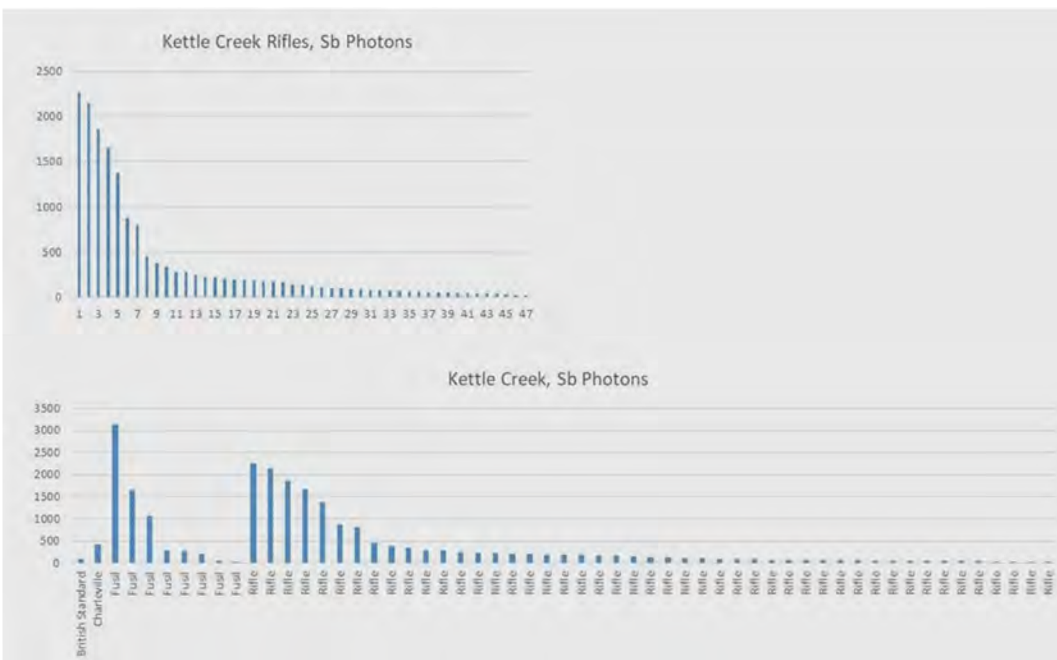


Figure 69. Antimony (Sb) Photons in Kettle Creek Sample.

Table 13. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Kettle Creek Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	81.37	31.19	6.66		
Segment 2	6.66	22.93	2.11		
Segment 3	7.93	32.13	4.01		
Segment 4	2.75	405.85	2.24		
Segment 5	2.12	13.51	7.66		
AVERAGE	11.09	42.98	3.39		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	4	6.3%	8147.9		
Segment 2	35	55.6%	37900.7	**SSE Total**	**62.4**
Segment 3	15	23.8%	0.0		
Segment 4	3	4.8%	58125.9		
Segment 5	6	9.5%	473.0		
TOTAL	63	100.0%			

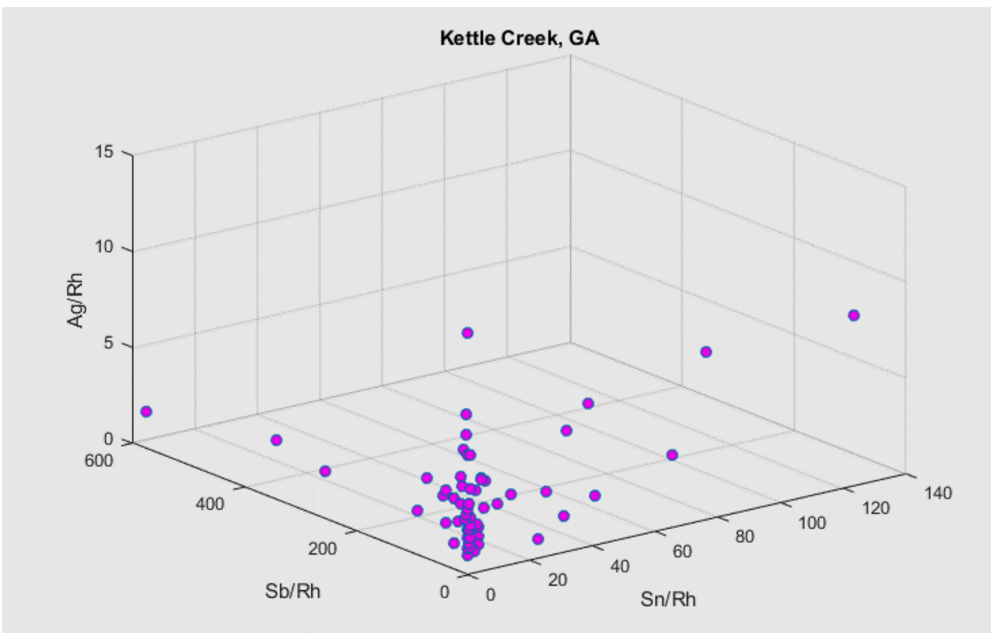


Figure 70. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Kettle Creek Sample.

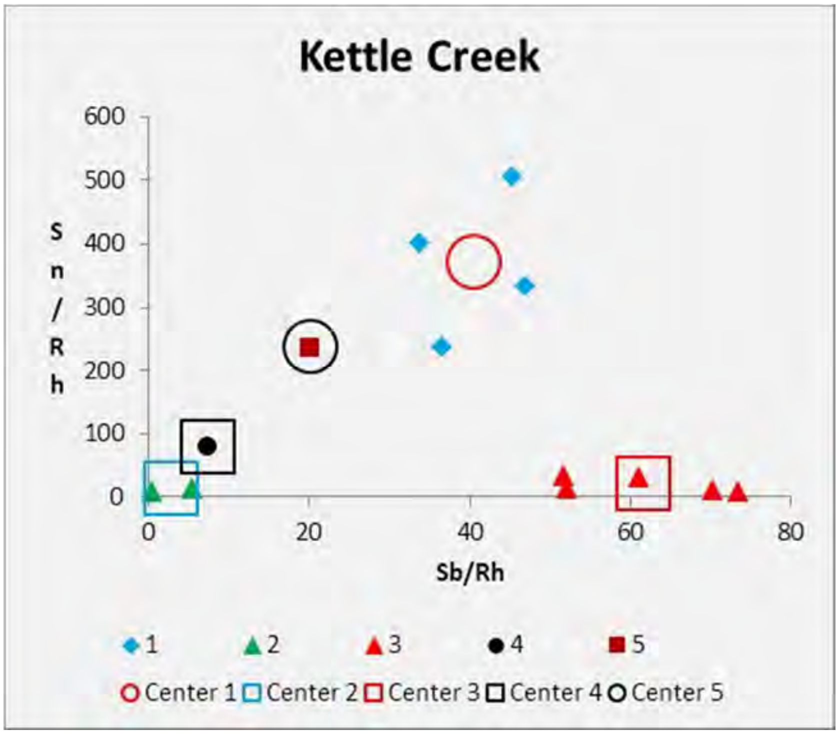


Figure 71. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Kettle Creek Sample.

Battle of Brier Creek

In early 1779 American forces commanded by General John Ashe were encamped on the north side of Brier Creek near its confluence with the Savannah River in present-day Screven County. These troops were surprised by British forces on March 3, 1779 and the Americans were dealt a devastating blow. In 2014 and 2015 archaeologists studied the battlefield remains, which were recorded as Site 9SN254 (Battle and Owens 2015). A sample of 90 round balls from that study were sampled in 2015 by Elliott and Battle. This sample is included as Group 3 in Appendix 1.

Archaeologists returned to the Brier Creek Battlefield in early 2017 and conducted more intensive survey of a small portion of the battlefield. The technical report of that effort by Brockington & Associates is in draft form at the time of this writing. Butler and his colleagues provided 24 round ball samples from that study for the 2017 project. This sample is included as Group 4 in Appendix 1.

Figures 72 and 73 show portions of the spectra for the Brier Creek (2015) sample. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figures 74 and 75 show portions of the spectra for the Brier Creek (2017) sample. Nickel (Ni), Copper (Cu), Zinc (Zn), Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the 2015 Brier Creek samples. Five clusters were identified (Table 14, Figures 76 and 77). This clustering was compared with the suspected weapon type for the Brier Creek 2015 sample. The dominant cluster (Segment 4) contained 37 of 91 specimens (40.7% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.10, Tin (Sn)/Rhodium (Rh), 0.54 and Silver (Ag)/Rhodium (Rh), 0.11. This cluster was dominant among the British Standard balls (19 of 31 specimens, or 61.2 percent of the British Standard balls. Cluster 1 dominated the rifle balls (8 of 19 specimens, or 42.1%). Cluster 5 dominated the fusil balls (7 of 15 specimens, or 46.7%).

Pearson's Chi-square tests was run on these results to determine if the clusters defined for the three ratios (Silver (Ag)/Rhodium (Rh), Tin (Sn)/Rhodium (Rh) and Antimony (Sb)/Rhodium (Rh)) were significant when compared with the results by bullet size (Rifles, Fusils, Charleville and British Standard balls (Table 15). This exercise yielded a Chi-square value of 39.981 and a P value of 0.0008. The null hypothesis, which states that the frequency distribution of certain events observed in the sample is consistent with the theoretical distribution, is rejected. The alternative hypothesis, that there is a difference between the distributions, is accepted at the 0.01 confidence level.

Cluster analysis also was performed on Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh) ratios for the Brier Creek (2015) sample. Four clusters were identified (Table 16 and Figure 78). The dominant cluster (Segment 3) contained 33 of 91 specimens (36.3% of assemblage). Cluster 1 dominated the assemblage of rifles, fusils and Charleville muskets, while Cluster 3 was dominant among British Standard balls. Mean/centroids for this cluster were Nickel (Ni)/Rhodium (Rh), 0.03, Copper (Cu)/Rhodium (Rh), 0.52 and Zinc (Zn)/Rhodium (Rh), 0.11.

Pearson's Chi-square tests was run on these results to determine if the clusters defined for the three ratios (Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh))were significant when compared with the results by weapon type (Rifles, Fusils, Charleville and British Standard balls (Table 17). This exercise yielded a Chi-square value of 22.918 and a P value of 0.0284. The null hypothesis, which states that the frequency distribution of certain events observed in the sample is consistent with the theoretical distribution, is rejected. The alternative hypothesis, that there is a difference between the distributions, is accepted at the 0.05 confidence level. At the 0.01 confidence level, however, the null hypothesis is accepted.

The 2017 sample from Brier Creek produced different results in the cluster analysis compared to the 2015 sample (Table 18 and Figures 79 and 80). This likely the result of sampling a smaller portion of the battlefield, which contained a subset of the site wide bullet types and to the smaller sample size (n-24). This clustering was compared with the suspected weapon type for the Brier Creek 2017 sample. The dominant cluster (Segment 1) contained eight of 24 specimens (33.3% of the assemblage). This cluster included five fusil balls (38.5% of the fusil balls). Cluster 5, which comprised 16.7 percent of the assemblage was dominated by rifle balls (50% of the rifle balls). Mean/centroids for Segment 1 were Antimony (Sb)/Rhodium (Rh), 1.31, Tin (Sn)/Rhodium (Rh), 7.23 and Silver (Ag)/Rhodium (Rh), 1.12.

Pearson's Chi-square tests was run on these results to determine if the clusters defined for the three ratios (Silver (Ag)/Rhodium (Rh), Tin (Sn)/Rhodium (Rh) and Antimony (Sb)/Rhodium (Rh)) were significant when compared with the results by weapon type (Rifles, Fusils, Charleville and British Standard balls (Table 19). This exercise yielded a Chi-square value of 15.996 and a P value of 0.4532. The null hypothesis, which states that the frequency distribution of certain events observed in the sample is consistent with the theoretical distribution, must be accepted.

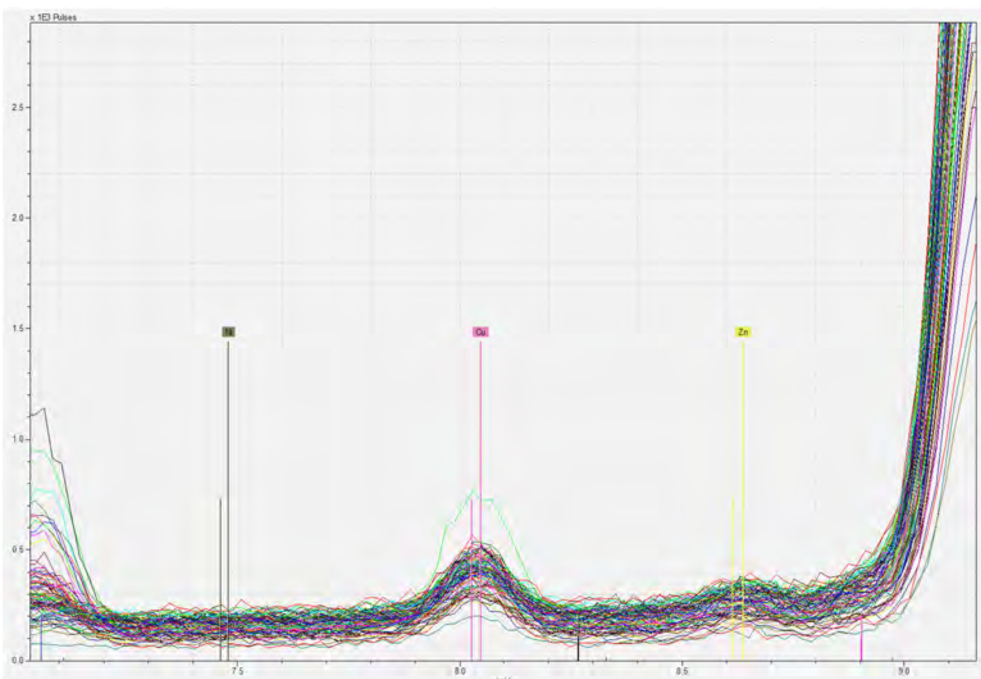


Figure 72. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Brier Creek 2015 Sample.

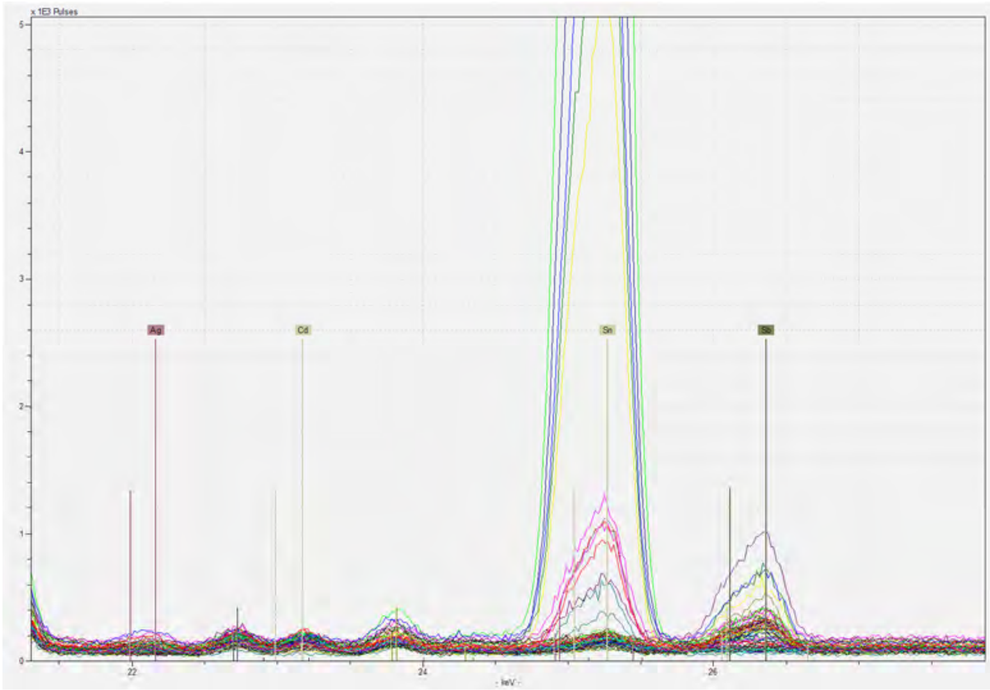


Figure 73. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Brier Creek 2015 Sample.

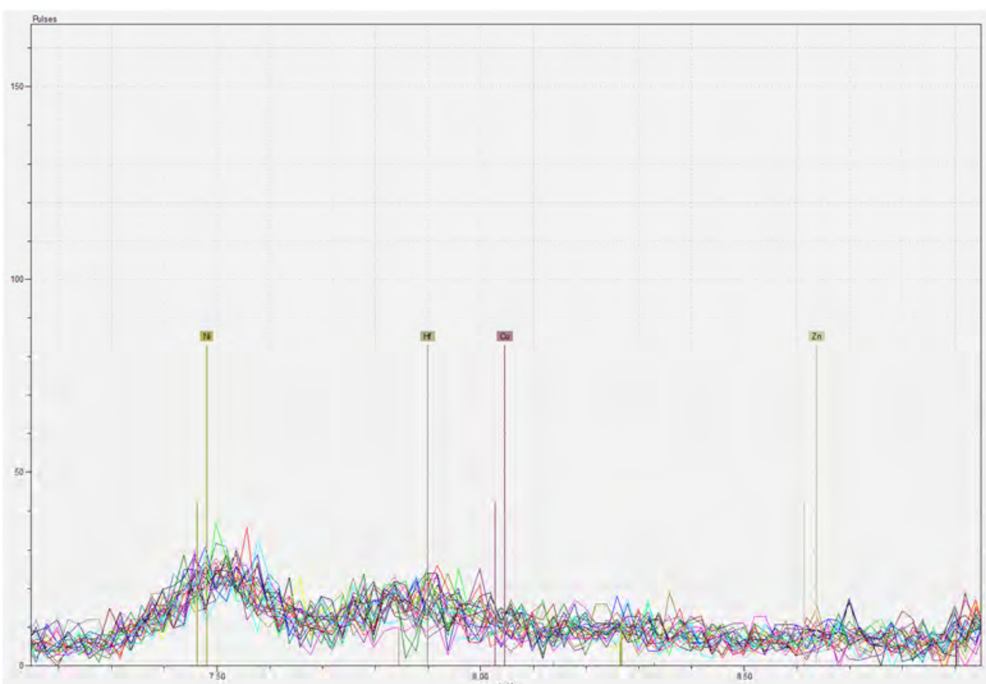


Figure 74. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Brier Creek 2017 Sample.

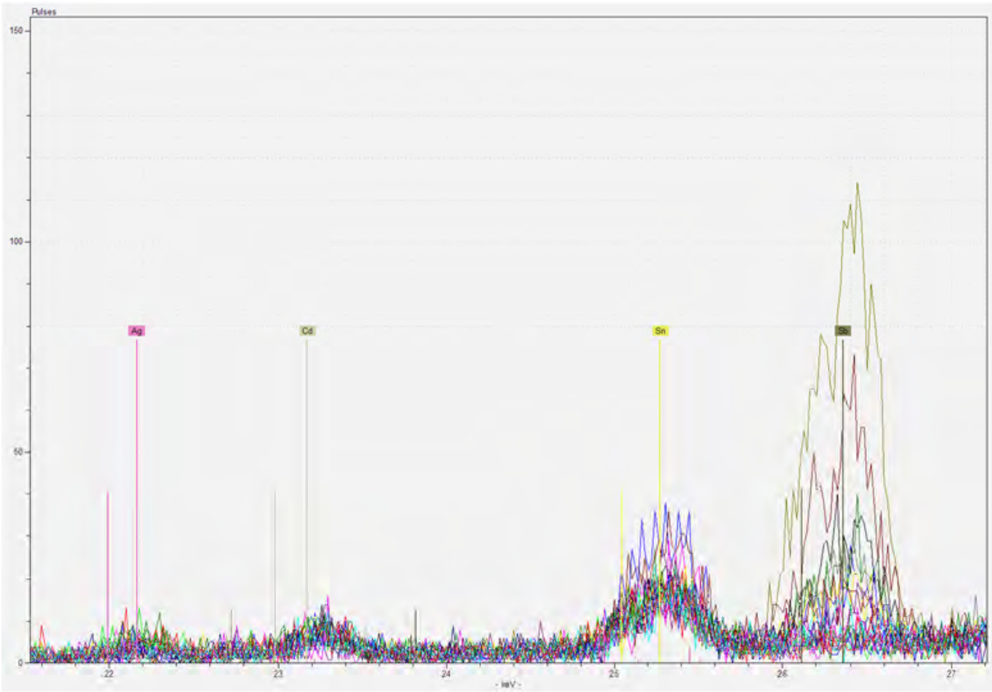


Figure 75. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Brier Creek 2017 Sample.

Table 14. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Brier Creek 2015 Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	0.80	7.59	0.42		
Segment 2	2.36	3.04	0.11		
Segment 3	1.63	122.86	0.16		
Segment 4	0.10	0.54	0.11		
Segment 5	1.01	0.66	0.06		
AVERAGE	0.80	4.68	0.14		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	14	15.4%	2855.8		
Segment 2	12	13.2%	819.8	**SSE Total**	**109.7**
Segment 3	2	2.2%	0.0		
Segment 4	37	40.7%	22.8		
Segment 5	26	28.6%	27.5		
TOTAL	91	100.0%			

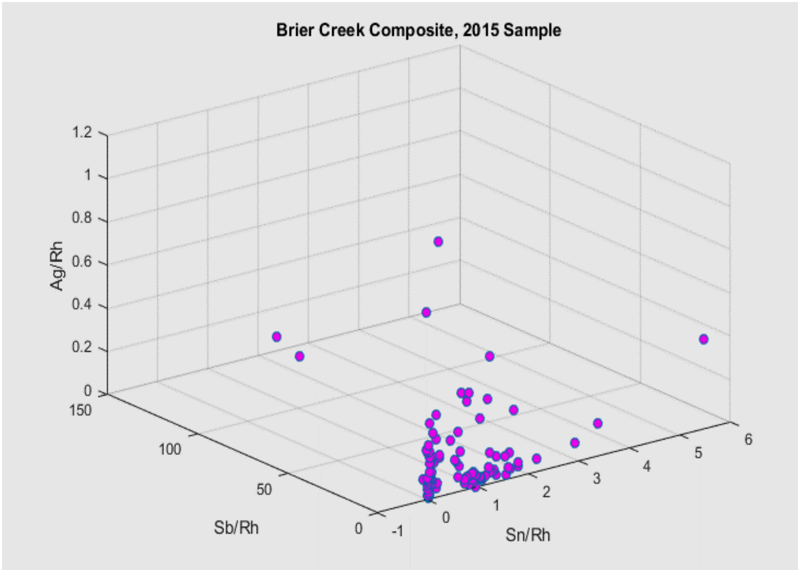


Figure 76. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Brier Creek 2015 Sample.

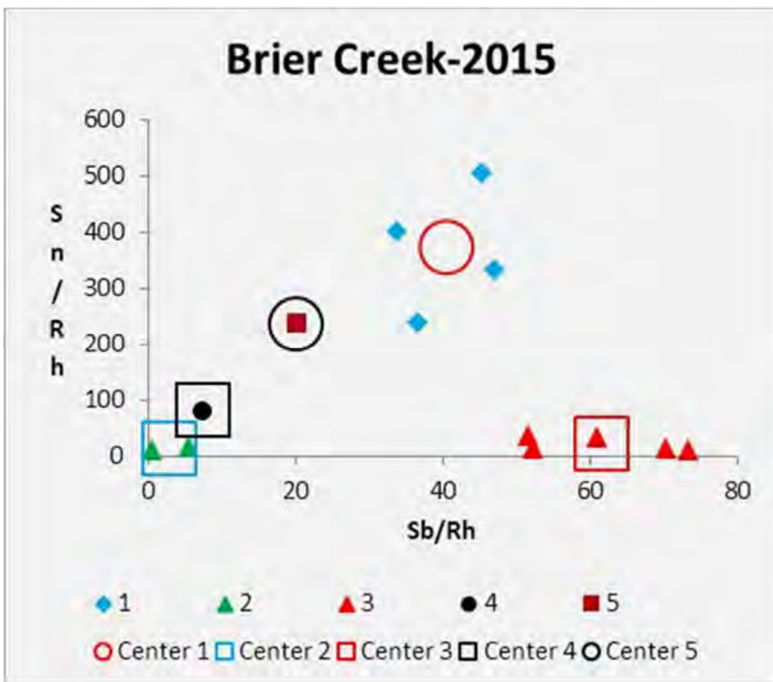


Figure 77. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Brier Creek 2015 Sample.

Table 15. Chi-square Calculations, Silver (Ag), Tin (Sn) and Antimony (Sb) Ratios and Weapon Type, Brier Creek 2015 Sample.

	Brier Creek Balls					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	
Rifle	8 *2.92* (8.82)	3 *2.51* (0.10)	2 *0.42* (6.00)	4 *7.73* (1.80)	2 *5.43* (2.17)	**19**
Fusil	1 *2.31* (0.74)	1 *1.98* (0.48)	0 *0.33* (0.33)	6 *6.10* (0.00)	7 *4.29* (1.72)	**15**
Charleville	0 *0.46* (0.46)	2 *0.40* (6.51)	0 *0.07* (0.07)	1 *1.22* (0.04)	0 *0.86* (0.86)	**3**
British	3 *4.77* (0.66)	2 *4.09* (1.07)	0 *0.68* (0.68)	19 *12.60* (3.25)	7 *8.86* (0.39)	**31**
Other	2 *3.54* (0.67)	4 *3.03* (0.31)	0 *0.51* (0.51)	7 *9.35* (0.59)	10 *6.57* (1.79)	**23**
	14	**12**	**2**	**37**	**26**	**91**

χ^2 = 39.981, df = 16, χ^2/df = 2.50, P(χ^2 > 39.981) = 0.0008

Table 16. Output for Four Clusters/Segments, Nickel (Ni), Copper (Cu) and Zinc (Zn) Ratios, Brier Creek 2015 Sample.

Mean/Centroid	***Ni/Rh***	***Cu/Rh***	***Zn/Rh***	***0***	***0***
Segment 1	0.01	0.91	0.17		
Segment 2	0.01	0.45	0.08		
Segment 3	0.03	0.52	0.11		
Segment 4	0.05	0.87	0.21		
AVERAGE	0.02	0.64	0.13		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	23	25.3%	0.9		
Segment 2	25	27.5%	0.2	**SSE Total**	**1.7**
Segment 3	33	36.3%	0.3		
Segment 4	10	11.0%	0.2		
TOTAL	91	100.0%			

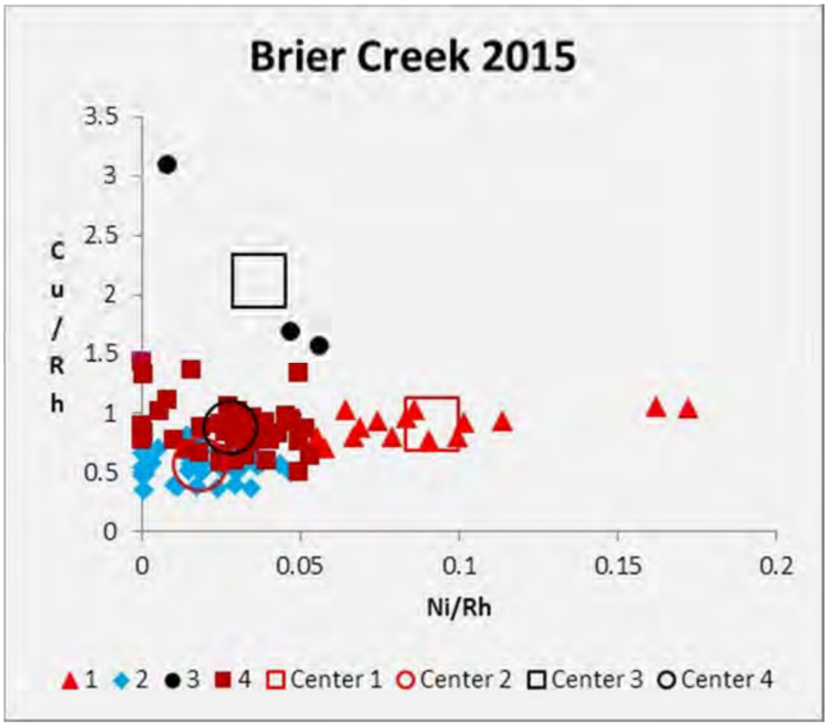


Figure 78. Central Means Chart for Four Segments, Nickel (Ni), Copper (Cu) and Zinc (Zn) Ratios, Brier Creek (2015) Sample.

Table 17. Chi-square Calculations, Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh) ratios and Weapon Type, Brier Creek 2015 Sample.

	Brier Creek 2015 Ni Cu Zn Ratios				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	
Rifle	7 *4.80* (1.01)	3 *5.22* (0.94)	5 *6.89* (0.52)	4 *2.09* (1.75)	19
Fusil	6 *3.79* (1.29)	4 *4.12* (0.00)	4 *5.44* (0.38)	1 *1.65* (0.26)	15
Charleville	3 *0.76* (6.63)	0 *0.82* (0.82)	0 *1.09* (1.09)	0 *0.33* (0.33)	3
British	4 *7.84* (1.88)	11 *8.52* (0.72)	15 *11.24* (1.26)	1 *3.41* (1.70)	31
Other	3 *5.81* (1.36)	7 *6.32* (0.07)	9 *8.34* (0.05)	4 *2.53* (0.86)	23
	23	25	33	10	91

χ^2 = 22.918, df = 12, χ^2/df = 1.91 , $P(\chi^2 > 22.918)$ = 0.0284

Table 18. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Brier Creek 2017 Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	1.31	7.23	1.12		
Segment 2	3.17	11.23	2.57		
Segment 3	15.07	17.28	7.38		
Segment 4	13.09	25.79	2.52		
Segment 5	24.10	6.95	1.03		
AVERAGE	8.27	11.51	2.22		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	8	33.3%	23.4		
Segment 2	7	29.2%	105.5	**SSE Total**	**18.6**
Segment 3	2	8.3%	0.0		
Segment 4	3	12.5%	10.1		
Segment 5	4	16.7%	748.7		
TOTAL	24	100.0%			

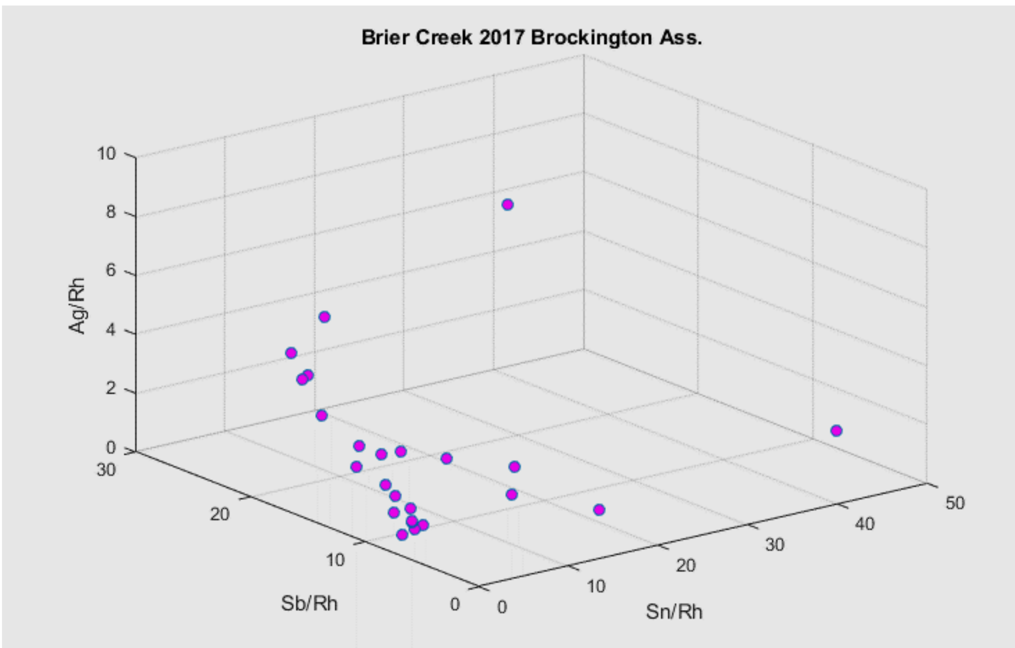


Figure 79. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Brier Creek 2017 Sample.

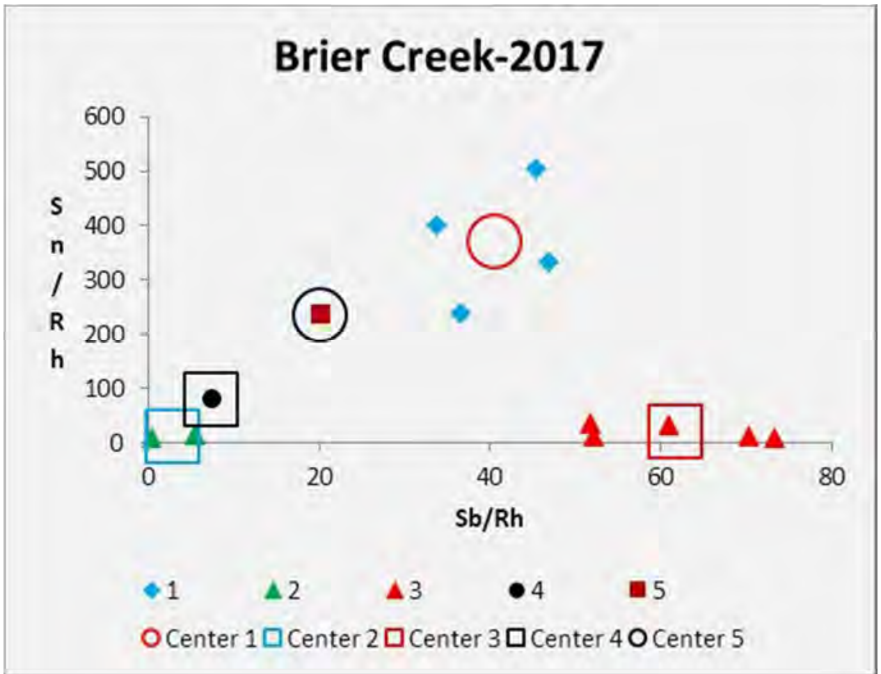


Figure 80. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Brier Creek 2017 Sample.

Table 19. Chi-square Calculations on Silver (Ag), Antimony (Sb) and Tin (Sn) Ratios by Weapon Type, Brier Creek (2017) Sample.

	Brier Creek Balls (2017 Sample)					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	
Rifle	2 *2.00* (0.00)	1 *1.75* (0.32)	0 *0.50* (0.50)	0 *0.75* (0.75)	3 *1.00* (4.00)	**6**
Fusil	5 *4.33* (0.10)	3 *3.79* (0.17)	2 *1.08* (0.78)	2 *1.62* (0.09)	1 *2.17* (0.63)	**13**
Charleville	0 *0.33* (0.33)	1 *0.29* (1.72)	0 *0.08* (0.08)	0 *0.12* (0.12)	0 *0.17* (0.17)	**1**
British	0 *1.00* (1.00)	2 *0.88* (1.45)	0 *0.25* (0.25)	1 *0.38* (1.04)	0 *0.50* (0.50)	**3**
Other	1 *0.33* (1.33)	0 *0.29* (0.29)	0 *0.08* (0.08)	0 *0.12* (0.12)	0 *0.17* (0.17)	**1**
	8	**7**	**2**	**3**	**4**	**24**

χ^2 = 15.996, df = 16, χ^2/df = 1.00 , $P(\chi^2 > 15.996)$ = 0.4532

Battle of Purysburg

Purysburg was a village in present-day Jasper County, South Carolina. In early 1779 it served as headquarters for the American forces commanded by General Benjamin Lincoln. The lightly defended town was attacked by a large British force in April, 1779. Archaeologists located and identified the Purysburg Battlefield (Elliott 2016b). In 2015 Elliott analyzed 149 round ball and related specimens from the Purysburg battlefield. This sample is included as Group 33 in Appendix 1. Figures 81 and 82 show portions of the spectra for the Purysburg sample. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios for 128 balls the Purysburg sample. Five clusters were identified (Table 20). The dominant cluster (Segment 2) contained 45 of 128 specimens (35.2% of the assemblage). Segment 2 was most common for the Rifle and Fusil balls. Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.29, Tin (Sn)/Rhodium (Rh), 1.13 and Silver (Ag)/Rhodium (Rh), 0.16.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios for 97 balls the Purysburg subset sample. Five clusters were identified (Table 21 and Figures 83 and 84). The dominant cluster (Segment 2) contained 31 of 97 specimens (32% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.37, Tin (Sn)/Rhodium (Rh), 1.22 and Silver (Ag)/Rhodium (Rh), 0.10.

Pearson's Chi-square tests was run on these results to determine if the clusters defined for the three ratios (Silver (Ag)/Rhodium (Rh), Tin (Sn)/Rhodium (Rh) and Antimony (Sb)/Rhodium (Rh)) were significant when compared with the results by weapon type (Rifles, Fusils, Charleville and British Standard balls (Table 22). This exercise yielded a Chi-square value of 106.148 and a P value of 0.0000. The null hypothesis, which states that the frequency distribution of certain events observed in the sample is consistent with the theoretical distribution, is rejected. The alternative hypothesis, that there is a difference between the distributions, is accepted at the 0.01 confidence level.

Cluster analysis also was performed on Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh) ratios in the Purysburg subset sample. Four clusters were identified (Table 23 and Figure 85). Segment 4 dominated the assemblage with 42 of 97 specimens. Segment 4 dominated the Rifle balls (20 of 41 specimens). Segments 2 and 4 equally dominated the Fusil balls (17 each of 42 specimens). Segment 2 dominated the Charleville balls (8 of 13 specimens). Mean/centroids for Segment 4 were Nickel (Ni)/Rhodium (Rh), 0.03, Copper (Cu)/Rhodium (Rh), 0.79 and Zinc (Zn)/Rhodium (Rh), 0.13.

Pearson's Chi-square tests was run on these results to determine if the clusters defined for these three ratios (Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh)) were significant when compared with the results by weapon type (Rifles, Fusils, Charleville and British Standard balls (Table 24). This exercise yielded a Chi-square value of 5.545 and a P value of 0.7844. The null hypothesis, which states that the frequency distribution of certain events observed in the sample is consistent with the theoretical distribution, must be accepted.

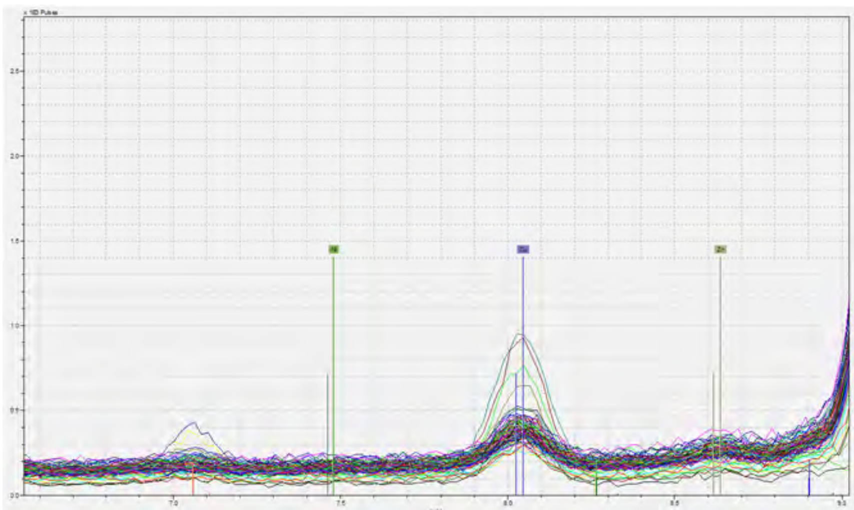


Figure 81. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Purysburg Sample.

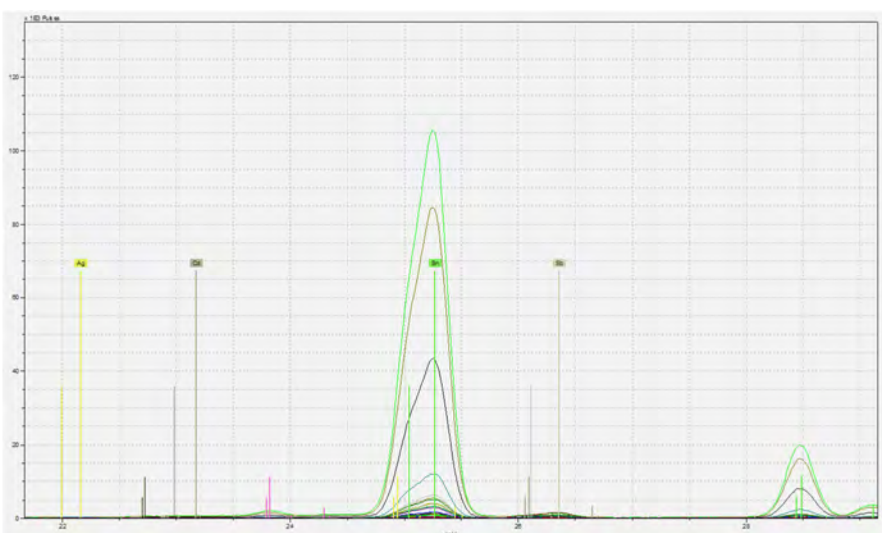


Figure 82. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Purysburg Sample.

Table 20. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Purysburg Composite Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*4*	*5*
Segment 1	1.93	11.92	0.49		
Segment 2	0.29	1.13	0.16		
Segment 3	2.02	6.68	0.29		
Segment 4	3.12	7.45	0.16		
Segment 5	1.65	409.18	0.00		
AVERAGE	***1.63***	***17.27***	***0.21***		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	42	32.8%	6,989	**SSE Total**	**38,437**
Segment 2	45	35.2%	93		
Segment 3	8	6.3%	614		
Segment 4	30	23.4%	4,721		
Segment 5	3	2.3%	26,021		
TOTAL	***128***	***100.0%***	***38,437***		

Table 21. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Purysburg Subset Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	3.26	5.43	0.15		
Segment 2	0.37	1.22	0.10		
Segment 3	1.65	409.18	0.00		
Segment 4	2.43	15.16	0.41		
Segment 5	0.24	2.80	0.32		
AVERAGE	1.48	17.81	0.21		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	24	24.7%	2161.5		
Segment 2	31	32.0%	77.9	**SSE Total**	**101.8**
Segment 3	3	3.1%	0.0		
Segment 4	18	18.6%	8485.2		
Segment 5	21	21.6%	780.1		
TOTAL	97	100.0%			

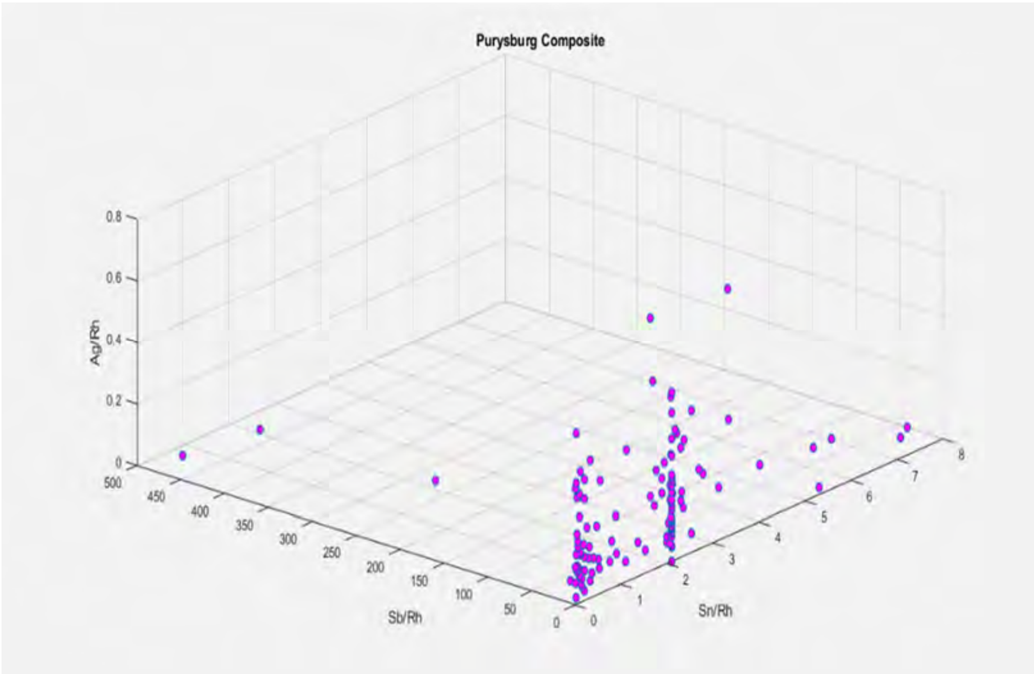


Figure 83. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Purysburg Sample.

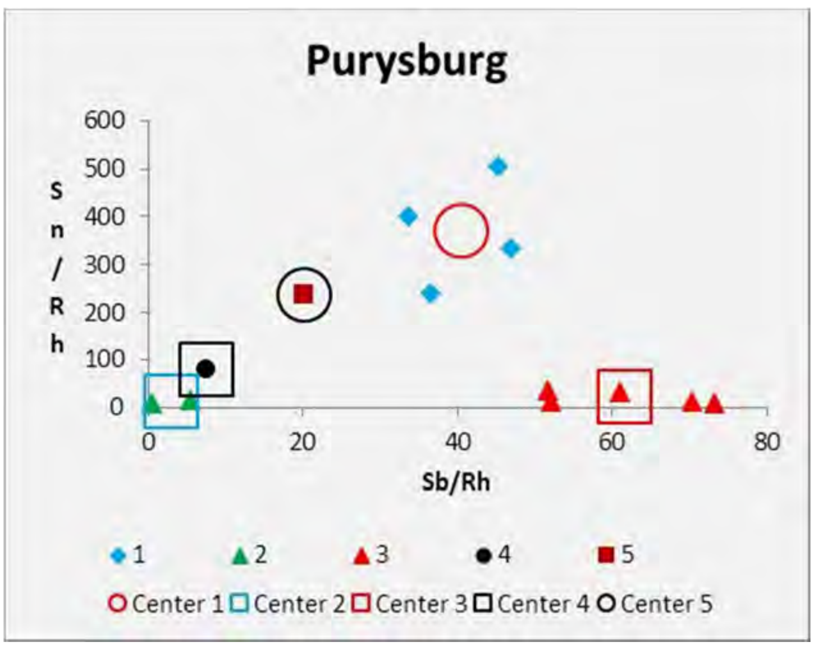


Figure 84. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Purysburg Sample (Subset).

Table 22. Chi-square Calculations for Silver (Ag), Tin (Sn) and Sh Ratios and Weapon Type, Purysburg Sample.

	Purysburg Balls					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	
Rifle	7 *13.24* (2.94)	22 *14.53* (3.84)	3 *2.58* (0.07)	8 *9.69* (0.29)	1 *0.97* (0.00)	**41**
Fusil	5 *13.56* (5.40)	23 *14.88* (4.43)	1 *2.65* (1.02)	12 *9.92* (0.44)	1 *0.99* (0.00)	**42**
Charleville	3 *4.20* (0.34)	0 *4.61* (4.61)	3 *0.82* (5.81)	7 *3.07* (5.03)	0 *0.31* (0.31)	**13**
British	0 *0.65* (0.65)	0 *0.71* (0.71)	1 *0.13* (6.06)	0 *0.47* (0.47)	1 *0.05* (19.21)	**2**
Other	26 *9.36* (29.57)	0 *10.28* (10.28)	0 *1.83* (1.83)	3 *6.85* (2.16)	0 *0.69* (0.69)	**29**
	41	**45**	**8**	**30**	**3**	**127**

χ^2 = 106.148, df = 16, χ^2/df = 6.63 , P(χ^2 > 106.148) = 0.0000

Table 23. Output for four Clusters/Segments, Nickel (Ni/Rh), Copper (Cu/Rh) and Zinc (Zn/Rh) Ratios, Purysburg Subset Sample.

Mean/Centroid	***Ni/Rh***	***Cu/Rh***	***Zn/Rh***	***0***	***0***
Segment 1	0.09	0.90	0.17		
Segment 2	0.02	0.57	0.09		
Segment 3	0.04	2.11	0.22		
Segment 4	0.03	0.87	0.15		
AVERAGE	0.03	0.79	0.13		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	15	15.3%	0.2		
Segment 2	38	38.8%	0.6	**SSE Total**	**4.1**
Segment 3	3	3.1%	1.5		
Segment 4	42	42.9%	1.9		
TOTAL	98	100.0%			

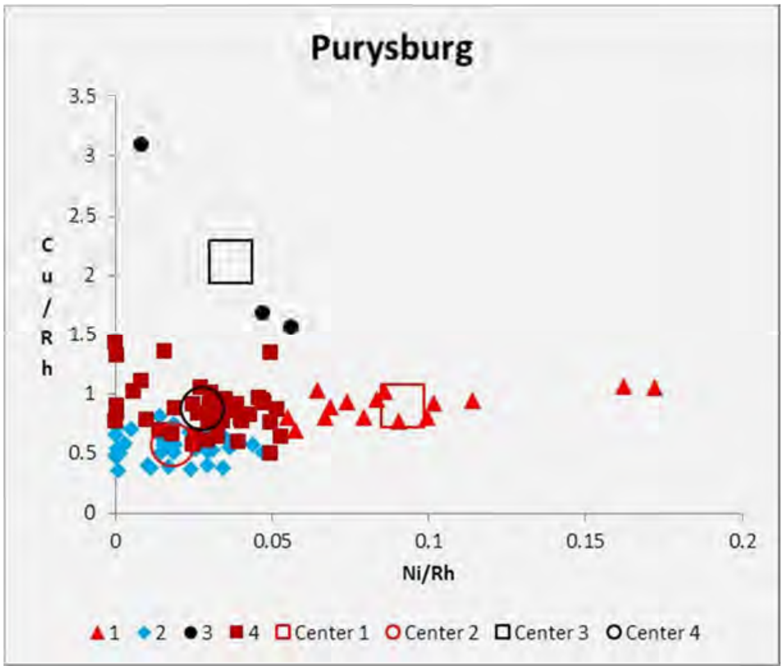


Figure 85. Central Means Chart for Four Segments, Nickel (Ni/Rh), Copper (Cu/Rh) and Zinc (Zn/Rh) Ratios, Purysburg Subset Sample.

Table 24. Chi-square Calculations for Nickel (Ni)/Rhodium (Rh), Copper (Cu)/Rhodium (Rh) and Zinc (Zn)/Rhodium (Rh) ratios and Weapon Type, Purysburg Sample.

	Purysburg Ni Cu Zn Ratios				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	
Rifle	7 *6.28* (0.08)	12 *15.90* (0.96)	2 *1.26* (0.44)	20 *17.57* (0.34)	41
Fusil	7 *6.43* (0.05)	17 *16.29* (0.03)	1 *1.29* (0.06)	17 *18.00* (0.06)	42
Charleville	1 *1.99* (0.49)	8 *5.04* (1.74)	0 *0.40* (0.40)	4 *5.57* (0.44)	13
British	0 *0.31* (0.31)	1 *0.78* (0.06)	0 *0.06* (0.06)	1 *0.86* (0.02)	2
	15	38	3	42	98

χ^2 = 5.545, df = 9, χ^2/df = 0.62 , P(χ^2 > 5.545) = 0.7844

Madison Square

Madison Square is located in Savannah, Georgia. It was the location of British fortifications that were attacked during the Siege of Savannah in September and

October 1779. Archaeologists explored this location in 2007 and recovered a well-preserved British ditch that contained ammunition related to the siege (Elliott and Elliott 2009). In 2015 Elliott and Moreton analyzed 13 round balls and one gambling die likely made from a musket ball from the archaeological collections from Madison Square, which are housed at the Coastal Historical Society in Savannah. This sample is included as Group 27 in Appendix 1. Figures 86 and 87 show portions of the spectra for the Madison Square sample. Copper (Cu), Zinc (Zn), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figure 88 shows a graph of the Tin (Sn) and Antimony (Sb) in the Madison Square sample.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios for 14 balls in the Madison Square sample. Five clusters were identified (Table 25 and Figures 89 and 90). The dominant cluster (Segment 3) contained five of 14 specimens (35.7% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.47, Tin (Sn)/Rhodium (Rh), 1.51 and Silver (Ag)/Rhodium (Rh), 0.05.

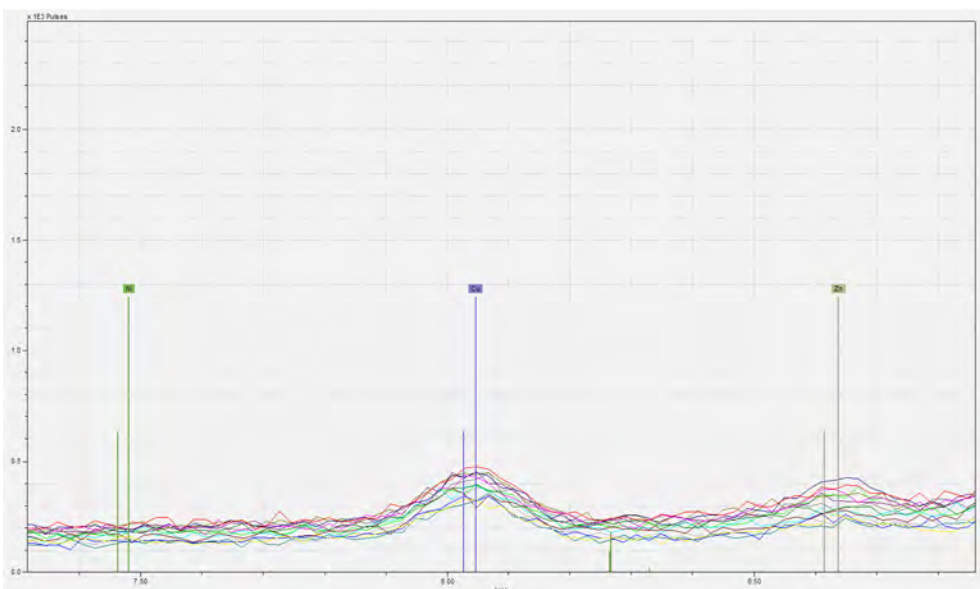


Figure 86. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Madison Square Sample.

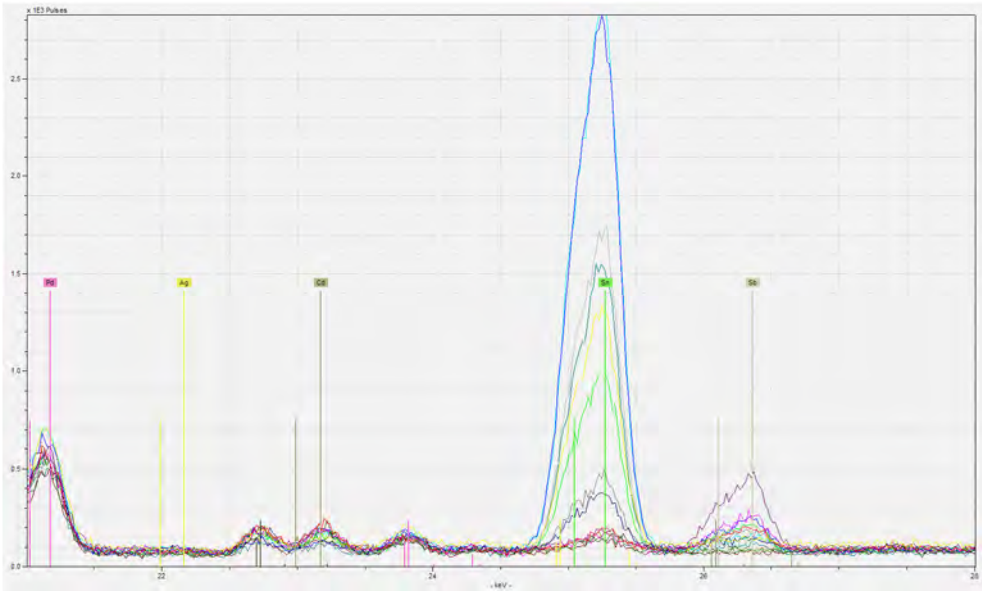


Figure 87. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Madison Square Sample.

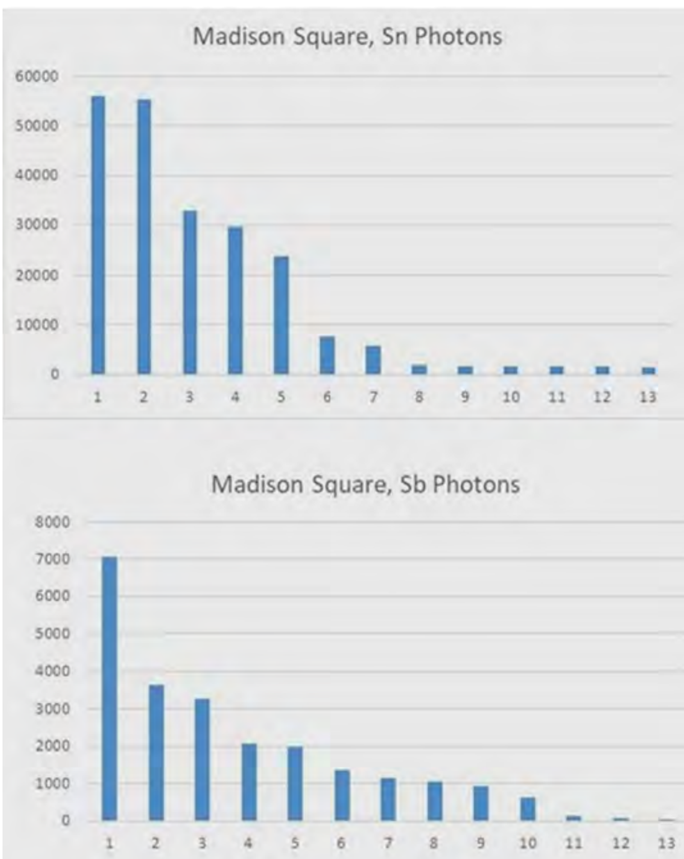


Figure 88. Distribution of Tin (Sn) and Antimony (Sb) Photons in Madison Square Sample.

Table 25. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Madison Square Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	0.43	14.94	0.11		
Segment 2	0.11	2.30	0.09		
Segment 3	0.47	1.51	0.05		
Segment 4	1.65	0.38	0.05		
Segment 5	1.51	25.62	0.15		
AVERAGE	0.52	6.26	0.08		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	3	21.4%	0.3		
Segment 2	4	28.6%	31.2	**SSE Total**	**6.3**
Segment 3	5	35.7%	0.0		
Segment 4	1	7.1%	0.0		
Segment 5	1	7.1%	0.0		
TOTAL	14	100.0%			

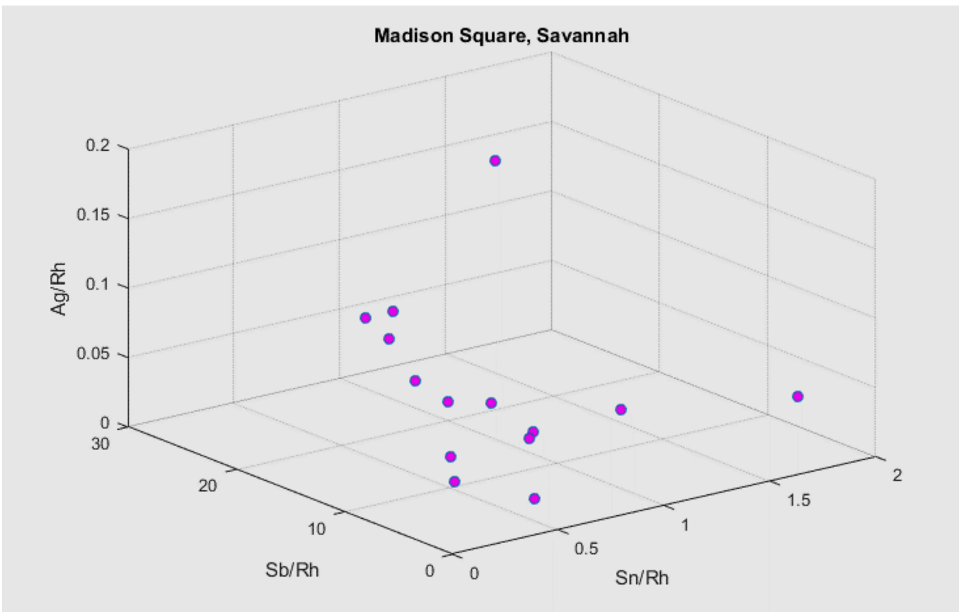


Figure 89. Scattergram of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Madison Square Sample.

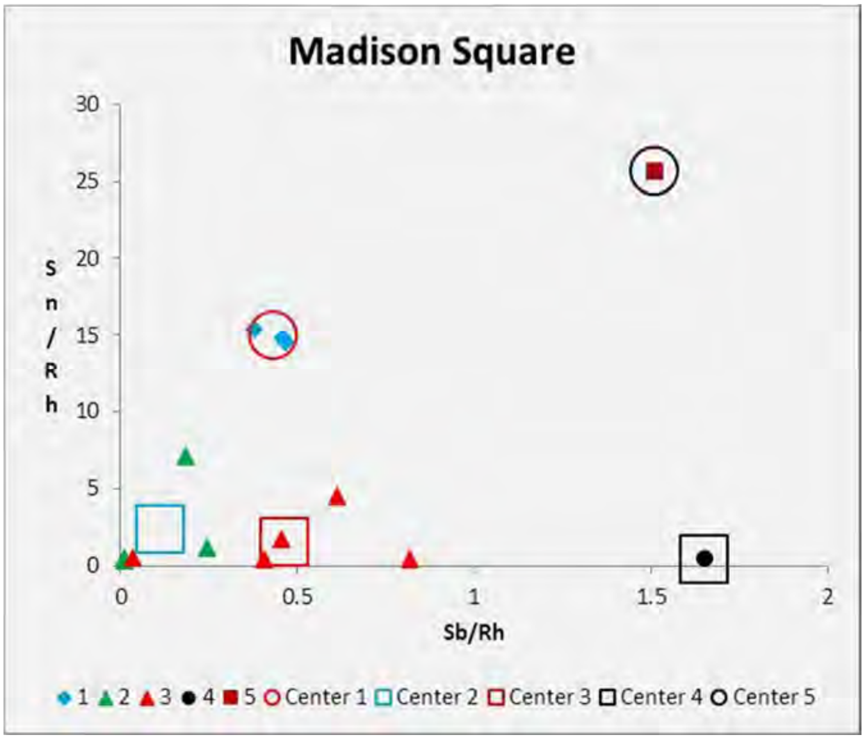


Figure 90. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Madison Square Sample.

Spring Hill

The British erected an earthen redoubt at Spring Hill beyond the southwestern limits of Savannah in September and early October, 1779. On October 9, 1779, this redoubt was the primary attack point of French and American forces who had besieged the city for several weeks. Archaeologists located a portion of the British ditch work at Spring Hill redoubt (R. Elliott 2011). In 2015 Elliott and Moreton analyzed 10 round balls from the archaeological collections from Spring Hill redoubt, which are housed at the Coastal Historical Society in Savannah. This sample is included as Group 37in Appendix 1. Figures 91 and 92 show portions of the spectra for the Spring Hill sample. Copper (Cu), Zinc (Zn), Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Spring Hill sample. Five clusters were identified (Table 26 and Figures 93 and 94). The dominant cluster (Segment 5) contained five of 10 specimens (35.2% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.23, Tin (Sn)/Rhodium (Rh), 0.54 and Silver (Ag)/Rhodium (Rh), 0.17.

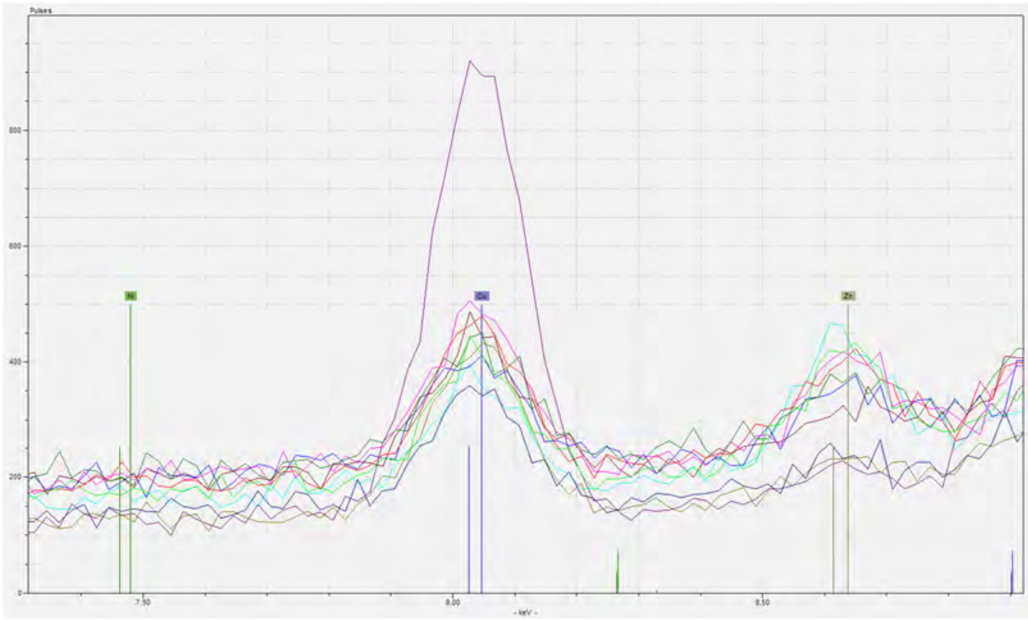


Figure 91. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Spring Hill Sample.

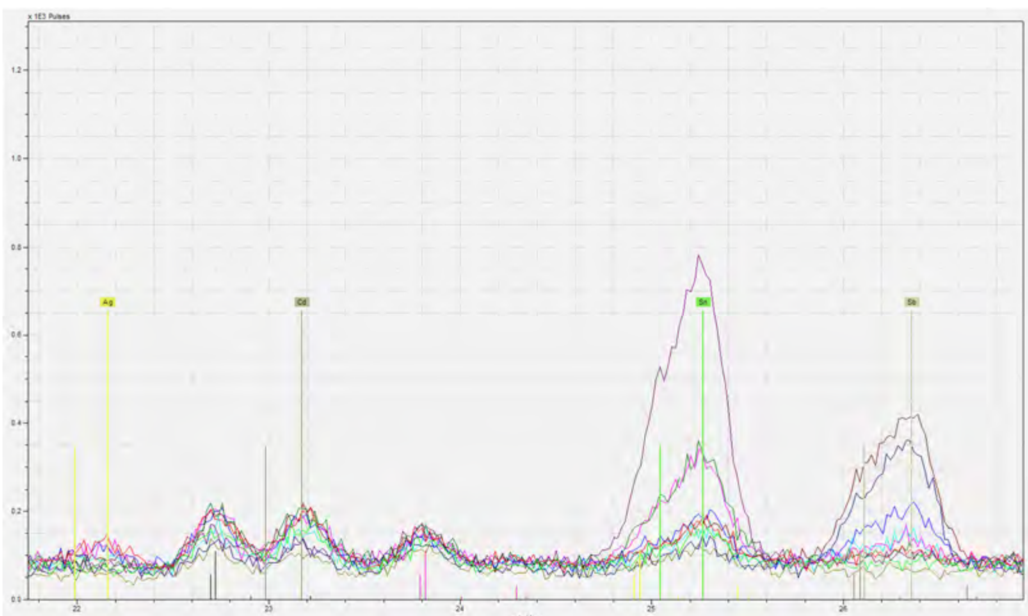


Figure 92. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Spring Hill Sample.

Table 26. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Spring Hill Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	2.74	0.50	0.12		
Segment 2	0.05	0.69	0.04		
Segment 3	1.32	0.31	0.09		
Segment 4	0.04	4.44	0.06		
Segment 5	0.23	0.54	0.17		
AVERAGE	0.54	0.93	0.12		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	1	10.0%	0.0		
Segment 2	2	20.0%	0.2	**SSE Total**	**2.2**
Segment 3	1	10.0%	0.0		
Segment 4	1	10.0%	0.0		
Segment 5	5	50.0%	0.4		
TOTAL	10	100.0%			

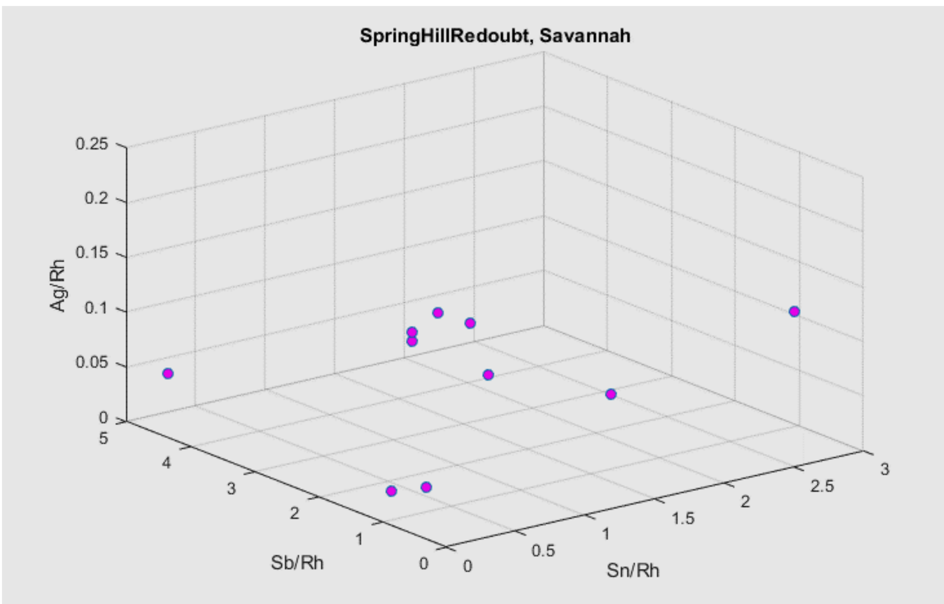


Figure 93. Scattergram of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Spring Hill Sample.

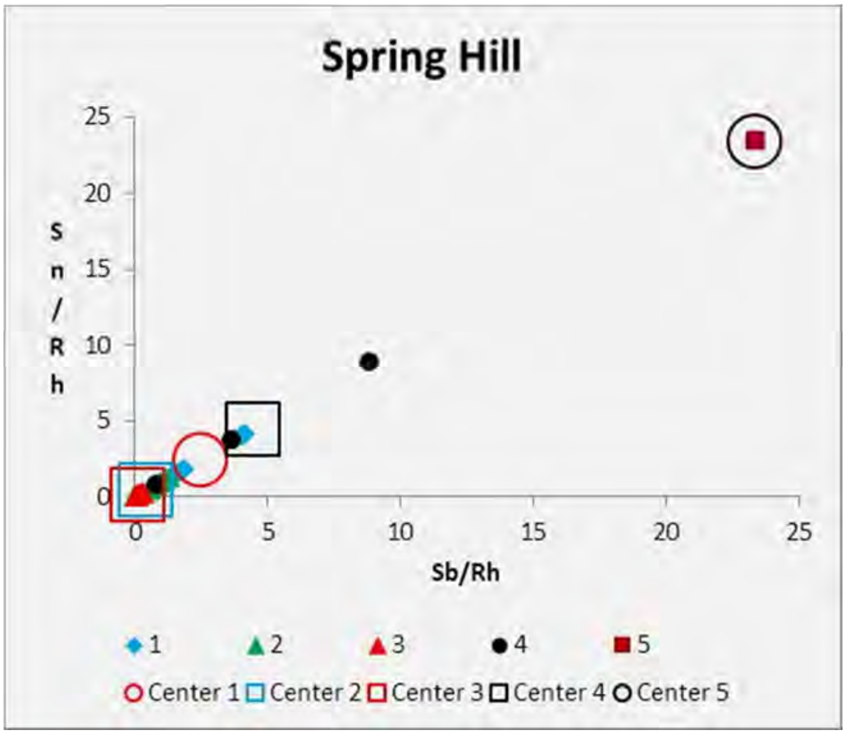


Figure 94. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Spring Hill Sample.

Fahm Street

Fahm Street is located in western Savannah, Georgia. In October, 1779, when it was the scene of a Revolutionary War engagement, it was located outside town along the British defensive perimeter. Archaeologists explored a portion of Fahm Street in the 1980s, when Fahm Street was extended (Wood 1985). Two round balls in he Fahm Street Extension collection, which is housed at the Coastal Heritage Society, was analyzed by Elliott and Moreton in 2015. This sample is included as Group 13 in Appendix 1.

Savannah Composite

The composite sample from the Battle of Savannah, which includes samples from Madison Square, Spring Hill and Fahm Street, were examined collectively. Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios for the composite Savannah sample. Five clusters were identified (Table 27 and Figure 95). The dominant cluster (Segment 1) contained 10 items (38.5% of the assemblage). It has a mean/centroid of 0.21 for Sb, 1.10 for Tin (Sn) and 0.06 for Ag. This cluster dominated at Madison Square but was a minority at Spring Hill. Cluster 4 was confined to the Spring Hill and Fahm Street assemblage, while Clusters 3 and 5 were restricted to Madison Square.

Table 27. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Savannah Composite Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	0.21	1.10	0.06		
Segment 2	1.90	0.40	0.09		
Segment 3	0.42	11.29	0.09		
Segment 4	0.27	2.80	0.19		
Segment 5	1.51	25.62	0.15		
AVERAGE	0.51	4.38	0.11		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	10	38.5%	15.0		
Segment 2	3	11.5%	1.1	**SSE Total**	**24.3**
Segment 3	5	19.2%	0.0		
Segment 4	7	26.9%	166.5		
Segment 5	1	3.8%	0.0		
TOTAL	26	100.0%			

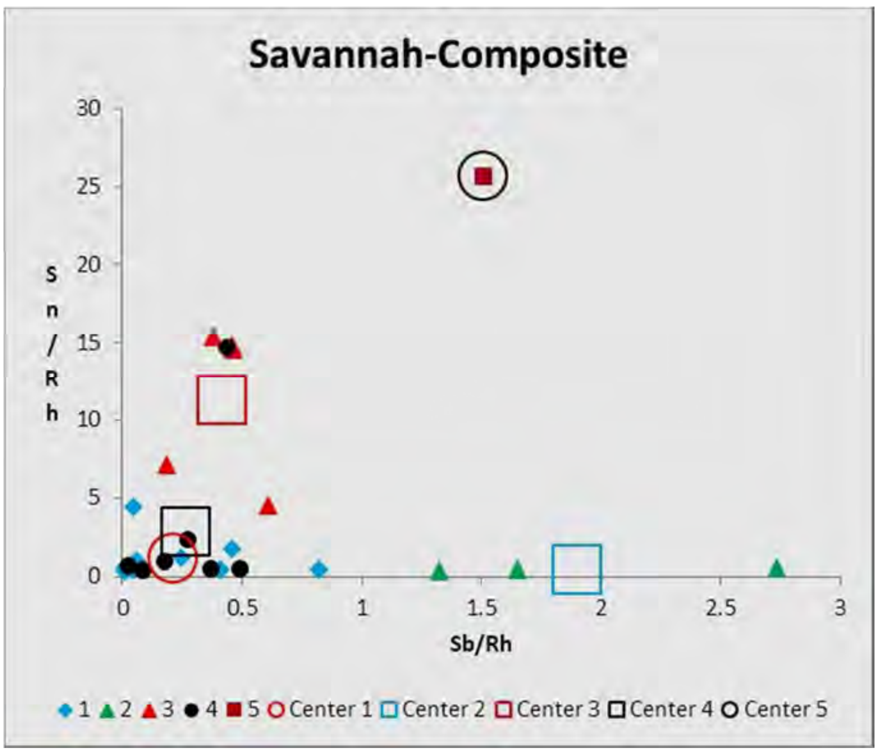


Figure 95. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Savannah Composite Sample.

Battle of Camden

Camden was an eighteenth century town and battlefield in present-day Kershaw County in the South Carolina piedmont. In 1780, it was the scene of major military engagements between the British and American forces. Archaeologists with SCIAA conducted several battlefield archaeology studies at various portions of the Camden Battlefield. John Allison provided a sample of 11 round shot from Camden for the 2017 workshop. These include two case shot and nine musket balls. This sample is included as Group 7 in Appendix 1. Figures 96 and 97 show portions of the spectra for the Camden sample. Copper (Cu), Tin (Sn) and Antimony (Sb) display peaks in these graphs. One specimen (Camden 83-001) contains higher amounts of Tin (Sn) and Antimony (Sb) than the rest of the assemblage. The Camden assemblage was too small for any meaningful cluster analysis.

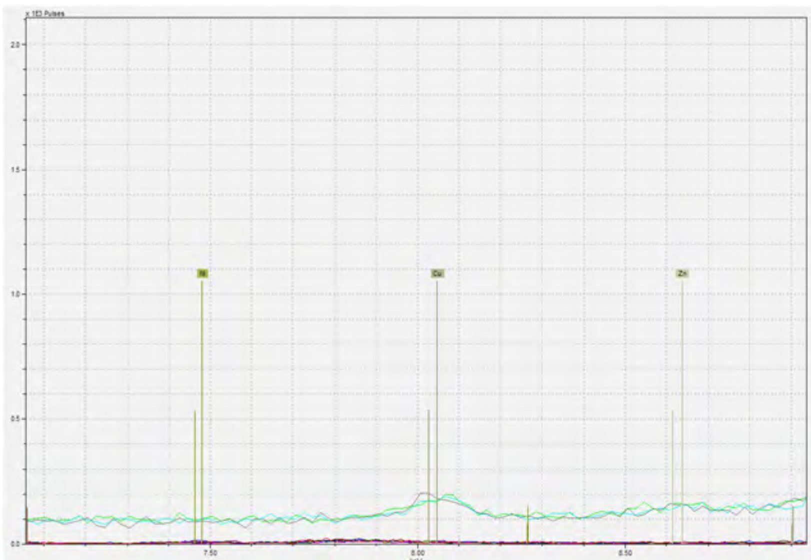


Figure 96. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Camden Sample.

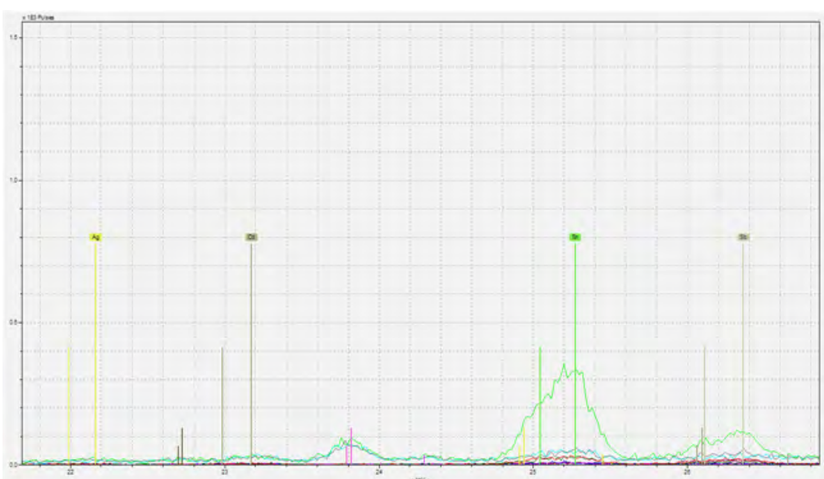


Figure 97. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Camden Sample.

Kings Mountain

The battle of Kings Mountain, South Carolina took place on October 7, 1780. The battlefield is located in Cherokee County, South Carolina and is currently operated by the National Park Service as the Kings Mountain National Military Park. The battle, which was an American victory, pitted about 900 Patriot militia against 1,105 Loyalist militia (Draper 1881). In 2015 Seibert analyzed 66 round ball samples from the National Park Service collections from Kings Mountain. This sample is included as Group 26 in Appendix 1. Figures 98 and 99 show portions of the spectra for the Kings Mountain sample. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios for 66 balls in the Kings Mountain sample. Five clusters were identified (Table 28; Figures 100 and 101). The dominant cluster (Segment 5) contained 26 of 66 specimens (39.4% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.51, Tin (Sn)/Rhodium (Rh), 2.65 and Silver (Ag)/Rhodium (Rh), 0.30.

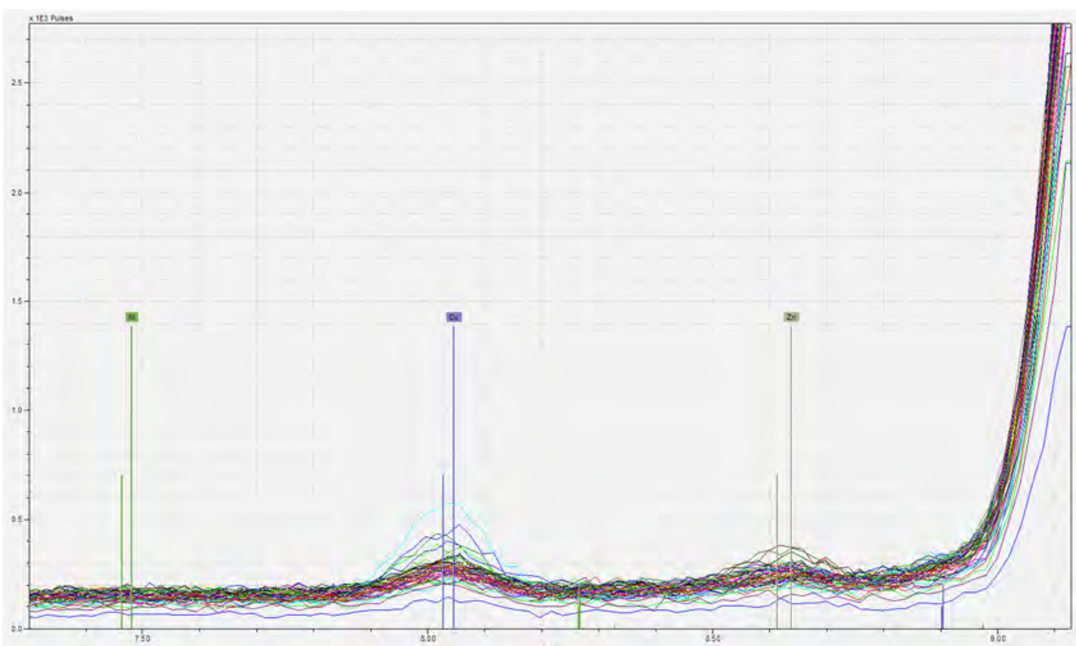


Figure 98. Spectra of Nickel (Ni,) Copper (Cu) and Zinc (Zn), Kings Mountain Sample.

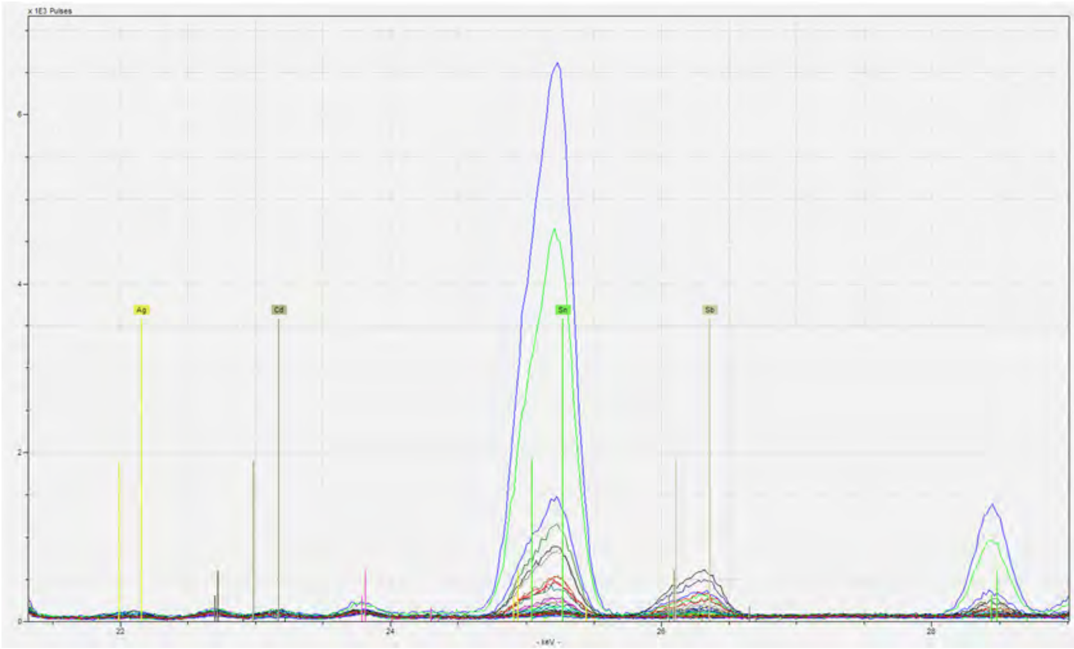


Figure 99. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb), Kings Mountain Sample.

Table 28. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Kings Mountain Sample.

Mean/Centroid	***Sb/Rh***	***Sn/Rh***	***Ag/Rh***	***0***	***0***
Segment 1	0.21	2.09	0.16		
Segment 2	0.33	0.75	0.11		
Segment 3	2.23	39.49	0.51		
Segment 4	4.80	5.01	0.43		
Segment 5	0.51	2.65	0.30		
AVERAGE	0.69	4.35	0.24		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	15	22.7%	150.4		
Segment 2	18	27.3%	9.2	**SSE Total**	**62.1**
Segment 3	4	6.1%	0.0		
Segment 4	3	4.5%	32.8		
Segment 5	26	39.4%	539.4		
TOTAL	66	100.0%			

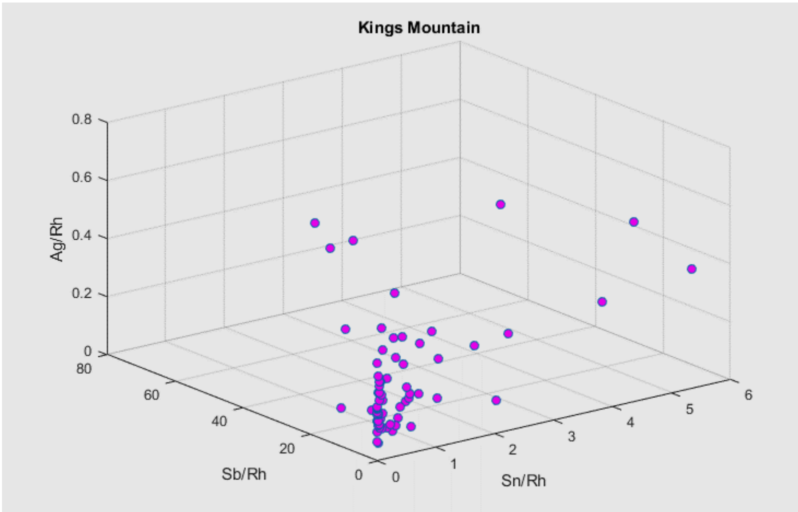


Figure 100. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in Kings Mountain Sample.

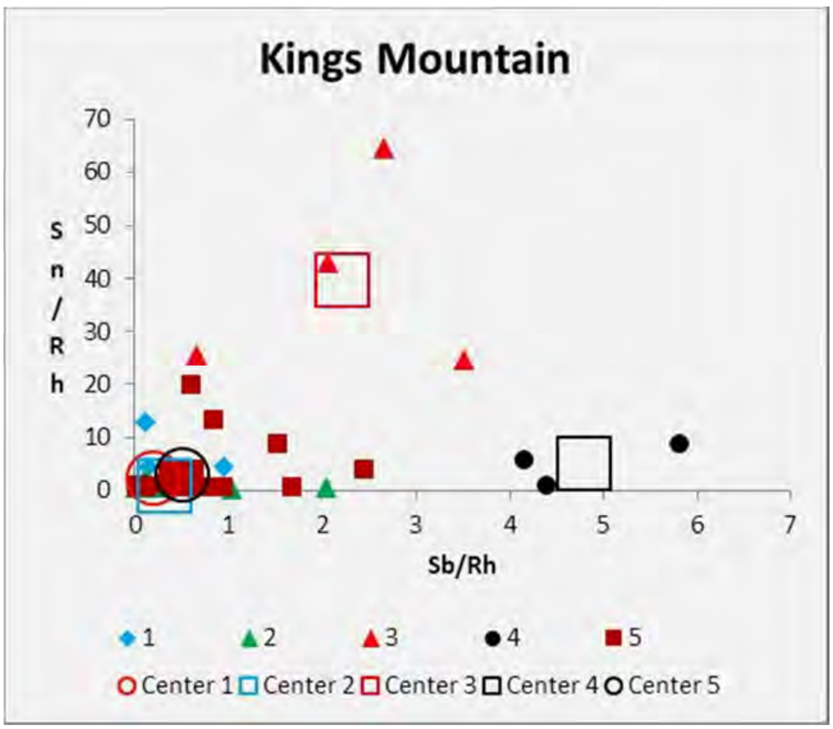


Figure 101. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Kings Mountain Sample.

Cowpens

The Battle of Cowpens took place on January 17, 1781 at Robert Hanna's Cowpen in the South Carolina piedmont (Babits 1998). The battle, which was an American victory, pitted approximately 1,900 Patriots against 1,150 British and Loyalist troops. Most of the battlefield is currently managed by the National Park Service as the Cowpens National Battlefield. Archaeologists recently completed a metal detector survey of portions of the battlefield (Seibert 2016a-b). Seibert provided 36 round ball samples from the National Park Service's Cowpens collection, which he analyzed in 2012. Some of these specimens were analyzed again at the December 2015 workshop. The Cowpens sample is included as Group 11 in Appendix 1. Figures 102 and 103 show close-ups of the Cowpens spectra for those samples where information was collected for 500 seconds per sample. Nickel (Ni), Copper (Cu) and Zinc (Zn) are present in low levels in most of these samples. High Cadmium (Cd) levels are present in these samples. Many contain higher Cadmium levels than Tin (Sn) or Antimony (Sb), which are also present in most samples.

Cluster analysis was performed on the Silver (Ag), Antimony (Sb) and Tin (Sn) ratios from the Cowpens sample. Four clusters were identified (Table 29; Figures 104 and 105). The dominant cluster (Segment 1) contained 25 of 36 balls (69.4%). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.00, Tin (Sn)/Rhodium (Rh), 0.36 and Silver (Ag)/Rhodium (Rh), 0.05. Three of these clusters (Segments 1, 2 and 4) were relatively similar, while the fourth (Segment 3) consisted of a single specimen with notably higher Antimony (Sb), Tin (Sn) and Silver (Ag) values.

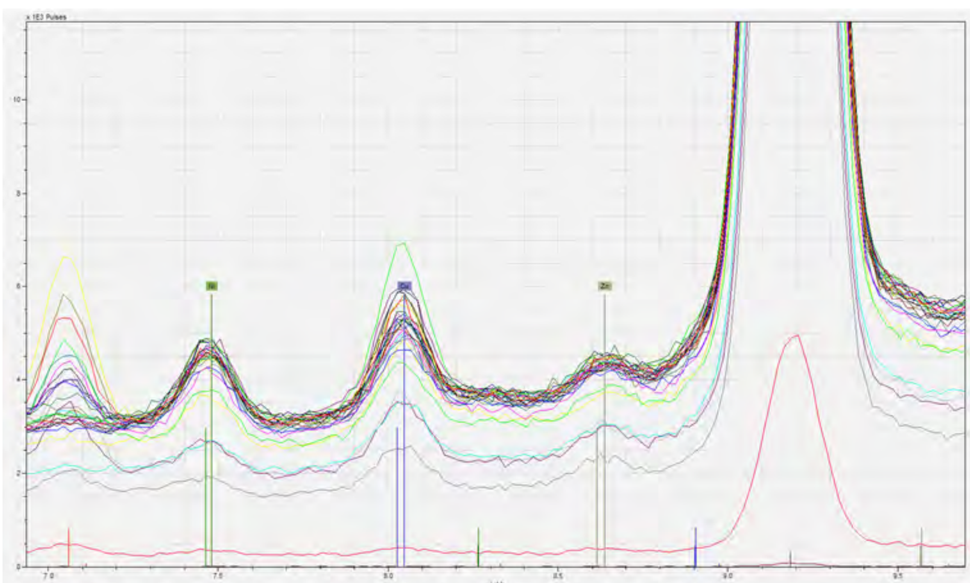


Figure 102. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Cowpens Sample.

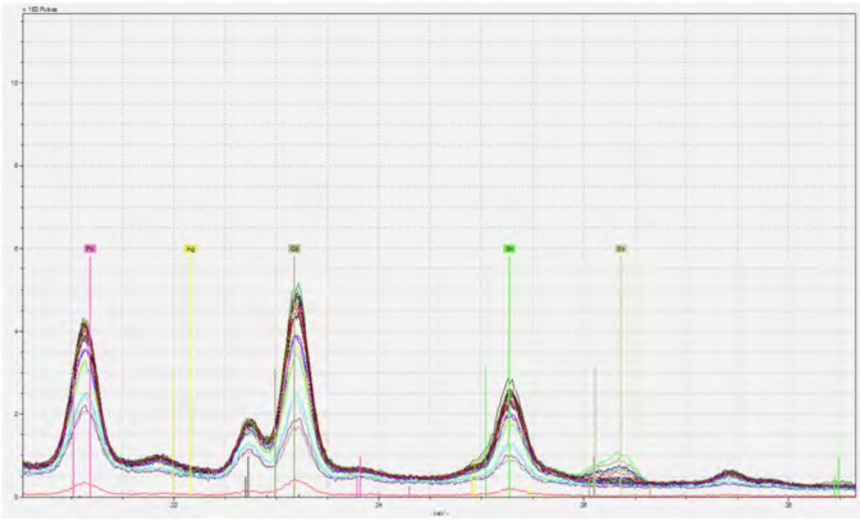


Figure 103. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Cowpens Sample.

Table 29. Output for Four Clusters/Segments, Silver (Ag), Tin (Sn) and Antimony (Sb) Ratios, Cowpens Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	0.00	0.36	0.05		
Segment 2	0.06	0.43	0.08		
Segment 3	0.55	1.46	0.46		
Segment 4	0.06	0.40	0.30		
AVERAGE	0.03	0.41	0.08		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	25	69.4%	0.1		
Segment 2	8	22.2%	0.0	**SSE Total**	**0.2**
Segment 3	1	2.8%	0.0		
Segment 4	2	5.6%	0.0		
TOTAL	36	100.0%			

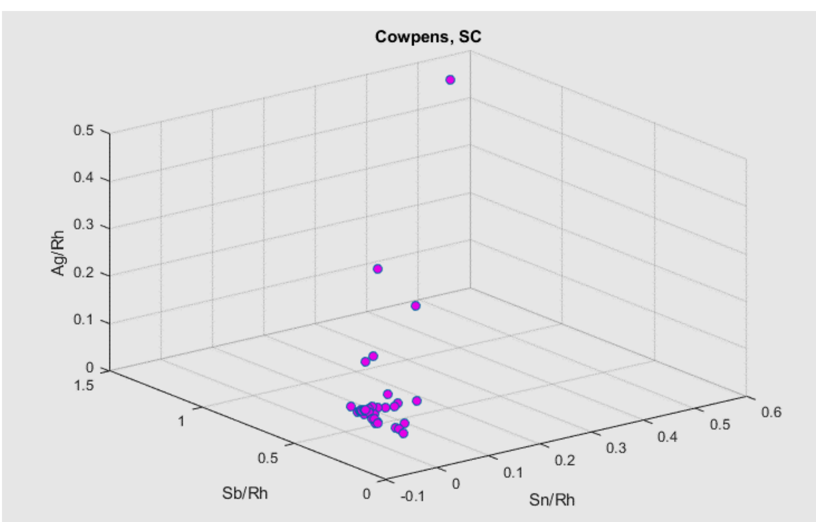


Figure 104. Scatterplot of Silver (Ag), Antimony (Sb) and Tin (Sn) in Cowpens Sample.

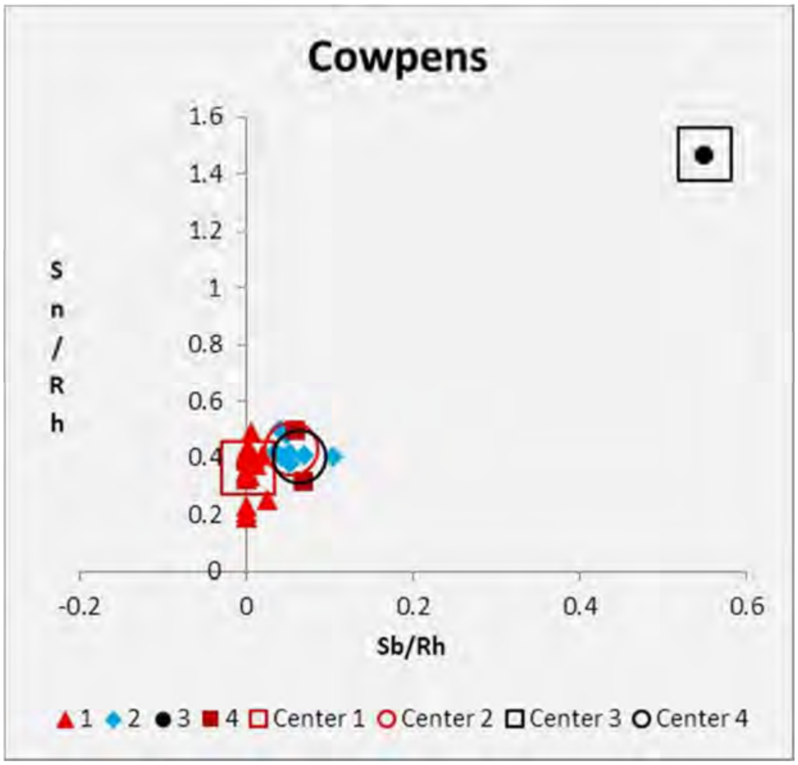


Figure 105. Central Means Chart for Four Clusters, Silver (Ag), Tin (Sn) and Antimony (Sb) Ratios, Cowpens Sample.

Guilford Courthouse

The Battle of Guilford Courthouse took place on March 15, 1781 in present-day Greensboro, Guilford County, North Carolina. The battlefield is presently maintained as the Guilford Courthouse National Military Park. Seibert analyzed 50 round balls recovered from archaeological work at Guilford Courthouse prior to the 2015 workshop. This sample is included as Group 23 in Appendix 1. Figures 106 and 107 show portions of the spectra for the Guilford Courthouse sample. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Guilford Courthouse sample. Five clusters were identified (Table 30; Figures 108 and 109). The dominant cluster (Segment 2) contained 20 of 50 items (40% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.40, Tin (Sn)/Rhodium (Rh), 0.40 and Silver (Ag)/Rhodium (Rh), 0.13.

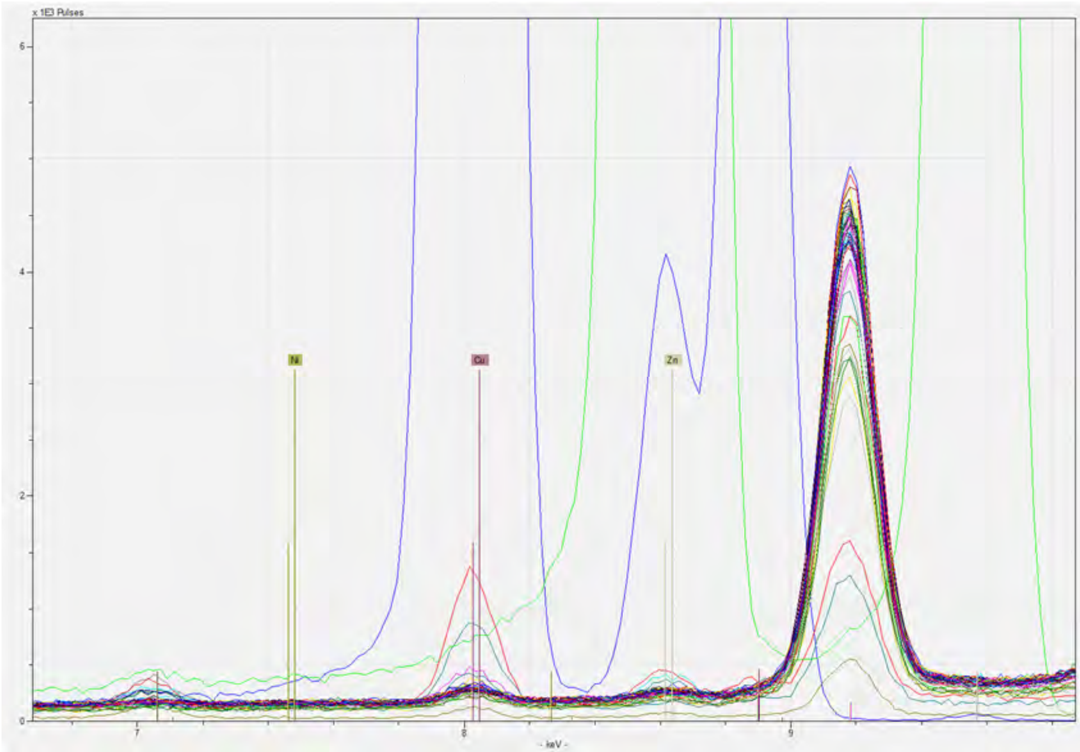


Figure 106. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Guilford Courthouse.

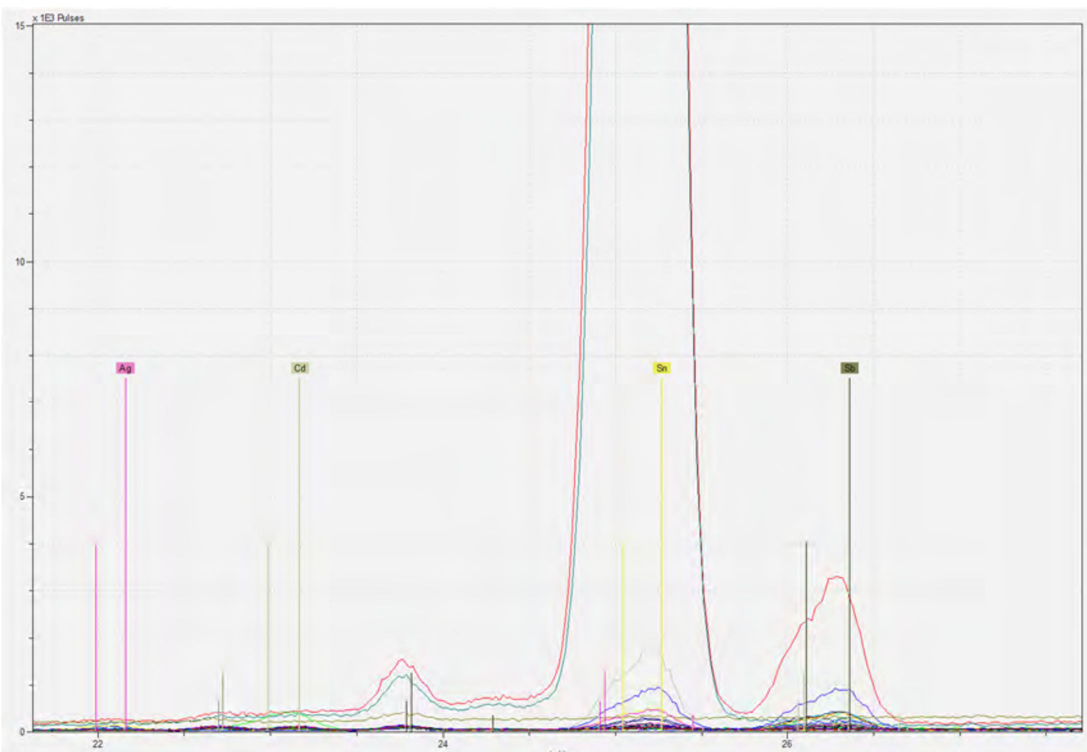


Figure 107. Guilford Courthouse Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Guilford Courthouse Sample.

Table 30. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Guilford Courthouse Sample.

Mean/Centroid	Sb/Rh	Sn/Rh	Ag/Rh	0	0
Segment 1	2.46	2.46	0.22		
Segment 2	0.40	0.40	0.13		
Segment 3	0.11	0.11	0.24		
Segment 4	4.46	4.46	1.29		
Segment 5	23.37	23.37	0.29		
AVERAGE	1.33	1.33	0.26		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	8	16.0%	22.4		
Segment 2	20	40.0%	6.8	SSE Total	39.7
Segment 3	18	36.0%	0.0		
Segment 4	3	6.0%	69.6		
Segment 5	1	2.0%	0.0		
TOTAL	50	100.0%			

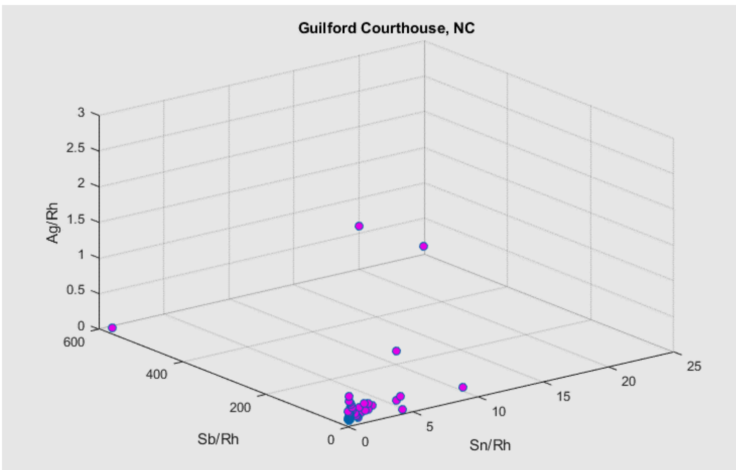


Figure 108. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Guilford Courthouse Sample.

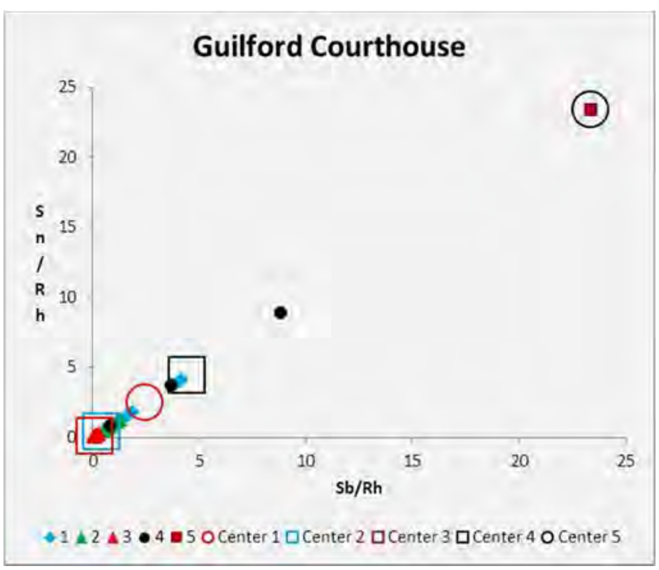


Figure 109. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Guilford Courthouse Sample.

Fort Motte

Fort Motte was a fortified plantation mansion located in the interior coastal plain of South Carolina. American Continental soldiers lay siege to the British-held position on May 8, 1781 and the siege lasted until May 12. It was an American victory. Archaeological exploration of Fort Motte was undertaken by SCIAA archaeologists (Smith et al. 2007). Smith and Legg provided 11 round balls from Fort Motte for analysis in the 2017 workshop. This sample is included as Group 18 in Appendix 1. Figures 110 and 111 show portions of the spectra for the Fort Motte sample. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios for 11 balls in the Fort Motte sample. Five clusters were identified (Table 31; Figures 112 and 113). The dominant cluster (Segment 1) contained five of 11 specimens (45.5% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.86, Tin (Sn)/Rhodium (Rh), 4.07 and Silver (Ag)/Rhodium (Rh), 0.59.

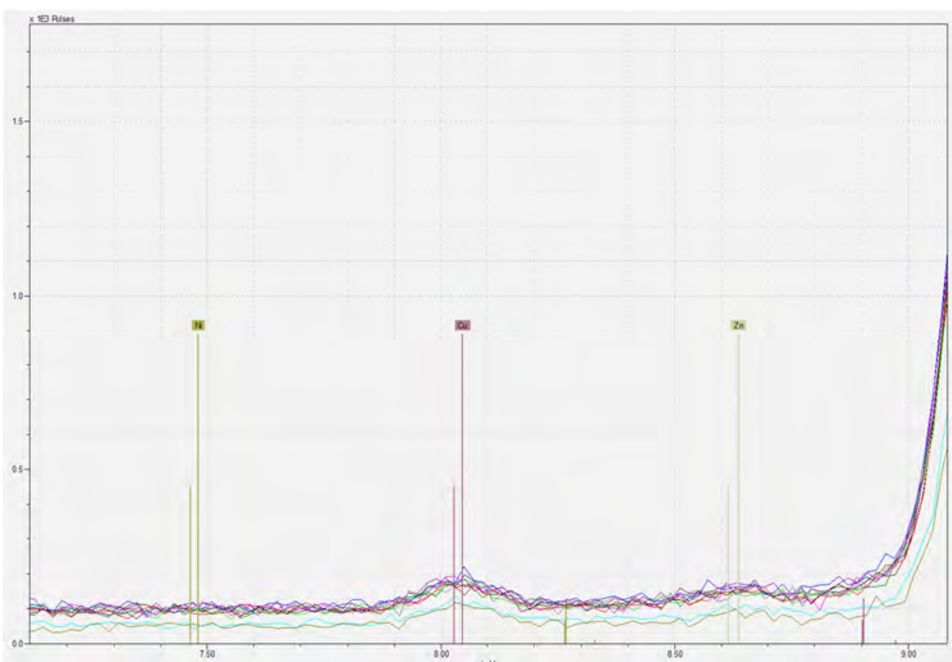


Figure 110. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Fort Motte Sample.

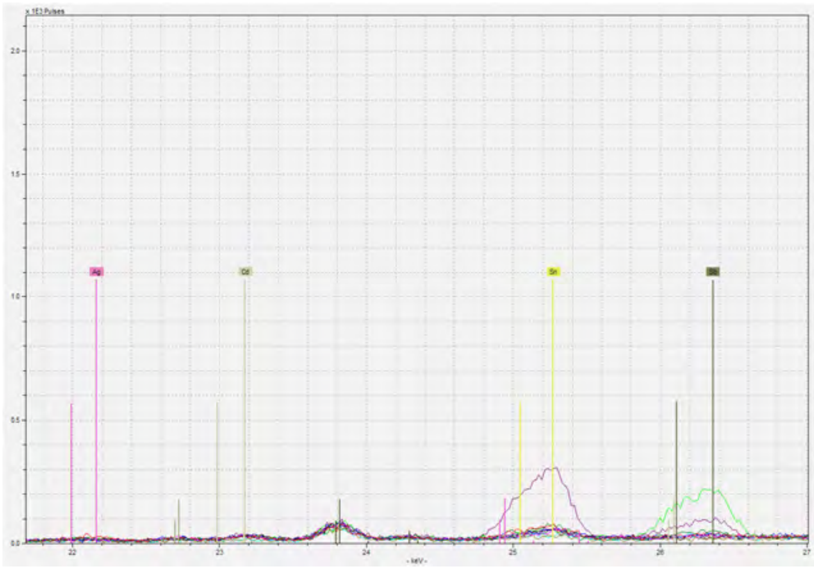


Figure 111. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Motte Sample.

Table 31. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Motte Sample.

Mean/Centroid	***Sb/Rh***	***Sn/Rh***	***Ag/Rh***	***0***	***0***
Segment 1	0.86	4.07	0.59		
Segment 2	8.11	31.51	0.80		
Segment 3	4.34	5.20	0.97		
Segment 4	34.06	4.96	1.50		
Segment 5	1.44	5.53	1.47		
AVERAGE	5.01	7.15	0.96		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	5	45.5%	7.3		
Segment 2	1	9.1%	0.0	**SSE Total**	**3.6**
Segment 3	1	9.1%	0.0		
Segment 4	1	9.1%	0.0		
Segment 5	3	27.3%	8.2		
TOTAL	11	100.0%			

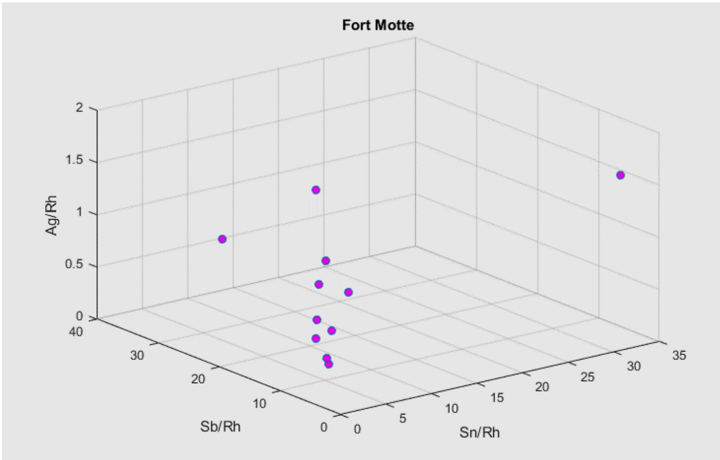


Figure 112. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort Motte Sample.

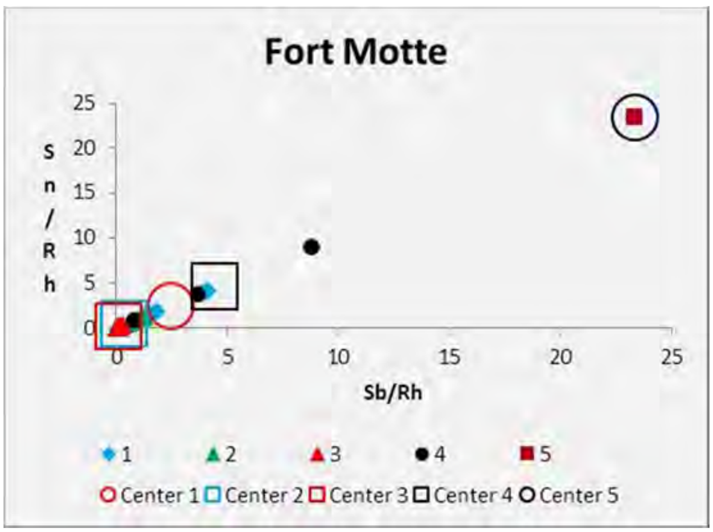


Figure 113. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Motte Sample.

Fort Watson

Fort Watson is located in the interior coastal plain of present-day Clarendon County, South Carolina. It was the scene of a Revolutionary War siege from April 15-23, 1781. Continental Army forces besieged the British held fort. It was an American victory. Archaeologists with SCIAA have investigated the Fort Watson battlefield. Smith and Legg provided two round balls from Fort Watson for analysis in the 2017 workshop. This sample is included as Group 20 in Appendix 1. Figures 114 and 115 show portions of the spectra for the Fort Watson sample. Copper (Cu), Tin (Sn) and Antimony (Sb) display peaks in these graphs. While the sample from Fort Watson was very small, the elemental composition of the two specimens are noticeable different. Both contain trace amounts of Copper (Cu). One of the samples contained traces of Tin (Sn), while the other contained traces of Antimony (Sb). Figure 116 shows a scatterplot of the Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium ratios for this sample. The Fort Watson sample was too small for any meaningful cluster analysis.

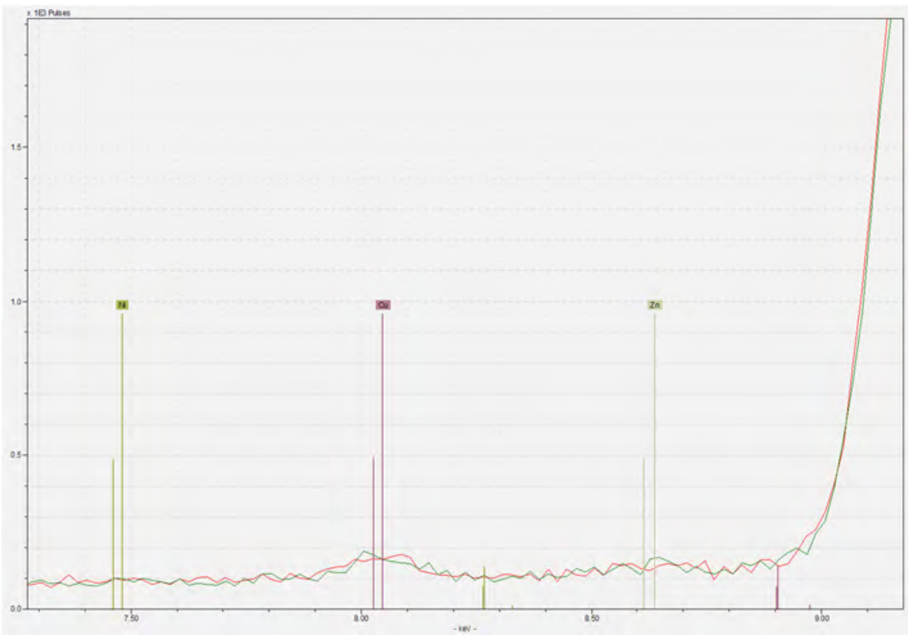


Figure 114. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Fort Watson Sample.

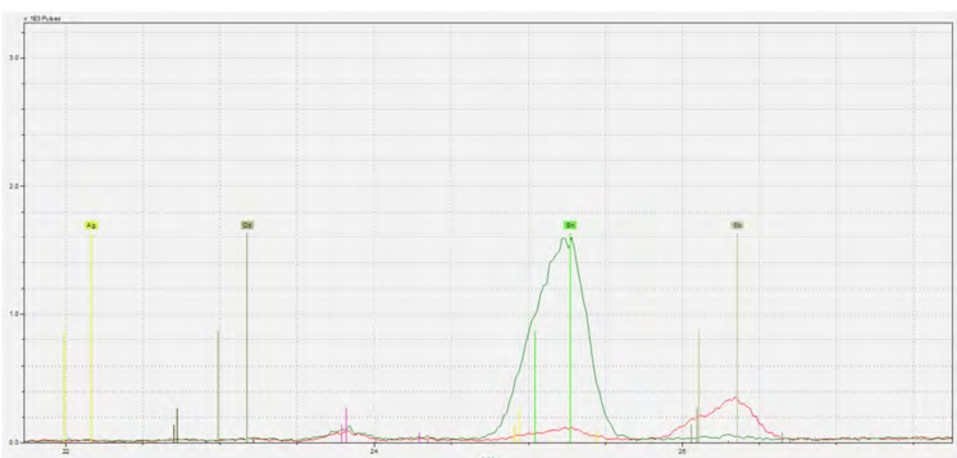


Figure 115. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Watson Sample.

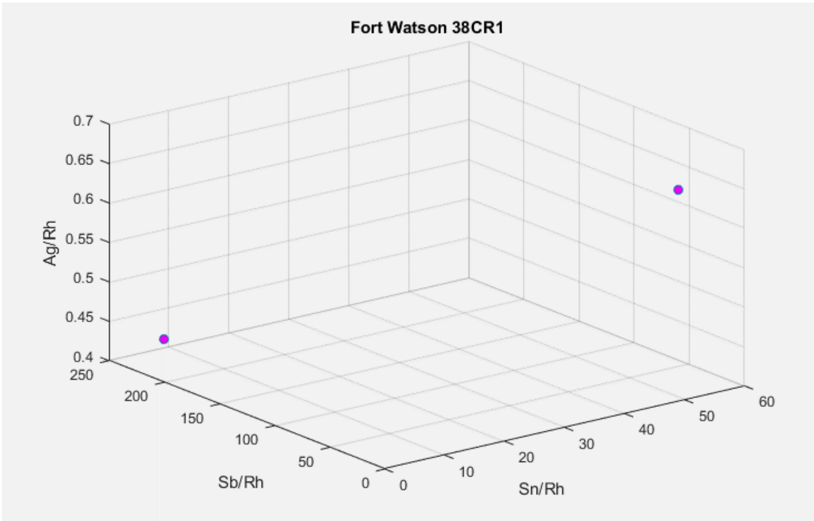


Figure 116. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort Watson Sample.

Ninety-Six

From May 22, to June 18, 1781 the Loyalists who were fortified at Ninety-Six, South Carolina were besieged by Continental troops. The siege was lifted by the Patriots upon the approach of British troops from Charleston. It is considered a loyalist victory. Ninety-Six is presently operated by the National Park Service as the Ninety-Six National Historic Site. Seibert analyzed 29 round balls from Ninety-Six in 2015. This sample is included as Group 32 in Appendix 1. Figures 117 and 118 show portions of the spectra for the Ninety-Six sample. Copper (Cu), Zinc (Zn), Tin (Sn) and Antimony (Sb) display peaks in these graphs. One sample contains markedly higher quantities of Antimony (Sb) and Tin (Sn) than the other samples.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Ninety-Six sample. Five clusters were identified (Table 32; Figures 119 and 120). The dominant cluster (Segment 4) contained 11 of 29 specimens (35.2% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 1.26, Tin (Sn)/Rhodium (Rh), 0.54 and Silver (Ag)/Rhodium (Rh), 0.15.

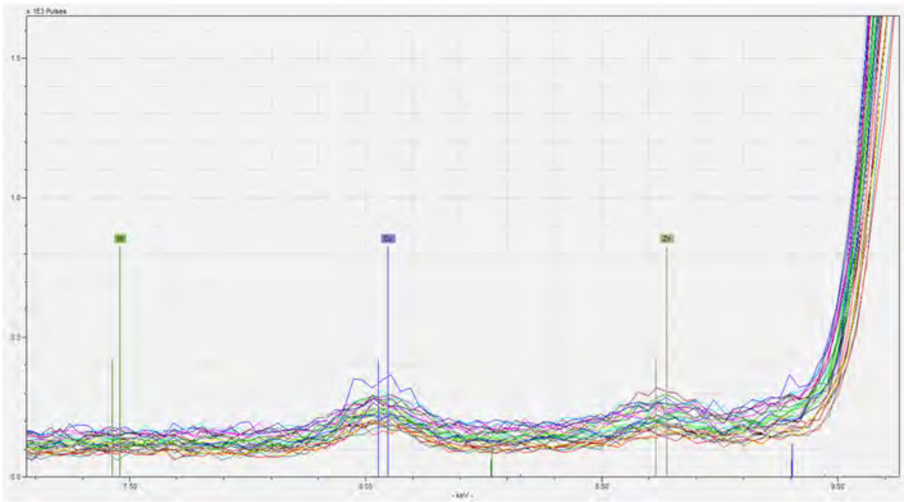


Figure 117. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Ninety-Six Sample.

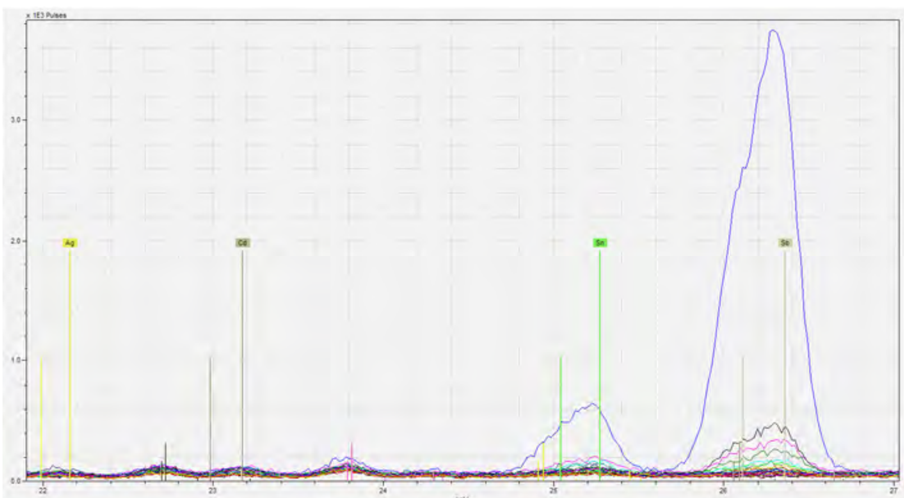


Figure 118. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Ninety-Six Sample.

Table 32. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Ninety-Six Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	36.69	5.27	0.17		
Segment 2	0.55	1.60	0.25		
Segment 3	0.57	0.46	0.26		
Segment 4	1.26	0.54	0.15		
Segment 5	0.27	0.47	0.45		
AVERAGE	2.02	0.74	0.25		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	1	3.4%	0.0		
Segment 2	2	6.9%	0.0	**SSE Total**	**6.0**
Segment 3	10	34.5%	0.0		
Segment 4	11	37.9%	35.6		
Segment 5	5	17.2%	0.2		
TOTAL	29	100.0%			

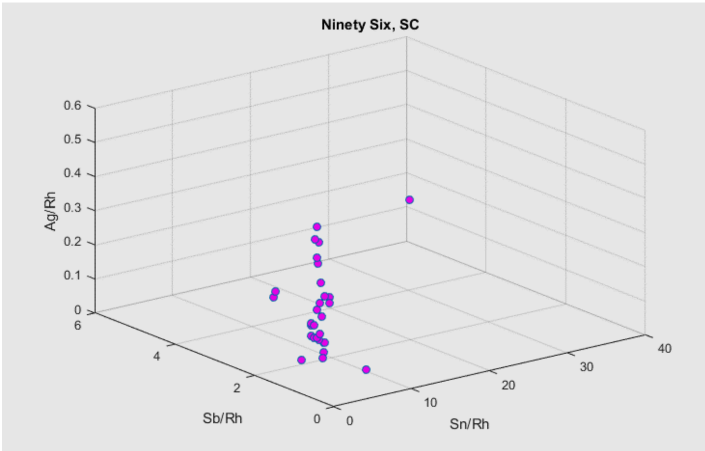


Figure 119. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Ninety-Six Sample.

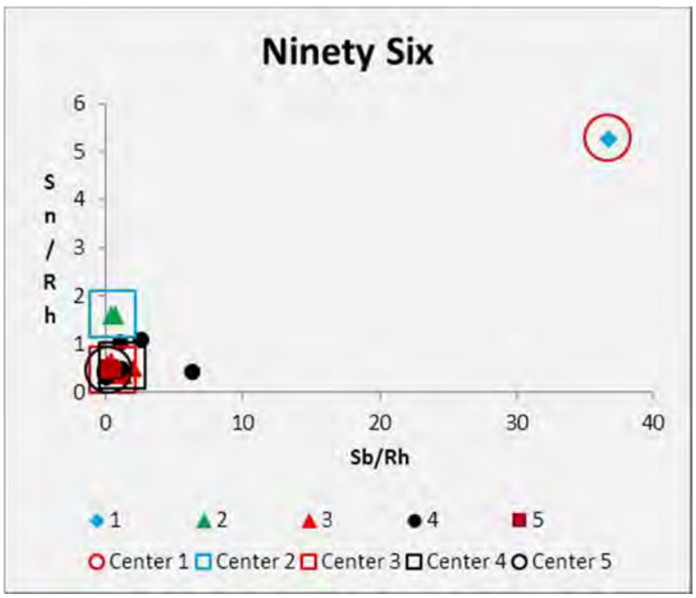


Figure 120. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Ninety-Six Sample.

Shubrick Plantation

Shubrick Plantation was a plantation where a Revolutionary War skirmish took place in present-day Berkeley County, South Carolina. Allison provided four round balls from the Shubrick Battlefield for analysis in the 2017 workshop. This sample is included as Group 35 in Appendix 1. Figures 121 and 122 show portions of the spectra for the Shubrick sample. Copper (Cu), Silver (Ag), Tin (Sn) and Antimony (Sb) display peaks in these graphs. The Shubrick sample was too small for any meaningful cluster analysis.

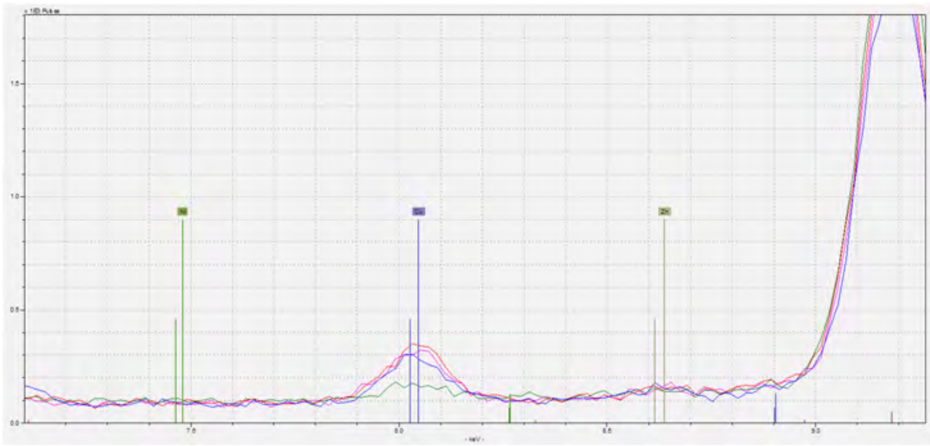


Figure 121. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Shubrick Sample.

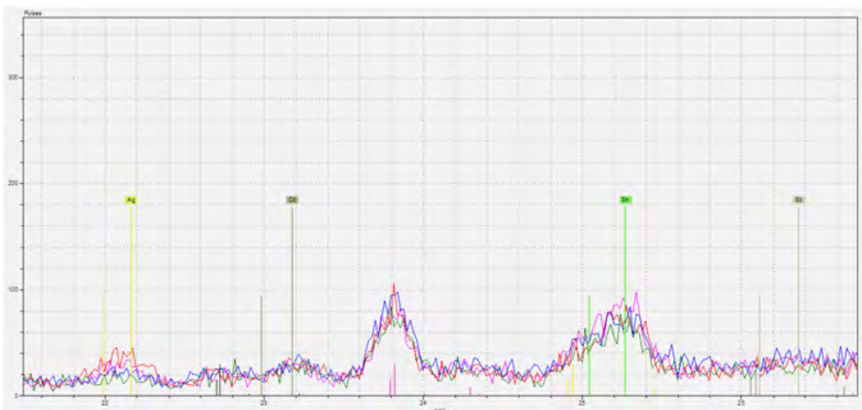


Figure 122. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Shubrick Sample.

Hanging Rock

Hanging Rock Battlefield is located in Lancaster County in the South Carolina piedmont. Allison provided six round balls from Hanging Rock for analysis in the 2017 workshop. This sample is included as Group 24 in Appendix 1. Figures 123 and 124 show portions of the spectra for the Hanging Rock sample. Hafnium (Hf), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs. The Hanging Rock sample was too small for any meaningful cluster analysis.

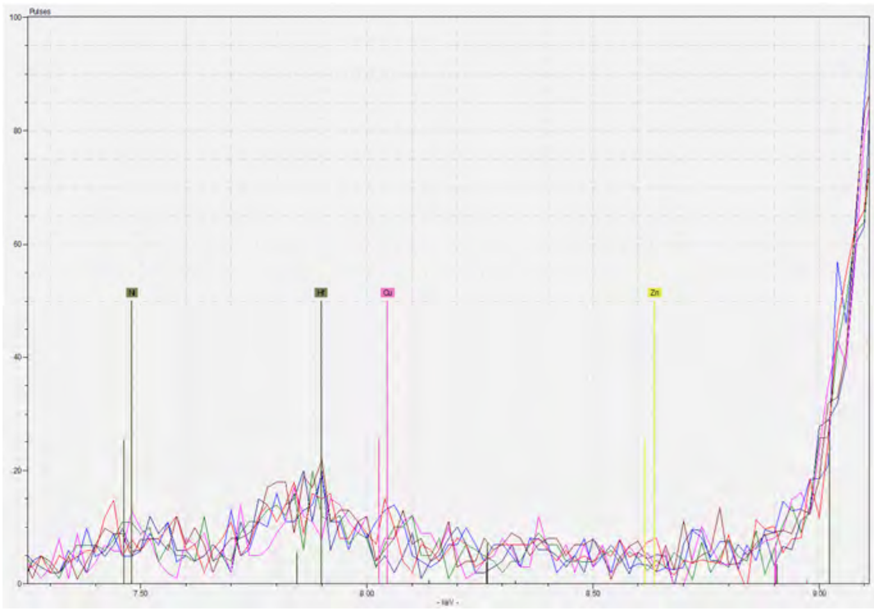


Figure 123. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Hanging Rock Sample.

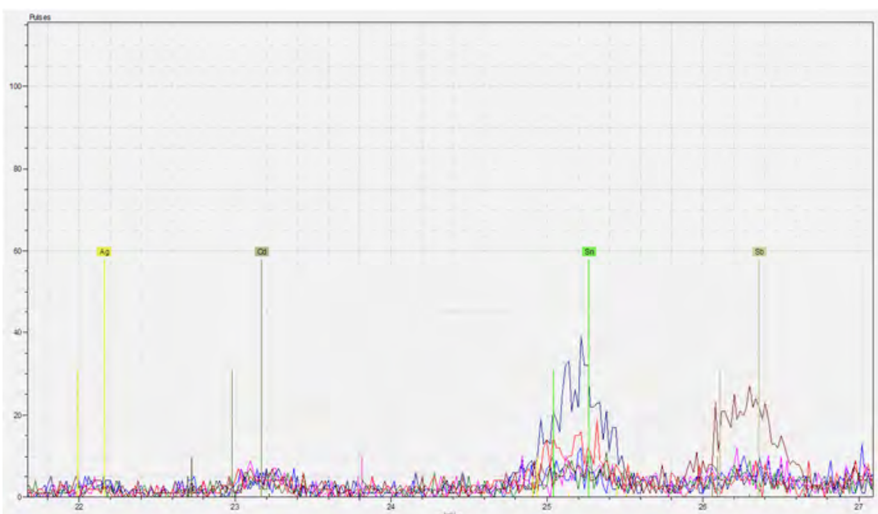


Figure 124. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Hanging Rock Sample.

Tar Bluff

The battle of Tar Bluff, also known as the Battle of Combahee Ferry, took place on August 25, 1782 in Beaufort County, South Carolina. It pitted Continental troops against British regulars and was a British victory. Archaeologists recently began to explore the Tar Bluff battlefield but no report is available at present. Allison provided six round balls from Tar Bluff for analysis in the 2017 workshop. These included three intended for use with a British Standard (.75 caliber musket) and three for use in a Charleville (.69 caliber musket). This sample is included as Group 39 in Appendix 1. Figures 125 and 126 show portions of the spectra for the Tar Bluff sample. Hafnium (Hf), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figure 127 shows a scatterplot of the Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium ratios for this sample. The Tar Bluff sample was too small for any meaningful cluster analysis.

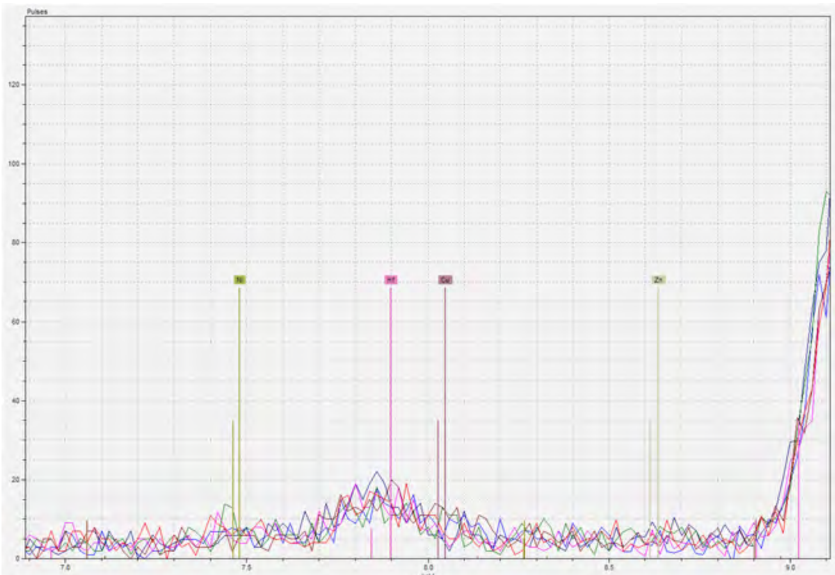


Figure 125. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn) Tar Bluff Sample.

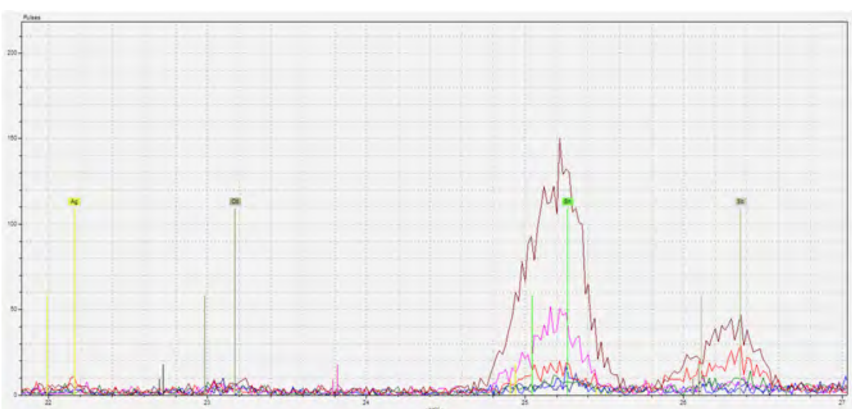


Figure 126. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Tar Bluff Sample.

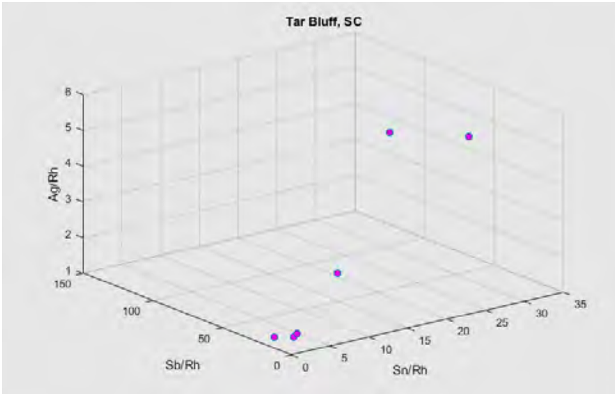


Figure 127. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Tar Bluff Sample.

Estatoe

Estatoe was a Lower Cherokee town located in the present-day northeastern Georgia Blue Ridge Mountains. The site was excavated by the University of Georgia archaeologists. In 2015 Elliott visited the Laboratory of Archaeology at the University of Georgia, accessed the collection and sampled a small sample of six round balls. This sample is included as Group 12 in Appendix 1. Figures 128 and 129 show portions of the spectra for the Estatoe sample. Copper (Cu), Zinc (Zn), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs. Figure 130 shows a scatterplot of the Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium ratios for this sample. The Estatoe sample was too small for any meaningful cluster analysis.

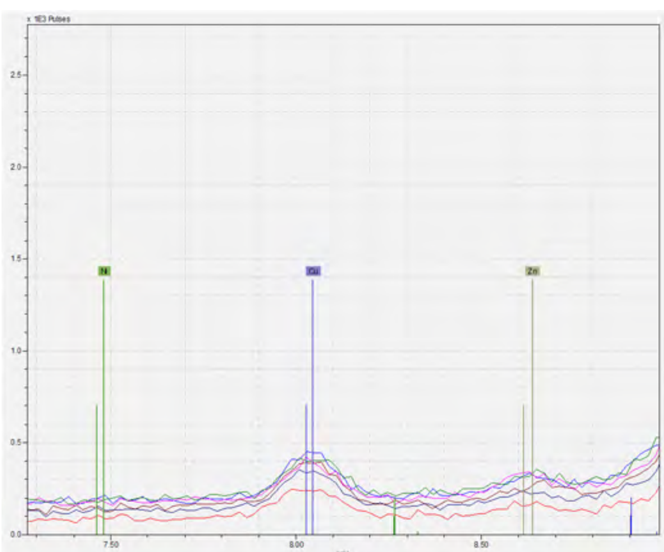


Figure 128. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Estatoe Sample.

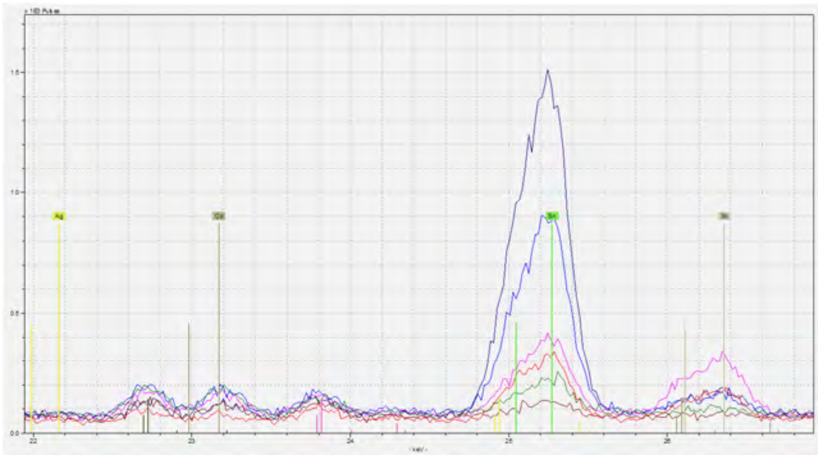


Figure 129. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Estatoe Sample.

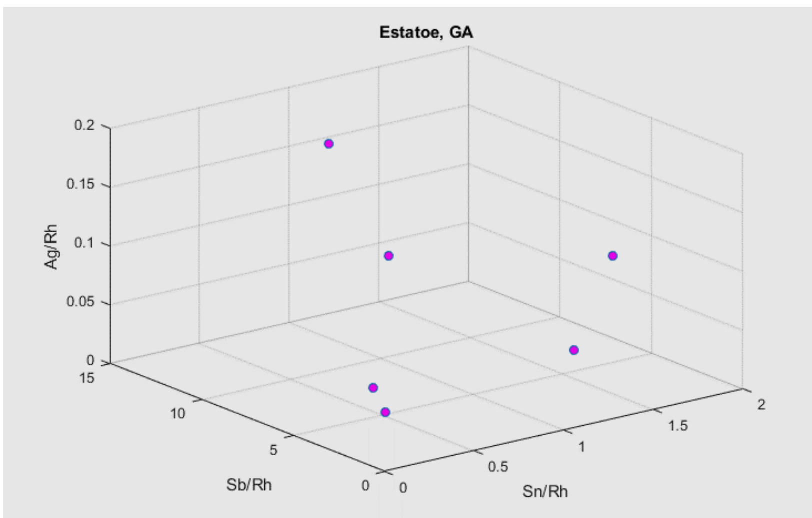


Figure 130. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Estatoe Sample.

Okfuskenena

Okfuskenena was a Creek village located in the present-day western Georgia piedmont. Also known as the Burnt Village, the village was attacked and burned by Georgia militia in 1793. Okfuskenena (Site 9TP9) was excavated by University of Georgia archaeologists in the 1960s (Williams 2009). In 2015 Elliott visited the Laboratory of Archaeology at the University of Georgia, accessed the collection and sampled 10 round balls. This sample is included as Group 6 in Appendix 1. Figures 131 and 132 show portions of the spectra for the Okfuskenena sample. Copper (Cu), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios in the Okfuskenena sample. Five clusters were identified (Table 33; Figures 133 and 134). The dominant cluster (Segment 4) contained five of 10 specimens (50% of the assemblage). Mean/centroids for this cluster were Antimony (Sb)/Rhodium (Rh), 0.37, Tin (Sn)/Rhodium (Rh), 1.17 and Silver (Ag)/Rhodium (Rh), 0.06.

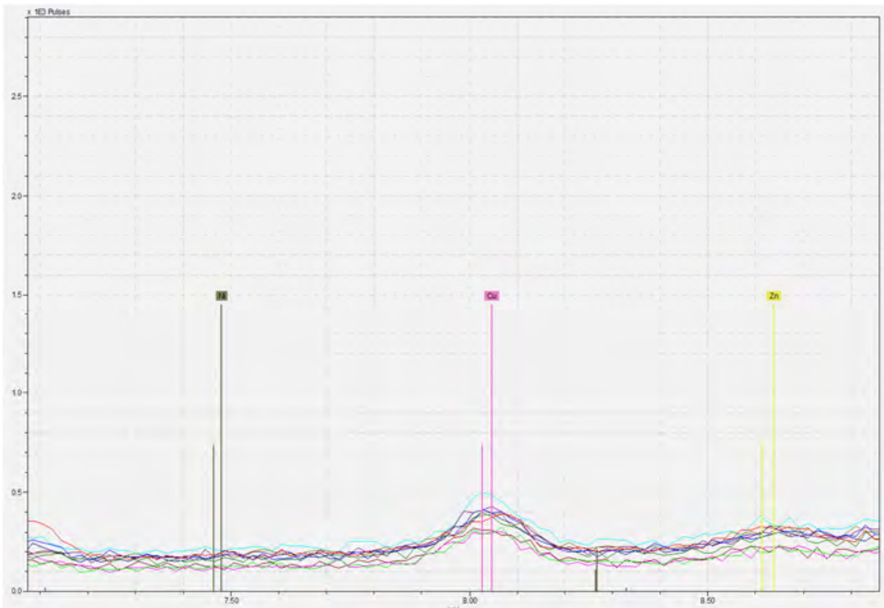


Figure 131. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Okfuskenena Sample.

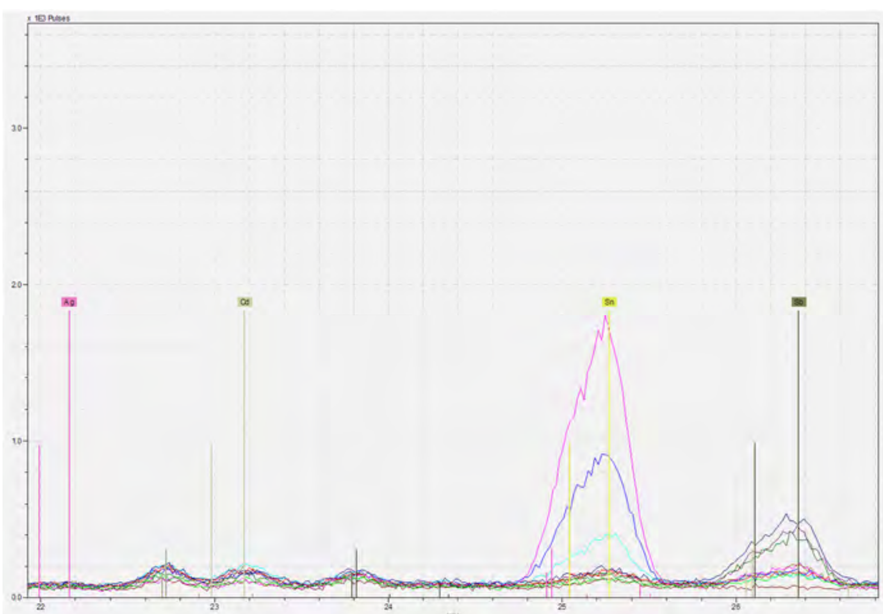


Figure 132. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Okfuskenena Sample.

Table 33. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Okfuskenena Sample.

Mean/Centroid	Sb/Rh	Sn/Rh	Ag/Rh	0	0
Segment 1	1.34	16.58	0.19		
Segment 2	0.06	0.48	0.11		
Segment 3	1.67	0.36	0.06		
Segment 4	0.37	1.17	0.06		
Segment 5	2.13	0.48	0.12		
AVERAGE	0.87	2.41	0.08		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	1	10.0%	0.0		
Segment 2	1	10.0%	0.0	SSE Total	2.0
Segment 3	2	20.0%	0.0		
Segment 4	5	50.0%	8.3		
Segment 5	1	10.0%	0.0		
TOTAL	10	100.0%			

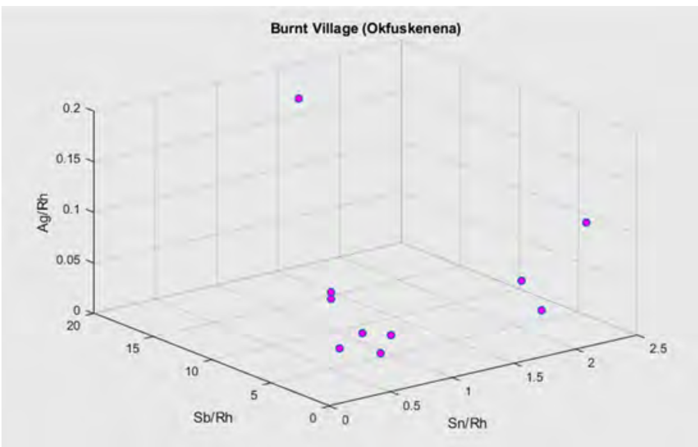


Figure 133. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Okfuskenena Sample.

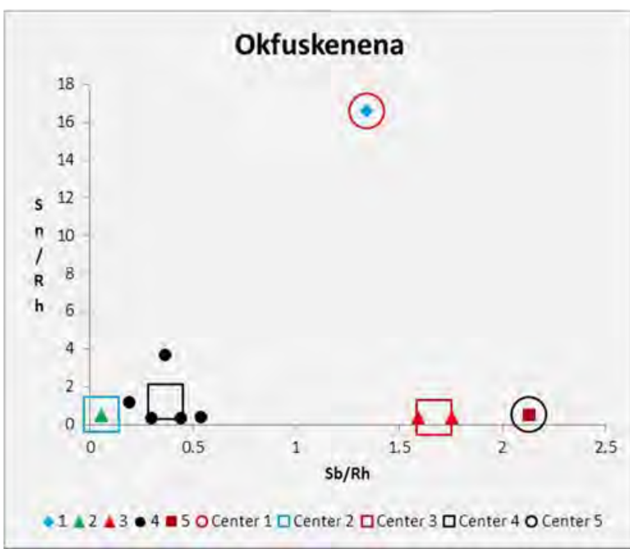


Figure 134. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Okfuskenena Sample.

Fort Hawkins

Fort Hawkins was a U.S. Army fort in present-day Macon, Bibb County, Georgia. It was never the scene of any military engagement. The archaeological remains of Fort Hawkins is recorded as Site 9BI28. Archaeological excavations at Fort Hawkins began in the 1970s by the University of South Carolina and were followed by more extensive excavations by the LAMAR Institute from 2005-2012 (Elliott 2009a, Elliott et al. 2013). Elliott analyzed the LAMAR Institute's collection of 43 round balls from the site prior to the 2015 workshop and these data are included in this report. This sample is included as Group 21 in Appendix 1. Figure 135 shows a close-up of Nickel (Ni), Copper (Cu) and Zinc (Zn) spectra in the Fort Hawkins assemblage, where some presence of Copper (Cu) and Zinc (Zn) is indicated. Figure 136 shows a close-up of the Fort Hawkins spectra of Silver of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb). Tin (Sn) is elevated in numerous specimens in this assemblage, although most contain low levels of Tin (Sn).

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios from the Fort Hawkins sample. Five clusters were identified (Table 34; Figures 137 and 138). The dominant cluster (Segment 4) contained 32 of 43 specimens (74.4%). Its mean/centroid values were Antimony (Sb)/Rhodium (Rh) 0.09, Tin (Sn)/Rhodium (Rh), 1.17 and Silver (Ag)/Rhodium (Rh), 0.08.

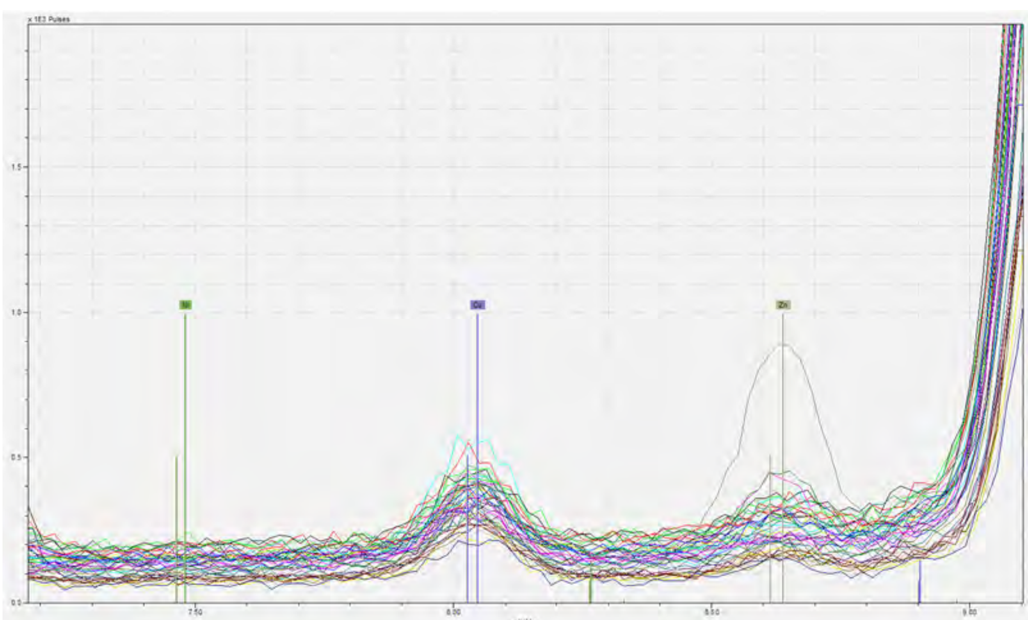


Figure 135. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Fort Hawkins Sample.

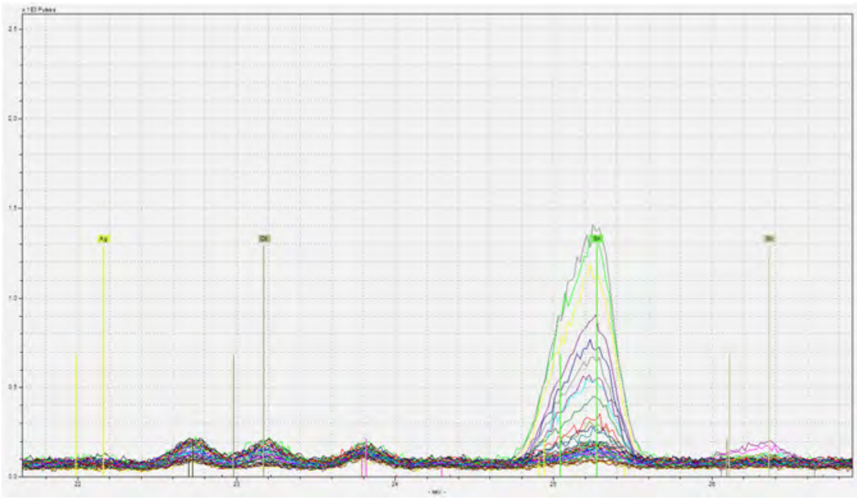


Figure 136. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Hawkins Sample.

Table 34. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Hawkins Sample.

Mean/Centroid	*Sb/Rh*	*Sn/Rh*	*Ag/Rh*	*0*	*0*
Segment 1	0.09	0.72	0.31		
Segment 2	0.06	0.56	0.22		
Segment 3	0.23	9.40	0.19		
Segment 4	0.09	1.17	0.08		
Segment 5	1.12	4.35	0.20		
AVERAGE	0.15	1.82	0.12		
Respondents	**Number**	**%**	**SSE/Segment**		
Segment 1	4	9.3%	0.1		
Segment 2	2	4.7%	0.0	**SSE Total**	**48.6**
Segment 3	3	7.0%	0.0		
Segment 4	32	74.4%	65.6		
Segment 5	2	4.7%	25.5		
TOTAL	43	100.0%			

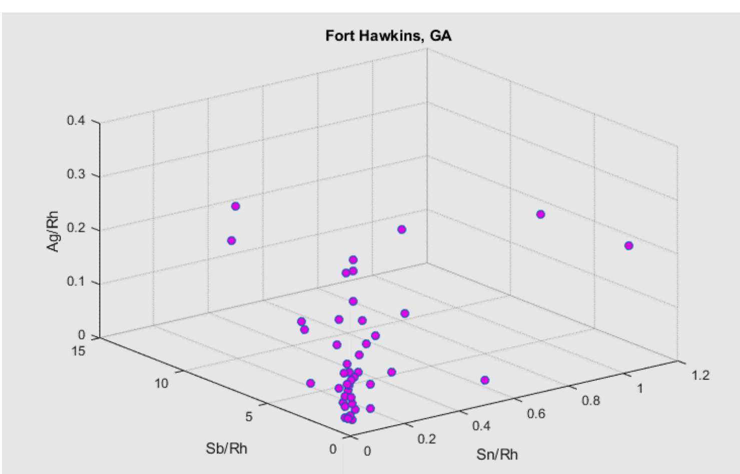


Figure 137. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort Hawkins Sample.

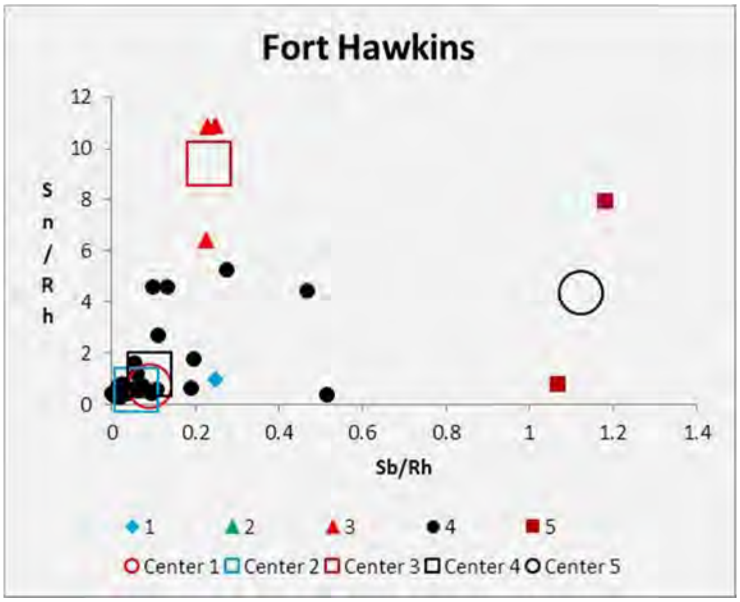


Figure 138. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort Hawkins Sample.

Fort Daniel

Fort Daniel was a Georgia militia fort located in the piedmont in present-day Gwinnett County, Georgia. It was active in the War of 1812. The archaeological site of Fort Daniel (9GW623) has been studied by D'Angelo. Anthropologist Gregg Beavers provided a sample of four round balls from Fort Daniel for the 2017 workshop. This sample is included as Group 14 in Appendix 1. Figures 139 and 140 show close-ups of the Fort Daniel spectra. Copper (Cu), Silver (Ag) and Tin (Sn) show slight peaks in these graphs. Figure 141 shows a scatterplot of the Antimony (Sb)/Rhodium (Rh), Tin (Sn)/Rhodium (Rh) and Silver (Ag)/Rhodium (Rh) ratios. The Fort Daniel sample was too small for any meaningful cluster analysis.

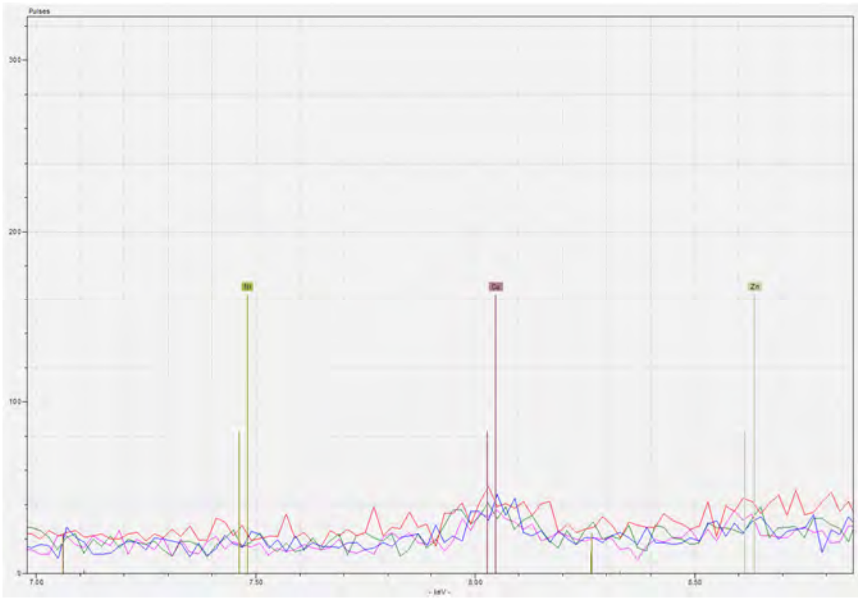


Figure 139. Fort Daniel Spectra (Nickel (Ni), Copper (Cu) and Zinc (Zn)).

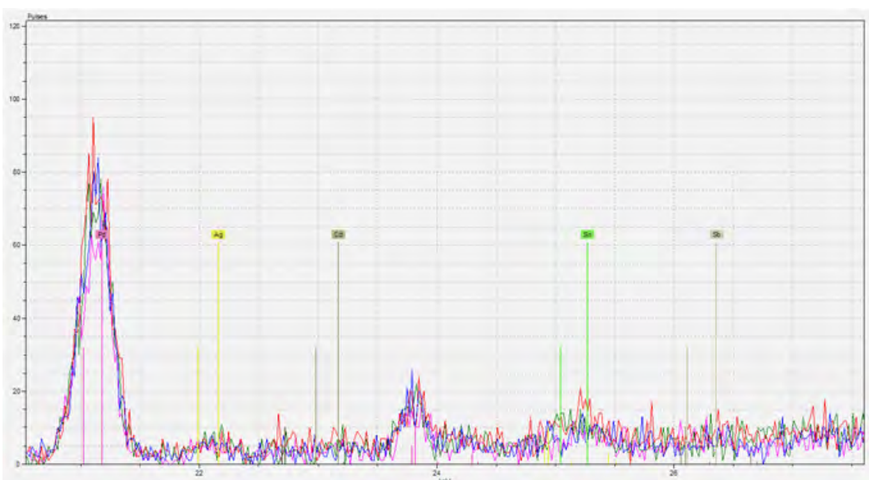


Figure 140. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort Daniel Sample.

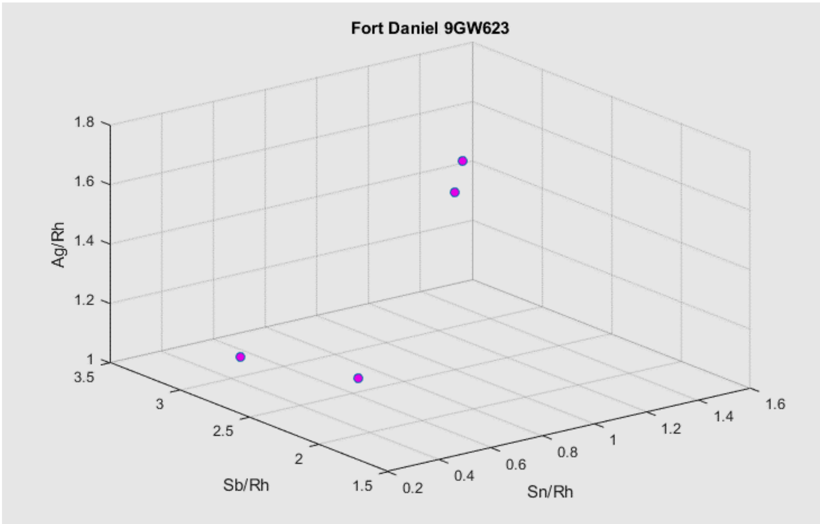


Figure 141. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort Daniel Sample.

Fort King

Fort King was a U.S. Army fort located near present-day Ocala, in Marion County, Florida. It was constructed in 1827, burned in 1836, rebuilt in 1837 and used throughout the Second Seminole War (1835-1842). The fort spans a 15 year period from 1827 to 1842. The archaeological remains of Fort King are recorded as Site 8MR60, as documented in several reports by the Gulf Archaeology Research Institute (GARI). Michelle Sivilich, executive director of GARI provided a sample of 33 round ball ammunition from Fort King for analysis in the 2017 workshop. This sample is included as Group 16 in Appendix 1. Figures 142 and 143 show portions of the spectra for the Fort King sample. Nickel (Ni), Hafnium (Hf), Copper (Cu), Cadmium (Cd), Tin (Sn) and Antimony (Sb) display peaks in these graphs.

Cluster analysis was performed on Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios from the Fort King sample. Five clusters were identified (Table 35; Figures 144 and 145). The dominant cluster (Segment 3) contained 12 of 33 specimens (36.4%). Its mean/centroid values were Antimony (Sb)/Rhodium (Rh), 1.06, Tin (Sn)/Rhodium (Rh), 7.84 and Silver (Ag)/Rhodium (Rh), 2.26.

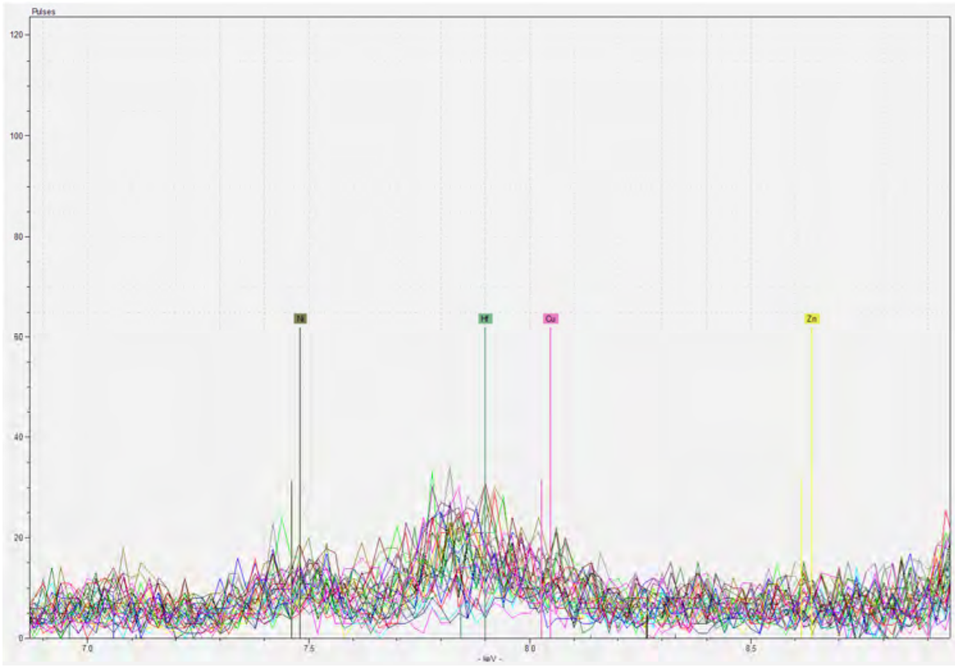


Figure 142. Spectra of Nickel (Ni), Hafnium (Hf), Copper (Cu) and Zinc (Zn), Fort King Sample.

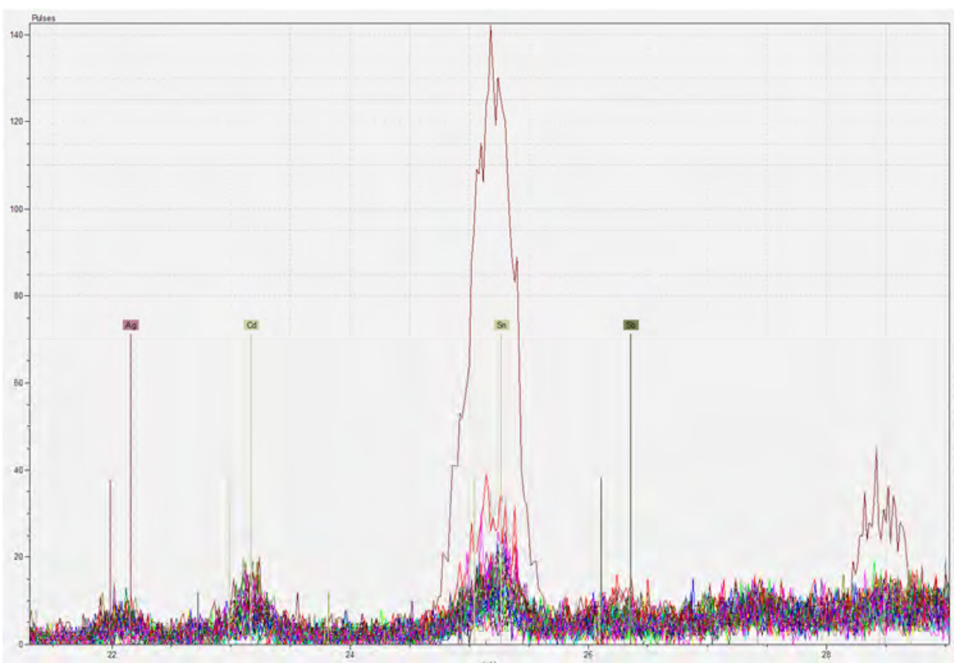


Figure 143. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Fort King Sample.

Table 35. Output for Five Clusters/Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort King Sample.

Mean/Centroid	Sb/Rh	Sn/Rh	Ag/Rh	0	0	0	0	0
Segment 1	0.76	5.30	1.19					
Segment 2	2.11	74.32	1.82					
Segment 3	1.06	7.84	2.26					
Segment 4	8.55	28.64	3.68					
Segment 5	1.66	10.45	3.56					
AVERAGE	1.39	10.43	2.32					
Respondents	**Number**	**%**	**SSE/Segment**					
Segment 1	10	30.3%	21.3					
Segment 2	1	3.0%	0.0	SSE Total	17.7			
Segment 3	12	36.4%	0.0					
Segment 4	1	3.0%	0.0					
Segment 5	9	27.3%	165.8					
TOTAL	33	100.0%						

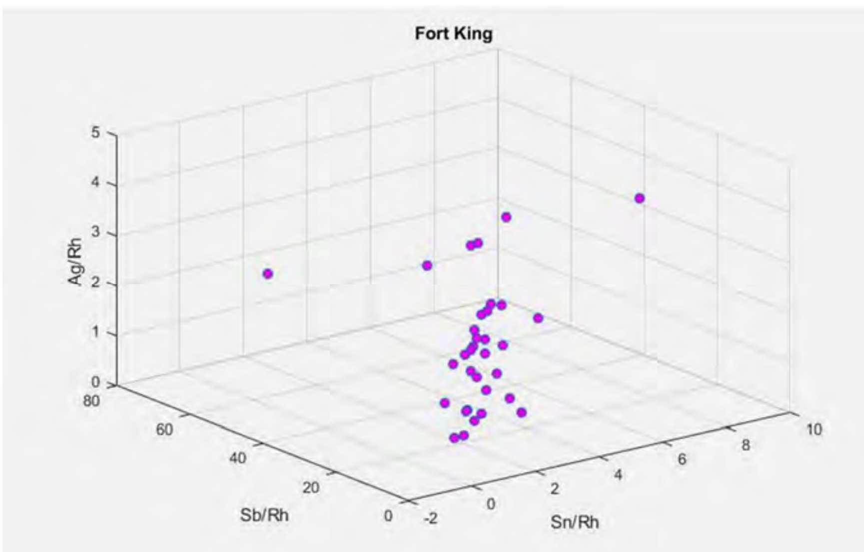


Figure 144. Scatterplot of Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) ratios, Fort King Sample.

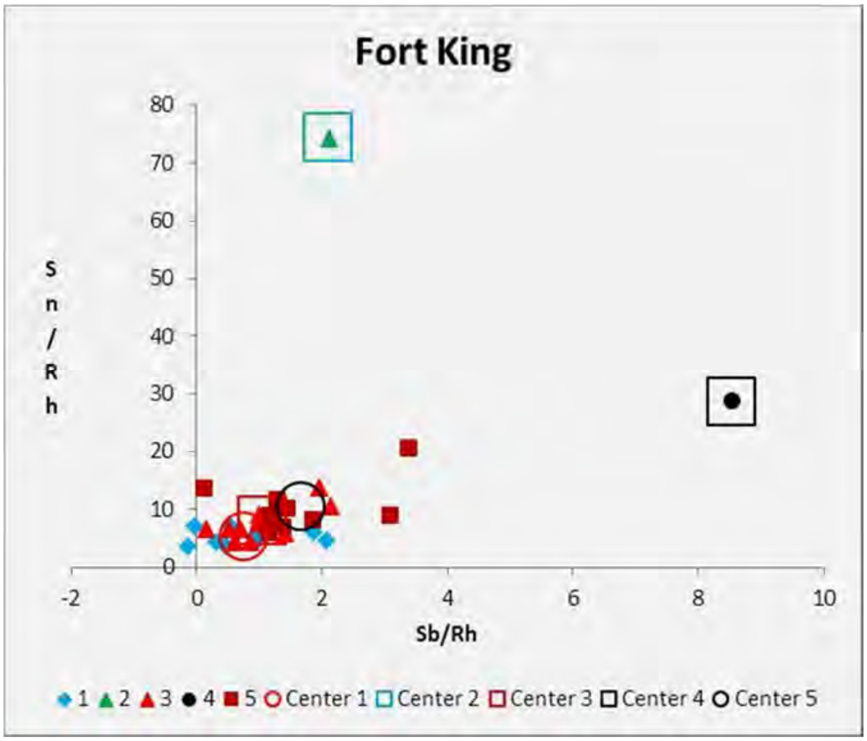


Figure 145. Central Means Chart for Five Segments, Silver (Ag)/Rhodium (Rh), Antimony (Sb)/Rhodium (Rh) and Tin (Sn)/Rhodium (Rh) Ratios, Fort King Sample.

British Royal Arsenal, Nepal

Legg provided one British Standard musket ball from the British Royal Arsenal in Kathmandu, Nepal for the 2017 workshop. This object was acquired by Legg via Ebay purchase from the 2003 liquidation of that arsenal. He provided one round ball for analysis in the 2017 workshop. This sample is included as Group 5 in Appendix 1. Figures 146 and 147 show portions of the spectra for the British Arsenal sample. The sample displays slight only traces of Copper (Cu), Tin (Sn) and Antimony (Sb).

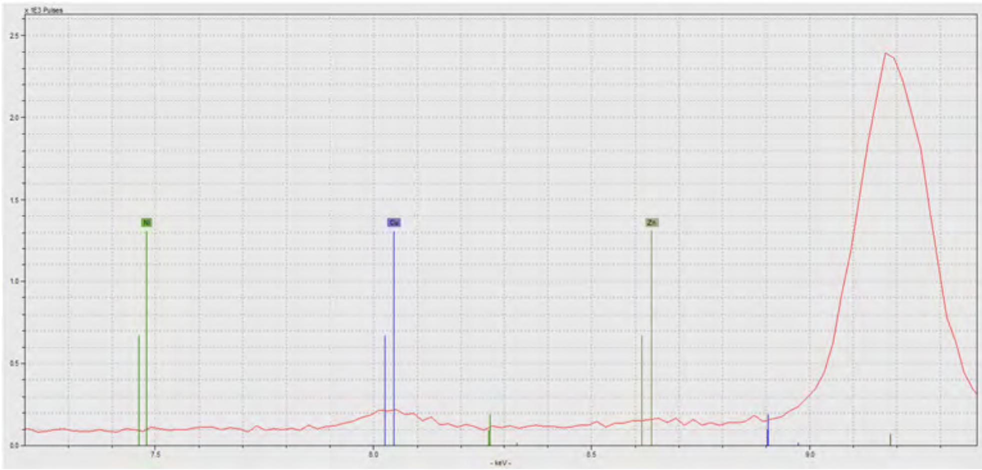


Figure 146. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) British Arsenal Sample.

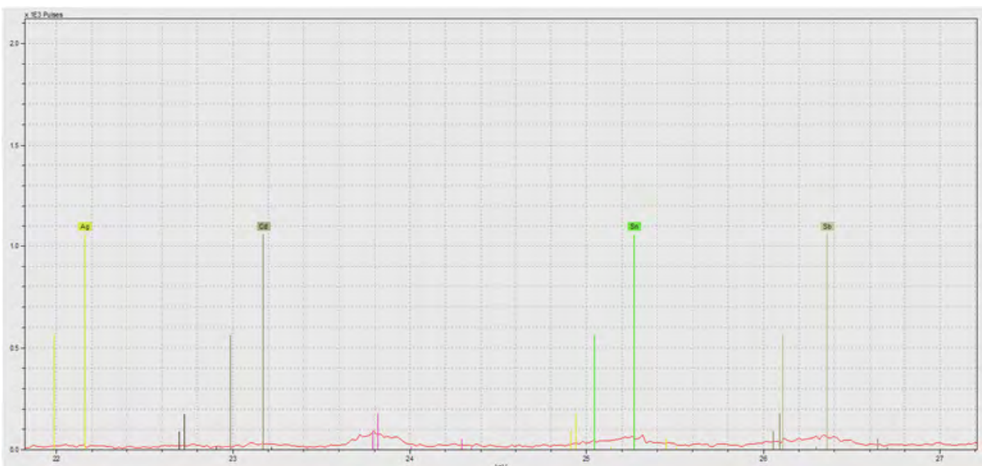


Figure 147. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) British Arsenal Sample.

Civil War Examples

Several bullets from the American Civil War period were sampled in the 2017 workshop. While these bullets were not round balls, the elemental information that they provided my prove useful in future studies of later nineteenth-century ammunition. Elliott provided eight Civil War bullets from Purysburg, South Carolina. These include three Enfield bullets, four 3-ringer bullets and one Williams Cleaner bullet. Figures 148 and 149 show portions of the spectra for the Civil War bullets from Purysburg.

McNutt provided three Civil War bullets from the Confederate prison at Camp Lawton (9JS1) in Jenkins County, Georgia and six examples from the Blackshear Confederate prison camp (9PR26) in Pierce County, Georgia. Moreton and

Roberson provided two examples of Civil War bullets from Fort James Jackson, Chatham County, Georgia. One was a 3-ringer minie ball and the other was an Enfield bullet.

Figures 150 and 151 show portions of the spectra for five Enfield bullets from Purysburg, Kettle Creek and Fort James Jackson. Enfield bullets were used in Enfield rifles, which were produced in England and most commonly associated with the Confederate Army. Quantities of Enfield ammunition also were manufactured in England, although quantities also were manufactured in America by the Confederates.

Figure 148. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn) Purysburg Civil War Bullet Sample.

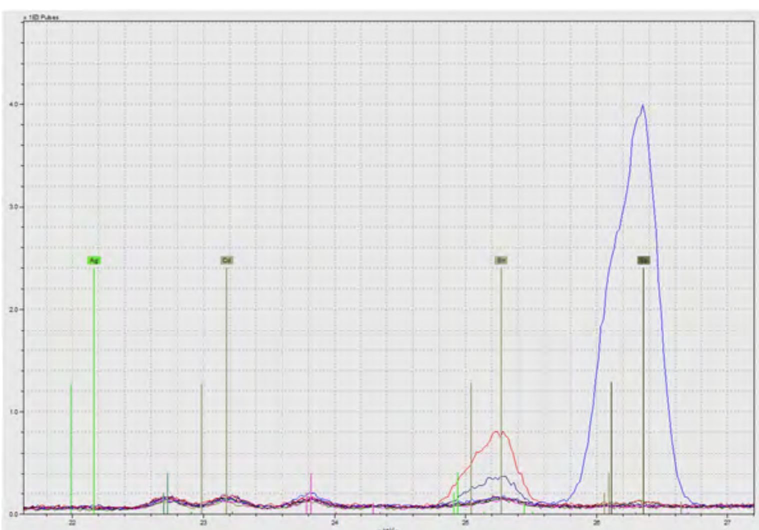


Figure 149. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb) Purysburg Civil War Bullet Sample.

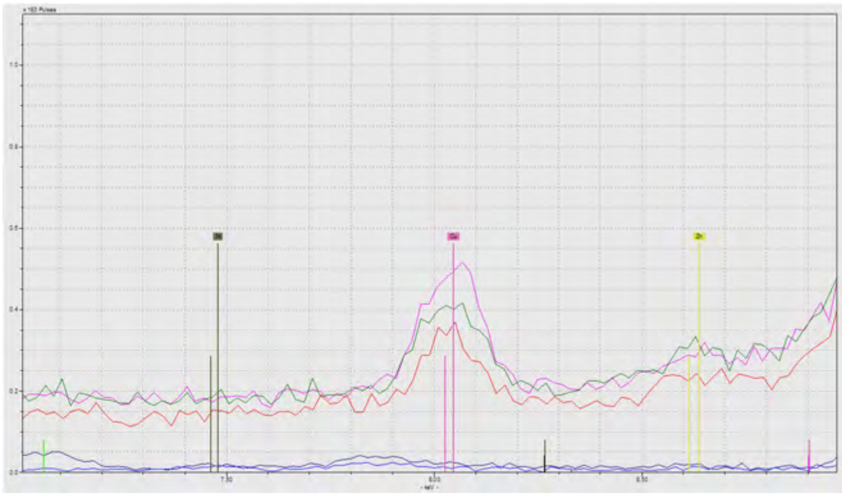


Figure 150. Spectra of Nickel (Ni), Copper (Cu) and Zinc (Zn)), Enfield Bullets from Purysburg, Kettle Creek and Fort James Jackson Samples.

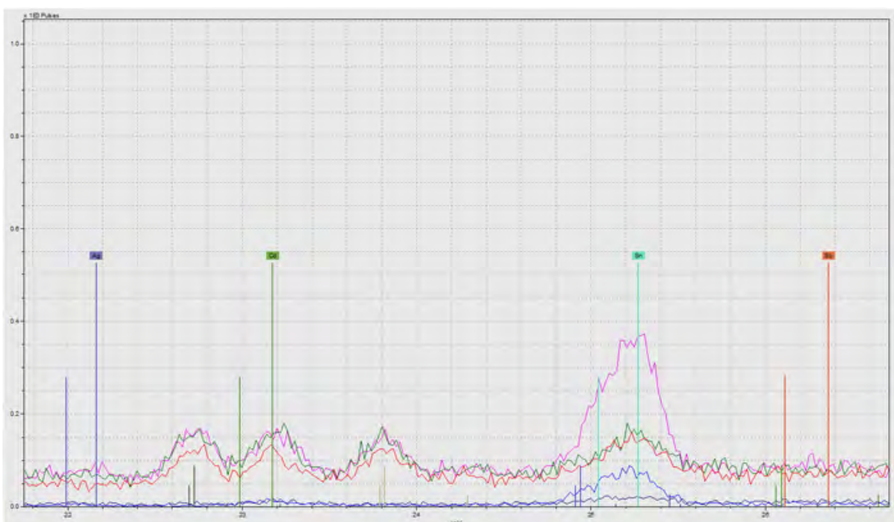


Figure 151. Spectra of Silver (Ag), Cadmium (Cd), Tin (Sn) and Antimony (Sb), Enfield Bullets from Purysburg, Kettle Creek and Fort James Jackson Samples.

Modern Samples

Participants in the 2017 brought additional samples for analysis in addition to those from historical contexts. Battle brought samples from his recent experimental archaeology project that studied the dynamics of lead case shot fired from artillery.

V. Interpretations

The current dataset, which comprises 933 samples, contains information on several elements that are important elements in the differentiation of the elemental characterization of round ball ammunition. Each is discussed in the following.

Antimony

Antimony (Sb) is a silvery white, brittle metalloid with the atomic number 51 (Butterman and Carlin 2004; Royal Society of Chemistry 2017). It occurs with lead ores. Antimony has a high melting point (1170°F) compared to lead. It has a value of 3 on Mohs hardness scale. In early America, Antimony was a key minor ingredient in the alloy pewter. It served to harden and strengthen the pewter.

Figure 152 shows a graph of the Antimony (Sb) values by weapon type. Figure 153 shows a graph of Antimony (Sb) values for Guilford Courthouse, Kings Mountain, Moores Creek and Ninety-Six. A graph showing higher Antimony (Sb) values (>5,000 Photons) in Fusil and Rifle samples are shown in Figure 154. These include Fusil balls from Brier Creek, Carr's Fort, Mount Pleasant and Purysburg. This graph includes Rifle balls from Brier Creek, Carrs Fort, Mount Pleasant and Purysburg.

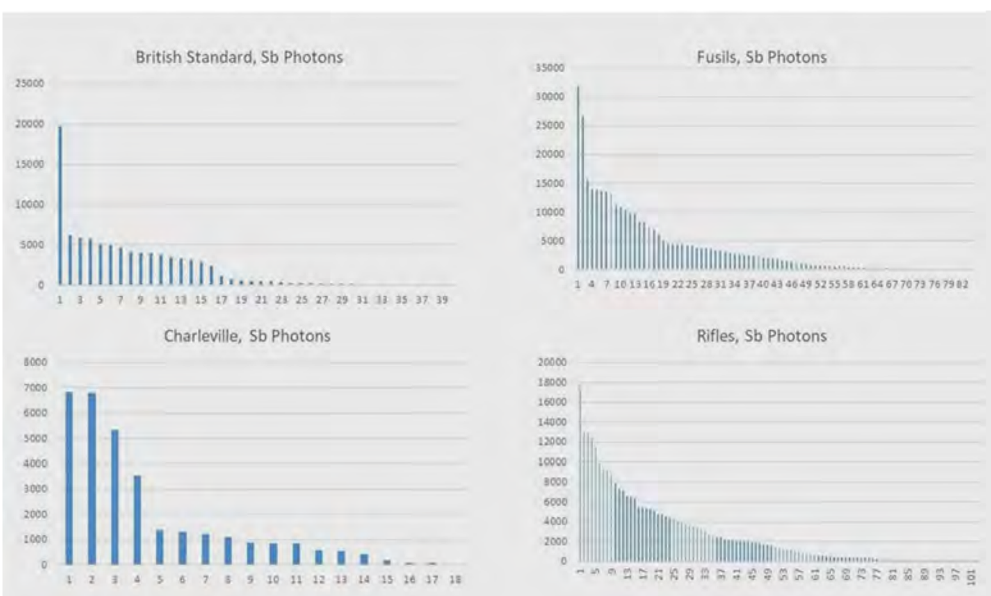


Figure 152. Antimony (Sb) in British Standard, Charleville, Fusils and Rifles (Method 2).

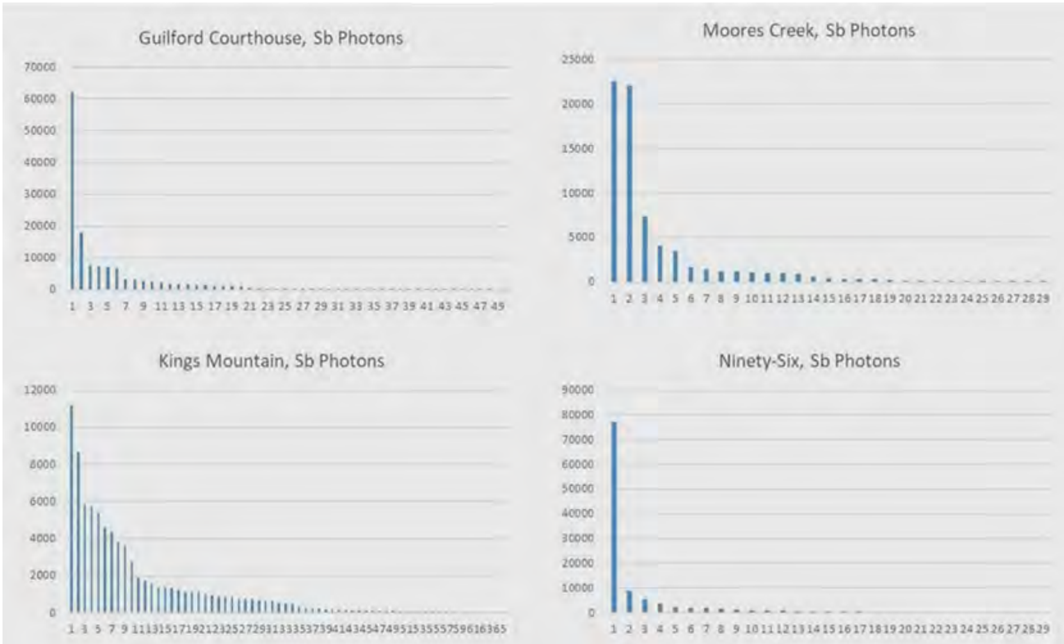


Figure 153. Antimony (Sb) Photons in Guilford Courthouse, Kings Mountain, Moores Creek and Ninety-Six Samples.

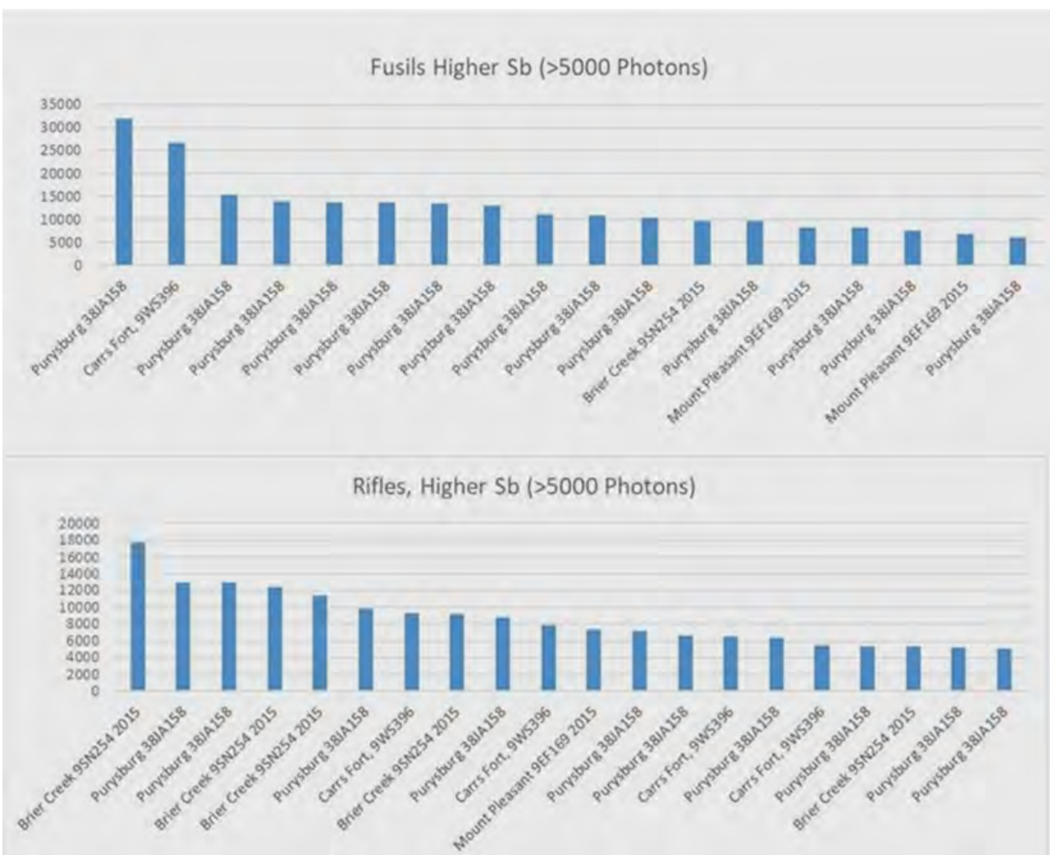


Figure 154. Higher Antimony (Sb) Photon Values in Fusils and Rifles (Method 2).

Antimony (Sb)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 22 (42%), Charleville, 23 (82%), Fusil, 55 (49%), and Rifles, 80 (50%).

Cadmium

Cadmium (Cd) is a soft, ductile metal with the atomic number 48 (Butterman and Plachy 2004; International Cadmium Association 2017). Cadmium occurs as an impurity in lead ores. Cadmium has a melting point of 610°F, which is slightly lower than that of lead. It has a value of 2 on Mohs hardness scale.

Cadmium (Cd) amounts vary considerably in the round ball collections, although its importance and meaning remains unclear. A total of 783 of 933 samples (84%) emitted 100 photons or higher and 297 (26%) emitted 1000 photons or higher of this element. Cadmium (Cd)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 11 (21%), Charleville, 9 (32%), Fusil, 28 (25%), and Rifles, 56 (35%). While Cadmium is present in low frequencies, the distribution of balls with Cadmium (Cd)/Rhodium (Rh) ratio values of five or greater reveals some patterning (Figure 155). Balls in this category were identified at the Battle of Beaufort, Brier Creek, Fort Frederica, Fort King, Galphins, Guilford Courthouse, Kettle Creek, Mount Pleasant and the New Jersey Sites.

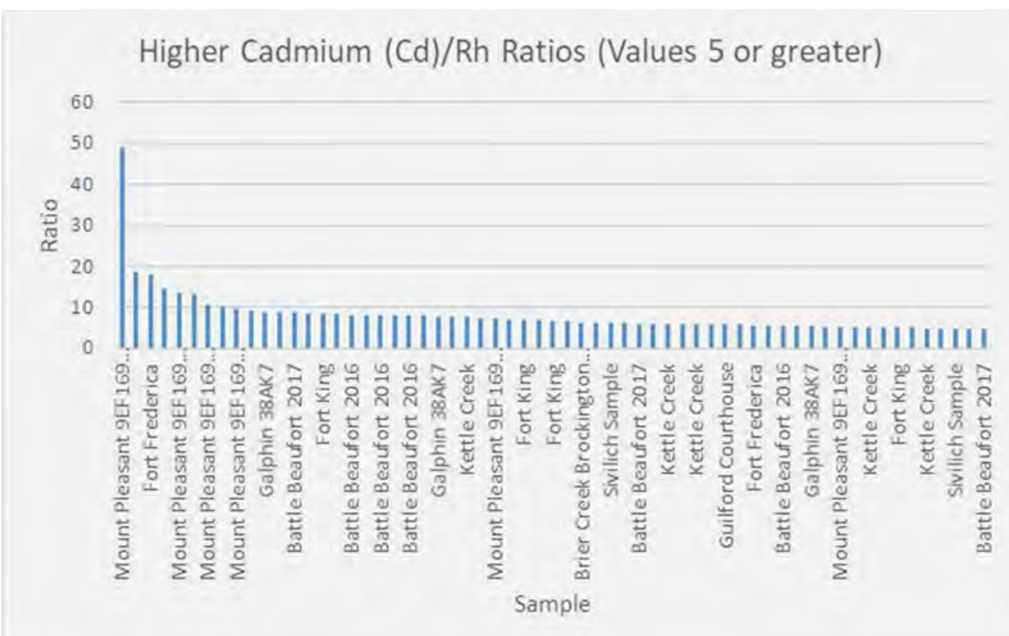


Figure 155. Samples with Higher Cadmium to Rhodium (Cd)/Rh Ratios.

Copper

Copper (Cu) is a malleable reddish-gold metal with the atomic number 29 (Doebrich 2009:1-4). It occurs with lead ores. Copper has a very high melting point (1984°F) compared to lead. It has a value of 3 on Mohs hardness scale.

Copper was identified in many of the round balls that were sampled. A total of 922 of 933 samples (99%) emitted 100 photons or higher and 512 (55%) emitted 1000 photons or higher of this element. Five specimens in the study, including Moores Creek (MOCR 1021), Minute Man (FS29, FS29B and 77=6685) and Guilford Courthouse (GUCO 10672) have markedly higher amounts of copper (390,000 photons or higher) compared to all of the other specimens in the study. Thirty-one other specimens in the study have Cu photon values of 10,000 or higher. Copper (Cu)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 14 (27%), Charleville, 9 (32%), Fusil, 33 (30%), and Rifles, 85 (54%).

Hafnium

Hafnium (Hf) is a lustrous, silvery gray, transition metal with the atomic number 72. It was not discovered until 1923. Hafnium has a melting point of 4051°F. It has a value of 5.5 on Mohs hardness scale (Greenwood and Earnshaw 1997).

Hafnium was identified in the spectra of only a few samples and confirmation of its presence remains tentative. It was recognized in the Beaufort (2016), Fort Frederica, Fort King, Galphins, Hanging Rock, Kettle Creek and Tar Bluff samples.

Nickel

Nickel (Ni) is a silvery-white lustrous metal with the atomic number 28 (Nickel Institute 2017). Nickel has a very high melting point (2646°F) compared to lead. It has a value of 4.0 on Mohs hardness scale.

Nickel was not observed in significant amounts in most of the samples. Nickel displayed recognizable peaks in the spectra for the Battle of Beaufort (2016 and 2017 samples), Brier Creek (2017 sample), Cowpens, Fort Frederica, Fort Moore, Galphins and the King George Statue samples. A total of 439 of 933 samples (47%) emitted 100 photons or greater but only 41 (4%) emitted 10,000 photons or greater. Nickel (Ni)/Rhodium (Rh) ratio values were sorted. Ten samples had values of 10 or greater. These were from Beaufort, Brier Creek, Kettle Creek, Mount Pleasant.

A total of 276 (30%) had ratios greater than one. Nickel (Ni)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 11 (21%), Charleville, 9 (32%), Fusil, 28 (25%), and Rifles, 56 (35%).

Silver

Silver (Ag) is a precious silver metal with the atomic number 47 (Butterman and Hilliard 2004). Silver has a high melting point (1761°F) compared to lead. It has a value of 2.5 on Mohs hardness scale. It commonly occurs with lead ores.

Silver is evidenced in many of the round ball samples in this study. Its importance and meaning in their identification remains unclear. Figure 156 shows the distribution of Silver photons by weapon type. Silver (Ag)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 12 (23%), Charleville, 9 (32%), Fusil, 25 (22%), and Rifles, 53 (33%).

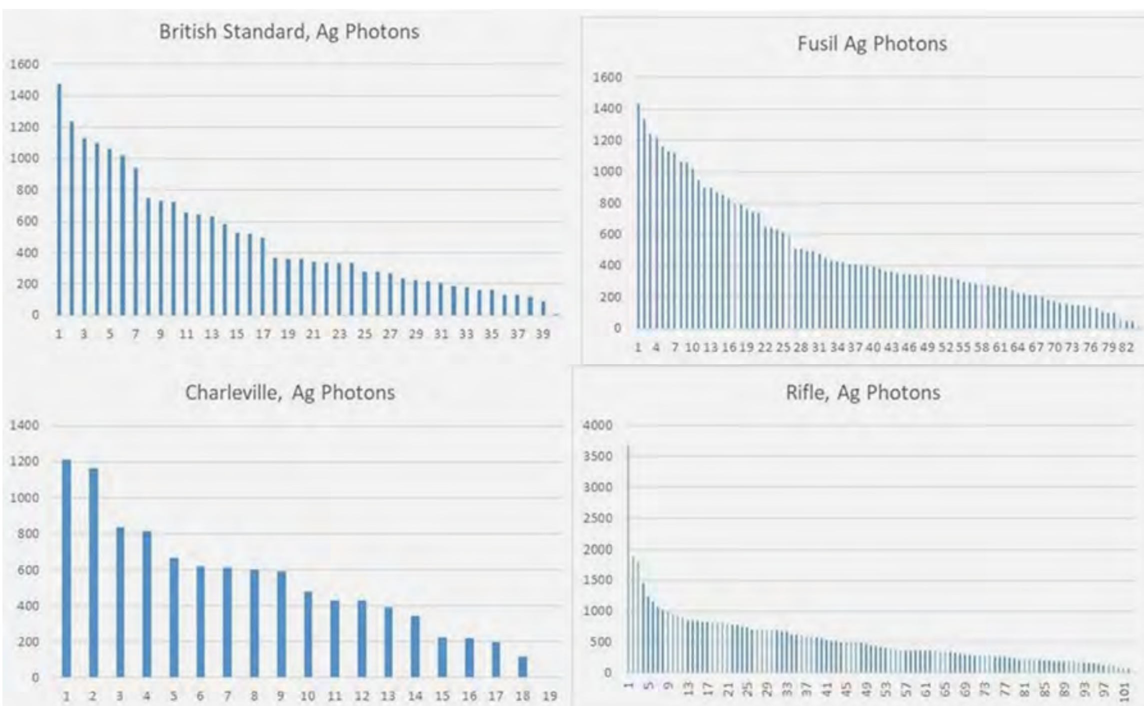


Figure 156. Silver (Ag) Photons by Weapon Type (Method 2).

Tin

Tin (Sn) is a soft, white metal with the atomic number 50 (Calvert 2002). It occurs with lead ores. Tin has a melting point of 449°F, which is lower than that of lead. It has a value of 1.5 on Mohs hardness scale. Tin is a major component of pewter alloy.

Figure 157 shows the distribution of Silver photons by weapon type. Figure 158 shows the distribution of Silver for Guilford Courthouse, Kings Mountain, Moores Creek and Ninety-Six. Higher Tin (Sn) photon values (> 10,000 Photons) and Antimony (Sb) (>5,000 Photons) in Fusil and Rifle samples are shown in Figure 159. For Tin (Sn), these include Fusil balls from Carrs Fort, Estatoe, Mount Pleasant, Purysburg (and Black Swamp). It includes Rifle balls from Brier Creek, Carrs Fort, Fort Hawkins, Okfuskenena and Purysburg. For Antimony (Sb), these include Fusil balls from Brier Creek, Carr's Fort, Mount Pleasant and Purysburg. It includes Rifle balls from Brier Creek, Carrs Fort, Mount Pleasant and Purysburg. Tin (Sn)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 15 (29%), Charleville, 11 (39%), Fusil, 55 (49%), and Rifles, 115 (72%).

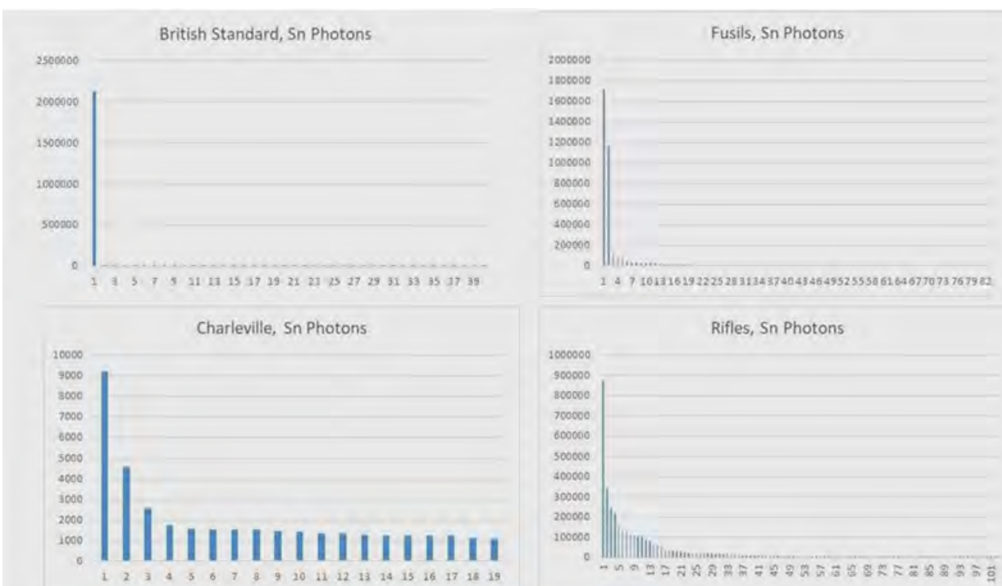


Figure 157. Tin (Sn) in British Standard, Charleville, Fusils and Rifles (Method 2).

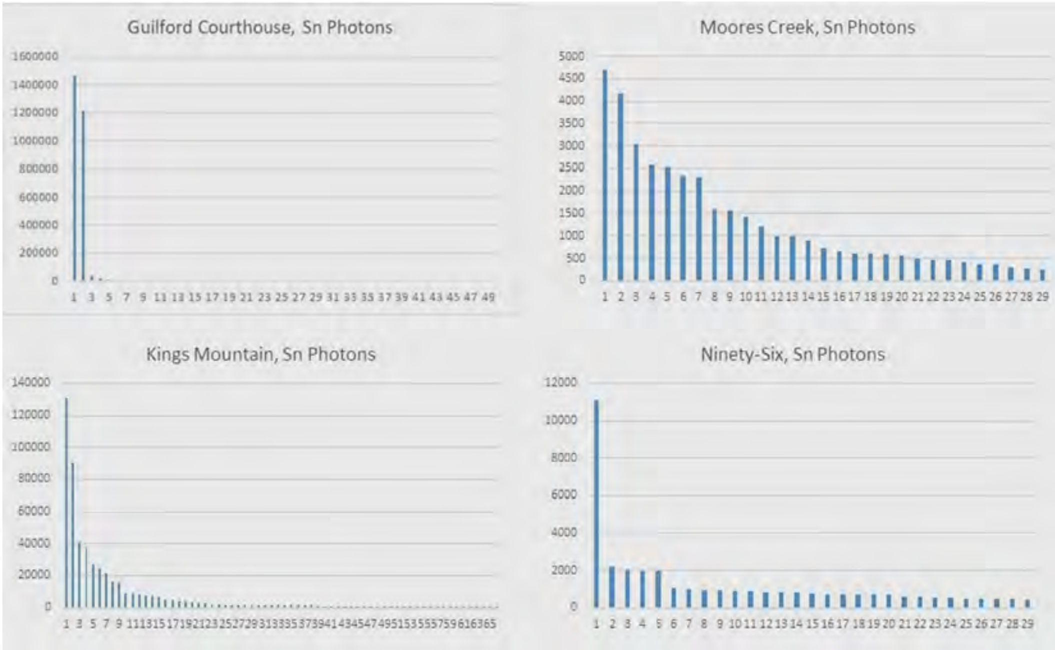


Figure 158. Tin (Sn) Photons in Guilford Courthouse, Kings Mountain, Moores Creek and Ninety-Six Samples.

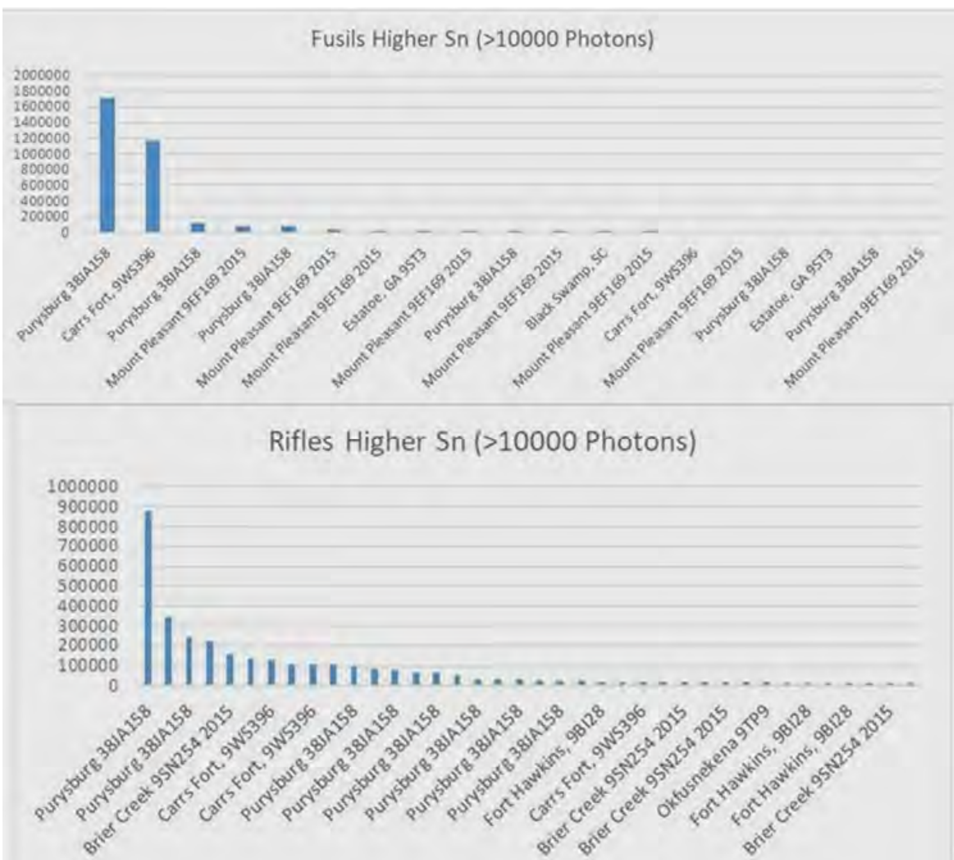


Figure 159. Higher Tin (Sn) Photon Values in Fusils and Rifles (Method 2).

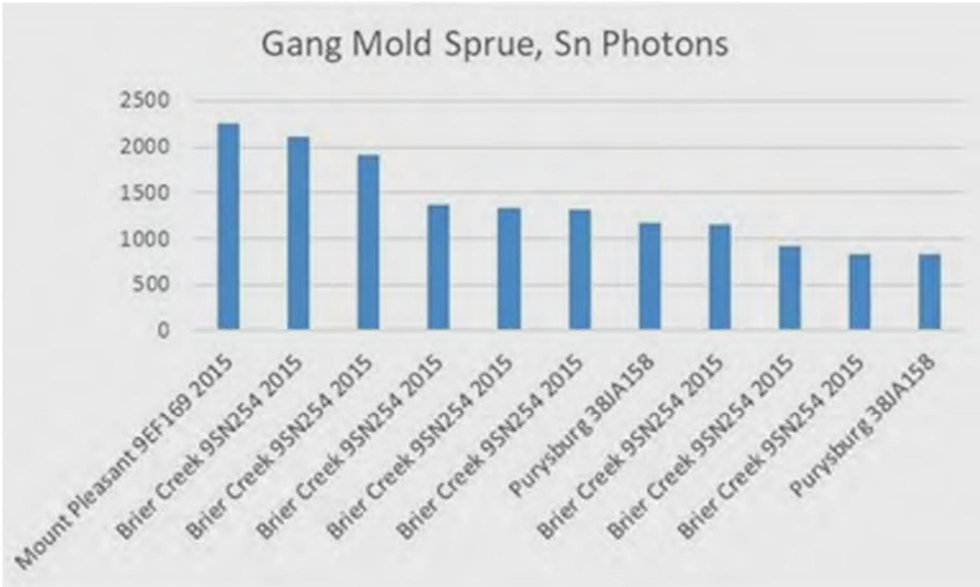
Zinc

Zinc (Zn) is a lustrous metal with the atomic number 30 (Bleiwas and diFrancesco 2010; International Zinc Association 2017). It is found with lead ores. Zinc has a high melting point (787°F). Zinc has a value of 2.5-3 on Mohs hardness scale.

Zinc (Zn)/Rhodium (Rh) ratio values were sorted by weapon type. We tallied the number of specimens for weapon type with values of one or greater. The results were: British Standard balls, 6 (12%), Charleville, 1 (4%), Fusil, 9 (8%), and Rifles, 22 (14%). While Zinc (Zn) in Rifle balls sows the highest percentage this distribution does not appear to have statistical validity.

Casting Sprue

Archaeological evidence for metal casting of round balls was observed at three sites in the study-- Brier Creek, Mount Pleasant and Purysburg. Examples of gang mold sprue from each of these three sites were analyzed. Tin (Sn) and Antimony (Sb) photon values for these gang mold sprue samples are shown in Figure 160.



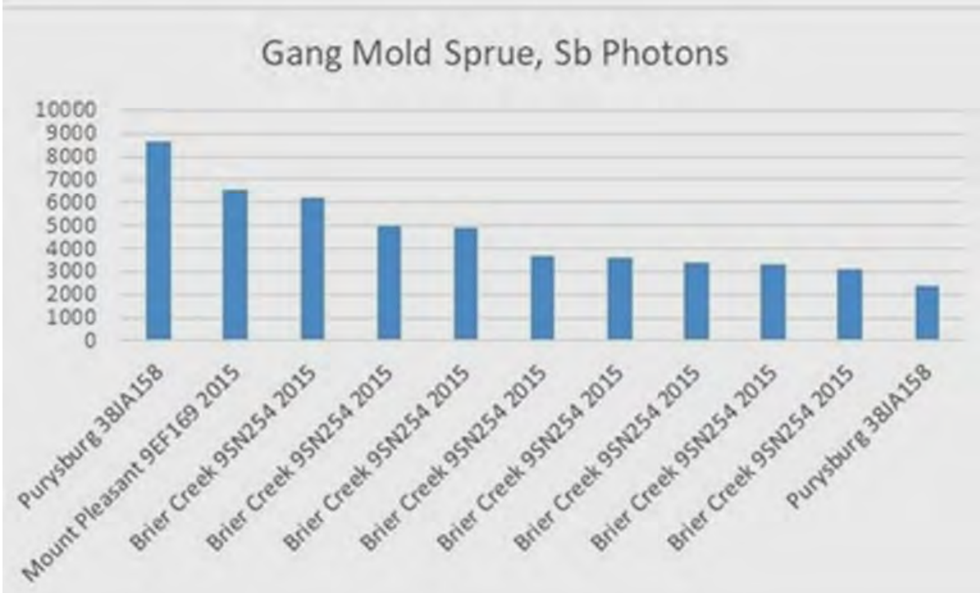


Figure 160. Tin (Sn) and Antimony (Sb) Photons, Gang Mold Sprue from Brier Creek, Mount Pleasant and Purysburg Samples.

VI. Summary

This report contains a wide range of information about the elemental composition of metallic round balls recovered from many eighteenth and early nineteenth century sites in the United States. It also includes information on a few examples from other places and later time periods. Bruker's Tracer series machines generated these data, which were processed using Bruker's Artax software. The purpose of this project was to explore the feasibility of these techniques in characterizing round balls in culturally meaningful ways. The project team endeavored to develop standardized methods for data collection. This report includes data collect by numerous methods over a several year period, culminating in the 2017 Get the Lead Out! Workshop, which was sponsored by the National Center for Preservation Technology and Training, National Park Service.

This report explores many of the elements that were identified in the samples. We looked for relationships between elements, or clusters of elements, by weapon type and by archaeological site. The elements Tin (Sn), Antimony (Sb) and Silver (Ag) appear to be important additives to the Lead (Pb) balls. Other elements, including Nickel (Ni), Copper (Cu), Zinc (Zn) and Cadmium (Cd) also may be important, but more study is needed to establish their relevance. This research has established the utility of this technology for identifying patterning in the data. The task of interpreting these patterns remains to be fully completed. Hopefully, the data and interpretations provided in this report represent a sound basis for future studies on this topic.

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Appendix 1. Data Spreadsheet

Group	Dataset	Method	Weapon	Sample	Ag K12	Cd K12	Cu K12	Fe K12	Ni K12	Pb L1	Pb M1	Pd K12	Rh K12	Sb K12	Sn K12	Zn K12	Sb/Sn	Ag/Sn	Zn/Pb	Cu/Pb	Sb/Rh	Sn/Rh	Ag/Rh	Cd/Rh	Cd/Sn	Pd/Rh	Sn/Sb	Ni/Rh	Cu/Rh	Zn/Rh	Sn/Pb
1	Battle Beaufort 2016	4		BFS595	81	164	405	384	182	104624	376	55	20	530	302	6	1.755	0.268	0.000	0.004	26.500	15.100	4.050	8.200	0.543	2.750	0.570	9.100	20.250	0.300	0.003
1	Battle Beaufort 2016	4		BFFS77	131	135	370	336	206	93567	453	92	31	55	299	19	0.184	0.438	0.000	0.004	1.774	9.645	4.226	4.355	0.452	2.968	5.436	6.645	11.935	0.613	0.003
1	Battle Beaufort 2016	4		BFFS89	206	256	507	448	202	110235	449	79	31	661	338	14	1.956	0.609	0.000	0.005	21.323	10.903	6.645	8.258	0.757	2.548	0.511	6.516	16.355	0.452	0.003
1	Battle Beaufort 2016	4		BFFS85a	160	126	301	546	174	77842	346	28	29	128	1333	24	0.096	0.120	0.000	0.004	4.414	45.966	5.517	4.345	0.095	0.966	10.414	6.000	10.379	0.828	0.017
1	Battle Beaufort 2016	4		BFFS83	216	110	378	393	160	87559	238	77	29	32	305	50	0.105	0.708	0.001	0.004	1.103	10.517	7.448	3.793	0.361	2.655	9.531	5.517	13.034	1.724	0.003
1	Battle Beaufort 2016	4		BFFS74	102	150	464	303	175	85612	282	49	36	1034	243	4	4.255	0.420	0.000	0.005	28.722	6.750	2.833	4.167	0.617	1.361	0.235	4.861	12.889	0.111	0.003
1	Battle Beaufort 2016	4		BFFS100a	324	144	420	457	170	94798	423	77	35	3421	323	66	10.591	1.003	0.001	0.004	97.743	9.229	9.257	4.114	0.446	2.200	0.094	4.857	12.000	1.886	0.003
1	Battle Beaufort 2016	4		BFFS84	327	169	458	527	175	98488	371	38	37	27	294	9	0.092	1.112	0.000	0.005	0.730	7.946	8.838	4.568	0.575	1.027	10.889	4.730	12.378	0.243	0.003
1	Battle Beaufort 2016	4		BFFS86	234	176	421	390	173	104416	409	85	37	188	431	31	0.436	0.543	0.000	0.004	5.081	11.649	6.324	4.757	0.408	2.297	2.293	4.676	11.378	0.838	0.004
1	Battle Beaufort 2016	4		BFFS92	277	189	432	452	171	95887	383	86	40	61	242	16	0.252	1.145	0.000	0.005	1.525	6.050	6.925	4.725	0.781	2.150	3.967	4.275	10.800	0.400	0.003
1	Battle Beaufort 2016	4		BFFS96	255	109	374	352	152	80514	261	56	40	730	264	37	2.765	0.966	0.000	0.005	18.250	6.600	6.375	2.725	0.413	1.400	0.362	3.800	9.350	0.925	0.003
1	Battle Beaufort 2016	4		BFFS93	220	55	329	463	131	81702	305	50	36	393	292	14	1.346	0.753	0.000	0.004	10.917	8.111	6.111	1.528	0.188	1.389	0.743	3.639	9.139	0.389	0.004
1	Battle Beaufort 2016	4		BFFS87	182	73	357	371	166	66012	234	30	46	112	194	32	0.577	0.938	0.000	0.005	2.435	4.217	3.957	1.587	0.376	0.652	1.732	3.609	7.761	0.696	0.003
1	Battle Beaufort 2016	4		BFFS75	160	178	437	323	141	96692	429	57	40	317	344	20	0.922	0.465	0.000	0.005	7.925	8.600	4.000	4.450	0.517	1.425	1.085	3.525	10.925	0.500	0.004
1	Battle Beaufort 2016	4		BFFS99	181	132	325	420	170	88573	411	90	49	2228	229	24	9.729	0.790	0.000	0.004	45.469	4.673	3.694	2.694	0.576	1.837	0.103	3.469	6.633	0.490	0.003
1	Battle Beaufort 2016	4		BFFS82	142	120	521	434	156	96281	506	68	47	632	296	32	2.135	0.480	0.000	0.005	13.447	6.298	3.021	2.553	0.405	1.447	0.468	3.319	11.085	0.681	0.003
1	Battle Beaufort 2016	4		BFFS85b	154	141	398	367	150	90782	418	28	48	411	4212	1	0.098	0.037	0.000	0.004	8.563	87.750	3.208	2.938	0.033	0.583	10.248	3.125	8.292	0.021	0.046
1	Battle Beaufort 2016	4		BFFS94	238	218	399	339	165	108147	757	102	59	282	339	18	0.832	0.702	0.000	0.004	4.780	5.746	4.034	3.695	0.643	1.729	1.202	2.797	6.763	0.305	0.003
1	Battle Beaufort 2016	4		BFFS90	208	196	420	410	151	106607	664	81	56	132	292	12	0.452	0.712	0.000	0.004	2.357	5.214	3.714	3.500	0.671	1.446	2.212	2.696	7.500	0.214	0.003
1	Battle Beaufort 2016	4		BFFS100b	252	190	461	290	116	96597	460	57	50	134	298	65	0.450	0.846	0.001	0.005	2.680	5.960	5.040	3.800	0.638	1.140	2.224	2.320	9.220	1.300	0.003
1	Battle Beaufort 2016	4		BFFS76	77	91	356	836	150	68985	181	52	67	334	273	26	1.223	0.282	0.000	0.005	4.985	4.075	1.149	1.358	0.333	0.776	0.817	2.239	5.313	0.388	0.004
1	Battle Beaufort 2016	4	Case shot	BFFS81	180	221	439	382	180	107457	647	43	27	50	999	11	0.050	0.180	0.000	0.004	1.852	37.000	6.667	8.185	0.221	1.593	19.980	6.667	16.259	0.407	0.009
1	Battle Beaufort 2016	4	Case shot	BFFS88b	148	173	506	458	133	103045	425	75	21	227	828	58	0.274	0.179	0.001	0.005	10.810	39.429	7.048	8.238	0.209	3.571	3.648	6.333	24.095	2.762	0.008
1	Battle Beaufort 2016	4	Case shot	BFFS79	135	168	381	321	180	102678	627	85	30	26	456	24	0.057	0.296	0.000	0.004	0.867	15.200	4.500	5.600	0.368	2.833	17.538	6.000	12.700	0.800	0.004
1	Battle Beaufort 2016	4	Case shot	BFFS91	342	152	533	437	151	101144	315	65	33	144	333	-11	0.432	1.027	0.000	0.005	4.364	10.091	10.364	4.606	0.456	1.970	2.313	4.576	16.152	-0.333	0.003
1	Battle Beaufort 2016	4	Case shot	BFFS88a	144	139	315	429	123	84265	292	43	36	105	345	3	0.304	0.417	0.000	0.004	2.917	9.583	4.000	3.861	0.403	1.194	3.286	3.417	8.750	0.083	0.004
1	Battle Beaufort 2016	4	Case shot	BFFS80	253	123	348	482	109	74861	214	62	76	71	335	12	0.212	0.755	0.000	0.005	0.934	4.408	3.329	1.618	0.367	0.816	4.718	1.434	4.579	0.158	0.004
2	Battle Beaufort 2017	7		BB MB3	7	105	161	197	209	48983	242	38	12	268	320	24	0.838	0.022	0.000	0.003	22.333	26.667	0.583	8.750	0.328	3.167	1.194	17.417	13.417	2.000	0.007
2	Battle Beaufort 2017	7		BBMB2	70	86	153	156	238	44251	227	58	14	16	284	7	0.056	0.246	0.000	0.003	1.143	20.286	5.000	6.143	0.303	4.143	17.750	17.000	10.929	0.500	0.006
2	Battle Beaufort 2017	7		BB023	89	88	257	246	217	47726	142	69	20	811	284	-1	2.856	0.313	0.000	0.005	40.550	14.200	4.450	4.400	0.310	3.450	0.350	10.850	12.850	-0.050	0.006
2	Battle Beaufort 2017	7		BB 176a	51	105	130	114	203	44396	193	51	20	883	251	18	3.518	0.203	0.000	0.003	44.150	12.550	2.550	5.250	0.418	2.550	0.284	10.150	6.500	0.900	0.006
2	Battle Beaufort 2017	7		BB137	30	118	174	208	243	49975	385	46	25	150	300	24	0.500	0.100	0.000	0.003	6.000	12.000	1.200	4.720	0.393	1.840	2.000	9.720	6.960	0.960	0.006
2	Battle Beaufort 2017	7		BB 173	80	113	208	173	251	48158	259	68	26	56	323	43	0.173	0.248	0.001	0.004	2.154	12.423	3.077	4.346	0.350	2.615	5.768	9.654	8.000	1.654	0.007
2	Battle Beaufort 2017	7		BB 124	42	123	226	181	210	47212	190	68	22	1191	735	1	1.620	0.057	0.000	0.005	54.136	33.409	1.909	5.591	0.167	3.091	0.617	9.545	10.273	0.045	0.016
2	Battle Beaufort 2017	7		BB152	127	112	126	178	235	44199	154	65	25	87	341	19	0.255	0.372	0.000	0.003	3.480	13.640	5.080	4.480	0.328	2.600	3.920	9.400	5.040	0.760	0.008
2	Battle Beaufort 2017	7		BB147	83	112	181	115	251	49645	269	38	32	7	465	9	0.015	0.178	0.000	0.004	0.219	14.531	2.594	3.500	0.241	1.188	66.429	7.844	5.656	0.281	0.009
2	Battle Beaufort 2017	7		BB139	77	83	154	185	249	42281	194	31	33	131	284	15	0.461	0.271	0.000	0.004	3.970	8.606	2.333	2.515	0.292	0.939	2.168	7.545	4.667	0.455	0.007
2	Battle Beaufort 2017	7		BB146	101	48	173	156	203	33526	117	46	27	46	364	21	0.126	0.277	0.001	0.005	1.704	13.481	3.741	1.778	0.132	1.704	7.913	7.519	6.407	0.778	0.011
2	Battle Beaufort 2017	7		BB 168	96	126	186	175	179	49857	174	62	25	75	313	15	0.240	0.307	0.000	0.004	3.000	12.520	3.840	5.040	0.403	2.480	4.173	7.160	7.440	0.600	0.006
2	Battle Beaufort 2017	7		BB 171	114	133	169	282	218	46852	193	48	31	13	325	17	0.040	0.351	0.000	0.004	0.419	10.484	3.677	4.290	0.409	1.548	25.000	7.032	5.452	0.548	0.007
2	Battle Beaufort 2017	7		BB309	70	115	199	202	238	49789	252	41	35	1334	267	18	4.996	0.262	0.000	0.004	38.114	7.629	2.000	3.286	0.431	1.171	0.200	6.800	5.686	0.514	0.005
2	Battle Beaufort 2017	7		BB 134	115	94	171	95	251	43176	202	56	38	86	403	11	0.213	0.285	0.000	0.004	2.263	10.605	3.026	2.474	0.233	1.474	4.686	6.605	4.500	0.289	0.009
2	Battle Beaufort 2017	7		BB 176b	58	87	190	194	224	45544	194	65	35	17720	418	15	42.392	0.139	0.000	0.004	506.286	11.943	1.657	2.486	0.208	1.857	0.024	6.400	5.429	0.429	0.009
2	Battle Beaufort 2017	7		BB 169	55	128	178	227	199	48029	190	100	33	20	461	30	0.043	0.119	0.001	0.004	0.606	13.970	1.667	3.879	0.278	3.030	23.050	6.030	5.394	0.909	0.010
2	Battle Beaufort 2017	7		BB133	62	143	219	147	216	47406	272	54	38	232	460	11	0.504	0.135	0.000	0.005	6.105	12.105	1.632	3.763	0.311	1.421	1.983	5.684	5.763	0.289	0.010
2	Battle Beaufort 2017	7		BB 138	22	51	78	90	118	20074	133	30	21	31	117	10	0.265	0.188	0.000	0.004	1.476	5.571	1.048	2.429	0.436	1.429	3.774	5.619	3.714	0.476	0.006
2	Battle Beaufort 2017	7		BBMB1	66	136	191	263	206	47901	250	87	38	179	1083	41	0.165	0.061	0.001	0.004	4.711	28.500	1.737	3.579	0.126	2.289	6.050	5.421	5.026	1.079	0.023
2	Battle Beaufort 2017	7		BB125	49	117	176	189	223	39097	167	57	43	102	487	21	0.209	0.101	0.001	0.005	2.372	11.326	1.140	2.721	0.240	1.326	4.775	5.186	4.093	0.488	0.012
2	Battle Beaufort 2017	7		BB 161	52	135	209	158	233	50850	212	64	51	331	283	34	1.170	0.184	0.001	0.004	6.490	5.549	1.020	2.647	0.477	1.255	0.855	4.569	4.098	0.667	0.006
2	Battle Beaufort 2017	7		BB170	67	115	151	243	236	46191	180	57	59	37	303	42	0.122	0.221	0.001	0.003	0.627	5.136	1.136	1.949	0.380	0.966	8.189	4.000	2.559	0.712	0.007
2	Battle Beaufort 2017	6		BB04	189	59	212	203	79	112649	780	1205	34	73	145	78	0.503	1.303	0.001	0.002	2.147	4.265	5.559	1.735	0.407	35.441	1.986	2.324	6.235	2.294	0.001
2	Battle Beaufort 2017	6		BB08	183	52	265	202	113	126201	637	1320	53	9	107	22	0.084	1.710	0.000	0.002	0.170	2.019	3.453	0.981	0.486	24.906	11.889	2.132	5.000	0.415	0.001
2	Battle Beaufort 2017	6		BB54round	118	44	433	460	73	137044	642	1346	40	246	380	76	0.647	0.311	0.001	0.003	6.150	9.500	2.950	1.100	0.116	33.650	1.545	1.825	10.825	1.900	0.003
2	Battle Beaufort 2017	6		BB17	40	18	238	222	118	145962	879	1579	72	352	2997	46	0.117	0.013	0.000	0.002	4.889	41.625	0.556	0.250	0.006	21.931	8.514	1.639	3.306	0.639	0.021
2	Battle Beaufort 2017	6		BB07	291	28	232	207	76	147161	1065	1385	61	308	208	77	1.481	1.399	0.001	0.002	5.049	3.410	4.770	0.459	0.135	22.705	0.675	1.246	3.803	1.262	0.001
2	Battle Beaufort 2017	6		BB57	96	40	166	278	38	137653	1036	1339	48	99	909	65	0.109	0.106	0.000	0.001	2.063	18.938	2.000	0.833	0.044	27.896	9.182	0.792	3.458	1.354	0.007
2	Battle Beaufort 2017	6		BB72	300	47	271	510	36	131670	558	1416	46	204	410	91	0.498	0.732	0.001	0.002	4.435	8.913	6.522	1.022	0.115	30.783	2.010	0.783	5.891	1.978	0.003
2	Battle Beaufort 2017	6		BB74	156	63	166	277	65	145534	944	1287	85	288	126	118	2.286	1.238	0.001	0.001	3.388	1.482	1.835	0.741	0.500	15.141	0.438	0.765	1.953	1.388	0.001
2	Battle Beaufort 2017	6		BB05	147	63	124	264	29	145622	1089	1508	91	518	1732	54	0.299	0.085	0.000	0.001	5.692	19.033	1.615	0.692	0.036	16.571	3.344	0.319	1.363	0.593	0.012
2	Battle Beaufort 2017	6		bb10	90	65	237	463	22	147769	902	1504	74	1064	175	91	6.080	0.514	0.001	0.002	14.378	2.365	1.216	0.878	0.371	20.324	0.164	0.297	3.203	1.230	0.001
2	Battle Beaufort 2017	6		BB54impacted	132	42	252	501	16	148509	662	1431	71	186	248	47	0.750	0.532	0.000	0.002	2.620	3.493	1.859	0.592	0.169	20.155	1.333	0.225	3.549	0.662	0.002
2	Battle Beaufort 2017	6		BB13	79	33	543	180	8	141884	812	1914	69	7855	257	-3	30.564	0.307	0.000	0.004	113.841	3.725	1.145	0.478	0.128	27.739	0.033	0.116	7.870	-0.043	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc605	280	777	2079	11609	62	893073	1664	8015	2365	3836	1246	310	3.079	0.225	0.000	0.002	1.622	0.527	0.118	0.329	0.624	3.389	0.325	0.026	0.879	0.131	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc3	335	1210	2090	2018	114	1140745	4522	8325	3050	4694	1607	315	2.921	0.208	0.000	0.002	1.539	0.527	0.110	0.397	0.753	2.730	0.342	0.037	0.685	0.103	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc519	235	887	2078	12249	158	889581	2030	10571	4458	5727	1507	392	3.800	0.156	0.000	0.002	1.285	0.338	0.053	0.199	0.589	2.371	0.263	0.035	0.466	0.088	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc604	580	1721	2055	2167	130	1340453	7917	8584	4097	5091	1818	522	2.800	0.319	0.000	0.002	1.243	0.444	0.142	0.420	0.947	2.095	0.357	0.032	0.502	0.127	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc384	1101	700	2510	37366	33	831193	1485	8924	2774	3299	1118	705	2.951	0.985	0.001	0.003	1.189	0.403	0.397	0.252	0.626	3.217	0.339	0.012	0.905	0.254	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc453	162	1275	2783	11799	47	1137179	2007	8541	3832	4050	1613	486	2.511	0.100	0.000	0.002	1.057	0.421	0.042	0.333	0.790	2.229	0.398	0.012	0.726	0.127	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc504	205	1561	2848	6874	43	1263794	3430	8770	4712	4948	1585	305	3.122	0.129	0.000	0.002	1.050	0.336	0.044	0.331	0.985	1.861	0.320	0.009	0.604	0.065	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc368	940	270	2393	17639	1	424251	543	11690	2978	3123	1058	590	2.952	0.888	0.001	0.006	1.049	0.355	0.316	0.091	0.255	3.925	0.339	0.000	0.804	0.198	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc441	180	1253	2241	5510	62	1204152	4114	8219	3555	3463	1445	485	2.397	0.125	0.000	0.002	0.974	0.406	0.051	0.352	0.867	2.312	0.417	0.017	0.630	0.136	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc439	130	1265	2812	14701	44	1137663	2061	9000	4544	4124	1606	548	2.568	0.081	0.000	0.002	0.908	0.353	0.029	0.278	0.788	1.981	0.389	0.010	0.619	0.121	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc455	184	1631	2495	10324	78	1315957	3275	9159	5457	3989	1765	337	2.260	0.104	0.000	0.002	0.731	0.323	0.034	0.299	0.924	1.678	0.442	0.014	0.457	0.062	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc58	730	1549	2443	7292	118	1371016	4777	8707	5008	2865	1799	428	1.593	0.406	0.000	0.002	0.572	0.359	0.146	0.309	0.861	1.739	0.628	0.024	0.488	0.085	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc385	362	1057	2062	45385	1	999356	1065	11221	5669	1084	1561	1100	0.694	0.232	0.001	0.002	0.191	0.275	0.064	0.186	0.677	1.979	1.440	0.000	0.364	0.194	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc414	1478	1526	1917	9390	1	1322258	3268	8443	4869	489	1750	321	0.279	0.845	0.000	0.001	0.100	0.359	0.304	0.313	0.872	1.734	3.579	0.000	0.394	0.066	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc469	726	1863	1701	7587	106	1443309	4363	8838	5905	552	2370	315	0.233	0.306	0.000	0.001	0.093	0.401	0.123	0.315	0.786	1.497	4.293	0.018	0.288	0.053	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc226	1128	1164	1714	25981	121	1197059	2994	9477	5707	480	1629	710	0.295	0.692	0.001	0.001	0.084	0.285	0.198	0.204	0.715	1.661	3.394	0.021	0.300	0.124	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc44	220	1259	1989	2056	167	1158219	6891	7634	3192	265	1376	458	0.193	0.160	0.000	0.002	0.083	0.431	0.069	0.394	0.915	2.392	5.192	0.052	0.623	0.143	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc8	279	1870	2224	2918	119	1411349	7137	8724	4675	368	2130	607	0.173	0.131	0.000	0.002	0.079	0.456	0.060	0.400	0.878	1.866	5.788	0.025	0.476	0.130	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc33	333	1322	2436	1344	114	1225264	7195	8146	3264	209	3556	337	0.059	0.094	0.000	0.002	0.064	1.089	0.102	0.405	0.372	2.496	17.014	0.035	0.746	0.103	0.003
3	Brier Creek 9SN254 2015	2	British Standard	bc603	364	656	1936	17404	121	713731	1041	11804	4081	252	1553	620	0.162	0.234	0.001	0.003	0.062	0.381	0.089	0.161	0.422	2.892	6.163	0.030	0.474	0.152	0.002
3	Brier Creek 9SN254 2015	2	British Standard	bc60	642	1379	2630	6968	131	1225407	3582	8156	5056	263	1618	419	0.163	0.397	0.000	0.002	0.052	0.320	0.127	0.273	0.852	1.613	6.152	0.026	0.520	0.083	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc319	1233	1261	2194	16352	119	1251433	3221	8343	5543	173	1469	594	0.118	0.839	0.000	0.002	0.031	0.265	0.222	0.227	0.858	1.505	8.491	0.021	0.396	0.107	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc292	523	1673	2505	14121	110	1287674	3180	9242	5270	149	1656	620	0.090	0.316	0.000	0.002	0.028	0.314	0.099	0.317	1.010	1.754	11.114	0.021	0.475	0.118	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc291	495	1463	2672	30288	13	1301724	2747	8955	5642	114	1743	564	0.065	0.284	0.000	0.002	0.020	0.309	0.088	0.259	0.839	1.587	15.289	0.002	0.474	0.100	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc586	358	1754	1930	2608	122	1307796	7778	7991	4129	58	1683	433	0.034	0.213	0.000	0.001	0.014	0.408	0.087	0.425	1.042	1.935	29.017	0.030	0.467	0.105	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc584	133	1533	1939	3304	41	1265367	7085	8228	4264	54	1670	219	0.032	0.080	0.000	0.002	0.013	0.392	0.031	0.360	0.918	1.930	30.926	0.010	0.455	0.051	0.001
3	Brier Creek 9SN254 2015	2	British Standard	bc5	525	1926	1933	1027	65	1479687	7934	8606	5242	51	1753	410	0.029	0.299	0.000	0.001	0.010	0.334	0.100	0.367	1.099	1.642	34.373	0.012	0.369	0.078	0.001

3 Brier Creek 9SN254 2015	2	British Standard	bc293	337	1386	1974	13007	25	1284276	3941	9307	5289	45	1547	485	0.029	0.218	0.000	0.002	0.009	0.292	0.064	0.262	0.896	1.760	34.378	0.005	0.373	0.092	0.001
3 Brier Creek 9SN254 2015	2	British Standard	bc378	86	1456	2131	6536	110	1196327	4444	7943	4284	34	1631	428	0.021	0.053	0.000	0.002	0.008	0.381	0.020	0.340	0.893	1.854	47.971	0.026	0.497	0.100	0.001
3 Brier Creek 9SN254 2015	2	British Standard	bc299	227	1483	1818	8459	54	1301632	4218	8278	4617	32	1646	330	0.019	0.138	0.000	0.001	0.007	0.357	0.049	0.321	0.901	1.793	51.438	0.012	0.394	0.071	0.001
3 Brier Creek 9SN254 2015	2	British Standard	bc4	1060	1785	2205	2342	-2	1440593	6906	8648	4865	21	1839	309	0.011	0.576	0.000	0.002	0.004	0.378	0.218	0.367	0.971	1.778	87.571	0.000	0.453	0.064	0.001
3 Brier Creek 9SN254 2015	2	Charleville	bc590	200	966	2188	10148	52	1003464	3324	8089	2329	6821	1235	342	5.523	0.162	0.000	0.002	2.929	0.530	0.086	0.415	0.782	3.473	0.181	0.022	0.939	0.147	0.001
3 Brier Creek 9SN254 2015	2	Charleville	bc485	119	808	2054	3617	39	879703	4074	7421	2184	3534	1085	344	3.257	0.110	0.000	0.002	1.618	0.497	0.054	0.370	0.745	3.398	0.307	0.018	0.940	0.158	0.001
3 Brier Creek 9SN254 2015	2	Charleville	bc2	615	1202	1938	2373	1	1142463	6551	7786	2690	-11	1550	368	-0.007	0.397	0.000	0.002	-0.004	0.576	0.229	0.447	0.775	2.894	-140.909	0.000	0.720	0.137	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc42	275	1120	2421	21224	78	1083286	2000	10969	5425	9762	1725	483	5.659	0.159	0.000	0.002	1.799	0.318	0.051	0.206	0.649	2.022	0.177	0.014	0.446	0.089	0.002
3 Brier Creek 9SN254 2015	2	Fusil	bc457	288	1069	2037	6072	-3	1012661	2654	7678	2453	3346	1208	386	2.770	0.238	0.000	0.002	1.364	0.492	0.117	0.436	0.885	3.130	0.361	-0.001	0.830	0.157	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc422	133	675	1795	8736	4	898072	1570	7609	2185	2900	1140	313	2.544	0.117	0.000	0.002	1.327	0.522	0.061	0.309	0.592	3.482	0.393	0.002	0.822	0.143	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc505	180	1309	2262	6446	27	1120993	3757	8104	3308	4077	1465	289	2.783	0.123	0.000	0.002	1.232	0.443	0.054	0.396	0.894	2.450	0.359	0.008	0.684	0.087	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc491	142	784	3238	16423	73	926708	986	9412	3293	3782	1256	324	3.011	0.113	0.000	0.003	1.148	0.381	0.043	0.238	0.624	2.858	0.332	0.022	0.983	0.098	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc451	154	1202	2977	7819	45	1107466	2984	8205	4250	4467	1255	397	3.559	0.123	0.000	0.003	1.051	0.295	0.036	0.283	0.958	1.931	0.281	0.011	0.700	0.093	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc474	214	1783	2514	4592	162	1357363	4391	8845	5197	4581	1907	773	2.402	0.112	0.001	0.002	0.881	0.367	0.041	0.343	0.935	1.702	0.416	0.031	0.484	0.149	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc434	278	1543	2260	11389	98	1269077	2925	8725	4788	3772	1580	314	2.387	0.176	0.000	0.002	0.788	0.330	0.058	0.322	0.977	1.822	0.419	0.020	0.472	0.066	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc408	504	942	1609	9511	24	1034196	2883	7543	2658	652	1254	451	0.520	0.402	0.000	0.002	0.245	0.472	0.190	0.354	0.751	2.838	1.923	0.009	0.605	0.170	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc9	640	1322	5162	7281	70	1218157	4841	8385	3881	549	3224	433	0.170	0.199	0.000	0.004	0.141	0.831	0.165	0.341	0.410	2.161	5.872	0.018	1.330	0.112	0.003
3 Brier Creek 9SN254 2015	2	Fusil	bc308	404	664	1555	14022	46	693309	697	11212	4450	368	1556	548	0.237	0.260	0.001	0.002	0.083	0.350	0.091	0.149	0.427	2.520	4.228	0.010	0.349	0.123	0.002
3 Brier Creek 9SN254 2015	2	Fusil	bc7	381	944	1914	3951	49	992427	4713	7412	2300	165	1270	425	0.130	0.300	0.000	0.002	0.072	0.552	0.166	0.410	0.743	3.223	7.697	0.021	0.832	0.185	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc35	896	853	1888	4495	114	1030489	5785	7628	2552	118	1276	430	0.092	0.702	0.000	0.002	0.046	0.500	0.351	0.334	0.668	2.989	10.814	0.045	0.740	0.168	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc23	792	1550	2130	2503	61	1352820	6469	8409	4805	162	1784	395	0.091	0.444	0.000	0.002	0.034	0.371	0.165	0.323	0.869	1.750	11.012	0.013	0.443	0.082	0.001
3 Brier Creek 9SN254 2015	2	Fusil	bc24	1161	1579	1912	1047	197	1310206	7584	8384	4576	88	1535	475	0.057	0.756	0.000	0.001	0.019	0.335	0.254	0.345	1.029	1.832	17.443	0.043	0.418	0.104	0.001
3 Brier Creek 9SN254 2015	2	Rifle	bc43	700	425	1844	2249	122	729732	5005	7010	1679	9192	673	428	13.658	1.040	0.001	0.003	5.475	0.401	0.417	0.253	0.632	4.175	0.073	0.073	1.098	0.255	0.001
3 Brier Creek 9SN254 2015	2	Rifle	bc51	744	631	3479	28825	29	794329	1094	13521	5194	17788	9546	1074	1.863	0.078	0.001	0.004	3.425	1.838	0.143	0.121	0.066	2.603	0.537	0.006	0.670	0.207	0.012
3 Brier Creek 9SN254 2015	2	Rifle	bc10	632	1170	3004	6442	115	1194942	3999	15969	4479	12413	135126	492	0.092	0.005	0.000	0.003	2.771	30.169	0.141	0.261	0.009	3.565	10.886	0.026	0.671	0.110	0.113
3 Brier Creek 9SN254 2015	2	Rifle	bc28	1902	520	2461	26726	74	787200	1084	19171	4740	11371	155341	691	0.073	0.012	0.001	0.003	2.399	32.772	0.401	0.110	0.003	4.045	13.661	0.016	0.519	0.146	0.197
3 Brier Creek 9SN254 2015	2	Rifle	bc113	175	909	2555	28028	1	810622	3717	25554	2310	5346	343067	497	0.016	0.001	0.001	0.003	2.314	148.514	0.076	0.394	0.003	11.062	64.173	0.000	1.106	0.215	0.423
3 Brier Creek 9SN254 2015	2	Rifle	bc571	1234	771	2035	6373	27	861169	3515	12779	2109	3659	104498	248	0.035	0.012	0.000	0.002	1.735	49.549	0.585	0.366	0.007	6.059	28.559	0.013	0.965	0.118	0.121
3 Brier Creek 9SN254 2015	2	Rifle	bc631	1451	420	1855	24176	26	627453	1302	13756	3851	3756	21243	413	0.177	0.068	0.001	0.003	0.975	5.516	0.377	0.109	0.020	3.572	5.656	0.007	0.482	0.107	0.034
3 Brier Creek 9SN254 2015	2	Rifle	bc32	571	660	2906	8597	65	757572	2668	18695	2278	2147	221424	555	0.010	0.003	0.001	0.004	0.942	97.201	0.251	0.290	0.003	8.207	103.132	0.029	1.276	0.244	0.292
3 Brier Creek 9SN254 2015	2	Rifle	bc425	823	669	1934	4390	63	817888	4271	7372	1926	1646	10657	593	0.154	0.077	0.001	0.002	0.855	5.533	0.427	0.347	0.063	3.828	6.474	0.033	1.004	0.308	0.013
3 Brier Creek 9SN254 2015	2	Rifle	bc601	593	680	2239	12694	98	895720	2451	10605	3799	3081	19398	422	0.159	0.031	0.000	0.002	0.811	5.106	0.156	0.179	0.035	2.792	6.296	0.026	0.589	0.111	0.022
3 Brier Creek 9SN254 2015	2	Rifle	bc26	519	787	3083	5442	67	958137	3684	8903	2545	1848	19974	414	0.093	0.026	0.000	0.003	0.726	7.848	0.204	0.309	0.039	3.498	10.808	0.026	1.211	0.163	0.021
3 Brier Creek 9SN254 2015	2	Rifle	bc6	667	2293	2348	2668	194	1568670	7480	10375	6229	4420	17048	348	0.259	0.039	0.000	0.001	0.710	2.737	0.107	0.368	0.135	1.666	3.857	0.031	0.377	0.056	0.011
3 Brier Creek 9SN254 2015	2	Rifle	bc633	925	1108	1901	10697	77	1150803	3324	8137	3358	2045	1554	444	1.316	0.595	0.000	0.002	0.609	0.463	0.275	0.330	0.713	2.423	0.760	0.023	0.566	0.132	0.001
3 Brier Creek 9SN254 2015	2	Rifle	bc579	282	593	1703	52635	98	777224	3570	6822	1854	1003	958	383	1.047	0.294	0.000	0.002	0.541	0.517	0.152	0.320	0.619	3.680	0.955	0.053	0.919	0.207	0.001
3 Brier Creek 9SN254 2015	2	Rifle	bc41	526	421	1655	11870	65	704587	3545	7811	1992	432	2664	488	0.162	0.197	0.001	0.002	0.217	1.337	0.264	0.211	0.158	3.921	6.167	0.033	0.831	0.245	0.004
3 Brier Creek 9SN254 2015	2	Rifle	bc405	834	474	1645	28059	1	733297	695	7564	2172	385	913	649	0.422	0.913	0.001	0.002	0.177	0.420	0.384	0.218	0.519	3.483	2.371	0.000	0.757	0.299	0.001
3 Brier Creek 9SN254 2015	2	Rifle	bc320	290	724	2521	10210	21	923893	2211	9780	3980	311	20090	667	0.015	0.014	0.001	0.003	0.078	5.048	0.073	0.182	0.036	2.457	64.598	0.005	0.633	0.168	0.022
3 Brier Creek 9SN254 2015	2	Rifle	bc73	62	1627	2124	6527	1	1389708	6130	8385	5312	76	1772	498	0.043	0.035	0.000	0.002	0.014	0.334	0.012	0.306	0.918	1.579	23.316	0.000	0.400	0.094	0.001
3 Brier Creek 9SN254 2015	2	Rifle	bc622	400	1912	1824	2156	82	1426926	8050	8641	5347	64	1843	250	0.035	0.217	0.000	0.001	0.012	0.345	0.075	0.358	1.037	1.616	28.797	0.015	0.341	0.047	0.001
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc473	127	366	1617	4834	83	533272	1273	8170	2030	3641	924	418	3.940	0.137	0.001	0.003	1.794	0.455	0.063	0.180	0.396	4.025	0.254	0.041	0.797	0.206	0.002
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc461	21	1492	2225	6282	114	1266316	2671	8922	5113	4879	1914	580	2.549	0.011	0.000	0.002	0.954	0.374	0.004	0.292	0.780	1.745	0.392	0.022	0.435	0.113	0.002
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc480	391	2287	2137	3857	113	1537531	6885	9293	5698	3413	2111	198	1.617	0.185	0.000	0.001	0.599	0.370	0.069	0.401	1.083	1.631	0.619	0.020	0.375	0.035	0.001
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc514	246	1350	2725	12960	94	1107192	1782	9742	4840	3582	1369	438	2.617	0.180	0.000	0.002	0.740	0.283	0.051	0.279	0.986	2.013	0.382	0.019	0.563	0.090	0.001
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc509	81	921	1831	5567	72	1062516	2876	7919	3819	3110	1156	358	2.690	0.070	0.000	0.002	0.814	0.303	0.021	0.241	0.797	2.074	0.372	0.019	0.479	0.094	0.001
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc424	316	1244	2550	9595	65	1101069	2035	8943	4109	4939	1324	525	3.730	0.239	0.000	0.002	1.202	0.322	0.077	0.303	0.940	2.176	0.268	0.016	0.621	0.128	0.001
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc511	87	709	1691	1710	22	847683	3751	7270	3089	3323	837	383	3.970	0.104	0.000	0.002	1.076	0.271	0.028	0.230	0.847	2.354	0.252	0.007	0.547	0.124	0.001
3 Brier Creek 9SN254 2015	2	Sprue, gang mold	bc452	90	1172	2172	5331	2	1111636	3476	8264	3971	6206	1341	349	4.628	0.067	0.000	0.002	1.563	0.338	0.023	0.295	0.874	2.081	0.216	0.001	0.547	0.088	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc307	45	1384	2041	8335	209	1152893	2522	8221	4357	105	1551	578	0.068	0.029	0.001	0.002	0.024	0.356	0.010	0.318	0.892	1.887	14.771	0.048	0.468	0.133	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc431	127	996	2219	5768	122	1054986	3239	7855	2782	4600	1169	406	3.935	0.109	0.000	0.002	1.653	0.420	0.046	0.358	0.852	2.824	0.254	0.044	0.798	0.146	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc352	62	914	1585	13859	151	987373	1954	7636	3820	191	1340	580	0.143	0.046	0.001	0.002	0.050	0.351	0.016	0.239	0.682	1.999	7.016	0.040	0.415	0.152	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc506	245	994	2071	4956	104	888453	1955	8331	3610	3209	1132	384	2.835	0.216	0.000	0.002	0.889	0.314	0.068	0.275	0.878	2.308	0.353	0.029	0.574	0.106	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc494	961	1587	2404	11052	75	1389466	3059	8584	5003	230	1821	470	0.126	0.528	0.000	0.002	0.046	0.364	0.192	0.317	0.871	1.716	7.917	0.015	0.481	0.094	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc574	255	1373	2032	10688	39	1181794	1880	8766	4177	3955	1600	388	2.472	0.159	0.000	0.002	0.947	0.383	0.061	0.329	0.858	2.099	0.405	0.009	0.486	0.093	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc432	345	1268	3018	11079	39	1197781	2254	9132	4878	4423	1536	371	2.880	0.225	0.000	0.003	0.907	0.315	0.071	0.260	0.826	1.872	0.347	0.008	0.619	0.076	0.001
3 Brier Creek 9SN254 2015	2	Unidentified	bc364	105	454	1703	6256	1	657543	3142	6921	1798	3893	814	452	4.783	0.129	0.001	0.003	2.165	0.453	0.058	0.253	0.558	3.849	0.209	0.001	0.947	0.251	0.001
3 Brier Creek 9SN254 2015	2	Buckshot	bc11	810	531	1734	5299	118	705072	4549	6813	1819	1527	1087	377	1.405	0.745	0.001	0.002	0.839	0.598	0.445	0.292	0.489	3.745	0.712	0.065	0.953	0.207	0.002
3 Brier Creek 9SN254 2015	2	Buckshot	bc56	2240	376	2197	18064	42	460410	1550	9884	1892	438	1079	315	0.406	2.076	0.001	0.005	0.232	0.570	1.184	0.199	0.348	5.224	2.463	0.022	1.161	0.166	0.002
3 Brier Creek 9SN254 2015	2	Chunk	bc575	290	1850	2338	5097	219	1414783	5320	8909	5092	4278	5467	431	0.783	0.053	0.000	0.002	0.840	1.074	0.057	0.363	0.338	1.750	1.278	0.043	0.459	0.085	0.004
3 Brier Creek 9SN254 2015	2	Folded lead	bc449	148	1219	2398	7701	51	1124031	1988	9100	4540	6189	1416	466	4.371	0.105	0.000	0.002	1.363	0.312	0.033	0.269	0.861	2.004	0.229	0.011	0.528	0.103	0.001
3 Brier Creek 9SN254 2015	2	Lead patch	bc377	60	98	1264	603	72	396738	1439	5826	1359	251	1001	283	0.251	0.060	0.001	0.003	0.185	0.737	0.044	0.072	0.098	4.287	3.988	0.053	0.930	0.208	0.003
3 Brier Creek 9SN254 2015	2	Lead patch	bc595	321	466	1572	3954	50	661163	3012	6499	1787	421	860	304	0.490	0.373	0.000	0.002	0.236	0.481	0.180	0.261	0.542	3.637	2.043	0.028	0.880	0.170	0.001
4 Brier Creek 9SN254 2017	7	British Standard	Brier Creek 134 1	59	106	140	239	227	45523	248	55	25	336	635	32	0.529	0.093	0.001	0.003	13.440	25.400	2.360	4.240	0.167	2.200	1.890	9.080	5.600	1.280	0.014
4 Brier Creek 9SN254 2017	7	British Standard	Brier Creek 117 1	68	122	168	248	229	49944	207	37	32	305	328	11	0.930	0.207	0.000	0.003	9.531	10.250	2.125	3.813	0.372	1.156	1.075	7.156	5.250	0.344	0.007
4 Brier Creek 9SN254 2017	7	British Standard	Brier Creek 211 1	71	70	110	183	229	32167	153	48	26	111	263	34	0.422	0.270	0.001	0.003	4.269	10.115	2.731	2.692	0.266	1.846	2.369	8.808	4.231	1.308	0.008
4 Brier Creek 9SN254 2017	7	Charleville	Brier Creek 133 1	69	100	156	261	207	46043	271	44	23	86	383	13	0.225	0.180	0.000	0.003	3.739	16.652	3.000	4.348	0.261	1.913	4.453	9.000	6.783	0.565	0.008
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 48 1	121	108	127	345	235	42337	198	49	15	419	291	13	1.440	0.416	0.000	0.003	27.933	19.400	8.067	7.200	0.371	3.267	0.695	15.667	8.467	0.867	0.007
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 109 1	53	97	116	410	200	45056	171	47	31	464	267	-1	1.738	0.199	0.000	0.003	14.968	8.613	1.710	3.129	0.363	1.516	0.575	6.452	3.742	-0.032	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 218 1	27	82	169	218	222	47239	268	42	10	144	276	6	0.522	0.098	0.000	0.004	14.400	27.600	2.700	8.200	0.297	4.200	1.917	22.200	16.900	0.600	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 78 1	60	121	149	136	248	46540	296	78	24	274	585	15	0.468	0.103	0.000	0.003	11.417	24.375	2.500	5.042	0.207	3.250	2.135	10.333	6.208	0.625	0.013
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 83 1	20	101	159	164	211	47467	290	70	46	222	398	20	0.558	0.050	0.000	0.003	4.826	8.652	0.435	2.196	0.254	1.522	1.793	4.587	3.457	0.435	0.008
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 80 1	69	112	160	352	212	47135	160	47	25	56	306	31	0.183	0.225	0.001	0.003	2.240	12.240	2.760	4.480	0.366	1.880	5.464	8.480	6.400	1.240	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 93 1	127	122	160	318	217	45451	174	80	19	42	288	35	0.146	0.441	0.001	0.004	2.211	15.158	6.684	6.421	0.424	4.211	6.857	11.421	8.421	1.842	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 132 1	57	105	141	196	207	45578	291	39	26	33	304	26	0.109	0.188	0.001	0.003	1.269	11.692	2.192	4.038	0.345	1.500	9.212	7.962	5.423	1.000	0.007
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 68 1	20	108	182	244	230	48115	245	80	38	47	291	41	0.162	0.069	0.001	0.004	1.237	7.658	0.526	2.842	0.371	2.105	6.191	6.053	4.789	1.079	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 144 1	46	128	157	384	201	49792	219	71	39	39	321	28	0.121	0.143	0.001	0.003	1.000	8.231	1.179	3.282	0.399	1.821	8.231	5.154	4.026	0.718	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 130 1	39	125	175	181	208	47624	269	88	43	40	273	14	0.147	0.143	0.000	0.004	0.930	6.349	0.907	2.907	0.458	2.047	6.825	4.837	4.070	0.326	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 115 1	68	116	118	232	226	48195	275	50	43	36	286	7	0.126	0.238	0.000	0.002	0.837	6.651	1.581	2.698	0.406	1.163	7.944	5.256	2.744	0.163	0.006
4 Brier Creek 9SN254 2017	7	Fusil	Brier Creek 85 1	60	85	106	183	192	37520	208	42	28	13	239	9	0.054	0.251	0.000	0.003	0.464	8.536	2.143	3.036	0.356	1.500	18.385	6.857	3.786	0.321	0.006
4 Brier Creek 9SN254 2017	7	Rifle	Brier Creek 204 1	50	87	147	157	219	42992	240	85	46	2179	270	9	8.070	0.185	0.000	0.003	47.370	5.870	1.087	1.891	0.322	1.848	0.124	4.761	3.196	0.196	0.006
4 Brier Creek 9SN254 2017	7	Rifle	Brier Creek 191 1	31	80	146	190	239	46419	233	58	59	1150	281	3	4.093	0.110	0.000	0.003	19.492	4.763	0.525	1.356	0.285	0.983	0.244	4.051	2.475	0.051	0.006
4 Brier Creek 9SN254 2017	7	Rifle	Brier Creek 129 1	31	89	177	221	232	44768	247	59	39	569	334	36	1.704	0.093	0.001	0.004	14.590	8.564	0.795	2.282	0.266	1.513	0.587	5.949	4.538	0.923	0.007
4 Brier Creek 9SN254 2017	7	Rifle	Brier Creek 58 1	79	65	66	144	226	32266	192	55	26	18	237	7	0.076	0.333	0.000	0.002	0.692	9.115	3.038	2.500	0.274	2.115	13.167	8.692	2.538	0.269	0.007
4 Brier Creek 9SN254 2017	7	Rifle	Brier Creek 60 1	50	101	127	134	239	48028	291	69	41	20	256	10	0.078	0.195	0.000	0.003	0.488	6.244	1.220	2.463	0.395	1.683	12.800	5.829	3.098	0.244	0.005
4 Brier Creek 9SN254 2017	7	Rifle	Brier Creek 114 1	64	95	147	292	230	47561	230	48	49	15	299	27	0.050	0.214	0.001	0.003	0.306	6.102	1.306	1.939	0.318	0.980	19.933	4.694	3.000	0.551	0.006
4 Brier Creek 9SN254 2017	7		Brier Creek 9SN254	76	117	146	271	235	45051	158	44	42	36	335	28	0.107	0.227	0.001	0.003	0.857	7.976	1.810	2.786	0.349	1.048	9.306	5.595	3.476	0.667	0.007
5 British Arsenal Nepal	9	British Standard	Royal Arsenal 180sec	132	212	856	1126	43	531884	3297	5442	99	696	733	155	0.950	0.180	0.000	0.002	7.030	7.404	1.333	2.141	0.289	54.970	1.053	0.434	8.646	1.566	0.001
6 Okfusnekena 9TP9	2	Rifle	bv15006a	381	688	1723	5806	20	797769	4999	8515	2003	2688	33203	515	0.081	0.011	0.001	0.002	1.342	16.577	0.190	0.343	0.021	4.251	12.352	0.010	0.860	0.257	0.042
6 Okfusnekena 9TP9	2	Rifle	bv15553	181	1325	1781	2100	91	1237946	6901	7365	4667	2064	1476	568	1.398	0.123	0.000	0.001	0.442	0.316	0.039	0.284	0.898	1.578	0.715	0.019	0.382	0.122	0.001
6 Okfusnekena 9TP9	2	Rifle	bv15258	363	1134	1845	6550	30	1179986	6183	8677	4598	1672	16774	429	0.100	0.022	0.000	0.002	0.364	3.648	0.079	0.247	0.068	1.887	10.032	0.007	0.401	0.093	0.014
6 Okfusnekena 9TP9	2	Rifle	bv11379	294	1444	1580	12715	34	1220255	4244	8134	4752	1420	1542	576	0.921	0.191	0.000	0.001	0.299	0.324	0.062	0.304	0.936	1.712	1.086	0.007	0.332	0.121	0.001
6 Okfusnekena 9TP9	2	Rifle	bv15552	225	629	1724	1857	1	863028	6858	6669	2070	116	992	337	0.117	0.227	0.000	0.002	0.056	0.479	0.109	0.304	0.634	3.222	8.552	0.000	0.833	0.163	0.001
6 Okfusnekena 9TP9	2		bv15462	216	1367	1914	3668	85	1139742	3092	9177	4898	8590	1709	576	5.026	0.126	0.001	0.002	1.754	0.349	0.044	0.279	0.800	1.874	0.199	0.017	0.391	0.118	0.001
6 Okfusnekena 9TP9	2		bv15868	344	1218	1992	3106	47	1234440	7399	7823	4443	7081	1646	297	4.302	0.209	0.000	0.002	1.594	0.370	0.077	0.274	0.740	1.761	0.232	0.011	0.448	0.067	0.001
6 Okfusnekena 9TP9	2		bv16512	241	1984	2178	5816	36	1427151	5917	8694	5257	1005	6159	469	0.163	0.039	0.000	0.002	0.191	1.172	0.046	0.377	0.322	1.654	6.128	0.007	0.414	0.089	0.004
6 Okfusnekena 9TP9	2		bv15006	352	1252	1767	2667	11	1112650	7951	8119	2955	6301	1420	414	4.437	0.248	0.000	0.002	2.132	0.481	0.119	0.424	0.882	2.748	0.225	0.004	0.598	0.140	0.001

6 Okfusnekena 9TP9	2	Lead patch	bv17544	153	564	1560	1668	109	816725	3981	6987	2847	1536	1072	301	1.433	0.143	0.000	0.002	0.540	0.377	0.054	0.198	0.526	2.454	0.698	0.038	0.548	0.106	0.001
7 Camden, SC	8	Charleville	Camden mb 5 charleville Allison	27	67	157	183	92	35867	199	34	23	263	115	8	2.287	0.235	0.000	0.004	11.435	5.000	1.174	2.913	0.583	1.478	0.437	4.000	6.826	0.348	0.003
7 Camden, SC	8	Charleville	Camden mb 6 charleville Allison	63	49	169	148	82	34674	269	42	35	24	103	16	0.233	0.612	0.000	0.005	0.686	2.943	1.800	1.400	0.476	1.200	4.292	2.343	4.829	0.457	0.003
7 Camden, SC	8		Camden mb 3 Allison	48	78	157	152	87	37776	257	47	16	64	148	3	0.432	0.324	0.000	0.004	4.000	9.250	3.000	4.875	0.527	2.938	2.313	5.438	9.813	0.188	0.004
7 Camden, SC	8		Camden mb 2 Allison	31	76	158	145	87	35427	245	29	32	42	140	53	0.300	0.221	0.001	0.004	1.313	4.375	0.969	2.375	0.543	0.906	3.333	2.719	4.938	1.656	0.004
7 Camden, SC	8		Camden mb 4 Allison	47	68	159	135	80	34951	253	34	35	46	146	14	0.315	0.322	0.000	0.005	1.314	4.171	1.343	1.943	0.466	0.971	3.174	2.286	4.543	0.400	0.004
7 Camden, SC	8		Camden mb Allison	49	71	121	183	45	34433	169	44	38	330	90	19	3.667	0.544	0.001	0.004	8.684	2.368	1.289	1.868	0.789	1.158	0.273	1.184	3.184	0.500	0.003
7 Camden, SC	9		Camden 79-004 180sec	69	279	593	520	113	541571	3918	5630	144	199	692	100	0.288	0.100	0.000	0.001	1.382	4.806	0.479	1.938	0.403	39.097	3.477	0.785	4.118	0.694	0.001
7 Camden, SC	9		Camden 83-001 180sec	213	275	690	574	67	557330	3981	6294	151	1764	6266	242	0.282	0.034	0.000	0.001	11.682	41.497	1.411	1.821	0.044	41.682	3.552	0.444	4.570	1.603	0.011
7 Camden, SC	9		Camden Garrison 335 180sec	78	208	816	840	34	528801	3261	5341	139	393	585	169	0.672	0.133	0.000	0.002	2.827	4.209	0.561	1.496	0.356	38.424	1.489	0.245	5.871	1.216	0.001
7 Camden, SC	8	Case shot	Camden 17.020 case shot Allison	43	47	153	140	71	35789	280	22	21	111	559	12	0.199	0.077	0.000	0.004	5.286	26.619	2.048	2.238	0.084	1.048	5.036	3.381	7.286	0.571	0.016
7 Camden, SC	8	Case shot	Camden 17.020 case shot 2 Allisc	59	62	121	129	54	35979	280	37	31	403	614	21	0.656	0.096	0.001	0.003	13.000	19.806	1.903	2.000	0.101	1.194	1.524	1.742	3.903	0.677	0.017
8 Carrs Fort, 9WS396	2	Fusil	17cf558	350	1160	4587	45931	35	344518	2852	69829	2852	26687	1174787	696	0.023	0.000	0.002	0.013	9.357	411.917	0.123	0.407	0.001	24.484	44.021	0.012	1.608	0.244	3.410
8 Carrs Fort, 9WS396	2	Fusil	16cf563	97	643	1966	8889	126	836955	3721	8101	3269	1376	18054	408	0.076	0.005	0.000	0.002	0.421	5.523	0.030	0.197	0.036	2.478	13.121	0.039	0.601	0.125	0.022
8 Carrs Fort, 9WS396	2	Fusil	18cf309	897	1042	1853	68523	33	924737	1319	8706	4073	245	1369	722	0.179	0.655	0.001	0.002	0.060	0.336	0.220	0.256	0.761	2.137	5.588	0.008	0.455	0.177	0.001
8 Carrs Fort, 9WS396	2	Rifle	2cf276	816	927	13041	9846	252	1031636	5293	15197	3883	9281	130670	613	0.071	0.006	0.001	0.013	2.390	33.652	0.210	0.239	0.007	3.914	14.079	0.065	3.358	0.158	0.127
8 Carrs Fort, 9WS396	2	Rifle	5cf275	684	784	2554	24597	34	993474	2922	12310	3849	6532	87536	584	0.075	0.008	0.001	0.003	1.697	22.743	0.178	0.204	0.009	3.198	13.401	0.009	0.664	0.152	0.088
8 Carrs Fort, 9WS396	2	Rifle	11cf556	576	1186	2010	23301	116	1140761	3957	9802	4901	7831	20115	432	0.389	0.029	0.000	0.002	1.598	4.104	0.118	0.242	0.059	2.000	2.569	0.024	0.410	0.088	0.018
8 Carrs Fort, 9WS396	2	Rifle	9cf297	613	1279	2706	70641	59	1139404	1952	9689	5091	5469	15765	778	0.347	0.039	0.001	0.002	1.074	3.097	0.120	0.251	0.081	1.903	2.883	0.012	0.532	0.153	0.014
8 Carrs Fort, 9WS396	2	Rifle	8cf299	1011	1439	2151	68625	43	1287991	3105	9227	5027	2430	6121	777	0.397	0.165	0.001	0.002	0.483	1.218	0.201	0.286	0.235	1.835	2.519	0.009	0.428	0.155	0.005
8 Carrs Fort, 9WS396	2	Rifle	7cf567	694	626	1608	44683	53	799567	1931	8122	3004	1338	3545	472	0.377	0.196	0.001	0.002	0.445	1.180	0.231	0.208	0.177	2.704	2.649	0.018	0.535	0.157	0.004
8 Carrs Fort, 9WS396	2	Rifle	13cf555	937	1349	1934	47112	278	1307134	3104	9094	5262	2018	8578	565	0.235	0.109	0.000	0.001	0.384	1.630	0.178	0.256	0.157	1.728	4.251	0.053	0.368	0.107	0.007
8 Carrs Fort, 9WS396	2	Rifle	15cf311	600	1575	2972	26787	71	1250188	3900	14720	4970	1578	105232	868	0.015	0.006	0.001	0.002	0.318	21.173	0.121	0.317	0.015	2.962	66.687	0.014	0.598	0.175	0.084
8 Carrs Fort, 9WS396	2	Rifle	3cf546	439	1494	2020	19086	21	1332287	6054	8193	4867	1255	1957	354	0.641	0.224	0.000	0.002	0.258	0.402	0.090	0.307	0.763	1.683	1.559	0.004	0.415	0.073	0.001
8 Carrs Fort, 9WS396	2	Rifle	12cf568	195	955	1462	14054	1	1041348	5254	7511	2554	131	1743	466	0.075	0.112	0.000	0.001	0.051	0.682	0.076	0.374	0.548	2.941	13.305	0.000	0.572	0.182	0.002
8 Carrs Fort, 9WS396	2	Rifle	14cf301	251	1447	2007	18415	78	1305798	4954	8807	5043	235	1813	411	0.130	0.138	0.000	0.002	0.047	0.360	0.050	0.287	0.798	1.746	7.715	0.015	0.398	0.081	0.001
8 Carrs Fort, 9WS396	2	Rifle	10cf577	630	895	1552	15343	18	967005	3264	7535	3921	142	1233	402	0.115	0.511	0.000	0.002	0.036	0.314	0.161	0.228	0.726	1.922	8.683	0.005	0.396	0.103	0.001
8 Carrs Fort, 9WS396	2	Rifle	4cf578	340	1830	2128	16108	15	1432192	6631	8628	5295	178	2502	381	0.071	0.136	0.000	0.001	0.034	0.473	0.064	0.346	0.731	1.629	14.056	0.003	0.402	0.072	0.002
8 Carrs Fort, 9WS396	2		1cf562	666	1087	2365	46042	203	1052079	1984	14772	4793	5905	99718	723	0.059	0.007	0.001	0.002	1.232	20.805	0.139	0.227	0.011	3.082	16.887	0.042	0.493	0.151	0.095
8 Carrs Fort, 9WS396	2		6cf286	703	676	2433	22363	81	807072	2622	17249	3749	5724	175220	481	0.033	0.004	0.001	0.003	1.527	46.738	0.188	0.180	0.004	4.601	30.611	0.022	0.649	0.128	0.217
8 Carrs Fort, 9WS396	2		cf274	419	1513	2119	23326	35	1316434	6059	9268	4960	2850	15686	371	0.182	0.027	0.000	0.002	0.575	3.163	0.084	0.305	0.096	1.869	5.504	0.007	0.427	0.075	0.012
9 Charlesfort/Santa Elena 38	6		38BU162R Prov 158	177	44	252	327	103	123096	587	1298	39	44	152	113	0.289	1.164	0.001	0.002	1.128	3.897	4.538	1.128	0.289	33.282	3.455	2.641	6.462	2.897	0.001
9 Charlesfort/Santa Elena 38	6		38BU162R Prov 52	206	24	182	470	50	84527	455	1818	20	16	10572	36	0.002	0.019	0.000	0.002	0.800	528.600	10.300	1.200	0.002	90.900	660.750	2.500	9.100	1.800	0.125
9 Charlesfort/Santa Elena 38	6		38BU162R Prov 52 sprue	73	0	198	523	33	72366	366	1385	24	27	4342	128	0.006	0.017	0.002	0.003	1.125	180.917	3.042	0.000	0.000	57.708	160.815	1.375	8.250	5.333	0.060
9 Charlesfort/Santa Elena 38	6		38BU162D Prov 102	21	80	191	272	35	147893	1113	1269	28	53	118	45	0.449	0.178	0.000	0.001	1.893	4.214	0.750	2.857	0.678	45.321	2.226	1.250	6.821	1.607	0.001
9 Charlesfort/Santa Elena 38	6		38BU162N Prov 66	42	25	217	255	56	85287	466	1113	54	127	109	94	1.165	0.385	0.001	0.003	2.352	2.019	0.778	0.463	0.229	20.611	0.858	1.037	4.019	1.741	0.001
9 Charlesfort/Santa Elena 38	6		38BU162R Prov 169	89	29	230	465	26	126987	648	1311	28	242	136	97	1.779	0.654	0.001	0.002	8.643	4.857	3.179	1.036	0.213	46.821	0.562	0.929	8.214	3.464	0.001
9 Charlesfort/Santa Elena 38	6		38BU162L Prov 130	190	31	172	209	11	85558	567	1150	14	27	78	61	0.346	2.436	0.001	0.002	1.929	5.571	13.571	2.214	0.397	82.143	2.889	0.786	12.286	4.357	0.001
9 Charlesfort/Santa Elena 38	6		38BU162D Prov 50	163	37	193	658	26	135813	908	1360	62	81	158	44	0.513	1.032	0.000	0.001	1.306	2.548	2.629	0.597	0.234	21.935	1.951	0.419	3.113	0.710	0.001
9 Charlesfort/Santa Elena 38	6		38BU162M Prov 284	810	37	242	155	13	142294	982	1301	38	53	127	94	0.417	6.378	0.001	0.002	1.395	3.342	21.316	0.974	0.291	34.237	2.396	0.342	6.368	2.474	0.001
9 Charlesfort/Santa Elena 38	6		38BU162R Prov 61 strip	48	14	170	335	8	76137	417	1103	32	46	103	66	0.447	0.466	0.001	0.002	1.438	3.219	1.500	0.438	0.136	34.469	2.239	0.250	5.313	2.063	0.001
9 Charlesfort/Santa Elena 38	6		38BU162R Prov 61 sprue	54	48	193	383	1	140642	727	1329	34	43	149	51	0.289	0.362	0.000	0.001	1.265	4.382	1.588	1.412	0.322	39.088	3.465	0.029	5.676	1.500	0.001
9 Charlesfort/Santa Elena 38	6		38BU162L Prov 97B	32	35	103	197	0	78677	524	1014	50	45	110	77	0.409	0.291	0.001	0.001	0.900	2.200	0.640	0.700	0.318	20.280	2.444	0.000	2.060	1.540	0.001
10 En Bas Saline, Haiti	8		EBS TT8-SEC9 Cobb	51	361	81	876	73	14200	207	15	41	3	84037	-2	0.000	0.001	0.000	0.006	0.073	2049.683	1.244	8.805	0.004	0.366	28012.333	1.780	1.976	-0.049	5.918
11 Cowpens, SC	4		COWP1908 FS 1.2	9	73	51	89	33	15048	289	84	115	6	48	15	0.125	0.188	0.001	0.003	0.052	0.417	0.078	0.635	1.521	0.730	8.000	0.287	0.443	0.130	0.003
11 Cowpens, SC	1		COWP1193 FS 35.1	4379	60053	13345	12427	16632	12290796	200856	49234	85871	58	33970	3440	0.002	0.129	0.000	0.001	0.001	0.396	0.051	0.699	1.768	0.573	585.690	0.194	0.155	0.040	0.003
11 Cowpens, SC	1		COWP1193 FS 24.1	5245	59787	16009	22214	16023	12267641	194937	49923	85599	78	33769	2958	0.002	0.155	0.000	0.001	0.001	0.395	0.061	0.698	1.770	0.583	432.936	0.187	0.187	0.035	0.003
11 Cowpens, SC	1		COWP1908 FS 1.5	5104	67348	19742	20895	16299	12974284	203811	54878	90900	6299	37056	2996	0.170	0.138	0.000	0.002	0.069	0.408	0.056	0.741	1.817	0.604	5.883	0.179	0.217	0.033	0.003
11 Cowpens, SC	1		COWP1193 FS 39.1	4097	51591	14795	107025	14835	11592789	168918	45495	82759	-5	29216	3813	0.000	0.140	0.000	0.001	0.000	0.353	0.050	0.623	1.766	0.550	-5843.200	0.179	0.179	0.046	0.003
11 Cowpens, SC	1		COWP1193 FS 31.1	4757	64593	30022	23110	15999	12773017	198395	53475	89740	9364	36239	3339	0.258	0.131	0.000	0.002	0.104	0.404	0.053	0.720	1.782	0.596	3.870	0.178	0.335	0.037	0.003
11 Cowpens, SC	1		COWP1193 FS 41.1	4906	59645	22698	23364	15230	12131815	200002	50065	85820	4483	32477	3108	0.138	0.151	0.000	0.002	0.052	0.378	0.057	0.695	1.837	0.583	7.244	0.177	0.264	0.036	0.003
11 Cowpens, SC	1		COWP2563 FS 48.1	5140	65685	17619	23351	15720	12674927	197934	53405	88955	74	37136	3175	0.002	0.138	0.000	0.001	0.001	0.417	0.058	0.738	1.769	0.600	501.838	0.177	0.198	0.036	0.003
11 Cowpens, SC	1		COWP1193 FS 9.1	5158	69705	14606	36999	16346	13174751	188316	56102	92821	70	38610	3772	0.002	0.134	0.000	0.001	0.001	0.416	0.056	0.751	1.805	0.604	551.571	0.176	0.157	0.041	0.003
11 Cowpens, SC	1		COWP1193 FS 28.1	5270	65048	24685	58790	15942	12861252	204857	53704	91156	826	36054	4146	0.023	0.146	0.000	0.002	0.009	0.396	0.058	0.714	1.804	0.589	43.649	0.175	0.271	0.045	0.003
11 Cowpens, SC	1		COWP1193 FS 50.1	5230	62590	17180	17722	15006	12547111	211959	50490	86827	4	34593	2611	0.000	0.151	0.000	0.001	0.000	0.398	0.060	0.721	1.809	0.582	8648.250	0.173	0.198	0.030	0.003
11 Cowpens, SC	1		COWP1908 FS 1.1	4475	58462	17617	15690	14866	12336494	195605	49041	86296	958	32456	3244	0.030	0.138	0.000	0.001	0.011	0.376	0.052	0.677	1.801	0.568	33.879	0.172	0.204	0.038	0.003
11 Cowpens, SC	1		COWP1193 FS 46.1	5411	62284	14992	18308	14964	12481186	204252	50837	87202	598	34370	3201	0.017	0.157	0.000	0.001	0.007	0.394	0.062	0.714	1.812	0.583	57.475	0.172	0.172	0.037	0.003
11 Cowpens, SC	1		COWP1193 FS 15.1	5238	65091	16356	61529	15296	12840469	198833	53581	90743	269	36552	3371	0.007	0.143	0.000	0.001	0.003	0.403	0.058	0.717	1.781	0.590	135.881	0.169	0.180	0.037	0.003
11 Cowpens, SC	1		COWP1193 FS 11.1	4083	50985	13183	13689	13769	11727906	197571	45515	81790	15	28259	2794	0.001	0.144	0.000	0.001	0.000	0.346	0.050	0.623	1.804	0.556	1883.933	0.168	0.161	0.034	0.002
11 Cowpens, SC	1		COWP1193 FS 27.1	4453	58337	18253	174530	14295	12143383	103417	50421	87984	233	38568	4032	0.006	0.115	0.000	0.002	0.003	0.438	0.051	0.663	1.513	0.573	165.528	0.162	0.207	0.046	0.003
11 Cowpens, SC	1		COWP1193 FS 49.1	4879	67551	18379	22839	14458	12838316	204045	53732	89521	3046	37666	2787	0.081	0.130	0.000	0.001	0.034	0.421	0.055	0.755	1.793	0.600	12.366	0.162	0.205	0.031	0.003
11 Cowpens, SC	1		COWP2563 FS 52.1	4843	61536	21921	75289	14329	12464792	187404	52703	89719	479	43636	3532	0.011	0.111	0.000	0.002	0.005	0.486	0.054	0.686	1.410	0.587	91.098	0.160	0.244	0.039	0.004
11 Cowpens, SC	1		COWP1193 FS 53.1	4810	65762	15920	61435	14405	12755511	192337	53420	90389	3893	36599	2976	0.106	0.131	0.000	0.001	0.043	0.405	0.053	0.728	1.797	0.591	9.401	0.159	0.176	0.033	0.003
11 Cowpens, SC	1		COWP2563 FS 53.1	5573	67218	19720	147477	14411	12814467	168327	53976	90983	1829	37480	3608	0.049	0.149	0.000	0.002	0.020	0.412	0.061	0.739	1.793	0.593	20.492	0.158	0.217	0.040	0.003
11 Cowpens, SC	1		COWP2563 FS 28.1	4991	67571	13962	24632	13676	12875875	194596	53392	89492	19	37472	4146	0.001	0.133	0.000	0.001	0.000	0.419	0.056	0.755	1.803	0.597	1972.211	0.153	0.156	0.046	0.003
11 Cowpens, SC	1		COWP1193 FS 10.1	3576	49258	17490	96789	12625	11466467	132984	45192	84752	101	28575	5968	0.004	0.125	0.001	0.002	0.001	0.337	0.042	0.581	1.724	0.533	282.921	0.149	0.206	0.070	0.002
11 Cowpens, SC	1		COWP1193 FS 40.1	5244	63047	20502	220407	13521	12632767	171163	53611	90805	367	34872	4427	0.011	0.150	0.000	0.002	0.004	0.384	0.058	0.694	1.808	0.590	95.019	0.149	0.226	0.049	0.003
11 Cowpens, SC	1		COWP2563 FS 34.1	3448	43396	13110	132214	11367	10792229	142737	40866	77211	54	24991	3804	0.002	0.138	0.000	0.001	0.001	0.324	0.045	0.562	1.736	0.529	462.796	0.147	0.170	0.049	0.002
11 Cowpens, SC	1		COWP2563 FS 37.1	5123	64040	13830	41266	12451	12555710	176095	52334	87756	41	35791	3228	0.001	0.143	0.000	0.001	0.000	0.408	0.058	0.730	1.789	0.596	872.951	0.142	0.158	0.037	0.003
11 Cowpens, SC	1		COWP2563 FS 50.1	3441	47278	17467	14943	10560	11222631	149857	42805	79175	354	26637	2178	0.013	0.129	0.000	0.002	0.004	0.336	0.043	0.597	1.775	0.541	75.246	0.133	0.221	0.028	0.002
11 Cowpens, SC	1		COWP2563 FS 14.1	2886	21515	12672	92224	7805	8047078	119321	27324	58851	3	12308	3855	0.000	0.234	0.000	0.002	0.000	0.209	0.049	0.366	1.748	0.464	4102.667	0.133	0.215	0.066	0.002
11 Cowpens, SC	1		COWP1193 FS 8.1	462	5483	1202	14528	868	1031040	10639	4229	7322	9	2866	721	0.003	0.161	0.001	0.001	0.001	0.391	0.063	0.749	1.913	0.578	318.444	0.119	0.164	0.098	0.003
11 Cowpens, SC	4		COWP 1521	266	887	801	1568	201	995332	7521	7183	1950	78	979	264	0.080	0.272	0.000	0.001	0.040	0.502	0.136	0.455	0.906	3.684	12.551	0.103	0.411	0.135	0.001
11 Cowpens, SC	1		COWP2563 FS 38.1	3232	26124	13703	127596	6739	8691520	109629	31329	65483	59	15066	3992	0.004	0.215	0.000	0.002	0.001	0.230	0.049	0.399	1.734	0.478	255.356	0.103	0.209	0.061	0.002
11 Cowpens, SC	1		COWP1193 FS 29.1	3311	29151	11922	13141	6229	9169061	115466	32839	66660	1697	16626	3096	0.102	0.199	0.000	0.001	0.025	0.249	0.050	0.437	1.753	0.493	9.797	0.093	0.179	0.046	0.002
11 Cowpens, SC	4		COWP 1527	306	852	878	2203	173	997835	8427	6959	2037	98	987	344	0.099	0.310	0.000	0.001	0.048	0.485	0.150	0.418	0.863	3.416	10.071	0.085	0.431	0.169	0.001
11 Cowpens, SC	1		COWP1193 FS 33.1	2453	17778	8692	32562	4166	7493644	77816	26806	55470	27	10369	3040	0.003	0.237	0.000	0.001	0.000	0.187	0.044	0.320	1.715	0.483	384.037	0.075	0.157	0.055	0.001
11 Cowpens, SC	4		COWP 1507	415	326	732	3234	55	593869	4774	5697	1259	75	620	246	0.121	0.669	0.000	0.001	0.060	0.492	0.330	0.259	0.526	4.525	8.267	0.044	0.581	0.195	0.001
11 Cowpens, SC	4		COWP 1531	393	291	1149	12187	18	496013	1363	6307	1429	99	448	362	0.221	0.877	0.001	0.002	0.069	0.314	0.275	0.204	0.650	4.414	4.525	0.013	0.804	0.253	0.001
11 Cowpens, SC	4		COWP 129	891	785	1084	7166	13	776801	6154	7181	1956	1075	2865	517	0.375	0.311	0.001	0.001	0.550	1.465	0.456	0.401	0.274	3.671	2.665	0.007	0.554	0.264	0.004
12 Estatoe, GA 9ST3	2	Fusil	es8470a	430	713	1796	6061	45	869588	5307	8592	2424	2107	27952	291	0.075	0.015	0.000	0.002	0.869	11.531	0.177	0.294	0.026	3.545	13.266	0.019	0.741	0.120	0.032
12 Estatoe, GA 9ST3	2	Fusil	es8470	226	1365	2154	11903	66	1230341	4940	8802	5270	1344	16355	453	0.082	0.014	0.000	0.002	0.255	3.103	0.043	0.259	0.083	1.670	12.169	0.013	0.409	0.086	0.013
12 Estatoe, GA 9ST3	2	Fusil	es9118	420	930	2174	2666	15	983242	5616	6865	2370	174	1229	630	0.142	0.342	0.001	0.002	0.073	0.519	0.177	0.392	0.757	2.897	7.063	0.006	0.917	0.266	0.001
12 Estatoe, GA 9ST3	2	Rifle	es5887	160	314	1632	4966	81	597095	3373	6352	1538	2513	5460	379	0.460	0.029	0.001	0.003	1.634	3.550	0.104	0.204	0.058	4.130	2.173	0.053	1.061	0.246	0.009
12 Estatoe, GA 9ST3	2	Rifle	es8446	195	1318	1781	5829	150	1176730	5865	8350	3892	4760	6324	663	0.753	0.031	0.001	0.002	1.223	1.625	0.050	0.339	0.208	2.145	1.329	0.039	0.458	0.170	0.005
12 Estatoe, GA 9ST3	2	Rifle	es8422	242	1505	1850	3210	56	1315423	6685	7898	5353	316	2901	397	0.109	0.083	0.000	0.001	0.059	0.542	0.045	0.281	0.519	1.475	9.180	0.010	0.346	0.074	0.002
13 Fahm St., Savannah	2	Charleville	fm37	666	1216	1807	6520	67	1125460	4212	8563	3984	1100	9208	1070	0.119	0.072	0.001	0.002	0.276	2.311	0.167	0.305	0.132	2.149	8.371	0.017	0.454	0.269	0.008
13 Fahm St., Savannah	2		fm4	650	860	2156	2227	120	971940	5515	9335	2448	1081	35837	408	0.030	0.018	0.000	0.002	0.442	14.639	0.266	0.351	0.024	3.813	33.152	0.049	0.881	0.167	0.037
14 Fort Daniel 9GW623	6		FD4	53	23	167	180	34	93497	749	1172	37	56	126	55	0.444	0.421	0.001	0.002	1.514	3.405	1.432	0.622	0.183	31.676	2.250	0.919	4.514	1.486	0.001
14 Fort Daniel 9GW623	6		FD1	62	70	193	232	32	136532	408	1278	61	32	193	47	0.166	0.321	0.000	0.001	0.525	3.164	1.016	1.148	0.363	20.951	6.031	0.525	3.164	0.770	0.001
14 Fort Daniel 9GW623	6		FD3	83	34	200	161	11	87479	748	1082	48	36	98	95	0.367	0.847	0.001	0.002	0.750	2.042	1.729	0.708	0.347	22.542	2.722	0.229	4.167	1.979	0.001
14 Fort Daniel 9GW623	6		FD2	90	48	179	401	16	102237	595	1193	74	23	142	25	0.162	0.634	0.000	0.002	0.311	1.919	1.216	0.649	0.338	16.122	6.174	0.216	2.419	0.338	0.001
15 Fort Frederica 9GN177	8		FOFR 688 puck Seibert	46	80	134	225	86	28988	152	21	14	124	3034	11	0.041	0.015	0.000	0.005	8.857	216.714	3.286	5.714	0.026	1.500	24.468	6.143	9.571	0.786	0.105
15 Fort Frederica 9GN177	8		FOFR 158 Seibert	35	56	163	131	95	32770	192	38	26	1029	90	2	11.433	0.389	0.000	0.005	39.577	3.462	1.346	2.154	0.622	1.462	0.087	3.654	6.269	0.077	0.003
15 Fort Frederica 9GN177	8		FOFR 1473	58	88	128	115	72	33204	255	48	21	602	108	1	5.574	0.537	0.000	0.004	28.667	5.143	2.762	4.190	0.815	2.286	0.179	3.429	6.095	0.048	0.003

15 Fort Frederica 9GN177	8		FOFR 1118 Seibert	36	58	143	181	67	31551	150	39	21	722	157	17	4.599	0.229	0.001	0.005	34.381	7.476	1.714	2.762	0.369	1.857	0.217	3.190	6.810	0.810	0.005
15 Fort Frederica 9GN177	8		FOFR 2094 handle Seibert	61	452	137	109	62	13842	293	32	25	11	88525	21	0.000	0.001	0.002	0.010	0.440	3541.000	2.440	18.080	0.005	1.280	8047.727	2.480	5.480	0.840	6.395
15 Fort Frederica 9GN177	8		FOFR 139 Seibert	38	67	121	134	53	34306	251	29	22	20	97	4	0.206	0.392	0.000	0.004	0.909	4.409	1.727	3.045	0.691	1.318	4.850	2.409	5.500	0.182	0.003
15 Fort Frederica 9GN177	8		FOFR 25459 Seibert	31	36	174	155	59	25624	103	29	25	50	1735	26	0.029	0.018	0.001	0.007	2.000	69.400	1.240	1.440	0.021	1.160	34.700	2.360	6.960	1.040	0.068
15 Fort Frederica 9GN177	8		FOFR 25454 Seibert	46	78	130	160	79	34397	207	36	35	84	190	26	0.442	0.242	0.001	0.004	2.400	5.429	1.314	2.229	0.411	1.029	2.262	2.257	3.714	0.743	0.006
15 Fort Frederica 9GN177	8		FOFR 1479 sinker Seibert	39	56	873	189	78	28221	139	33	36	22	163	469	0.135	0.239	0.017	0.031	0.611	4.528	1.083	1.556	0.344	0.917	7.409	2.167	24.250	13.028	0.006
15 Fort Frederica 9GN177	8		FOFR 137 Seibert	52	71	174	153	61	33870	213	31	30	154	91	30	1.692	0.571	0.001	0.005	5.133	3.033	1.733	2.367	0.780	1.033	0.591	2.033	5.800	1.000	0.003
15 Fort Frederica 9GN177	8		FOFR 2251 sinker Seibert	55	86	130	222	58	31764	192	48	34	236	1074	12	0.220	0.051	0.000	0.004	6.941	31.588	1.618	2.529	0.080	1.412	4.551	1.706	3.824	0.353	0.034
15 Fort Frederica 9GN177	8		FOFR 25458 Seibert	36	57	129	172	62	29418	153	24	37	26	290	46	0.090	0.124	0.002	0.004	0.703	7.838	0.973	1.541	0.197	0.649	11.154	1.676	3.486	1.243	0.010
15 Fort Frederica 9GN177	8		FOFR 2250 sinker Seibert	56	85	115	270	30	33132	115	30	31	103	105	8	0.981	0.533	0.000	0.003	3.323	3.387	1.806	2.742	0.810	0.968	1.019	0.968	3.710	0.258	0.003
16 Fort King 8MR60	8		8MR60 FS27.007 Michelle	32	68	164	179	78	35441	234	31	8	1	108	16	0.009	0.296	0.000	0.005	0.125	13.500	4.000	8.500	0.630	3.875	108.000	9.750	20.500	2.000	0.003
16 Fort King 8MR60	8		FS459.004 Michelle	29	78	147	183	68	35232	262	40	11	34	98	10	0.347	0.296	0.000	0.004	3.091	8.909	2.636	7.091	0.796	3.636	2.882	6.182	13.364	0.909	0.003
16 Fort King 8MR60	8		FK567.004	43	76	88	110	61	36217	287	20	10	34	204	19	0.167	0.211	0.001	0.002	3.400	20.400	4.300	7.600	0.373	2.000	6.000	6.100	8.800	1.900	0.006
16 Fort King 8MR60	8		FK488.006	63	62	127	231	105	33024	176	53	20	23	119	24	0.193	0.529	0.001	0.004	1.150	5.950	3.150	3.100	0.521	2.650	5.174	5.250	6.350	1.200	0.004
16 Fort King 8MR60	8		FK499.007	49	136	227	257	175	58926	338	78	34	-1	244	37	-0.004	0.201	0.001	0.004	-0.029	7.176	1.441	4.000	0.557	2.294	-244.000	5.147	6.676	1.088	0.004
16 Fort King 8MR60	8		FK284.011	79	169	223	285	138	55466	227	75	29	29	236	17	0.123	0.335	0.000	0.004	1.000	8.138	2.724	5.828	0.716	2.586	8.138	4.759	7.690	0.586	0.004
16 Fort King 8MR60	8		FK589.007	48	107	140	240	103	46726	187	47	24	17	155	9	0.110	0.310	0.000	0.003	0.708	6.458	2.000	4.458	0.690	1.958	9.118	4.292	5.833	0.375	0.003
16 Fort King 8MR60	8		FK78.006	65	79	103	213	87	35453	189	36	21	39	169	8	0.231	0.385	0.000	0.003	1.857	8.048	3.095	3.762	0.467	1.714	4.333	4.143	4.905	0.381	0.005
16 Fort King 8MR60	8		FK308.007	70	114	197	271	111	43331	261	42	27	27	206	35	0.131	0.340	0.001	0.005	1.000	7.630	2.593	4.222	0.553	1.556	7.630	4.111	7.296	1.296	0.005
16 Fort King 8MR60	8		FK95.006	58	37	97	220	74	20152	106	15	18	25	123	35	0.203	0.472	0.002	0.005	1.389	6.833	3.222	2.056	0.301	0.833	4.920	4.111	5.389	1.944	0.006
16 Fort King 8MR60	8		TU324 FS562.011 Michelle	28	84	143	179	101	34446	236	39	27	56	124	8	0.452	0.226	0.000	0.004	2.074	4.593	1.037	3.111	0.677	1.444	2.214	3.741	5.296	0.296	0.004
16 Fort King 8MR60	8		FK313.023	102	119	168	495	84	44442	166	58	23	27	202	21	0.134	0.505	0.000	0.004	1.174	8.783	4.435	5.174	0.589	2.522	7.481	3.652	7.304	0.913	0.005
16 Fort King 8MR60	8		FK8.028	81	49	125	220	77	26085	62	39	22	188	630	20	0.298	0.129	0.001	0.005	8.545	28.636	3.682	2.227	0.078	1.773	3.351	3.500	5.682	0.909	0.024
16 Fort King 8MR60	8		FK275.022	53	107	170	347	80	42060	97	35	23	23	210	35	0.110	0.252	0.001	0.004	1.000	9.130	2.304	4.652	0.510	1.522	9.130	3.478	7.391	1.522	0.005
16 Fort King 8MR60	8		FK197.009	76	175	204	425	88	56694	179	78	26	38	263	8	0.144	0.289	0.000	0.004	1.462	10.115	2.923	6.731	0.665	3.000	6.921	3.385	7.846	0.308	0.005
16 Fort King 8MR60	8		FK432.016	77	149	223	367	116	52204	186	63	35	75	366	-10	0.205	0.210	0.000	0.004	2.143	10.457	2.200	4.257	0.407	1.800	4.880	3.314	6.371	-0.286	0.007
16 Fort King 8MR60	8		FK236.007	64	54	172	313	128	34867	93	43	39	38	183	34	0.208	0.350	0.001	0.005	0.974	4.692	1.641	1.385	0.295	1.103	4.816	3.282	4.410	0.872	0.005
16 Fort King 8MR60	8		FK305.009	60	82	117	198	45	37917	213	47	14	18	161	9	0.112	0.373	0.000	0.003	1.286	11.500	4.286	5.857	0.509	3.357	8.944	3.214	8.357	0.643	0.004
16 Fort King 8MR60	8		FK164.004	69	187	228	520	120	54992	131	58	38	80	2824	31	0.028	0.024	0.001	0.004	2.105	74.316	1.816	4.921	0.066	1.526	35.300	3.158	6.000	0.816	0.051
16 Fort King 8MR60	8		FK194.007	99	224	216	514	123	59216	180	85	42	22	271	23	0.081	0.365	0.000	0.004	0.524	6.452	2.357	5.333	0.827	2.024	12.318	2.929	5.143	0.548	0.005
16 Fort King 8MR60	8		FK276.042	86	154	221	617	113	49778	68	52	39	6	261	29	0.023	0.330	0.001	0.004	0.154	6.692	2.205	3.949	0.590	1.333	43.500	2.897	5.667	0.744	0.005
16 Fort King 8MR60	8		FK77.013	27	163	183	396	101	57213	227	70	37	20	261	14	0.077	0.103	0.000	0.003	0.541	7.054	0.730	4.405	0.625	1.892	13.050	2.730	4.946	0.378	0.005
16 Fort King 8MR60	8		FK283.009	45	95	216	450	85	49334	140	32	36	21	231	32	0.091	0.195	0.001	0.004	0.583	6.417	1.250	2.639	0.411	0.889	11.000	2.361	6.000	0.889	0.005
16 Fort King 8MR60	8		FK211.006	57	36	134	123	68	27230	153	51	29	18	124	25	0.145	0.460	0.001	0.005	0.621	4.276	1.966	1.241	0.290	1.759	6.889	2.345	4.621	0.862	0.005
16 Fort King 8MR60	8		FK205.004	58	52	94	207	70	25271	128	34	31	44	177	26	0.249	0.328	0.001	0.004	1.419	5.710	1.871	1.677	0.294	1.097	4.023	2.258	3.032	0.839	0.007
16 Fort King 8MR60	8		FK228.003	61	120	151	256	99	47691	182	66	46	14	198	13	0.071	0.308	0.000	0.003	0.304	4.304	1.326	2.609	0.606	1.435	14.143	2.152	3.283	0.283	0.004
16 Fort King 8MR60	8		FK284.010	59	19	70	157	63	14653	60	26	30	59	411	21	0.144	0.144	0.001	0.005	1.967	13.700	1.967	0.633	0.046	0.867	6.966	2.100	2.333	0.700	0.028
16 Fort King 8MR60	8		FK215.011	60	188	228	323	91	58846	199	106	46	86	282	5	0.305	0.213	0.000	0.004	1.870	6.130	1.304	4.087	0.667	2.304	3.279	1.978	4.957	0.109	0.005
16 Fort King 8MR60	8		FS297.010 Michelle	25	70	123	311	47	33578	145	41	28	-4	102	-4	-0.039	0.245	0.000	0.004	-0.143	3.643	0.893	2.500	0.686	1.464	-25.500	1.679	4.393	-0.143	0.003
16 Fort King 8MR60	8		FK57.009	52	152	155	294	61	54452	239	75	45	41	239	9	0.172	0.218	0.000	0.003	0.911	5.311	1.156	3.378	0.636	1.667	5.829	1.356	3.444	0.200	0.004
16 Fort King 8MR60	8		FK228.004	120	99	162	218	48	37851	221	70	45	39	190	44	0.205	0.632	0.001	0.004	0.867	4.222	2.667	2.200	0.521	1.556	4.872	1.067	3.600	0.978	0.005
16 Fort King 8MR60	8		FS310.004 Michelle	38	83	135	190	35	34783	182	25	34	16	124	26	0.129	0.306	0.001	0.004	0.471	3.647	1.118	2.441	0.669	0.735	7.750	1.029	3.971	0.765	0.004
16 Fort King 8MR60	8		FK573.005	118	72	104	178	32	32482	85	52	52	69	586	11	0.118	0.201	0.000	0.003	1.327	11.269	2.269	1.385	0.123	1.000	8.493	0.615	2.000	0.212	0.018
17 Fort Moore 38AK4	10		GOOD_38AK4_53C1-02263-Spec	1202	9017	7129	4623	5060	1343123	16191	3865	3734	1050	35584	397	0.030	0.034	0.000	0.005	0.281	9.530	0.322	2.415	0.253	1.035	33.890	1.355	1.909	0.106	0.026
17 Fort Moore 38AK4	10		GOOD_38AK4_53D2-02265-Spec	1805	8440	1283	3415	4961	1327171	16087	3861	3794	72	17008	501	0.004	0.106	0.000	0.001	0.019	4.483	0.476	2.225	0.496	1.018	236.222	1.308	0.338	0.132	0.013
17 Fort Moore 38AK4	10		GOOD_38AK4_53G-02261-Spect	1492	10331	1011	1800	5042	1433431	19245	4630	4051	835	45939	420	0.018	0.032	0.000	0.001	0.206	11.340	0.368	2.550	0.225	1.143	55.017	1.245	0.250	0.104	0.032
17 Fort Moore 38AK4	10		GOOD_38AK4_50A-02262-Spect	1121	8530	1015	1812	4598	1338479	18872	3960	3712	17	16790	426	0.001	0.067	0.000	0.001	0.005	4.523	0.302	2.298	0.508	1.067	987.647	1.239	0.273	0.115	0.013
17 Fort Moore 38AK4	10		GOOD_38AK4_51DSMALL-02260	3094	6497	942	1186	4254	1193899	16652	2999	3466	4591	16192	331	0.284	0.191	0.000	0.001	1.325	4.672	0.893	1.874	0.401	0.865	3.527	1.227	0.272	0.095	0.014
17 Fort Moore 38AK4	10		GOOD_38AK4_53D3-02266-Spec	1725	10950	911	3875	4922	1466893	19671	4934	4047	157	18996	287	0.008	0.091	0.000	0.001	0.039	4.694	0.426	2.706	0.576	1.219	120.994	1.216	0.225	0.071	0.013
17 Fort Moore 38AK4	10		GOOD_38AK4_53C2-02264-Spec	1638	9077	1165	3188	4641	1369603	16481	3990	3911	2537	16856	546	0.151	0.097	0.000	0.001	0.649	4.310	0.419	2.321	0.539	1.020	6.644	1.187	0.298	0.140	0.012
17 Fort Moore 38AK4	10		GOOD_38AK4_51D-02259-Spect	1390	7373	1039	1135	4164	1255337	18129	3311	3635	809	40437	388	0.020	0.034	0.000	0.001	0.223	11.124	0.382	2.028	0.182	0.911	49.984	1.146	0.286	0.107	0.032
17 Fort Moore 38AK4	10		GOOD_38AK4_53D1-02258-Spec	1829	19507	1156	2543	5852	1798706	27058	9103	8554	283	25700	355	0.011	0.071	0.000	0.001	0.033	3.004	0.214	2.280	0.759	1.064	90.813	0.684	0.135	0.042	0.014
18 Fort Motte	9		Fort Motte 18-003-001 180sec	48	54	500	560	172	287628	2303	4264	122	108	404	127	0.267	0.119	0.000	0.002	0.885	3.311	0.393	0.443	0.134	34.951	3.741	1.410	4.098	1.041	0.001
18 Fort Motte	9		Fort Motte 03-307 180sec	77	246	776	711	133	542054	3889	5558	104	148	627	179	0.236	0.123	0.000	0.001	1.423	6.029	0.740	2.365	0.392	53.442	4.236	1.279	7.462	1.721	0.001
18 Fort Motte	9		Fort Motte 18-001 180sec	85	237	550	427	138	534510	3707	5525	137	50	641	139	0.078	0.133	0.000	0.001	0.365	4.679	0.620	1.730	0.370	40.328	12.820	1.007	4.015	1.015	0.001
18 Fort Motte	9		Fort Motte 24-037 180sec	180	306	602	580	140	552563	3897	5417	155	13	587	149	0.022	0.307	0.000	0.001	0.084	3.787	1.161	1.974	0.521	34.948	45.154	0.903	3.884	0.961	0.001
18 Fort Motte	9		Fort Motte 03-027-001 180sec	279	205	540	897	108	521513	3367	5623	142	257	964	137	0.267	0.289	0.000	0.001	1.810	6.789	1.965	1.444	0.213	39.599	3.751	0.761	3.803	0.965	0.002
18 Fort Motte	9		Fort Motte 03-038-001 180sec	144	241	647	939	103	554731	3936	5589	200	186	580	334	0.321	0.248	0.001	0.001	0.930	2.900	0.720	1.205	0.416	27.945	3.118	0.515	3.235	1.670	0.001
18 Fort Motte	9		Fort Motte 03-300 180sec	90	307	542	698	55	596375	4043	5583	199	135	679	140	0.199	0.133	0.000	0.001	0.678	3.412	0.452	1.543	0.452	28.055	5.030	0.276	2.724	0.704	0.001
18 Fort Motte	9		Fort Motte 24-001 180sec	92	70	522	594	22	333145	2607	4441	95	412	494	147	0.834	0.186	0.000	0.002	4.337	5.200	0.968	0.737	0.142	46.747	1.199	0.232	5.495	1.547	0.001
18 Fort Motte	9		Fort Motte 03-029-01 180sec	229	286	659	403	37	546749	4014	5585	178	430	1072	142	0.401	0.214	0.000	0.001	2.416	6.022	1.287	1.607	0.267	31.376	2.493	0.208	3.702	0.798	0.002
18 Fort Motte	9		Fort Motte 18-010 180sec	144	299	678	513	31	578148	4067	6078	180	1459	5672	246	0.257	0.025	0.000	0.001	8.106	31.511	0.800	1.661	0.053	33.767	3.888	0.172	3.767	1.367	0.010
18 Fort Motte	9		Fort Motte 24-018 180sec	183	225	625	518	9	534404	3656	5767	122	4155	605	99	6.868	0.302	0.000	0.001	34.057	4.959	1.500	1.844	0.372	47.270	0.146	0.074	5.123	0.811	0.001
19 Fort Necessity	6		FONE 3-EP	50	29	181	2579	44	111903	203	1692	27	1888	151	125	12.503	0.331	0.001	0.002	69.926	5.593	1.852	1.074	0.192	62.667	0.080	1.630	6.704	4.630	0.001
19 Fort Necessity	6		FONE 3-DF	100	40	258	1127	11	122300	552	1645	44	1340	3025	133	0.443	0.033	0.001	0.002	30.455	68.750	2.273	0.909	0.013	37.386	2.257	0.250	5.864	3.023	0.025
19 Fort Necessity	6		FONE 3-E2	208	43	234	2902	63	122200	155	1487	32	72	140	168	0.514	1.486	0.001	0.002	2.250	4.375	6.500	1.344	0.307	46.469	1.944	1.969	7.313	5.250	0.001
19 Fort Necessity	6		FONE 3-CU	287	60	175	1793	66	141295	410	1524	44	786	101	95	7.782	2.842	0.001	0.001	17.864	2.295	6.523	1.364	0.594	34.636	0.128	1.500	3.977	2.159	0.001
19 Fort Necessity	6		FONE 3-DK	334	25	267	4053	52	93195	111	1657	59	133	140	299	0.950	2.386	0.003	0.003	2.254	2.373	5.661	0.424	0.179	28.085	1.053	0.881	4.525	5.068	0.002
19 Fort Necessity	6		FONE 3-DU	151	25	214	4194	62	103886	140	1541	73	180	114	293	1.579	1.325	0.003	0.002	2.466	1.562	2.068	0.342	0.219	21.110	0.633	0.849	2.932	4.014	0.001
19 Fort Necessity	6		FONE 3-FT	148	37	228	2561	41	102037	166	1657	61	766	1913	153	0.400	0.077	0.001	0.002	12.557	31.361	2.426	0.607	0.019	27.164	2.497	0.672	3.738	2.508	0.019
19 Fort Necessity	6		FONE 3-DH	221	47	301	2619	30	106696	216	2694	45	799	23991	162	0.033	0.009	0.002	0.003	17.756	533.133	4.911	1.044	0.002	59.867	30.026	0.667	6.689	3.600	0.225
19 Fort Necessity	6		FONE 3-DB	189	26	250	2584	31	102005	175	1598	50	64	142	224	0.451	1.331	0.002	0.002	1.280	2.840	3.780	0.520	0.183	31.960	2.219	0.620	5.000	4.480	0.001
19 Fort Necessity	6		FONE 3-EM	224	57	209	2003	26	119017	436	1600	46	81	143	309	0.566	1.566	0.003	0.002	1.761	3.109	4.870	1.239	0.399	34.783	1.765	0.565	4.543	6.717	0.001
19 Fort Necessity	6		FONE- 3-M	195	23	543	2537	20	115382	213	1632	39	232	3539	323	0.066	0.055	0.003	0.005	5.949	90.744	5.000	0.590	0.006	41.846	15.254	0.513	13.923	8.282	0.031
19 Fort Necessity	6		FONE 3-CX	339	59	245	1204	23	114034	424	1700	51	446	6482	92	0.069	0.052	0.001	0.002	8.745	127.098	6.647	1.157	0.009	33.333	14.534	0.451	4.804	1.804	0.057
19 Fort Necessity	6		FONE-3-EC	245	36	159	2333	47	115090	269	1539	32	72	132	94	0.545	1.856	0.001	0.001	2.250	4.125	7.656	1.125	0.273	48.094	1.833	1.469	4.969	2.938	0.001
19 Fort Necessity	6		FONE 3-GA	34	55	219	691	56	139022	502	1464	65	218	1975	41	0.110	0.017	0.000	0.002	3.354	30.385	0.523	0.846	0.028	22.523	9.060	0.862	3.369	0.631	0.014
19 Fort Necessity	6		FN 00322	162	31	199	2281	59	136361	297	1552	108	458	179	134	2.559	0.905	0.001	0.001	4.241	1.657	1.500	0.287	0.173	14.370	0.391	0.546	1.843	1.241	0.001
19 Fort Necessity	6		FONE 3-CW	170	44	167	3310	29	107523	113	1928	60	3274	4192	210	0.781	0.041	0.002	0.002	54.567	69.867	2.833	0.733	0.010	32.133	1.280	0.483	2.783	3.500	0.039
20 Fort Watson 38CR1	9		38CR1-1506-23 180sec	66	186	749	2811	60	504023	2514	7291	149	399	31916	226	0.013	0.002	0.000	0.001	2.678	214.201	0.443	1.248	0.006	48.933	79.990	0.403	5.027	1.517	0.063
20 Fort Watson 38CR1	9		38CR1-1479G-191 180sec	80	226	610	2905	41	523697	2570	6308	122	6302	1738	163	3.626	0.046	0.000	0.001	51.656	14.246	0.656	1.852	0.130	51.705	0.276	0.336	5.000	1.336	0.003
21 Fort Hawkins, 9BI28	2	Fusil	fh621	478	1094	2300	3369	18	1039695	5050	7182	2399	185	1374	614	0.135	0.348	0.001	0.002	0.077	0.573	0.199	0.456	0.796	2.994	7.427	0.008	0.959	0.256	0.001
21 Fort Hawkins, 9BI28	2	Fusil	fh580c	134	1076	2510	8019	80	1094597	2909	7762	5370	111	1432	1791	0.078	0.094	0.002	0.002	0.021	0.267	0.025	0.200	0.751	1.445	12.901	0.015	0.467	0.334	0.001
21 Fort Hawkins, 9BI28	2	Rifle	fh389	368	837	1857	2530	4	945234	6042	7582	2052	2424	16252	334	0.149	0.023	0.000	0.002	1.181	7.920	0.179	0.408	0.052	3.695	6.705	0.002	0.905	0.163	0.017
21 Fort Hawkins, 9BI28	2	Rifle	fh728b	261	610	2956	8711	1	811887	4637	7230	2156	1013	9498	508	0.107	0.027	0.001	0.004	0.470	4.405	0.121	0.283	0.064	3.353	9.376	0.000	1.371	0.236	0.012
21 Fort Hawkins, 9BI28	2	Rifle	fh632	279	611	1843	5106	34	817204	3587	7558	2317	644	12113	695	0.053	0.023	0.001	0.002	0.278	5.228	0.120	0.264	0.050	3.262	18.809	0.015	0.795	0.300	0.015
21 Fort Hawkins, 9BI28	2	Rifle	fh703e	692	210	1619	48994	16	579419	2303	7027	2007	500	1980	432	0.253	0.349	0.001	0.003	0.249	0.987	0.345	0.105	0.106	3.501	3.960	0.008	0.807	0.215	0.003
21 Fort Hawkins, 9BI28	2	Rifle	fh321a	346	223	1511	5710	84	434045	1299	6662	1297	322	14134	518	0.023	0.024	0.001	0.003	0.248	10.897	0.267	0.172	0.016	5.136	43.894	0.065	1.165	0.399	0.033
21 Fort Hawkins, 9BI28	2	Rifle	fh728a	150	394	2306	9148	142	618991	2591	6546	1581	355	10164	804	0.035	0.015	0.001	0.004	0.225	6.429	0.095	0.249	0.039	4.140	28.631	0.090	1.459	0.509	0.016
21 Fort Hawkins, 9BI28	2	Rifle	fh525	195	174	1352	1312	100	592302	4659	5974	1365	270	2366	240	0.114	0.082	0.000	0.002	0.198	1.733	0.143	0.127	0.074	4.377	8.763	0.073	0.990	0.176	0.004
21 Fort Hawkins, 9BI28	2	Rifle	fh559	132	817	1984	3580	83	1013871	4332	8603	4758	637	21819	428	0.029	0.006	0.000	0.002	0.134	4.586	0.028	0.172	0.037	1.808	34.253	0.017	0.417	0.090	0.022
21 Fort Hawkins, 9BI28	2	Rifle	fh728	217	488	1927	7946	179	767881	4571	6702	1736	195	4607	524	0.042	0.047	0.001	0.003	0.112	2.654	0.125	0.281	0.106	3.861	23.626	0.103	1.110	0.302	0.006
21 Fort Hawkins, 9BI28	2	Rifle	fh735b	179	366	3635	18295	88	446909	1109	7738	1755	131	1304	940	0.100	0.137	0.002	0.008	0.075	0.743	0.102	0.209	0.281	4.409	9.954	0.050	2.071	0.536	0.003
21 Fort Hawkins, 9BI28	2	Rifle	fh654a	206	304	1488	5261	42	471760	1881	5596	1492	95	788	699	0.121	0.261	0.001	0.003	0.064	0.528	0.138	0.204	0.386	3.751	8.295	0.028	0.997	0.468	0.002
21 Fort Hawkins, 9BI28	2	Rifle	fh703b	283	1183	2066	8409	1	1093244	4762	8215	4462	253	7139	455	0.035	0.040	0.000	0.002	0.057	1.600	0.063	0.265	0.166	1.841	28.217	0.000	0.463	0.102	0.007
21 Fort Hawkins, 9BI28	2	Rifle	fh654	506	494	2014	11230	68	664340	1689	6351	1721	84	1103	631	0.076	0.459	0.001	0.003	0.049	0.641	0.294	0.287	0.448	3.690	13.131	0.040	1.170	0.367	0.002
21 Fort Hawkins, 9BI28	2	Rifle	fh386	365	251	1783	5734	15	567653	2808	6159	1524	64	844	541	0.076	0.432	0.001	0.003	0.042	0.554	0.240	0.165	0.297	4.041	13.188	0.010	1.170	0.355	0.001

21 Fort Hawkins, 9BI28	2	Rifle	fh553	419	976	1906	4381	102	1025585	5535	7020	3443	106	2504	434	0.042	0.167	0.000	0.002	0.031	0.727	0.122	0.283	0.390	2.039	23.623	0.030	0.554	0.126	0.002
21 Fort Hawkins, 9BI28	2	Rifle	fh580e	289	747	2072	14663	83	979155	1869	8533	4666	120	3510	1072	0.034	0.082	0.001	0.002	0.026	0.752	0.062	0.160	0.213	1.829	29.250	0.018	0.444	0.230	0.004
21 Fort Hawkins, 9BI28	2	Rifle	fh619	86	755	4012	6888	47	973926	4342	7268	2996	21	1301	1426	0.016	0.066	0.001	0.004	0.007	0.434	0.029	0.252	0.580	2.426	61.952	0.016	1.339	0.476	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh314	637	787	1647	1515	195	952279	7458	6934	2020	105	1374	262	0.076	0.464	0.000	0.002	0.052	0.680	0.315	0.390	0.573	3.433	13.086	0.097	0.815	0.130	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh414	509	968	2158	7471	169	982938	3681	8902	2471	566	26845	6192	0.021	0.019	0.006	0.002	0.229	10.864	0.206	0.392	0.036	3.603	47.429	0.068	0.873	2.506	0.027
21 Fort Hawkins, 9BI28	2	Springfield	fh580d	253	1006	1758	8827	111	1023900	3897	7479	2611	127	1506	836	0.084	0.168	0.001	0.002	0.049	0.577	0.097	0.385	0.668	2.864	11.858	0.043	0.673	0.320	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh735	792	1730	2371	16378	187	1319135	3697	10207	5444	549	24885	560	0.022	0.032	0.000	0.002	0.101	4.571	0.145	0.318	0.070	1.875	45.328	0.034	0.436	0.103	0.019
21 Fort Hawkins, 9BI28	2	Springfield	fh633	520	1724	1943	5553	133	1343487	3962	8677	5621	38	1880	916	0.020	0.277	0.001	0.001	0.007	0.334	0.093	0.307	0.917	1.544	49.474	0.024	0.346	0.163	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh580a	266	1222	2050	11383	95	1096838	2138	8809	4150	259	4902	960	0.053	0.054	0.001	0.002	0.062	1.181	0.064	0.294	0.249	2.123	18.927	0.023	0.494	0.231	0.004
21 Fort Hawkins, 9BI28	2	Springfield	fh581	573	791	1913	5142	41	847326	3905	6925	1937	37	1101	519	0.034	0.520	0.001	0.002	0.019	0.568	0.296	0.408	0.718	3.575	29.757	0.021	0.988	0.268	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh313	206	1472	1843	4154	84	1270320	6107	7900	5040	204	1984	424	0.103	0.104	0.000	0.001	0.040	0.394	0.041	0.292	0.742	1.567	9.725	0.017	0.366	0.084	0.002
21 Fort Hawkins, 9BI28	2	Springfield	fh321	396	1131	1850	15683	67	1124070	2909	8307	4447	68	1473	565	0.046	0.269	0.001	0.002	0.015	0.331	0.089	0.254	0.768	1.868	21.662	0.015	0.416	0.127	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh703a	162	1517	2486	29858	61	1320083	4998	8597	5030	111	1927	596	0.058	0.084	0.000	0.002	0.022	0.383	0.032	0.302	0.787	1.709	17.360	0.012	0.494	0.118	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh580b	279	944	1986	12190	47	1041990	2041	7873	5030	121	1537	1930	0.079	0.182	0.002	0.002	0.024	0.306	0.055	0.188	0.614	1.565	12.702	0.009	0.395	0.384	0.001
21 Fort Hawkins, 9BI28	2	Springfield	fh580	588	1599	2041	10263	47	1375432	4694	8847	6015	133	2085	801	0.064	0.282	0.001	0.001	0.022	0.347	0.098	0.266	0.767	1.471	15.677	0.008	0.339	0.133	0.002
21 Fort Hawkins, 9BI28	2	Springfield	fh743	246	1402	1812	6346	15	1313644	4326	8616	4667	79	3383	675	0.023	0.073	0.001	0.001	0.017	0.725	0.053	0.300	0.414	1.846	42.823	0.003	0.388	0.145	0.003
21 Fort Hawkins, 9BI28	2	Springfield	fh703	158	1085	2366	47761	14	1076446	2267	9053	5498	58	1651	1094	0.035	0.096	0.001	0.002	0.011	0.300	0.029	0.197	0.657	1.647	28.466	0.003	0.430	0.199	0.002
21 Fort Hawkins, 9BI28	2	Springfield	fh735a	313	1282	2301	20612	1	1197413	4353	8400	4837	125	1756	599	0.071	0.178	0.001	0.002	0.026	0.363	0.065	0.265	0.730	1.737	14.048	0.000	0.476	0.124	0.001
21 Fort Hawkins, 9BI28	2		fh703c	133	659	1856	9558	116	847371	3021	7945	3297	1702	1239	537	1.374	0.107	0.001	0.002	0.516	0.376	0.040	0.200	0.532	2.410	0.728	0.035	0.563	0.163	0.001
21 Fort Hawkins, 9BI28	2		fh394	123	1056	1956	3621	68	1065839	6598	7327	2586	30	1324	352	0.023	0.093	0.000	0.002	0.012	0.512	0.048	0.408	0.798	2.833	44.133	0.026	0.756	0.136	0.001
21 Fort Hawkins, 9BI28	2		fh313a	316	590	1527	2108	1	810870	5761	6728	2015	178	1017	273	0.175	0.311	0.000	0.002	0.088	0.505	0.157	0.293	0.580	3.339	5.713	0.000	0.758	0.135	0.001
21 Fort Hawkins, 9BI28	2		fh397	523	1555	2036	7126	1	1303009	5455	7881	4646	2	1888	553	0.001	0.277	0.000	0.002	0.000	0.406	0.113	0.335	0.824	1.696	944.000	0.000	0.438	0.119	0.001
21 Fort Hawkins, 9BI28	2	Buckshot	fh580g	298	276	2261	5838	341	545124	2403	6204	1356	1449	1054	500	1.375	0.283	0.001	0.004	1.069	0.777	0.220	0.204	0.262	4.575	0.727	0.251	1.667	0.369	0.002
21 Fort Hawkins, 9BI28	2	Buckshot	fh386b	125	292	1493	1992	25	549308	3563	5940	1384	264	893	276	0.296	0.140	0.001	0.003	0.191	0.645	0.090	0.211	0.327	4.292	3.383	0.018	1.079	0.199	0.002
21 Fort Hawkins, 9BI28	2	Buckshot	fh703f	53	242	1722	4523	27	569236	3122	6144	1626	179	943	498	0.190	0.056	0.001	0.003	0.110	0.580	0.033	0.149	0.257	3.779	5.268	0.017	1.059	0.306	0.002
21 Fort Hawkins, 9BI28	2	Buckshot	fh580f	147	283	1771	3302	2	576498	2665	6023	1823	178	738	507	0.241	0.199	0.001	0.003	0.098	0.405	0.081	0.155	0.383	3.304	4.146	0.001	0.971	0.278	0.001
21 Fort Hawkins, 9BI28	2	Lead patch	fh703d	346	693	1642	9223	63	794886	2180	8043	3054	61	1202	595	0.051	0.288	0.001	0.002	0.020	0.394	0.113	0.227	0.577	2.634	19.705	0.021	0.538	0.195	0.002
22 Galphin 38AK7	8		38AK7-393b	57	144	181	297	87	52237	236	64	14	115	211	17	0.545	0.270	0.000	0.003	8.214	15.071	4.071	10.286	0.682	4.571	1.835	6.214	12.929	1.214	0.004
22 Galphin 38AK7	8		38AK7-79x16	53	159	168	202	109	49404	261	61	18	156	651	6	0.240	0.081	0.000	0.003	8.667	36.167	2.944	8.833	0.244	3.389	4.173	6.056	9.333	0.333	0.013
22 Galphin 38AK7	8		38AK7-388csmall	84	93	168	221	79	42033	212	64	15	91	1104	63	0.082	0.076	0.001	0.004	6.067	73.600	5.600	6.200	0.084	4.267	12.132	5.267	11.200	4.200	0.026
22 Galphin 38AK7	8		38AK7-388b	61	204	218	427	117	58819	254	73	26	33	282	31	0.117	0.216	0.001	0.004	1.269	10.846	2.346	7.846	0.723	2.808	8.545	4.500	8.385	1.192	0.005
22 Galphin 38AK7	8		38AK7-381a	119	98	115	195	92	34542	125	52	22	299	1343	52	0.223	0.089	0.002	0.003	13.591	61.045	5.409	4.455	0.073	2.364	4.492	4.182	5.227	2.364	0.039
22 Galphin 38AK7	8		38AK7-395b	108	196	201	517	126	58676	258	76	32	74	279	27	0.265	0.387	0.000	0.003	2.313	8.719	3.375	6.125	0.703	2.375	3.770	3.938	6.281	0.844	0.005
22 Galphin 38AK7	8		38AK7-387c	69	191	206	277	109	54916	245	57	35	51	279	21	0.183	0.247	0.000	0.004	1.457	7.971	1.971	5.457	0.685	1.629	5.471	3.114	5.886	0.600	0.005
22 Galphin 38AK7	8		38AK7-79x11	68	179	216	436	110	56696	227	92	36	224	258	31	0.868	0.264	0.001	0.004	6.222	7.167	1.889	4.972	0.694	2.556	1.152	3.056	6.000	0.861	0.005
22 Galphin 38AK7	8		38AK7-381c	84	106	150	430	102	48590	180	69	37	200	1741	8	0.115	0.048	0.000	0.003	5.405	47.054	2.270	2.865	0.061	1.865	8.705	2.757	4.054	0.216	0.036
22 Galphin 38AK7	8		38AK7-395a	35	188	234	495	100	57807	201	89	37	27	291	12	0.093	0.120	0.000	0.004	0.730	7.865	0.946	5.081	0.646	2.405	10.778	2.703	6.324	0.324	0.005
22 Galphin 38AK7	8		38AK7-388c	47	151	202	322	100	52844	193	95	43	1433	188	29	7.622	0.250	0.001	0.004	33.326	4.372	1.093	3.512	0.803	2.209	0.131	2.326	4.698	0.674	0.004
22 Galphin 38AK7	8		38AK7-395achewed	77	118	196	448	88	41858	195	37	41	209	1230	9	0.170	0.063	0.000	0.005	5.098	30.000	1.878	2.878	0.096	0.902	5.885	2.146	4.780	0.220	0.029
22 Galphin 38AK7	8		38AK7-74x26	63	139	189	327	68	46643	121	47	37	677	253	29	2.676	0.249	0.001	0.004	18.297	6.838	1.703	3.757	0.549	1.270	0.374	1.838	5.108	0.784	0.005
22 Galphin 38AK7	8		38AK7-380b	71	79	162	300	62	44778	187	55	40	54	185	21	0.292	0.384	0.000	0.004	1.350	4.625	1.775	1.975	0.427	1.375	3.426	1.550	4.050	0.525	0.004
22 Galphin 38AK7	8		38AK7-393bsmall	76	95	96	271	44	34486	134	36	29	227	2287	10	0.099	0.033	0.000	0.003	7.828	78.862	2.621	3.276	0.042	1.241	10.075	1.517	3.310	0.345	0.066
22 Galphin 38AK7	8		38AK7-80x2	66	151	217	428	58	52951	201	73	40	58	198	56	0.293	0.333	0.001	0.004	1.450	4.950	1.650	3.775	0.763	1.825	3.414	1.450	5.425	1.400	0.004
22 Galphin 38AK7	8		38AK7-392b	50	167	189	452	78	57947	215	94	54	97	275	26	0.353	0.182	0.000	0.003	1.796	5.093	0.926	3.093	0.607	1.741	2.835	1.444	3.500	0.481	0.005
23 Guilford Courthouse	2		GUCO 10672	1436	50	872586	3877	3187	3192	87	5086	516	431	391	39835	1.102	3.673	12.480	273.367	0.835	0.758	2.783	0.097	0.128	9.857	0.907	6.176	1691.058	77.200	0.122
23 Guilford Courthouse	2		GUCO 1654	291	6557	4942	7409	175	7742	162	7627	1122	345	784	2184983	0.440	0.371	282.225	0.638	0.307	0.699	0.259	5.844	8.364	6.798	2.272	0.156	4.405	1947.400	0.101
23 Guilford Courthouse	2		GUCO 1513	270	862	951	901	235	978399	7777	7269	1744	65	950	257	0.068	0.284	0.000	0.001	0.037	0.545	0.155	0.494	0.907	4.168	14.615	0.135	0.545	0.147	0.001
23 Guilford Courthouse	2		GUCO 1491	381	872	1061	842	248	955124	7412	7195	1900	77	1007	478	0.076	0.378	0.001	0.001	0.041	0.530	0.201	0.459	0.866	3.787	13.078	0.131	0.558	0.252	0.001
23 Guilford Courthouse	2		GUCO 1539	54	1584	2778	1556	263	275796	4467	72024	2070	1148	1211566	292	0.001	0.000	0.001	0.010	0.555	585.298	0.026	0.765	0.001	34.794	1055.371	0.127	1.342	0.141	4.393
23 Guilford Courthouse	2		GUCO 1655	860	762	895	12123	241	1004404	5283	7724	2020	93	984	491	0.095	0.874	0.000	0.001	0.046	0.487	0.426	0.377	0.774	3.824	10.581	0.119	0.443	0.243	0.001
23 Guilford Courthouse	2		GUCO 1582	409	973	1200	1644	218	984019	7153	7295	1849	504	947	563	0.532	0.432	0.001	0.001	0.273	0.512	0.221	0.526	1.027	3.945	1.879	0.118	0.649	0.304	0.001
23 Guilford Courthouse	2		GUCO 1521	276	678	962	758	185	876521	6760	6724	1603	93	838	367	0.111	0.329	0.000	0.001	0.058	0.523	0.172	0.423	0.809	4.195	9.011	0.115	0.600	0.229	0.001
23 Guilford Courthouse	2		GUCO 7457	269	773	2659	3784	221	902100	4942	6589	1929	144	2864	731	0.050	0.094	0.001	0.003	0.075	1.485	0.139	0.401	0.270	3.416	19.889	0.115	1.378	0.379	0.003
23 Guilford Courthouse	2		GUCO 1584	368	773	1031	1903	213	943216	6726	7113	1896	195	1087	301	0.179	0.339	0.000	0.001	0.103	0.573	0.194	0.408	0.711	3.752	5.574	0.112	0.544	0.159	0.001
23 Guilford Courthouse	2		GUCO 1523	221	703	906	1051	191	935510	6929	6852	1802	307	4370	482	0.070	0.051	0.001	0.001	0.170	2.425	0.123	0.390	0.161	3.802	14.235	0.106	0.503	0.267	0.005
23 Guilford Courthouse	2		GUCO 1527	423	896	1154	2069	199	993443	5606	7160	1976	42	1048	395	0.040	0.404	0.000	0.001	0.021	0.530	0.214	0.453	0.855	3.623	24.952	0.101	0.584	0.200	0.001
23 Guilford Courthouse	2		GUCO 1529	283	772	958	988	162	1006347	7629	7261	1976	145	1016	462	0.143	0.279	0.000	0.001	0.073	0.514	0.143	0.391	0.760	3.675	7.007	0.082	0.485	0.234	0.001
23 Guilford Courthouse	2		GUCO 1480	360	782	1173	2280	148	926198	6831	6969	1822	124	912	386	0.136	0.395	0.000	0.001	0.068	0.501	0.198	0.429	0.857	3.825	7.355	0.081	0.644	0.212	0.001
23 Guilford Courthouse	2		GUCO 1572	360	982	1113	920	161	995478	7306	7357	2102	1078	1037	315	1.040	0.347	0.000	0.001	0.513	0.493	0.171	0.467	0.947	3.500	0.962	0.077	0.529	0.150	0.001
23 Guilford Courthouse	2		GUCO 1538	275	357	1041	9428	116	650055	2306	8579	1573	1234	33074	314	0.037	0.008	0.000	0.002	0.784	21.026	0.175	0.227	0.011	5.454	26.802	0.074	0.662	0.200	0.051
23 Guilford Courthouse	2		GUCO 1656	382	589	946	5104	127	859072	5415	6992	1731	3204	876	389	3.658	0.436	0.000	0.001	1.851	0.506	0.221	0.340	0.672	4.039	0.273	0.073	0.547	0.225	0.001
23 Guilford Courthouse	2		GUCO 1501	576	637	902	828	119	795848	5899	6619	1637	80	690	313	0.116	0.835	0.000	0.001	0.049	0.422	0.352	0.389	0.923	4.043	8.625	0.073	0.551	0.191	0.001
23 Guilford Courthouse	2		GUCO 1500	199	780	942	515	145	968740	7512	7064	2036	34	1044	378	0.033	0.191	0.000	0.001	0.017	0.513	0.098	0.383	0.747	3.470	30.706	0.071	0.463	0.186	0.001
23 Guilford Courthouse	2		GUCO 1645	479	652	1471	3694	122	943974	6671	7571	1810	7237	1018	517	7.109	0.471	0.001	0.002	3.998	0.562	0.265	0.360	0.640	4.183	0.141	0.067	0.813	0.286	0.001
23 Guilford Courthouse	2		GUCO 1555	555	781	1296	923	126	1008609	7920	7119	1933	2291	886	452	2.586	0.626	0.000	0.001	1.185	0.458	0.287	0.404	0.881	3.683	0.387	0.065	0.670	0.234	0.001
23 Guilford Courthouse	2		GUCO 1490	415	813	1177	1331	113	980715	7441	7803	1818	1752	8119	245	0.216	0.051	0.000	0.001	0.964	4.466	0.228	0.447	0.100	4.292	4.634	0.062	0.647	0.135	0.008
23 Guilford Courthouse	2		GUCO 1574	305	887	1152	1226	116	974047	7434	7161	1924	215	1039	408	0.207	0.294	0.000	0.001	0.112	0.540	0.159	0.461	0.854	3.722	4.833	0.060	0.599	0.212	0.001
23 Guilford Courthouse	2		GUCO 1493	301	853	1041	2109	124	1003744	7487	7413	2090	188	1223	436	0.154	0.246	0.000	0.001	0.090	0.585	0.144	0.408	0.697	3.547	6.505	0.059	0.498	0.209	0.001
23 Guilford Courthouse	2		GUCO 1489	242	397	958	1181	81	699637	5283	6210	1390	1776	685	354	2.593	0.353	0.001	0.001	1.278	0.493	0.174	0.286	0.580	4.468	0.386	0.058	0.689	0.255	0.001
23 Guilford Courthouse	2		GUCO 1528	727	897	961	8793	114	1012449	4934	7553	2103	255	1008	1409	0.253	0.721	0.001	0.001	0.121	0.479	0.346	0.427	0.890	3.592	3.953	0.054	0.457	0.670	0.001
23 Guilford Courthouse	2		GUCO 1494	194	937	829	1077	111	985928	7626	6948	2084	51	1033	456	0.049	0.188	0.000	0.001	0.024	0.496	0.093	0.450	0.907	3.334	20.255	0.053	0.398	0.219	0.001
23 Guilford Courthouse	2		GUCO 1496	182	711	926	1088	97	969253	7348	6941	1889	1494	1002	261	1.491	0.182	0.000	0.001	0.791	0.530	0.096	0.376	0.710	3.674	0.671	0.051	0.490	0.138	0.001
23 Guilford Courthouse	2		GUCO 1530	227	1007	852	775	94	1012016	7958	7254	1858	1298	1061	323	1.223	0.214	0.000	0.001	0.699	0.571	0.122	0.542	0.949	3.904	0.817	0.051	0.459	0.174	0.001
23 Guilford Courthouse	2		GUCO 6632	197	379	2067	5892	72	670045	3271	6537	1440	1643	8908	471	0.184	0.022	0.001	0.003	1.141	6.186	0.137	0.263	0.043	4.540	5.422	0.050	1.435	0.327	0.013
23 Guilford Courthouse	2		GUCO 1576	365	824	1188	1550	101	1007820	7407	8663	2021	17883	1394	344	12.829	0.262	0.000	0.001	8.849	0.690	0.181	0.408	0.591	4.286	0.078	0.050	0.588	0.170	0.001
23 Guilford Courthouse	2		GUCO 1503	152	457	830	4102	73	730563	2162	6710	1553	217	1266	334	0.171	0.120	0.000	0.001	0.140	0.815	0.098	0.294	0.361	4.321	5.834	0.047	0.534	0.215	0.002
23 Guilford Courthouse	2		GUCO 1644	381	866	890	1269	84	951342	7150	6863	1821	55	1022	272	0.054	0.373	0.000	0.001	0.030	0.561	0.209	0.476	0.847	3.769	18.582	0.046	0.489	0.149	0.001
23 Guilford Courthouse	2		GUCO 1514	239	924	905	884	94	1060644	7544	7485	2133	10	1063	385	0.009	0.225	0.000	0.001	0.005	0.498	0.112	0.433	0.869	3.509	106.300	0.044	0.424	0.180	0.001
23 Guilford Courthouse	2		GUCO 1502	443	637	859	919	66	891674	6995	6935	1655	2537	900	328	2.819	0.492	0.000	0.001	1.533	0.544	0.268	0.385	0.708	4.190	0.355	0.040	0.519	0.198	0.001
23 Guilford Courthouse	2		GUCO 1495	193	438	860	1222	58	721579	5296	6281	1610	67	690	327	0.097	0.280	0.000	0.001	0.042	0.429	0.120	0.272	0.635	3.901	10.299	0.036	0.534	0.203	0.001
23 Guilford Courthouse	2		GUCO 1568	116	545	928	5022	56	791516	4482	7054	1714	7073	859	242	8.234	0.135	0.000	0.001	4.127	0.501	0.068	0.318	0.634	4.116	0.121	0.033	0.541	0.141	0.001
23 Guilford Courthouse	2		GUCO 1510	1658	804	1044	1334	58	1019913	7238	7552	1825	6719	931	451	7.217	1.781	0.000	0.001	3.682	0.510	0.908	0.441	0.864	4.138	0.139	0.032	0.572	0.247	0.001
23 Guilford Courthouse	2		GUCO 1516	394	891	868	6926	57	946287	6211	7320	1805	213	1017	501	0.209	0.387	0.001	0.001	0.118	0.563	0.218	0.494	0.876	4.055	4.775	0.032	0.481	0.278	0.001
23 Guilford Courthouse	2		GUCO 1596	255	826	784	1449	60	997800	7419	7087	1909	85	1117	218	0.076	0.228	0.000	0.001	0.045	0.585	0.134	0.433	0.739	3.712	13.141	0.031	0.411	0.114	0.001
23 Guilford Courthouse	2		GUCO 1527 embedded item	550	57	733	5663	45	115684	445	18342	1825	413	1178	272	0.351	0.467	0.002	0.006	0.226	0.645	0.301	0.031	0.048	10.050	2.852	0.025	0.402	0.149	0.010
23 Guilford Courthouse	2		GUCO 1526	205	987	1007	2606	50	1042843	7037	7229	2103	56	1068	317	0.052	0.192	0.000	0.001	0.027	0.508	0.097	0.469	0.924	3.437	19.071	0.024	0.479	0.151	0.001
23 Guilford Courthouse	2		GUCO 6507	304	685	6150	8677	40	857790	4073	7052	1814	76	1647	1285	0.046	0.185	0.001	0.007	0.042	0.908	0.168	0.378	0.416	3.888	21.671	0.022	3.390	0.708	0.002
23 Guilford Courthouse	2		GUCO 7322	779	1612	10056	13055	48	339749	4629	92689	2662	62210	1465698	2667	0.042	0.001	0.008	0.030	23.370	550.600	0.293	0.606	0.001	34.819	23.560	0.018	3.778	1.002	4.314
23 Guilford Courthouse	2		GUCO 1505	328	678	869	1870	25	929208	7310	7060	1786	2738	820	299	3.339	0.400	0.000	0.001	1.533	0.459	0.184	0.380	0.827	3.953	0.299	0.014	0.487	0.167	0.001
23 Guilford Courthouse	2		GUCO 6716	622	889	872	1619	11	1011222	7721	7154	2018	475	2206	339	0.215	0.282	0.000	0.001	0.235	1.093	0.308	0.441	0.403	3.545	4.644	0.005	0.432	0.168	0.002
23 Guilford Courthouse	2		GUCO 1561	276	845	931	2007	6	995279	7309	7373	2013	1212	1628	574	0.744	0.170	0.001	0.001	0.602	0.809	0.137	0.420	0.519	3.663	1.343	0.003	0.462	0.285	0.002
23 Guilford Courthouse	2		GUCO 7365	289	509	1409	2490	1	704069	4843	6019	1503	72	887	510	0.081	0.326	0.001	0.002	0.048	0.590	0.192	0.339	0.574	4.005	12.319	0.001	0.937	0.339	0.001
23 Guilford Courthouse	2		GUCO 11395	431	847	1415	7922	1	943134	4703	7867	1998	7563	4434	420	1.706	0.097	0.000	0.002	3.785	2.219	0.216	0.424	0.191	3.937	0.586	0.001	0.708	0.210	0.005
23 Guilford Courthouse	2		GUCO 1522	458	852	1169	1051	1	1067900	7757	8620	2002	3410	17315	369	0.197	0.026	0.000	0.001	1.703	8.649	0.229	0.426	0.049	4.306	5.078	0.000	0.584	0.184	0.016
24 Hanging Rock, SC	8		Hanging Rock 01-041 Allison	62	68	162	116	91	36568	316	41	22	48	81	31	0.593	0.765	0.001	0.004	2.182	3.682	2.818	3.091	0.840	1.864	1.688	4.136	7.364	1.409	0.002
24 Hanging Rock, SC	8		Hanging Rock 01-084 Allison	39	74	147	150	60	36742	246	42	19	433	103	-2	4.204	0.379	0.000	0.004	22.789	5.421	2.053	3.895	0.718	2.211	0.238	3.158	7.737	-0.105	0.003
24 Hanging Rock, SC	8		Hanging Rock 01-021 Allison	20	59	135	113	78	34679	256	34	26	32	249	19	0.129	0.080	0.001	0.004	1.231	9.577	0.769	2.269	0.237	1.308	7.781	3.000	5.192	0.731	0.007

24 Hanging Rock, SC	8		Hanging Rock 01-022 Allison	33	47	133	122	84	34263	233	45	36	41	102	1	0.402	0.324	0.000	0.004	1.139	2.833	0.917	1.306	0.461	1.250	2.488	2.333	3.694	0.028	0.003
24 Hanging Rock, SC	8		Hanging Rock 01-025 Allison	35	79	146	143	69	37128	310	51	33	92	113	27	0.814	0.310	0.001	0.004	2.788	3.424	1.061	2.394	0.699	1.545	1.228	2.091	4.424	0.818	0.003
24 Hanging Rock, SC	8		Hanging Rock 01-057 Allison	36	65	138	125	71	33167	225	36	40	44	559	10	0.079	0.064	0.000	0.004	1.100	13.975	0.900	1.625	0.116	0.900	12.705	1.775	3.450	0.250	0.017
25 Kettle Creek, 9WS370	4	British Standard	237	78	136	377	808	152	88547	367	44	33	82	445	39	0.184	0.175	0.000	0.004	2.485	13.485	2.364	4.121	0.306	1.333	5.427	4.606	11.424	1.182	0.005
25 Kettle Creek, 9WS370	4	Charleville	154	152	195	355	591	167	102266	613	98	54	433	4808	38	0.090	0.032	0.000	0.003	8.019	89.037	2.815	3.611	0.041	1.815	11.104	3.093	6.574	0.704	0.047
25 Kettle Creek, 9WS370	4	Fusil	521	216	119	366	855	157	82444	193	61	25	3146	336	39	9.363	0.643	0.000	0.004	125.840	13.440	8.640	4.760	0.354	2.440	0.107	6.280	14.640	1.560	0.004
25 Kettle Creek, 9WS370	4	Fusil	309	173	157	364	570	219	92312	450	59	30	1654	2812	72	0.588	0.062	0.001	0.004	55.133	93.733	5.767	5.233	0.056	1.967	1.700	7.300	12.133	2.400	0.030
25 Kettle Creek, 9WS370	4	Fusil	104	269	137	472	954	183	98599	246	59	72	1069	3775	12	0.283	0.071	0.000	0.005	14.847	52.431	3.736	1.903	0.036	0.819	3.531	2.542	6.556	0.167	0.038
25 Kettle Creek, 9WS370	4	Fusil	109	94	52	261	1810	135	69962	306	29	33	294	3029	10	0.097	0.031	0.000	0.004	8.909	91.788	2.848	1.576	0.017	0.879	10.303	4.091	7.909	0.303	0.043
25 Kettle Creek, 9WS370	4	Fusil	250	107	138	330	784	155	89905	497	88	50	217	2094	4	0.104	0.051	0.000	0.004	4.340	41.880	2.140	2.760	0.066	1.760	9.650	3.100	6.600	0.080	0.023
25 Kettle Creek, 9WS370	4	Fusil	518	148	112	328	1195	132	85247	214	78	77	269	4496	54	0.060	0.033	0.001	0.004	3.494	58.390	1.922	1.455	0.025	1.013	16.714	1.714	4.260	0.701	0.053
25 Kettle Creek, 9WS370	4	Fusil	522	185	156	354	1573	122	87233	183	66	56	50	298	58	0.168	0.621	0.001	0.004	0.893	5.321	3.304	2.786	0.523	1.179	5.960	2.179	6.321	1.036	0.003
25 Kettle Creek, 9WS370	4	Fusil	529	355	145	547	1060	178	91773	262	45	49	23	312	78	0.074	1.138	0.001	0.006	0.469	6.367	7.245	2.959	0.465	0.918	13.565	3.633	11.163	1.592	0.003
25 Kettle Creek, 9WS370	4	Rifle	86	206	107	353	961	158	78870	312	55	24	1869	251	31	7.446	0.821	0.000	0.004	77.875	10.458	8.583	4.458	0.426	2.292	0.134	6.583	14.708	1.292	0.003
25 Kettle Creek, 9WS370	4	Rifle	152	124	204	401	600	177	101591	556	49	34	2265	243	32	9.321	0.510	0.000	0.004	66.618	7.147	3.647	6.000	0.840	1.441	0.107	5.206	11.794	0.941	0.002
25 Kettle Creek, 9WS370	4	Rifle	37	258	170	406	869	155	94851	380	60	50	2146	3233	17	0.664	0.080	0.000	0.004	42.920	64.660	5.160	3.400	0.053	1.200	1.507	3.100	8.120	0.340	0.034
25 Kettle Creek, 9WS370	4	Rifle	44	82	89	208	207	161	76605	615	42	33	1370	208	34	6.587	0.394	0.000	0.003	41.515	6.303	2.485	2.697	0.428	1.273	0.152	4.879	6.303	1.030	0.003
25 Kettle Creek, 9WS370	4	Rifle	40	97	107	216	364	139	84708	558	61	53	1657	198	26	8.369	0.490	0.000	0.003	31.264	3.736	1.830	2.019	0.540	1.151	0.119	2.623	4.075	0.491	0.002
25 Kettle Creek, 9WS370	4	Rifle	510	107	116	364	306	155	88038	588	72	33	879	287	30	3.063	0.373	0.000	0.004	26.636	8.697	3.242	3.515	0.404	2.182	0.327	4.697	11.030	0.909	0.003
25 Kettle Creek, 9WS370	4	Rifle	504	201	171	334	825	150	99855	330	92	56	810	248	22	3.266	0.810	0.000	0.003	14.464	4.429	3.589	3.054	0.690	1.643	0.306	2.679	5.964	0.393	0.002
25 Kettle Creek, 9WS370	4	Rifle	534	123	148	332	694	169	84101	292	63	32	458	1824	77	0.251	0.067	0.001	0.004	14.313	57.000	3.844	4.625	0.081	1.969	3.983	5.281	10.375	2.406	0.022
25 Kettle Creek, 9WS370	4	Rifle	110	119	140	394	579	184	92196	556	59	37	382	241	51	1.585	0.494	0.001	0.004	10.324	6.514	3.216	3.784	0.581	1.595	0.631	4.973	10.649	1.378	0.003
25 Kettle Creek, 9WS370	4	Rifle	532	68	147	304	925	149	85457	212	52	25	248	2027	34	0.122	0.034	0.000	0.004	9.920	81.080	2.720	5.880	0.073	2.080	8.173	5.960	12.160	1.360	0.024
25 Kettle Creek, 9WS370	4	Rifle	38	57	153	307	321	172	85181	479	54	20	177	1814	40	0.098	0.031	0.000	0.004	8.850	90.700	2.850	7.650	0.084	2.700	10.249	8.600	15.350	2.000	0.021
25 Kettle Creek, 9WS370	4	Rifle	259	87	162	312	3088	138	88631	238	49	54	340	854	-5	0.398	0.102	0.000	0.004	6.296	15.815	1.611	3.000	0.190	0.907	2.512	2.556	5.778	-0.093	0.010
25 Kettle Creek, 9WS370	4	Rifle	528	106	68	338	641	142	75112	258	40	33	202	222	30	0.910	0.477	0.000	0.004	6.121	6.727	3.212	2.061	0.306	1.212	1.099	4.303	10.242	0.909	0.003
25 Kettle Creek, 9WS370	4	Rifle	MDF4	125	158	310	1325	149	77539	177	55	32	194	1418	73	0.137	0.088	0.001	0.004	6.063	44.313	3.906	4.938	0.111	1.719	7.309	4.656	9.688	2.281	0.018
25 Kettle Creek, 9WS370	4	Rifle	310	98	133	335	557	197	80755	356	54	54	284	6452	37	0.044	0.015	0.000	0.004	5.259	119.481	1.815	2.463	0.021	1.000	22.718	3.648	6.204	0.685	0.080
25 Kettle Creek, 9WS370	4	Rifle	523	175	205	411	1191	180	94612	275	50	47	232	4746	-10	0.049	0.037	0.000	0.004	4.936	100.979	3.723	4.362	0.043	1.064	20.457	3.830	8.745	-0.213	0.050
25 Kettle Creek, 9WS370	4	Rifle	36	274	155	407	1600	148	91316	180	66	58	283	291	67	0.973	0.942	0.001	0.004	4.879	5.017	4.724	2.672	0.533	1.138	1.028	2.552	7.017	1.155	0.003
25 Kettle Creek, 9WS370	4	Rifle	313	49	199	435	1112	149	107518	441	76	38	180	344	18	0.523	0.142	0.000	0.004	4.737	9.053	1.289	5.237	0.578	2.000	1.911	3.921	11.447	0.474	0.003
25 Kettle Creek, 9WS370	4	Rifle	142	112	180	354	513	197	113327	714	104	50	232	389	-1	0.596	0.288	0.000	0.003	4.640	7.780	2.240	3.600	0.463	2.080	1.677	3.940	7.080	-0.020	0.003
25 Kettle Creek, 9WS370	4	Rifle	520	221	142	320	628	167	79915	255	21	28	122	759	21	0.161	0.291	0.000	0.004	4.357	27.107	7.893	5.071	0.187	0.750	6.221	5.964	11.429	0.750	0.009
25 Kettle Creek, 9WS370	4	Rifle	539	169	163	335	2640	136	87269	288	33	37	139	1274	56	0.109	0.133	0.001	0.004	3.757	34.432	4.568	4.405	0.128	0.892	9.165	3.676	9.054	1.514	0.015
25 Kettle Creek, 9WS370	4	Rifle	254	94	205	274	715	145	81868	439	43	60	206	35662	14	0.006	0.003	0.000	0.003	3.433	594.367	1.567	3.417	0.006	0.717	173.117	2.417	4.567	0.233	0.436
25 Kettle Creek, 9WS370	4	Rifle	257	117	178	358	360	145	83706	464	53	42	143	15148	76	0.009	0.008	0.001	0.004	3.405	360.667	2.786	4.238	0.012	1.262	105.930	3.452	8.524	1.810	0.181
25 Kettle Creek, 9WS370	4	Rifle	506	245	184	445	945	184	98870	313	94	58	188	295	0	0.637	0.831	0.000	0.005	3.241	5.086	4.224	3.172	0.624	1.621	1.569	3.172	7.672	0.000	0.003
25 Kettle Creek, 9WS370	4	Rifle	247	60	124	398	1857	154	79853	355	58	57	172	337	78	0.510	0.178	0.001	0.005	3.018	5.912	1.053	2.175	0.368	1.018	1.959	2.702	6.982	1.368	0.004
25 Kettle Creek, 9WS370	4	Rifle	255	68	163	395	693	150	102037	539	76	11	30	248	43	0.121	0.274	0.000	0.004	2.727	22.545	6.182	14.818	0.657	6.909	8.267	13.636	35.909	3.909	0.002
25 Kettle Creek, 9WS370	4	Rifle	537	160	169	333	1106	176	97003	174	63	37	91	327	61	0.278	0.489	0.001	0.003	2.459	8.838	4.324	4.568	0.517	1.703	3.593	4.757	9.000	1.649	0.003
25 Kettle Creek, 9WS370	4	Rifle	519	172	135	373	903	113	94497	378	45	46	111	2477	30	0.045	0.069	0.000	0.004	2.413	53.848	3.739	2.935	0.055	0.978	22.315	2.457	8.109	0.652	0.026
25 Kettle Creek, 9WS370	4	Rifle	248	81	121	276	1349	125	90148	354	67	29	69	292	45	0.236	0.277	0.000	0.003	2.379	10.069	2.793	4.172	0.414	2.310	4.232	4.310	9.517	1.552	0.003
25 Kettle Creek, 9WS370	4	Rifle	509	114	155	381	933	160	88267	156	55	19	43	249	56	0.173	0.458	0.001	0.004	2.263	13.105	6.000	8.158	0.622	2.895	5.791	8.421	20.053	2.947	0.003
25 Kettle Creek, 9WS370	4	Rifle	151	79	131	301	311	142	86488	541	58	33	68	231	16	0.294	0.342	0.000	0.003	2.061	7.000	2.394	3.970	0.567	1.758	3.397	4.303	9.121	0.485	0.003
25 Kettle Creek, 9WS370	4	Rifle	MDF27	104	130	298	577	198	85597	332	62	41	79	529	8	0.149	0.197	0.000	0.003	1.927	12.902	2.537	3.171	0.246	1.512	6.696	4.829	7.268	0.195	0.006
25 Kettle Creek, 9WS370	4	Rifle	505	331	165	344	832	150	103262	368	78	54	100	293	45	0.341	1.130	0.000	0.003	1.852	5.426	6.130	3.056	0.563	1.444	2.930	2.778	6.370	0.833	0.003
25 Kettle Creek, 9WS370	4	Rifle	33	102	141	434	1617	133	89122	183	45	55	81	251	33	0.323	0.406	0.000	0.005	1.473	4.564	1.855	2.564	0.562	0.818	3.099	2.418	7.891	0.600	0.003
25 Kettle Creek, 9WS370	4	Rifle	517	149	249	438	1276	144	93898	326	79	63	89	16539	95	0.005	0.009	0.001	0.005	1.413	262.524	2.365	3.952	0.015	1.254	185.831	2.286	6.952	1.508	0.176
25 Kettle Creek, 9WS370	4	Rifle	MDF8	106	164	415	556	200	105469	522	101	48	66	333	46	0.198	0.318	0.000	0.004	1.375	6.938	2.208	3.417	0.492	2.104	5.045	4.167	8.646	0.958	0.003
25 Kettle Creek, 9WS370	4	Rifle	155	82	152	292	988	154	92574	324	82	53	72	295	60	0.244	0.278	0.001	0.003	1.358	5.566	1.547	2.868	0.515	1.547	4.097	2.906	5.509	1.132	0.003
25 Kettle Creek, 9WS370	4	Rifle	144	97	108	339	756	152	93547	463	71	44	57	348	26	0.164	0.279	0.000	0.004	1.295	7.909	2.205	2.455	0.310	1.614	6.105	3.455	7.705	0.591	0.004
25 Kettle Creek, 9WS370	4	Rifle	MDF16	108	148	269	385	177	96541	547	88	82	103	552	15	0.187	0.196	0.000	0.003	1.256	6.732	1.317	1.805	0.268	1.073	5.359	2.159	3.280	0.183	0.006
25 Kettle Creek, 9WS370	4	Rifle	149	71	162	305	549	196	91816	422	54	46	53	275	32	0.193	0.258	0.000	0.003	1.152	5.978	1.543	3.522	0.589	1.174	5.189	4.261	6.630	0.696	0.003
25 Kettle Creek, 9WS370	4	Rifle	39	539	142	382	1472	134	97717	269	55	43	45	279	7	0.161	1.932	0.000	0.004	1.047	6.488	12.535	3.302	0.509	1.279	6.200	3.116	8.884	0.163	0.003
25 Kettle Creek, 9WS370	4	Rifle	MDF26	109	204	424	364	198	106237	715	83	36	35	316	70	0.111	0.345	0.001	0.004	0.972	8.778	3.028	5.667	0.646	2.306	9.029	5.500	11.778	1.944	0.003
25 Kettle Creek, 9WS370	4	Rifle	42	86	117	299	706	166	89551	446	64	25	24	486	40	0.049	0.177	0.000	0.003	0.960	19.440	3.440	4.680	0.241	2.560	20.250	6.640	11.960	1.600	0.005
25 Kettle Creek, 9WS370	4	Rifle	514	91	185	297	476	130	97671	564	70	50	47	293	20	0.160	0.311	0.000	0.003	0.940	5.860	1.820	3.700	0.631	1.400	6.234	2.600	5.940	0.400	0.003
25 Kettle Creek, 9WS370	4	Rifle	661	79	196	398	697	172	103537	485	52	62	55	1893	26	0.029	0.042	0.000	0.004	0.887	30.532	1.274	3.161	0.104	0.839	34.418	2.774	6.419	0.419	0.018
25 Kettle Creek, 9WS370	4	Rifle	508	53	136	458	1816	174	99047	342	44	58	47	346	214	0.136	0.153	0.002	0.005	0.810	5.966	0.914	2.345	0.393	0.759	7.362	3.000	7.897	3.690	0.003
25 Kettle Creek, 9WS370	4	Rifle	249	87	196	385	606	185	110252	767	112	65	41	272	56	0.151	0.320	0.001	0.003	0.631	4.185	1.338	3.015	0.721	1.723	6.634	2.846	5.923	0.862	0.002
25 Kettle Creek, 9WS370	4		MDF13	69	147	372	389	191	94166	543	67	25	25	257	35	0.097	0.268	0.000	0.004	1.000	10.280	2.760	5.880	0.572	2.680	10.280	7.640	14.880	1.400	0.003
25 Kettle Creek, 9WS370	4		312-melted	142	124	385	1616	133	85133	243	47	33	53	685	65	0.077	0.207	0.001	0.005	1.606	20.758	4.303	3.758	0.181	1.424	12.925	4.030	11.667	1.970	0.008
25 Kettle Creek, 9WS370	4		MDF10	198	141	370	869	208	90952	320	88	55	69	298	52	0.232	0.664	0.001	0.004	1.255	5.418	3.600	2.564	0.473	1.600	4.319	3.782	6.727	0.945	0.003
25 Kettle Creek, 9WS370	4		45	76	134	305	478	163	89199	537	54	77	1765	270	25	6.537	0.281	0.000	0.003	22.922	3.506	0.987	1.740	0.496	0.701	0.153	2.117	3.961	0.325	0.003
25 Kettle Creek, 9WS370	4		513	112	161	475	1456	90	100498	370	77	46	174	292	84	0.596	0.384	0.001	0.005	3.783	6.348	2.435	3.500	0.551	1.674	1.678	1.957	10.326	1.826	0.003
26 Kings Mountain, SC	2		KIMO 2883	511	851	1052	1534	286	989554	6692	7349	1785	1159	6604	525	0.175	0.077	0.001	0.001	0.649	3.700	0.286	0.477	0.129	4.117	5.698	0.160	0.589	0.294	0.007
26 Kings Mountain, SC	2		KIMO 3102	325	812	1341	957	277	1057695	6959	7554	1988	1222	4966	494	0.246	0.065	0.000	0.001	0.615	2.498	0.163	0.408	0.164	3.800	4.064	0.139	0.675	0.248	0.005
26 Kings Mountain, SC	2		KIMO 3162	748	751	992	1339	244	938074	7515	6876	1863	858	1440	290	0.596	0.519	0.000	0.001	0.461	0.773	0.402	0.403	0.522	3.691	1.678	0.131	0.532	0.156	0.002
26 Kings Mountain, SC	2		KIMO 2647	338	839	988	993	242	999194	7247	6755	1908	61	1014	328	0.060	0.333	0.000	0.001	0.032	0.531	0.177	0.440	0.827	3.540	16.623	0.127	0.518	0.172	0.001
26 Kings Mountain, SC	2		KIMO 3173	1007	694	1211	1976	200	814576	5808	8941	1663	5842	40961	253	0.143	0.025	0.000	0.001	3.513	24.631	0.606	0.417	0.017	5.376	7.011	0.120	0.728	0.152	0.050
26 Kings Mountain, SC	2		KIMO 2802	811	708	2672	2002	244	896800	5613	14284	2033	5393	131144	702	0.041	0.006	0.001	0.003	2.653	64.508	0.399	0.348	0.005	7.026	24.317	0.120	1.314	0.345	0.146
26 Kings Mountain, SC	2		KIMO 2594	318	761	1124	1013	198	942891	7034	6535	1725	47	1018	268	0.046	0.312	0.000	0.001	0.027	0.590	0.184	0.441	0.748	3.788	21.660	0.115	0.652	0.155	0.001
26 Kings Mountain, SC	2		KIMO 3049	320	624	841	2264	189	826956	6084	6499	1775	20	857	527	0.023	0.373	0.001	0.001	0.011	0.483	0.180	0.352	0.728	3.661	42.850	0.106	0.474	0.297	0.001
26 Kings Mountain, SC	2		KIMO 3054	402	562	1054	1519	153	750503	5487	6177	1523	148	1475	246	0.100	0.273	0.000	0.001	0.097	0.968	0.264	0.369	0.381	4.056	9.966	0.100	0.692	0.162	0.002
26 Kings Mountain, SC	2		KIMO 2598	407	204	618	4017	95	404836	1140	5636	1079	108	437	309	0.247	0.931	0.001	0.002	0.100	0.405	0.377	0.189	0.467	5.223	4.046	0.088	0.573	0.286	0.001
26 Kings Mountain, SC	2		KIMO 3123	190	805	1107	2086	169	962811	6497	6952	1931	460	2939	351	0.157	0.065	0.000	0.001	0.238	1.522	0.098	0.417	0.274	3.600	6.389	0.088	0.573	0.182	0.003
26 Kings Mountain, SC	2		KIMO 2868	88	426	635	1067	120	723131	5586	5767	1405	28	592	162	0.047	0.149	0.000	0.001	0.020	0.421	0.063	0.303	0.720	4.105	21.143	0.085	0.452	0.115	0.001
26 Kings Mountain, SC	2		KIMO 3169	464	858	1077	890	164	988324	7271	7010	1994	108	970	369	0.111	0.478	0.000	0.001	0.054	0.486	0.233	0.430	0.885	3.516	8.981	0.082	0.540	0.185	0.001
26 Kings Mountain, SC	2		KIMO 2954	376	638	850	1218	135	851649	6313	6397	1657	882	872	452	1.011	0.431	0.001	0.001	0.532	0.526	0.227	0.385	0.732	3.861	0.989	0.081	0.513	0.273	0.001
26 Kings Mountain, SC	2		KIMO 3089	484	1073	1188	941	167	1081159	7451	7511	2102	79	1103	230	0.072	0.439	0.000	0.001	0.038	0.525	0.230	0.510	0.973	3.573	13.962	0.079	0.565	0.109	0.001
26 Kings Mountain, SC	2		KIMO 2790	382	838	1005	1704	152	994853	7030	6946	1925	246	1231	1051	0.200	0.310	0.001	0.001	0.128	0.639	0.198	0.435	0.681	3.608	5.004	0.079	0.522	0.546	0.001
26 Kings Mountain, SC	2		KIMO 3127	441	747	857	1724	149	939344	7040	6913	1982	180	982	398	0.183	0.449	0.000	0.001	0.091	0.495	0.223	0.377	0.761	3.488	5.456	0.075	0.432	0.201	0.001
26 Kings Mountain, SC	2		KIMO 3056	228	676	957	800	142	913928	7580	6714	1895	117	938	330	0.125	0.243	0.000	0.001	0.062	0.495	0.120	0.357	0.721	3.543	8.017	0.075	0.505	0.174	0.001
26 Kings Mountain, SC	2		KIMO 2980	495	672	964	3172	140	941063	5845	7176	1986	732	7466	1201	0.098	0.066	0.001	0.001	0.369	3.759	0.249	0.338	0.090	3.613	10.199	0.070	0.485	0.605	0.008
26 Kings Mountain, SC	2		KIMO 3009	1094	547	1587	13696	137	847916	5087	6947	1969	710	2287	338	0.310	0.478	0.000	0.002	0.361	1.162	0.556	0.278	0.239	3.528	3.221	0.070	0.806	0.172	0.003
26 Kings Mountain, SC	2		KIMO 3149	210	870	1011	1692	133	1025781	7658	6963	1937	120	1095	358	0.110	0.192	0.000	0.001	0.062	0.565	0.108	0.449	0.795	3.595	9.125	0.069	0.522	0.185	0.001
26 Kings Mountain, SC	2		KIMO 3042	228	913	1044	2005	137	989404	5860	7228	2012	509	1016	448	0.501	0.224	0.000	0.001	0.253	0.505	0.113	0.454	0.899	3.592	1.996	0.068	0.519	0.223	0.001
26 Kings Mountain, SC	2		KIMO 3122	291	960	1200	2087	129	1025532	6753	7192	1897	959	4016	400	0.239	0.072	0.000	0.001	0.506	2.117	0.153	0.506	0.239	3.791	4.188	0.068	0.633	0.211	0.004
26 Kings Mountain, SC	2		KIMO 2872	205	858	1035	777	132	991422	7517	7080	1967	672	886	534	0.758	0.231	0.001	0.001	0.342	0.450	0.104	0.436	0.968	3.599	1.318	0.067	0.526	0.271	0.001
26 Kings Mountain, SC	2		KIMO 2700	381	729	951	3580	133	1016567	6747	7316	2022	1145	1054	378	1.086	0.361	0.000	0.001	0.566	0.521	0.188	0.361	0.692	3.618	0.921	0.066	0.470	0.187	0.001
26 Kings Mountain, SC	2		KIMO 2709	657	717	1018	1580	108	877124	5996	6622	1643	1554	762	280	2.039	0.862	0.000	0.001	0.946	0.464	0.400	0.436	0.941	4.030	0.490	0.066	0.620	0.170	0.001
26 Kings Mountain, SC	2		KIMO 2698	976	909	1695	2939	135	998357	5495	12626	2096	4334	90465	465	0.048	0.011	0.000	0.002	2.068	43.161	0.466	0.434	0.010	6.024	20.873	0.064	0.809	0.222	0.091
26 Kings Mountain, SC	2		KIMO 3158	396	793	932	4997	125	1021580	7131	7363	1949	1127	1102	281	1.023	0.359	0.000	0.001	0.578	0.565	0.203	0.407	0.720	3.778	0.978	0.064	0.478	0.144	0.001
26 Kings Mountain, SC	2		KIMO 3040	233	938	979	1441	125	1024299	7255	7010	1998	68	1062	302	0.064	0.219	0.000	0.001	0.034	0.532	0.117	0.469	0.883	3.509	15.618	0.063	0.490	0.151	0.001
26 Kings Mountain, SC	2		KIMO 2863	335	910	1020	2904	118	1024031	6246	7936	1991	1884	8831	461	0.213	0.038	0.000	0.001	0.946	4.435	0.168	0.457	0.103	3.986	4.687	0.059	0.512	0.232	0.009
26 Kings Mountain, SC	2		KIMO 3019	290	931	872	953	110	1017556	7497	7062	1864	46	914	435	0.050	0.317	0.000	0.001	0.025	0.490	0.156	0.499	1.019	3.789	19.870	0.059	0.468	0.233	0.001
26 Kings Mountain, SC	2		KIMO 2959	451	442	962	3070	78	693024	4751	6548	1376	5722	7934	264	0.721	0.057	0.000	0.001	4.158	5.766	0.328	0.321	0.056	4.759	1.387	0.057	0.699	0.192	0.011

26 Kings Mountain, SC	2		KIMO 2583	546	606	1091	1026	87	845211	5709	6766	1633	44	801	411	0.055	0.682	0.000	0.001	0.027	0.491	0.334	0.371	0.757	4.143	18.205	0.053	0.668	0.252	0.001
26 Kings Mountain, SC	2		KIMO 2978	309	786	880	8966	93	879920	4191	6759	1746	51	948	241	0.054	0.326	0.000	0.001	0.029	0.543	0.177	0.450	0.829	3.871	18.588	0.053	0.504	0.138	0.001
26 Kings Mountain, SC	2		KIMO 2684	229	663	841	999	88	876908	7027	6430	1711	76	751	353	0.101	0.305	0.000	0.001	0.044	0.439	0.134	0.387	0.883	3.758	9.882	0.051	0.492	0.206	0.001
26 Kings Mountain, SC	2		KIMO 3003	256	498	876	2015	81	775961	5595	6155	1575	32	848	387	0.038	0.302	0.000	0.001	0.020	0.538	0.163	0.316	0.587	3.908	26.500	0.051	0.556	0.246	0.001
26 Kings Mountain, SC	2		KIMO 3171	410	329	972	3870	61	573247	3207	7099	1229	737	24523	288	0.030	0.017	0.001	0.002	0.600	19.954	0.334	0.268	0.013	5.776	33.274	0.050	0.791	0.234	0.043
26 Kings Mountain, SC	2		KIMO 2707	387	766	969	1383	94	974064	7088	6688	1921	134	1181	414	0.113	0.328	0.000	0.001	0.070	0.615	0.201	0.399	0.649	3.482	8.813	0.049	0.504	0.216	0.001
26 Kings Mountain, SC	2		KIMO 3130	861	586	1507	1458	69	758315	5762	7715	1474	983	37845	190	0.026	0.023	0.000	0.002	0.667	25.675	0.584	0.398	0.015	5.234	38.499	0.047	1.022	0.129	0.050
26 Kings Mountain, SC	2		KIMO 2956	215	910	923	2870	95	1054116	7172	7193	2048	183	945	695	0.194	0.228	0.001	0.001	0.089	0.461	0.105	0.444	0.963	3.512	5.164	0.046	0.451	0.339	0.001
26 Kings Mountain, SC	2		KIMO 2804	111	741	838	1388	87	993974	7215	6844	1890	93	1029	332	0.090	0.108	0.000	0.001	0.049	0.544	0.059	0.392	0.720	3.621	11.065	0.046	0.443	0.176	0.001
26 Kings Mountain, SC	2		KIMO 3047	291	877	947	1718	91	998913	7004	7609	1988	299	8703	663	0.034	0.033	0.001	0.001	0.150	4.378	0.146	0.441	0.101	3.827	29.107	0.046	0.476	0.334	0.009
26 Kings Mountain, SC	2		KIMO 2864	403	311	937	2215	53	591714	3919	5902	1278	652	4628	319	0.141	0.087	0.001	0.002	0.510	3.621	0.315	0.243	0.067	4.618	7.098	0.041	0.733	0.250	0.008
26 Kings Mountain, SC	2		KIMO 3057	193	583	821	1370	80	869596	6414	6790	1985	34	811	366	0.042	0.238	0.000	0.001	0.017	0.409	0.097	0.294	0.719	3.421	23.853	0.040	0.414	0.184	0.001
26 Kings Mountain, SC	2		KIMO 3055	175	837	1099	3919	83	982341	5316	7492	2146	1390	2724	310	0.510	0.064	0.000	0.001	0.648	1.269	0.082	0.390	0.307	3.491	1.960	0.039	0.512	0.144	0.003
26 Kings Mountain, SC	2		KIMO 2775	204	750	1045	2111	72	916646	6716	6946	1865	3807	1042	486	3.654	0.196	0.001	0.001	2.041	0.559	0.109	0.402	0.720	3.724	0.274	0.039	0.560	0.261	0.001
26 Kings Mountain, SC	2		KIMO 2869	209	317	1001	1226	44	628845	4666	5671	1251	1302	436	589	2.986	0.479	0.001	0.002	1.041	0.349	0.167	0.253	0.727	4.533	0.335	0.035	0.800	0.471	0.001
26 Kings Mountain, SC	2		KIMO 2685	787	672	3704	10389	64	882722	3026	7708	1953	630	2002	401	0.315	0.393	0.000	0.004	0.323	1.025	0.403	0.344	0.336	3.947	3.178	0.033	1.897	0.205	0.002
26 Kings Mountain, SC	2		KIMO 2747	175	756	1106	1513	60	958802	7522	6696	1981	549	1011	253	0.543	0.173	0.000	0.001	0.277	0.510	0.088	0.382	0.748	3.380	1.842	0.030	0.558	0.128	0.001
26 Kings Mountain, SC	2		KIMO 3147	577	651	1099	5108	57	931072	6137	7637	1886	4614	7388	723	0.625	0.078	0.001	0.001	2.446	3.917	0.306	0.345	0.088	4.049	1.601	0.030	0.583	0.383	0.008
26 Kings Mountain, SC	2		KIMO 2962	686	1047	935	3413	56	1048380	6807	7734	2161	3625	1225	199	2.959	0.560	0.000	0.001	1.677	0.567	0.317	0.484	0.855	3.579	0.338	0.026	0.433	0.092	0.001
26 Kings Mountain, SC	2		KIMO 2871	437	644	905	1610	44	923454	6613	7603	1802	2759	15391	439	0.179	0.028	0.000	0.001	1.531	8.541	0.243	0.357	0.042	4.219	5.578	0.024	0.502	0.244	0.017
26 Kings Mountain, SC	2		KIMO 3015	668	647	837	3367	40	901533	6134	6915	1813	1353	976	291	1.386	0.684	0.000	0.001	0.746	0.538	0.368	0.357	0.663	3.814	0.721	0.022	0.462	0.161	0.001
26 Kings Mountain, SC	2		KIMO 2966	734	898	1495	1519	45	1047900	7432	8885	2050	1719	27320	303	0.063	0.027	0.000	0.001	0.839	13.327	0.358	0.438	0.033	4.334	15.893	0.022	0.729	0.148	0.026
26 Kings Mountain, SC	2		KIMO 2593	280	520	2284	7122	39	860958	3126	7542	1802	194	888	297	0.218	0.315	0.000	0.003	0.108	0.493	0.155	0.289	0.586	4.185	4.577	0.022	1.267	0.165	0.001
26 Kings Mountain, SC	2		KIMO 3043	490	419	809	1130	32	795065	6290	6054	1706	81	1306	328	0.062	0.375	0.000	0.001	0.047	0.766	0.287	0.246	0.321	3.549	16.123	0.019	0.474	0.192	0.002
26 Kings Mountain, SC	2		KIMO 2673	442	707	835	6951	30	850381	4044	6945	1761	122	1139	251	0.107	0.388	0.000	0.001	0.069	0.647	0.251	0.401	0.621	3.944	9.336	0.017	0.474	0.143	0.001
26 Kings Mountain, SC	2		KIMO 2999	239	931	941	1136	24	1024294	7453	7325	1967	868	3330	370	0.261	0.072	0.000	0.001	0.441	1.693	0.122	0.473	0.280	3.724	3.836	0.012	0.478	0.188	0.003
26 Kings Mountain, SC	2		KIMO 3000	428	675	752	2911	13	819324	5101	6502	1585	82	817	264	0.100	0.524	0.000	0.001	0.052	0.515	0.270	0.426	0.826	4.102	9.963	0.008	0.474	0.167	0.001
26 Kings Mountain, SC	2		KIMO 2806	313	829	796	773	11	941362	7138	6905	2012	60	947	248	0.063	0.331	0.000	0.001	0.030	0.471	0.156	0.412	0.875	3.432	15.783	0.005	0.396	0.123	0.001
26 Kings Mountain, SC	2		KIMO 3048	202	538	1003	1375	7	775593	5402	7408	1679	189	21389	425	0.009	0.009	0.001	0.001	0.113	12.739	0.120	0.320	0.025	4.412	113.169	0.004	0.597	0.253	0.028
26 Kings Mountain, SC	2		KIMO 3170	293	622	713	1337	2	867583	7013	6459	1810	55	833	366	0.066	0.352	0.000	0.001	0.030	0.460	0.162	0.344	0.747	3.569	15.145	0.001	0.394	0.202	0.001
26 Kings Mountain, SC	2		KIMO 2963	218	575	644	6603	1	845063	4655	6781	1788	212	3938	255	0.054	0.055	0.000	0.001	0.119	2.202	0.122	0.322	0.146	3.793	18.575	0.001	0.360	0.143	0.005
26 Kings Mountain, SC	2		KIMO 2796	251	616	911	588	1	853424	7114	6501	1818	135	1076	596	0.125	0.233	0.001	0.001	0.074	0.592	0.138	0.339	0.572	3.576	7.970	0.001	0.501	0.328	0.001
26 Kings Mountain, SC	2		KIMO 2769	666	632	1156	2195	1	938854	6951	8347	1914	11151	16309	177	0.684	0.041	0.000	0.001	5.826	8.521	0.348	0.330	0.039	4.361	1.463	0.001	0.604	0.092	0.017
26 Kings Mountain, SC	2		KIMO 2646	1209	799	1514	12685	0	946539	3475	8075	1966	8654	1446	391	5.985	0.836	0.000	0.002	4.402	0.736	0.615	0.406	0.553	4.107	0.167	0.000	0.770	0.199	0.002
27 Madison Square, 9CH1221	2		md96	401	996	1919	3363	192	1123709	6378	10562	3640	1371	56015	231	0.024	0.007	0.000	0.002	0.377	15.389	0.110	0.274	0.018	2.902	40.857	0.053	0.527	0.063	0.050
27 Madison Square, 9CH1221	2		md71	329	806	1932	5920	83	921313	4020	9964	2161	3264	55374	450	0.059	0.006	0.000	0.002	1.510	25.624	0.152	0.373	0.015	4.611	16.965	0.038	0.894	0.208	0.060
27 Madison Square, 9CH1221	2		md79	336	1779	2131	5963	179	1389568	6370	8103	4855	52	1729	584	0.030	0.194	0.000	0.002	0.011	0.356	0.069	0.366	1.029	1.669	33.250	0.037	0.439	0.120	0.001
27 Madison Square, 9CH1221	2		md74	454	1497	2051	4237	167	1349099	5514	8448	4723	1152	5703	1121	0.202	0.080	0.001	0.002	0.244	1.207	0.096	0.317	0.262	1.789	4.951	0.035	0.434	0.237	0.004
27 Madison Square, 9CH1221	2		md75	274	1150	1689	3907	89	1081995	5757	7246	2546	25	1395	329	0.018	0.196	0.000	0.002	0.010	0.548	0.108	0.452	0.824	2.846	55.800	0.035	0.663	0.129	0.001
27 Madison Square, 9CH1221	2		md122	326	717	1768	4276	107	872219	3712	10743	3364	621	23899	521	0.026	0.014	0.001	0.002	0.185	7.104	0.097	0.213	0.030	3.194	38.485	0.032	0.526	0.155	0.027
27 Madison Square, 9CH1221	2		md30	158	1452	1719	1556	100	1220919	6856	7419	3220	117	1600	387	0.073	0.099	0.000	0.001	0.036	0.497	0.049	0.451	0.908	2.304	13.675	0.031	0.534	0.120	0.001
27 Madison Square, 9CH1221	2		md28	123	2034	2106	1507	150	1450313	8031	8572	5066	2066	1978	609	1.044	0.062	0.000	0.001	0.408	0.390	0.024	0.402	1.028	1.692	0.957	0.030	0.416	0.120	0.001
27 Madison Square, 9CH1221	2		md89	234	1629	2031	2636	94	1312183	5578	8941	4278	7065	1612	413	4.383	0.145	0.000	0.002	1.651	0.377	0.055	0.381	1.011	2.090	0.228	0.022	0.475	0.097	0.001
27 Madison Square, 9CH1221	2		md116	271	1669	1942	2822	36	1310689	5972	8349	4335	1973	7583	423	0.260	0.036	0.000	0.001	0.455	1.749	0.063	0.385	0.220	1.926	3.843	0.008	0.448	0.098	0.006
27 Madison Square, 9CH1221	2		md118	188	753	1666	1704	2	887258	6553	8307	2000	918	29708	319	0.031	0.006	0.000	0.002	0.459	14.854	0.094	0.377	0.025	4.154	32.362	0.001	0.833	0.160	0.033
27 Madison Square, 9CH1221	2		md117	258	844	1859	2987	1	960248	5224	8699	2257	1051	32915	384	0.032	0.008	0.000	0.002	0.466	14.584	0.114	0.374	0.026	3.854	31.318	0.000	0.824	0.170	0.034
27 Madison Square, 9CH1221	2		md68	328	1628	1894	4549	1	1324746	5841	8293	4442	3638	1747	759	2.082	0.188	0.001	0.001	0.819	0.393	0.074	0.367	0.932	1.867	0.480	0.000	0.426	0.171	0.001
27 Madison Square, 9CH1221	2	Dice, from musket ball	md114	214	1315	1675	4067	1	1186093	6647	8797	4030	2462	18301	874	0.135	0.012	0.001	0.001	0.611	4.541	0.053	0.326	0.072	2.183	7.433	0.000	0.416	0.217	0.015
28 Minute Man, MA	2		FS29	1325	51	1077209	9487	2933	3683	80	5985	798	1439	12442	147537	0.116	0.106	40.059	292.481	1.803	15.591	1.660	0.064	0.004	7.500	8.646	3.675	1349.886	184.883	3.378
28 Minute Man, MA	2		FS29B	872	138	541600	5892	1382	3792	46	5442	420	277	7045	52190	0.039	0.124	13.763	142.827	0.660	16.774	2.076	0.329	0.020	12.957	25.433	3.290	1289.524	124.262	1.858
28 Minute Man, MA	2		76685	981	37	398114	2356	932	2798	88	5792	343	781	23905	12310	0.033	0.041	4.400	142.285	2.277	69.694	2.860	0.108	0.002	16.886	30.608	2.717	1160.682	35.889	8.544
28 Minute Man, MA	2		FS-33A	161	713	987	8645	212	851069	2539	6916	1904	176	1017	387	0.173	0.158	0.000	0.001	0.092	0.534	0.085	0.374	0.701	3.632	5.778	0.111	0.518	0.203	0.001
28 Minute Man, MA	2		CM1	707	785	1400	2899	177	866671	5583	9250	1839	4217	43983	390	0.096	0.016	0.000	0.002	2.293	23.917	0.384	0.427	0.018	5.030	10.430	0.096	0.761	0.212	0.051
28 Minute Man, MA	2		76682	243	914	982	644	172	945533	6905	8442	2024	14228	15215	1672	0.935	0.016	0.002	0.001	7.030	7.517	0.120	0.452	0.060	4.171	1.069	0.085	0.485	0.826	0.016
28 Minute Man, MA	2		FS-14	322	869	1601	7590	158	955844	3914	7682	1923	4674	1150	348	4.064	0.280	0.000	0.002	2.431	0.598	0.167	0.452	0.756	3.995	0.246	0.082	0.833	0.181	0.001
28 Minute Man, MA	2		CM5 M410	740	240	1490	511392	143	198751	843	11387	1765	299	1055	2534	0.283	0.701	0.013	0.007	0.169	0.598	0.419	0.136	0.227	6.452	3.528	0.081	0.844	1.436	0.005
28 Minute Man, MA	2		CM3	804	680	1380	1383	142	916006	6396	9866	1831	2741	59094	471	0.046	0.014	0.001	0.002	1.497	32.274	0.439	0.371	0.012	5.388	21.559	0.078	0.754	0.257	0.065
28 Minute Man, MA	2		76683	218	835	1385	1083	160	971099	7366	6942	2108	2506	2064	373	1.214	0.106	0.000	0.001	1.189	0.979	0.103	0.396	0.405	3.293	0.824	0.076	0.657	0.177	0.002
28 Minute Man, MA	2		CM4 M409	576	161	1290	475968	141	212842	987	11164	1989	268	1398	3349	0.192	0.412	0.016	0.006	0.135	0.703	0.290	0.081	0.115	5.613	5.216	0.071	0.649	1.684	0.007
28 Minute Man, MA	2		FS-41A	319	941	1392	10901	132	979975	3130	8131	2092	973	17694	644	0.055	0.018	0.001	0.001	0.465	8.458	0.152	0.450	0.053	3.887	18.185	0.063	0.665	0.308	0.018
28 Minute Man, MA	2		1174	142	771	786	5022	108	805420	3687	6717	1743	172	945	325	0.182	0.150	0.000	0.001	0.099	0.542	0.081	0.442	0.816	3.854	5.494	0.062	0.451	0.186	0.001
28 Minute Man, MA	2		FS-3A	252	750	869	6763	111	872211	4165	6781	1803	624	1005	264	0.621	0.251	0.000	0.001	0.346	0.557	0.140	0.416	0.746	3.761	1.611	0.062	0.482	0.146	0.001
28 Minute Man, MA	2		BR2	414	799	1134	2666	107	892642	5192	7536	1837	4829	7274	231	0.664	0.057	0.000	0.001	2.629	3.960	0.225	0.435	0.110	4.102	1.506	0.058	0.617	0.126	0.008
28 Minute Man, MA	2		BR1	192	924	858	629	102	957101	7508	6964	1850	854	3680	91	0.232	0.052	0.000	0.001	0.462	1.989	0.104	0.499	0.251	3.764	4.309	0.055	0.464	0.049	0.004
28 Minute Man, MA	2		1416	235	675	946	2552	89	833677	4063	6510	1633	251	1805	400	0.139	0.130	0.000	0.001	0.154	1.105	0.144	0.413	0.374	3.987	7.191	0.055	0.579	0.245	0.002
28 Minute Man, MA	2		CM2	971	941	1787	1255	93	966781	6889	8939	1822	5259	37476	250	0.140	0.026	0.000	0.002	2.886	20.569	0.533	0.516	0.025	4.906	7.126	0.051	0.981	0.137	0.039
28 Minute Man, MA	2		FS-51A	310	946	1311	8225	66	988324	3739	7400	2098	63	1120	326	0.056	0.277	0.000	0.001	0.030	0.534	0.148	0.451	0.845	3.527	17.778	0.031	0.625	0.155	0.001
28 Minute Man, MA	2		FS-67	171	658	1508	24102	55	859439	2734	6846	1821	124	910	572	0.136	0.188	0.001	0.002	0.068	0.500	0.094	0.361	0.723	3.759	7.339	0.030	0.828	0.314	0.001
28 Minute Man, MA	2		BR3	232	927	1883	4056	54	998519	5549	6596	1992	390	1216	277	0.321	0.191	0.000	0.002	0.196	0.610	0.116	0.465	0.762	3.311	3.118	0.027	0.945	0.139	0.001
28 Minute Man, MA	2		FS-18	482	629	2411	5361	52	743882	2603	19127	1919	4703	233464	269	0.020	0.002	0.000	0.003	2.451	121.659	0.251	0.328	0.003	9.967	49.642	0.027	1.256	0.140	0.314
28 Minute Man, MA	2		FS-21	670	890	2035	3270	46	881906	5445	24877	1858	13224	332146	316	0.040	0.002	0.000	0.002	7.117	178.765	0.361	0.479	0.003	13.389	25.117	0.025	1.095	0.170	0.377
28 Minute Man, MA	2		76684	150	817	1003	871	46	921743	7199	6859	1889	57	1072	267	0.053	0.140	0.000	0.001	0.030	0.567	0.079	0.433	0.762	3.631	18.807	0.024	0.531	0.141	0.001
28 Minute Man, MA	2		FS-16	748	711	2614	1866	33	777074	4865	19121	1753	10594	233087	215	0.045	0.003	0.000	0.003	6.043	132.965	0.427	0.406	0.003	10.908	22.002	0.019	1.491	0.123	0.300
28 Minute Man, MA	2		1175	73	732	872	2670	27	859273	4686	6612	1678	721	2562	423	0.281	0.028	0.000	0.001	0.430	1.527	0.044	0.436	0.286	3.940	3.553	0.016	0.520	0.252	0.003
28 Minute Man, MA	2		FS-22A	446	1008	2440	3213	20	974480	5019	9052	2046	14886	15259	861	0.976	0.029	0.001	0.003	7.276	7.458	0.218	0.493	0.066	4.424	1.025	0.010	1.193	0.421	0.016
28 Minute Man, MA	2		FS-2A	634	999	1661	4886	5	1010748	4343	7995	2077	5852	5103	504	1.147	0.124	0.000	0.002	2.818	2.457	0.305	0.481	0.196	3.849	0.872	0.002	0.800	0.243	0.005
28 Minute Man, MA	2		FS-28A	248	1024	993	5068	1	962276	5020	7020	2016	277	1621	132	0.171	0.153	0.000	0.001	0.137	0.804	0.123	0.508	0.632	3.482	5.852	0.000	0.493	0.065	0.002
28 Minute Man, MA	2		198	301	652	936	6556	-1	811329	3155	6756	1704	318	4042	235	0.079	0.074	0.000	0.001	0.187	2.372	0.177	0.383	0.161	3.965	12.711	-0.001	0.549	0.138	0.005
29 Moores Creek, NC	2		MOCR 1021	4401	36	1391627	6415	5180	11758	108	4962	848	1027	731	6931	1.405	6.021	0.589	118.356	1.211	0.862	5.190	0.042	0.049	5.851	0.712	6.108	1641.070	8.173	0.062
29 Moores Creek, NC	2		MOCR 1345	824	354	1024	3180	208	543754	2534	6530	1529	1023	602	320	1.699	1.369	0.001	0.002	0.669	0.394	0.539	0.232	0.588	4.271	0.588	0.136	0.670	0.209	0.001
29 Moores Creek, NC	2		MOCR 1280	841	157	1070	2829	102	382204	1865	3550	758	650	403	251	1.613	2.087	0.001	0.003	0.858	0.532	1.109	0.207	0.390	4.683	0.620	0.135	1.412	0.331	0.001
29 Moores Creek, NC	2		MOCR 1121	657	125	1448	1430	113	408510	2014	5455	893	191	1572	262	0.122	0.418	0.001	0.004	0.214	1.760	0.736	0.140	0.080	6.109	8.230	0.127	1.622	0.293	0.004
29 Moores Creek, NC	2		MOCR 156	797	300	877	1284	121	565367	4129	5802	1197	1188	1584	422	0.750	0.503	0.001	0.002	0.992	1.323	0.666	0.251	0.189	4.847	1.333	0.101	0.733	0.353	0.003
29 Moores Creek, NC	2		MOCR 1369	269	69	585	1957	47	274541	1330	4460	627	172	269	244	0.639	1.000	0.001	0.002	0.274	0.429	0.429	0.110	0.257	7.113	1.564	0.075	0.933	0.389	0.001
29 Moores Creek, NC	2		MOCR 1240	239	422	685	1316	83	649138	4188	5072	1366	55	608	406	0.090	0.393	0.001	0.001	0.040	0.445	0.175	0.309	0.694	3.713	11.055	0.061	0.501	0.297	0.001
29 Moores Creek, NC	2		MOCR 1290	335	318	1089	1235	78	601983	4269	5392	1299	89	550	245	0.162	0.609	0.000	0.002	0.069	0.423	0.258	0.245	0.578	4.151	6.180	0.060	0.838	0.189	0.001
29 Moores Creek, NC	2		MOCR 1335	292	88	1017	3283	60	364109	1550	5335	1039	170	471	224	0.361	0.620	0.001	0.003	0.164	0.453	0.281	0.085	0.187	5.135	2.771	0.058	0.979	0.216	0.001
29 Moores Creek, NC	2		MOCR 1384	896	173	787	1782	57	555972	3135	5126	1119	149	475	181	0.314	1.886	0.000	0.001	0.133	0.424	0.801	0.155	0.364	4.581	3.188	0.051	0.703	0.162	0.001
29 Moores Creek, NC	2		MOCR 1399	911	198	1076	1241	43	513295	3050	4757	978	406	358	341	1.134	2.545	0.001	0.002	0.415	0.366	0.931	0.202	0.553	4.864	0.882	0.044	1.100	0.349	0.001
29 Moores Creek, NC	2		MOCR 1237	943	675	1714	3339	68	854593	4462	6518	1715	83	1221	420	0.068	0.772	0.000	0.002	0.048	0.712	0.550	0.394	0.553	3.801	14.711	0.040	0.999	0.245	0.001
29 Moores Creek, NC	2		MOCR 1269	271	430	933	2085	56	717220	4912	5936	1611	101	585	353	0.173	0.463	0.000	0.001	0.063	0.363	0.168	0.267	0.735	3.685	5.792	0.035	0.579	0.219	0.001
29 Moores Creek, NC	2		MOCR 1268	154	17	672	101049	26	1734	88	8764	786	363	1420	854	0.256	0.108	0.493	0.388	0.462	1.807	0.196	0.022	0.012	11.150	3.912	0.033	0.855	1.087	0.819
29 Moores Creek, NC	2		MOCR 1347	604	444	2109	3578	57	772687	3891	7031	1753	7337	895	361	8.198	0.675	0.000	0.003	4.185	0.511	0.345	0.253	0.496	4.011	0.122	0.033	1.203	0.206	0.001
29 Moores Creek, NC	2		MOCR 1407	1308	292	1238	4687	43	645157	2899	6144	1535	365	2572	265	0.142	0.509	0.000	0.002	0.238	1.676	0.852	0.190	0.114	4.003	7.047	0.028	0.807	0.173	0.004
29 Moores Creek, NC	2		MOCR 1257	995	135	1536	4321	33	535074	1834	5959	1179	1224	2545	320	0.481	0.391	0.001	0.003	1.038	2.159	0.844	0.115	0.053	5.054	2.079	0.028	1.303	0.271	0.005

29 Moores Creek, NC	2		MOCR 1258	1392	34	1146	2131	23	377792	1878	3786	860	313	289	242	1.083	4.817	0.001	0.003	0.364	0.336	1.619	0.040	0.118	4.402	0.923	0.027	1.333	0.281	0.001
29 Moores Creek, NC	2		MOCR 1012	508	618	2809	5752	50	921464	4044	7010	1913	74	990	295	0.075	0.513	0.000	0.003	0.039	0.518	0.266	0.323	0.624	3.664	13.378	0.026	1.468	0.154	0.001
29 Moores Creek, NC	2		MOCR 1390	768	170	651	2096	26	492933	3101	4805	1171	99	366	198	0.270	2.098	0.000	0.001	0.085	0.313	0.656	0.145	0.464	4.103	3.697	0.022	0.556	0.169	0.001
29 Moores Creek, NC	2		MOCR 1260	221	513	2367	3114	38	797402	3740	7854	1759	22563	3046	312	7.407	0.073	0.000	0.003	12.827	1.732	0.126	0.292	0.168	4.465	0.135	0.022	1.346	0.177	0.004
29 Moores Creek, NC	2		MOCR 1244	784	683	1514	1898	30	875333	4842	6829	1726	896	4168	339	0.215	0.188	0.000	0.002	0.519	2.415	0.454	0.396	0.164	3.957	4.652	0.017	0.877	0.196	0.005
29 Moores Creek, NC	2		MOCR 1233	218	415	772	1430	23	637075	5041	5734	1336	3458	483	218	7.159	0.451	0.000	0.001	2.588	0.362	0.163	0.311	0.859	4.292	0.140	0.017	0.578	0.163	0.001
29 Moores Creek, NC	2		MOCR 1028	491	501	1555	3222	20	838819	4570	6576	1685	4053	2312	440	1.753	0.212	0.001	0.002	2.405	1.372	0.291	0.297	0.217	3.903	0.570	0.012	0.923	0.261	0.003
29 Moores Creek, NC	2		MOCR 1389	115	121	614	2043	10	413854	2340	3755	907	109	250	205	0.436	0.460	0.000	0.001	0.120	0.276	0.127	0.133	0.484	4.140	2.294	0.011	0.677	0.226	0.001
29 Moores Creek, NC	2		MOCR 1388	577	672	1785	2545	18	921507	4820	6984	1858	1059	998	157	1.061	0.578	0.000	0.002	0.570	0.537	0.311	0.362	0.673	3.759	0.942	0.010	0.961	0.084	0.001
29 Moores Creek, NC	2		MOCR 1238	445	707	1146	981	17	959280	6642	8208	1866	22106	2350	189	9.407	0.189	0.000	0.001	11.847	1.259	0.238	0.379	0.301	4.399	0.106	0.009	0.614	0.101	0.002
29 Moores Creek, NC	2		MOCR 1235	288	573	1583	2549	1	670570	4050	5634	1469	1414	659	333	2.146	0.437	0.000	0.002	0.963	0.449	0.196	0.390	0.869	3.835	0.466	0.001	1.078	0.227	0.001
29 Moores Creek, NC	2		MOCR 1230	301	871	1487	2453	1	1019971	6540	6941	1961	1622	4692	412	0.346	0.064	0.000	0.001	0.827	2.393	0.153	0.444	0.186	3.540	2.893	0.001	0.758	0.210	0.005
30 Mount Pleasant 9EF169 20	2	British Standard	mp75-5	121	891	1654	1281	1	901825	5753	7252	2027	6274	3658	306	1.715	0.033	0.000	0.002	3.095	1.805	0.060	0.440	0.244	3.578	0.583	0.000	0.816	0.151	0.004
30 Mount Pleasant 9EF169 20	2	British Standard	mp70-8	655	1046	2710	10880	257	1144491	2446	8928	3520	113	1609	966	0.070	0.407	0.001	0.002	0.032	0.457	0.186	0.297	0.650	2.536	14.239	0.073	0.770	0.274	0.001
30 Mount Pleasant 9EF169 20	2	Fusil	mp58-19	365	782	1935	4593	18	884024	4114	8156	2002	8292	1246	394	6.655	0.293	0.000	0.002	4.142	0.622	0.182	0.391	0.628	4.074	0.150	0.009	0.967	0.197	0.001
30 Mount Pleasant 9EF169 20	2	Fusil	mp78-12	612	748	1630	1850	88	913532	5302	11335	2061	6912	79178	260	0.087	0.008	0.000	0.002	3.354	38.417	0.297	0.363	0.009	5.500	11.455	0.043	0.791	0.126	0.087
30 Mount Pleasant 9EF169 20	2	Fusil	mp62-1	323	777	1710	1462	49	896513	5438	7274	1810	4372	7176	183	0.609	0.045	0.000	0.002	2.415	3.965	0.178	0.429	0.108	4.019	1.641	0.027	0.945	0.101	0.008
30 Mount Pleasant 9EF169 20	2	Fusil	mp92-5	297	625	2694	3571	99	845534	3105	8056	2699	4957	1808	386	2.742	0.164	0.000	0.003	1.837	0.670	0.110	0.232	0.346	2.985	0.365	0.037	0.998	0.143	0.002
30 Mount Pleasant 9EF169 20	2	Fusil	mp91-22	758	699	2109	10614	101	863267	1761	9517	2932	4425	17828	399	0.248	0.043	0.000	0.002	1.509	6.080	0.259	0.238	0.039	3.246	4.029	0.034	0.719	0.136	0.021
30 Mount Pleasant 9EF169 20	2	Fusil	mp93-41	873	627	2193	5855	21	780253	2574	8659	2324	3132	1160	528	2.700	0.753	0.001	0.003	1.348	0.499	0.376	0.270	0.541	3.726	0.370	0.009	0.944	0.227	0.001
30 Mount Pleasant 9EF169 20	2	Fusil	mp92-4	100	926	1778	949	116	1003214	6112	7172	2284	2709	1552	431	1.745	0.064	0.000	0.002	1.186	0.680	0.044	0.405	0.597	3.140	0.573	0.051	0.778	0.189	0.002
30 Mount Pleasant 9EF169 20	2	Fusil	mp91-14	497	1075	2405	7189	10	1044598	2685	9203	3338	3715	2831	361	1.312	0.176	0.000	0.002	1.113	0.848	0.149	0.322	0.380	2.757	0.762	0.003	0.720	0.108	0.003
30 Mount Pleasant 9EF169 20	2	Fusil	mp73-1	628	1030	2144	5116	125	1086136	4653	9863	2941	3049	34976	423	0.087	0.018	0.000	0.002	1.037	11.893	0.214	0.350	0.029	3.354	11.471	0.043	0.729	0.144	0.032
30 Mount Pleasant 9EF169 20	2	Fusil	mp92-3	314	643	1808	1591	1	830468	5138	7731	1623	1506	24952	341	0.060	0.013	0.000	0.002	0.928	15.374	0.193	0.396	0.026	4.763	16.568	0.001	1.114	0.210	0.030
30 Mount Pleasant 9EF169 20	2	Fusil	mp64-17	283	988	1877	2831	129	1079627	5191	9012	2920	2495	28264	302	0.088	0.010	0.000	0.002	0.854	9.679	0.097	0.338	0.035	3.086	11.328	0.044	0.643	0.103	0.026
30 Mount Pleasant 9EF169 20	2	Fusil	mp58-20	341	990	1850	3224	44	1007280	4465	9110	2900	2328	20038	414	0.116	0.017	0.000	0.002	0.803	6.910	0.118	0.341	0.049	3.141	8.607	0.015	0.638	0.143	0.020
30 Mount Pleasant 9EF169 20	2	Fusil	mp62-14	349	497	1711	6643	38	793476	2085	10694	2717	1999	18467	390	0.108	0.019	0.000	0.002	0.736	6.797	0.128	0.183	0.027	3.936	9.238	0.014	0.630	0.144	0.023
30 Mount Pleasant 9EF169 20	2	Fusil	mp93-26	366	1072	2527	5217	163	1147148	2951	8777	3265	2231	13163	499	0.169	0.028	0.000	0.002	0.683	4.032	0.112	0.328	0.081	2.688	5.900	0.050	0.774	0.153	0.011
30 Mount Pleasant 9EF169 20	2	Fusil	mp93-29	852	613	3165	5242	186	858788	2952	7716	2296	797	1163	246	0.685	0.733	0.000	0.004	0.347	0.507	0.371	0.267	0.527	3.361	1.459	0.081	1.378	0.107	0.001
30 Mount Pleasant 9EF169 20	2	Fusil	mp90-1	268	603	1549	6821	1	800529	2040	7188	1755	327	4498	456	0.073	0.060	0.001	0.002	0.186	2.563	0.153	0.344	0.134	4.096	13.755	0.001	0.883	0.260	0.006
30 Mount Pleasant 9EF169 20	2	Fusil	mp64-4	108	973	1740	1744	137	1016230	6164	7452	2070	314	7672	371	0.041	0.014	0.000	0.002	0.152	3.706	0.052	0.470	0.127	3.600	24.433	0.066	0.841	0.179	0.008
30 Mount Pleasant 9EF169 20	2	Fusil	mp70-13	1218	457	1620	7557	84	494720	1742	10976	2002	278	1421	589	0.196	0.857	0.001	0.003	0.139	0.710	0.608	0.228	0.322	5.483	5.112	0.042	0.809	0.294	0.003
30 Mount Pleasant 9EF169 20	2	Fusil	mp93-10	735	745	1507	8925	37	865846	2530	8646	2442	241	1267	190	0.190	0.580	0.000	0.002	0.099	0.519	0.301	0.305	0.588	3.541	5.257	0.015	0.617	0.078	0.001
30 Mount Pleasant 9EF169 20	2	Fusil	mp91-5	42	891	1702	1443	3	994611	6278	7069	2031	72	1271	511	0.057	0.033	0.001	0.002	0.035	0.626	0.021	0.439	0.701	3.481	17.653	0.001	0.838	0.252	0.001
30 Mount Pleasant 9EF169 20	2	Rifle	mp74-10	197	873	2016	4787	45	905832	3415	7503	1968	7324	1205	356	6.078	0.163	0.000	0.002	3.722	0.612	0.100	0.444	0.724	3.813	0.165	0.023	1.024	0.181	0.001
30 Mount Pleasant 9EF169 20	2	Rifle	mp72-17	336	1048	1813	1752	166	1053324	7420	6906	2270	4549	1243	360	3.660	0.270	0.000	0.002	2.004	0.548	0.148	0.462	0.843	3.042	0.273	0.073	0.799	0.159	0.001
30 Mount Pleasant 9EF169 20	2	Rifle	mp72-4	122	966	1933	1147	45	1032716	8102	6733	1986	120	1080	431	0.111	0.113	0.000	0.002	0.060	0.544	0.061	0.486	0.894	3.390	9.000	0.023	0.973	0.217	0.001
30 Mount Pleasant 9EF169 20	2	Sprue, gang mold	mp60-15	421	851	2293	3462	1	888758	3419	7688	2788	6580	2260	462	2.912	0.186	0.001	0.003	2.360	0.811	0.151	0.305	0.377	2.758	0.343	0.000	0.822	0.166	0.003
30 Mount Pleasant 9EF169 20	2	Wall gun	mp93-1	983	557	1861	8487	103	798604	2020	11122	3235	180	2775	376	0.065	0.354	0.000	0.002	0.056	0.858	0.304	0.172	0.201	3.438	15.417	0.032	0.575	0.116	0.003
31 Mount Pleasant 9EF169 Bla	3	Charleville	MP44-52.5	216	582	921	518	242	181046	1126	222	43	2018	14385	8	0.140	0.015	0.000	0.005	46.930	334.535	5.023	13.535	0.040	5.163	7.128	5.628	21.419	0.186	0.079
31 Mount Pleasant 9EF169 Bla	3	Fusil	MP52-18	144	525	728	533	246	175296	1032	227	62	4544	614	30	7.401	0.235	0.000	0.004	73.290	9.903	2.323	8.468	0.855	3.661	0.135	3.968	11.742	0.484	0.004
31 Mount Pleasant 9EF169 Bla	3	Fusil	MP44-11	126	594	648	622	238	179562	973	253	69	4206	2214	18	1.900	0.057	0.000	0.004	60.957	32.087	1.826	8.609	0.268	3.667	0.526	3.449	9.391	0.261	0.012
31 Mount Pleasant 9EF169 Bla	3	Fusil	MP52-23	258	699	745	595	311	188688	1102	263	52	1901	12453	70	0.153	0.021	0.000	0.004	36.558	239.481	4.962	13.442	0.056	5.058	6.551	5.981	14.327	1.346	0.066
31 Mount Pleasant 9EF169 Bla	3	Fusil	MP44-10	332	474	752	559	291	159997	921	157	89	1797	21004	50	0.086	0.016	0.000	0.005	20.191	236.000	3.730	5.326	0.023	1.764	11.688	3.270	8.449	0.562	0.131
31 Mount Pleasant 9EF169 Bla	3	Fusil	MP48-11	211	393	685	516	219	160239	990	154	8	60	634	7	0.095	0.333	0.000	0.004	7.500	79.250	26.375	49.125	0.620	19.250	10.567	27.375	85.625	0.875	0.004
31 Mount Pleasant 9EF169 Bla	3	Fusil	MP44-12	154	510	567	541	227	168991	1052	202	69	34	627	11	0.054	0.246	0.000	0.003	0.493	9.087	2.232	7.391	0.813	2.928	18.441	3.290	8.217	0.159	0.004
31 Mount Pleasant 9EF169 Bla	3	Rifle	MP48-14	162	562	689	634	249	176679	888	230	60	3128	753	67	4.154	0.215	0.000	0.004	52.133	12.550	2.700	9.367	0.746	3.833	0.241	4.150	11.483	1.117	0.004
31 Mount Pleasant 9EF169 Bla	3	Rifle	MP44-20	198	470	613	730	267	159857	762	149	44	1481	17722	54	0.084	0.011	0.000	0.004	33.659	402.773	4.500	10.682	0.027	3.386	11.966	6.068	13.932	1.227	0.111
31 Mount Pleasant 9EF169 Bla	3	Rifle	MP48-26	199	408	522	655	260	137389	620	136	59	321	878	51	0.366	0.227	0.000	0.004	5.441	14.881	3.373	6.915	0.465	2.305	2.735	4.407	8.847	0.864	0.006
31 Mount Pleasant 9EF169 Bla	3		MP52-12	206	654	725	796	332	179634	946	168	35	1586	17670	27	0.090	0.012	0.000	0.004	45.314	504.857	5.886	18.686	0.037	4.800	11.141	9.486	20.714	0.771	0.098
31 Mount Pleasant 9EF169 Bla	3		MP48-18	166	541	719	830	261	172319	951	197	56	3934	700	10	5.620	0.237	0.000	0.004	70.250	12.500	2.964	9.661	0.773	3.518	0.178	4.661	12.839	0.179	0.004
31 Mount Pleasant 9EF169 Bla	3		MP44-18	142	545	632	696	195	169808	766	246	70	3617	2452	105	1.475	0.058	0.001	0.004	51.671	35.029	2.029	7.786	0.222	3.514	0.678	2.786	9.029	1.500	0.014
32 Ninety Six	2		NISI 2576	356	343	759	5433	360	551559	3707	5721	1267	1643	457	299	3.595	0.779	0.001	0.001	1.297	0.361	0.281	0.271	0.751	4.515	0.278	0.284	0.599	0.236	0.001
32 Ninety Six	2		NISI 1580a	596	480	1000	1995	320	733720	6076	5836	1503	646	737	325	0.877	0.809	0.000	0.001	0.430	0.490	0.397	0.319	0.651	3.883	1.141	0.213	0.665	0.216	0.001
32 Ninety Six	2		NISI 1580	675	597	926	1632	234	762614	6027	6105	1482	877	717	222	1.223	0.941	0.000	0.001	0.592	0.484	0.455	0.403	0.833	4.119	0.818	0.158	0.625	0.150	0.001
32 Ninety Six	2		NISI 703	78	316	1121	2519	197	650409	3885	5942	1386	8776	585	380	15.002	0.133	0.001	0.002	6.332	0.422	0.056	0.228	0.540	4.287	0.067	0.142	0.809	0.274	0.001
32 Ninety Six	2		NISI 1579A	462	333	1105	1028	163	656777	5602	5603	1358	651	584	288	1.115	0.791	0.000	0.002	0.479	0.430	0.340	0.245	0.570	4.126	0.897	0.120	0.814	0.212	0.001
32 Ninety Six	2		NISI 7	358	686	895	6208	169	891356	5282	6519	1653	181	988	314	0.183	0.362	0.000	0.001	0.109	0.598	0.217	0.415	0.694	3.944	5.459	0.102	0.541	0.190	0.001
32 Ninety Six	2		NISI 1562	358	222	788	761	127	542402	4476	5254	1245	46	454	254	0.101	0.789	0.000	0.001	0.037	0.365	0.288	0.178	0.489	4.220	9.870	0.102	0.633	0.204	0.001
32 Ninety Six	2		NISI 1580b	663	553	792	1414	156	773821	6343	5940	1590	115	707	440	0.163	0.938	0.001	0.001	0.072	0.445	0.417	0.348	0.782	3.736	6.148	0.098	0.498	0.277	0.001
32 Ninety Six	2		NISI 3	346	171	829	10197	109	489493	2782	5529	1137	734	416	229	1.764	0.832	0.000	0.002	0.646	0.366	0.304	0.150	0.411	4.863	0.567	0.096	0.729	0.201	0.001
32 Ninety Six	2		NISI 1272	363	625	1500	2555	199	945967	6013	12254	2102	77115	11083	429	6.958	0.033	0.000	0.002	36.686	5.273	0.173	0.297	0.056	5.830	0.144	0.095	0.714	0.204	0.012
32 Ninety Six	2		NISI 871	406	604	722	1643	151	787631	4194	6576	1677	850	680	858	1.250	0.597	0.001	0.001	0.507	0.405	0.242	0.360	0.888	3.921	0.800	0.090	0.431	0.512	0.001
32 Ninety Six	2		NISI 746	175	291	809	9161	110	615601	4128	5907	1289	1227	550	403	2.231	0.318	0.001	0.001	0.952	0.427	0.136	0.226	0.529	4.583	0.448	0.085	0.628	0.313	0.001
32 Ninety Six	2		NISI 50	234	295	858	1983	96	558016	3293	5540	1320	135	534	292	0.253	0.438	0.001	0.002	0.102	0.405	0.177	0.223	0.552	4.197	3.956	0.073	0.650	0.221	0.001
32 Ninety Six	2		NISI 175	267	567	1353	9780	117	726349	2576	6674	1667	1990	816	309	2.439	0.327	0.000	0.002	1.194	0.490	0.160	0.340	0.695	4.004	0.410	0.070	0.812	0.185	0.001
32 Ninety Six	2		NISI 1548	642	363	850	637	83	663473	5743	5514	1372	133	674	254	0.197	0.953	0.000	0.001	0.097	0.491	0.468	0.265	0.539	4.019	5.068	0.060	0.620	0.185	0.001
32 Ninety Six	2		NISI 6	519	546	1370	27971	99	845990	2561	7293	1813	3688	900	648	4.098	0.577	0.001	0.002	2.034	0.496	0.286	0.301	0.607	4.023	0.244	0.055	0.756	0.357	0.001
32 Ninety Six	2		NISI 183	321	192	789	3573	63	486166	2785	5642	1232	828	1977	519	0.419	0.162	0.001	0.002	0.672	1.605	0.261	0.156	0.097	4.580	2.388	0.051	0.640	0.421	0.004
32 Ninety Six	2		NISI 1939	198	352	903	1544	78	685530	5019	5783	1532	202	469	133	0.431	0.422	0.000	0.001	0.132	0.306	0.129	0.230	0.751	3.775	2.322	0.051	0.589	0.087	0.001
32 Ninety Six	2		NISI 1579B	244	251	859	972	61	542118	4691	5340	1235	66	439	221	0.150	0.556	0.000	0.002	0.053	0.355	0.198	0.203	0.572	4.324	6.652	0.049	0.696	0.179	0.001
32 Ninety Six	2		NISI 1723	353	683	943	3335	82	923175	6073	6863	1939	58	844	667	0.069	0.418	0.001	0.001	0.030	0.435	0.182	0.352	0.809	3.539	14.552	0.042	0.486	0.344	0.001
32 Ninety Six	2		NISI 25	331	398	921	11838	60	724055	4110	6015	1597	711	1044	440	0.681	0.317	0.001	0.001	0.445	0.654	0.207	0.249	0.381	3.766	1.468	0.038	0.577	0.276	0.001
32 Ninety Six	2		NISI 177	305	449	858	6724	46	651189	4238	6055	1248	523	2000	423	0.262	0.153	0.001	0.001	0.419	1.603	0.244	0.360	0.225	4.852	3.824	0.037	0.688	0.339	0.003
32 Ninety Six	2		NISI 174	165	801	908	6991	66	959990	6280	7117	1948	2168	1995	254	1.087	0.083	0.000	0.001	1.113	1.024	0.085	0.411	0.402	3.653	0.920	0.034	0.466	0.130	0.002
32 Ninety Six	2		NISI 120	333	800	977	12022	62	950695	5105	7021	1841	39	899	305	0.043	0.370	0.000	0.001	0.021	0.488	0.181	0.435	0.890	3.814	23.051	0.034	0.531	0.166	0.001
32 Ninety Six	2		NISI 176	245	386	789	6400	43	701839	4843	6086	1523	1850	706	305	2.620	0.347	0.000	0.001	1.215	0.464	0.161	0.253	0.547	3.996	0.382	0.028	0.518	0.200	0.001
32 Ninety Six	2		NISI 872	292	884	938	7971	56	930528	2085	8127	2023	5395	2185	310	2.469	0.134	0.000	0.001	2.667	1.080	0.144	0.437	0.405	4.017	0.405	0.028	0.464	0.153	0.002
32 Ninety Six	2		NISI 26	1042	763	891	18302	39	960566	4599	7331	2060	291	925	283	0.315	1.126	0.000	0.001	0.141	0.449	0.506	0.370	0.825	3.559	3.179	0.019	0.433	0.137	0.001
32 Ninety Six	2		NISI 198	354	453	781	11377	1	769267	2425	6411	1634	50	814	670	0.061	0.435	0.001	0.001	0.031	0.498	0.217	0.277	0.557	3.924	16.280	0.001	0.478	0.410	0.001
32 Ninety Six	2		NISI 31	478	630	999	3907	0	925308	5786	6905	1811	143	811	778	0.176	0.589	0.001	0.001	0.079	0.448	0.264	0.348	0.777	3.813	5.671	0.000	0.552	0.430	0.001
33 Purysburg 38JA158	2	British Standard	pb286	1	3336	6092	3118	225	19926	4553	124523	4531	19734	2129649	592	0.009	0.000	0.030	0.306	2.104	470.017	0.000	0.736	0.002	27.482	107.918	0.050	1.345	0.131	106.878
33 Purysburg 38JA158	2	British Standard	pb232	751	923	1663	698	41	1023753	7351	7038	2213	736	1333	249	0.552	0.563	0.000	0.002	2.104	0.602	0.339	0.417	0.692	3.180	1.811	0.019	0.751	0.113	0.001
33 Purysburg 38JA158	2	Charleville	pb80	594	1004	2014	760	222	1074433	8421	7229	2181	852	1237	499	0.689	0.480	0.000	0.002	2.104	0.567	0.272	0.460	0.812	3.315	1.452	0.102	0.923	0.229	0.001
33 Purysburg 38JA158	2	Charleville	pb67	836	659	1691	562	80	914393	7038	6477	1746	71	1126	358	0.063	0.742	0.000	0.002	2.104	0.645	0.479	0.377	0.585	3.710	15.859	0.046	0.968	0.205	0.001
33 Purysburg 38JA158	2	Charleville	pb145	620	1118	1701	947	0	1073862	8010	7050	2215	164	1329	358	0.123	0.467	0.000	0.002	2.104	0.600	0.280	0.505	0.841	3.183	8.104	0.000	0.768	0.162	0.001
33 Purysburg 38JA158	2	Charleville	pb153	433	1117	2091	2321	106	1080523	7237	7738	2639	1377	1222	318	1.127	0.354	0.000	0.002	2.104	0.463	0.164	0.423	0.914	2.932	0.887	0.040	0.792	0.121	0.001
33 Purysburg 38JA158	2	Charleville	pb409	430	1199	1896	782	60	1179477	8519	7543	2268	72	1541	267	0.047	0.279	0.000	0.002	2.104	0.679	0.190	0.529	0.778	3.326	21.403	0.026	0.836	0.118	0.001
33 Purysburg 38JA158	2	Charleville	pb49	224	1077	1529	622	1	1071334	8056	7149	2096	1305	1343	216	0.972	0.167	0.000	0.001	2.104	0.641	0.107	0.514	0.802	3.411	1.029	0.000	0.729	0.103	0.001
33 Purysburg 38JA158	2	Charleville	pb137	343	1044	1483	945	8	1064915	7479	7165	2532	845	1243	251	0.680	0.276	0.000	0.001	2.104	0.491	0.135	0.412	0.840	2.830	1.471	0.003	0.586	0.099	0.001
33 Purysburg 38JA158	2	Charleville	pb198	219	1301	1760	782	130	1263022	7741	7859	4408	543	1732	394	0.314	0.126	0.000	0.001	2.104	0.393	0.050	0.295	1.751	1.783	3.190	0.029	0.399	0.089	0.001
33 Purysburg 38JA158	2	Charleville	pb344	1	1255	1700	706	1	1187393	8232	7875	3533	5312	1464	294	3.628	0.001	0.000	0.001	2.104	0.414	0.000	0.355	0.857	2.229	0.276	0.000	0.481	0.083	0.001
33 Purysburg 38JA158	2	Charleville	pb148	1164	991	1736	1026	1	1024506	7679	6871	2135	419	1254	148	0.334	0.928	0.000	0.002	2.104	0.587	0.545	0.464	0.790	3.218	2.993	0.000	0.813	0.069	0.001
33 Purysburg 38JA158	2	Charleville	pb242	392	1406	1619	735	77	1175294	7588	7762	2986	29	1558	192	0.019	0.252	0.000	0.001	2.104	0.522	0.131	0.471	0.902	2.599	53.724	0.026	0.542	0.064	0.001
33 Purysburg 38JA158	2	Charleville	pb60	1215	1002	1617	836	12	1071772	7945	7230	2281	572	2564	129	0.223	0.474	0.000	0.002	2.104	1.124	0.533	0.439	0.391	3.170	4.483	0.005	0.709	0.057	0.002
33 Purysburg 38JA158	2	Fusil	pb309	407	1495	2255	1082	208	1284887	8072	9670	4428	31947	1864	504	17.139	0.218	0.000	0.002	7.215	0.421	0.092	0.338	0.802	2.184	0.058	0.047	0.509	0.114	0.001
33 Purysburg 38JA158	2	Fusil	pb385	149	970	1766	1005	147	1044954	7990	7948	2197	15562	1387	258	11.220	0.107	0.000	0.002	7.083	0.631	0.068	0.442	0.699	3.618	0.089	0.067	0.804	0.117	0.001

33 Purysburg 38JA158	2	Fusil	pb430	395	1314	2218	861	61	1201653	8047	8396	2430	13543	1741	386	7.779	0.227	0.000	0.002	5.573	0.716	0.163	0.541	0.755	3.455	0.129	0.025	0.913	0.159	0.001
33 Purysburg 38JA158	2	Fusil	pb398	274	953	1853	1354	68	983485	7398	8416	1934	10344	17609	382	0.587	0.016	0.000	0.002	5.349	9.105	0.142	0.493	0.054	4.352	1.702	0.035	0.958	0.198	0.018
33 Purysburg 38JA158	2	Fusil	pb420	45	930	1746	964	67	987416	7198	7753	2043	10841	1359	291	7.977	0.033	0.000	0.002	5.306	0.665	0.022	0.455	0.684	3.795	0.125	0.033	0.855	0.142	0.001
33 Purysburg 38JA158	2	Fusil	pb13	592	1206	2207	2135	77	1163412	7031	8796	3228	13022	3971	341	3.279	0.149	0.000	0.002	4.034	1.230	0.183	0.374	0.304	2.725	0.305	0.024	0.684	0.106	0.003
33 Purysburg 38JA158	2	Fusil	pb440	326	873	1657	1079	73	1008024	7095	7357	1938	6112	4667	211	1.310	0.070	0.000	0.002	3.154	2.408	0.168	0.450	0.187	3.796	0.764	0.038	0.855	0.109	0.005
33 Purysburg 38JA158	2	Fusil	pb179	1115	1226	2389	2775	122	1174089	6918	15083	3710	11194	125647	446	0.089	0.009	0.000	0.002	3.017	33.867	0.301	0.330	0.010	4.065	11.224	0.033	0.644	0.120	0.107
33 Purysburg 38JA158	2	Fusil	pb136	830	1381	2059	2667	59	1247886	7697	8549	3494	9722	1615	259	6.020	0.514	0.000	0.002	2.782	0.462	0.238	0.395	0.855	2.447	0.166	0.017	0.589	0.074	0.001
33 Purysburg 38JA158	2	Fusil	pb194	1238	1453	2726	2678	2	1278861	7064	10375	4987	13861	23255	268	0.596	0.053	0.000	0.002	2.779	4.663	0.248	0.291	0.062	2.080	1.678	0.000	0.547	0.054	0.018
33 Purysburg 38JA158	2	Fusil	pb347	349	1620	2180	1249	57	1406020	8884	9412	5436	13751	1790	234	7.682	0.195	0.000	0.002	2.530	0.329	0.064	0.298	0.905	1.731	0.130	0.010	0.401	0.043	0.001
33 Purysburg 38JA158	2	Fusil	pb379	740	1303	2137	9628	1	1087795	5419	12402	3216	7551	78763	388	0.096	0.009	0.000	0.002	2.348	24.491	0.230	0.405	0.017	3.856	10.431	0.000	0.664	0.121	0.072
33 Purysburg 38JA158	2	Fusil	pb312	1	2263	4803	3547	251	278285	4163	100643	6195	13934	1719701	769	0.008	0.000	0.003	0.017	2.249	277.595	0.000	0.365	0.001	16.246	123.418	0.041	0.775	0.124	6.180
33 Purysburg 38JA158	2	Fusil	pb108	506	851	6765	1326	18	939090	6716	7057	2187	4175	3136	356	1.331	0.161	0.000	0.007	1.909	1.434	0.231	0.389	0.271	3.227	0.751	0.008	3.093	0.163	0.003
33 Purysburg 38JA158	2	Fusil	pb308	410	2064	2018	1174	186	1486498	9139	9042	5379	8206	1948	402	4.213	0.210	0.000	0.001	1.526	0.362	0.076	0.384	1.060	1.681	0.237	0.035	0.375	0.075	0.001
33 Purysburg 38JA158	2	Fusil	pb443	212	921	1736	879	74	1045253	7486	7085	1897	2627	1360	334	1.932	0.156	0.000	0.002	1.385	0.717	0.112	0.486	0.677	3.735	0.518	0.039	0.915	0.176	0.001
33 Purysburg 38JA158	2	Fusil	pb134	1333	1116	1982	2092	47	1121183	6760	7726	3131	3546	1371	205	2.586	0.972	0.000	0.002	1.133	0.438	0.426	0.356	0.814	2.468	0.387	0.015	0.633	0.065	0.001
33 Purysburg 38JA158	2	Fusil	pb370	649	1023	1975	608	40	1067044	7099	7530	2834	2550	1365	425	1.868	0.475	0.000	0.002	0.900	0.482	0.229	0.361	0.749	2.657	0.535	0.014	0.697	0.150	0.001
33 Purysburg 38JA158	2	Fusil	pb404	342	1172	1833	983	32	1117699	8131	7808	2244	1824	1440	211	1.267	0.238	0.000	0.002	0.813	0.642	0.152	0.522	0.814	3.480	0.789	0.014	0.817	0.094	0.001
33 Purysburg 38JA158	2	Fusil	pb37	264	1510	2105	1128	175	1241228	7778	8198	3296	1870	6303	468	0.297	0.042	0.000	0.002	0.567	1.912	0.080	0.458	0.240	2.487	3.371	0.053	0.639	0.142	0.005
33 Purysburg 38JA158	2	Fusil	pb367	337	1151	1705	2001	73	1114543	6736	7679	2952	1532	1487	457	1.030	0.227	0.000	0.002	0.519	0.504	0.114	0.390	0.774	2.601	0.971	0.025	0.578	0.155	0.001
33 Purysburg 38JA158	2	Fusil	pb343	243	800	1886	841	165	951854	7445	7075	1973	801	954	435	0.840	0.255	0.000	0.002	0.406	0.484	0.123	0.405	0.839	3.586	1.191	0.084	0.956	0.220	0.001
33 Purysburg 38JA158	2	Fusil	pb298	173	1101	1865	957	123	1148370	7331	7782	3129	1092	3482	482	0.314	0.050	0.000	0.002	0.349	1.113	0.055	0.352	0.316	2.487	3.189	0.039	0.596	0.154	0.003
33 Purysburg 38JA158	2	Fusil	pb132	338	908	1803	980	39	996063	7434	6843	2051	671	1137	349	0.590	0.297	0.000	0.002	0.327	0.554	0.165	0.443	0.799	3.336	1.694	0.019	0.879	0.170	0.001
33 Purysburg 38JA158	2	Fusil	pb146	1018	949	1827	1135	61	1095028	6475	7994	3190	923	13368	397	0.069	0.076	0.000	0.002	0.289	4.191	0.319	0.297	0.071	2.506	14.483	0.019	0.573	0.124	0.012
33 Purysburg 38JA158	2	Fusil	pb221	405	744	1554	819	128	992119	7757	6658	2222	438	1031	303	0.425	0.393	0.000	0.002	0.197	0.464	0.182	0.335	0.722	2.996	2.354	0.058	0.699	0.136	0.001
33 Purysburg 38JA158	2	Fusil	pb46	151	1100	1858	671	91	1099529	6869	7732	3085	507	1350	513	0.376	0.112	0.000	0.002	0.164	0.438	0.049	0.357	0.815	2.506	2.663	0.029	0.602	0.166	0.001
33 Purysburg 38JA158	2	Fusil	pb376	1061	814	1528	883	65	1062405	7511	7266	2504	311	1256	273	0.248	0.845	0.000	0.001	0.124	0.502	0.424	0.325	0.648	2.902	4.039	0.026	0.610	0.109	0.001
33 Purysburg 38JA158	2	Fusil	pb401	202	1321	2077	1014	166	1189410	8566	7536	2238	261	1560	339	0.167	0.129	0.000	0.002	0.117	0.697	0.090	0.590	0.847	3.367	5.977	0.074	0.928	0.151	0.001
33 Purysburg 38JA158	2	Fusil	pb88	796	1000	1775	1448	23	1063225	8023	6830	2277	257	1301	296	0.198	0.612	0.000	0.002	0.113	0.571	0.350	0.439	0.769	3.000	5.062	0.010	0.780	0.130	0.001
33 Purysburg 38JA158	2	Fusil	pb303	1431	1698	1961	2055	59	1398437	8251	8322	5148	547	1786	337	0.306	0.801	0.000	0.001	0.106	0.347	0.278	0.330	0.951	1.617	3.265	0.011	0.381	0.065	0.001
33 Purysburg 38JA158	2	Fusil	pb331	450	1058	1965	810	243	1038933	7622	7190	2444	171	1339	324	0.128	0.336	0.000	0.002	0.070	0.548	0.184	0.433	0.790	2.942	7.830	0.099	0.804	0.133	0.001
33 Purysburg 38JA158	2	Fusil	pb18	222	1022	1637	869	192	1074636	7963	7220	2120	128	1294	213	0.099	0.172	0.000	0.002	0.060	0.610	0.105	0.482	0.790	3.406	10.109	0.091	0.772	0.100	0.001
33 Black Swamp, SC	2	Fusil	pb207	161	1239	2303	890	115	1138497	8088	8705	2438	136	19921	195	0.007	0.008	0.000	0.002	0.056	8.171	0.066	0.508	0.062	3.571	146.478	0.047	0.945	0.080	0.017
33 Purysburg 38JA158	2	Fusil	pb268	340	1302	1718	1408	46	1235529	7885	7766	3012	137	1851	231	0.074	0.184	0.000	0.001	0.045	0.615	0.113	0.432	0.703	2.578	13.511	0.015	0.570	0.077	0.001
33 Purysburg 38JA158	2	Fusil	pb89	1058	1263	1797	705	50	1121883	8017	7231	2717	116	1629	350	0.071	0.649	0.000	0.002	0.043	0.600	0.389	0.465	0.775	2.661	14.043	0.018	0.661	0.129	0.001
33 Purysburg 38JA158	2	Fusil	pb102	944	1144	1964	1895	88	1115148	8092	7083	2565	105	1284	290	0.082	0.735	0.000	0.002	0.041	0.501	0.368	0.446	0.891	2.761	12.229	0.034	0.766	0.113	0.001
33 Purysburg 38JA158	2	Fusil	pb419	1130	946	1819	671	141	1022381	7332	6778	2050	81	1318	225	0.061	0.857	0.000	0.002	0.040	0.643	0.551	0.461	0.718	3.306	16.272	0.069	0.887	0.110	0.001
33 Purysburg 38JA158	2	Fusil	pb209	59	1182	1775	740	97	1138762	7994	7330	2781	88	1663	246	0.053	0.035	0.000	0.002	0.032	0.598	0.021	0.425	0.711	2.636	18.898	0.035	0.638	0.088	0.001
33 Purysburg 38JA158	2	Fusil	pb104	426	1360	1722	1014	5	1213718	7855	7788	3487	91	1685	327	0.054	0.253	0.000	0.001	0.026	0.483	0.122	0.390	0.807	2.233	18.516	0.001	0.494	0.094	0.001
33 Purysburg 38JA158	2	Fusil	pb152	496	800	1581	2691	45	958555	4757	7521	3085	80	1155	389	0.069	0.429	0.000	0.002	0.026	0.374	0.161	0.259	0.693	2.438	14.438	0.015	0.512	0.126	0.001
33 Purysburg 38JA158	2	Rifle	pb35	853	262	2090	1124	75	525244	3511	11149	1338	6385	103099	295	0.062	0.008	0.001	0.004	4.772	77.055	0.638	0.196	0.003	8.333	16.147	0.056	1.562	0.220	0.196
33 Purysburg 38JA158	2	Rifle	pb300	468	536	2130	2592	1	740315	5666	9671	1615	6603	63846	254	0.103	0.007	0.000	0.003	4.089	39.533	0.290	0.332	0.008	5.988	9.669	0.001	1.319	0.157	0.086
33 Purysburg 38JA158	2	Rifle	pb362	699	845	2055	4893	1	998811	6143	13173	2293	7136	109860	526	0.065	0.006	0.001	0.002	3.112	47.911	0.305	0.369	0.008	5.745	15.395	0.000	0.896	0.229	0.110
33 Purysburg 38JA158	2	Rifle	pb97	499	191	1730	1234	0	538926	4160	6822	1205	3544	26082	200	0.136	0.019	0.000	0.003	2.941	21.645	0.414	0.159	0.007	5.661	7.359	0.000	1.436	0.166	0.048
33 Purysburg 38JA158	2	Rifle	pb229	1017	939	2529	1772	97	1059581	6370	11310	3271	8707	64582	351	0.135	0.016	0.000	0.002	2.662	19.744	0.311	0.287	0.015	3.458	7.417	0.030	0.773	0.107	0.061
33 Purysburg 38JA158	2	Rifle	pb195	3673	1083	6945	1313	81	1147181	5065	22227	5109	12958	242971	546	0.053	0.015	0.000	0.006	2.536	47.557	0.719	0.212	0.004	4.351	18.751	0.016	1.359	0.107	0.212
33 Purysburg 38JA158	2	Rifle	pb244	355	758	1751	1046	58	935647	7116	8646	1927	4700	33311	245	0.141	0.011	0.000	0.002	2.439	17.286	0.184	0.393	0.023	4.487	7.087	0.030	0.909	0.127	0.036
33 Purysburg 38JA158	2	Rifle	pb332	784	1219	2189	2856	100	1148582	6597	9565	4028	9806	27758	469	0.353	0.028	0.000	0.002	2.434	6.891	0.195	0.303	0.044	2.375	2.831	0.025	0.543	0.116	0.024
33 Purysburg 38JA158	2	Rifle	pb350	916	1966	2777	3958	158	1446575	8480	11055	5370	12898	32864	365	0.392	0.028	0.000	0.002	2.402	6.120	0.171	0.366	0.060	2.059	2.548	0.029	0.517	0.068	0.023
33 Purysburg 38JA158	2	Rifle	pb200	262	407	1362	1357	135	656981	4575	6427	1706	4029	678	370	5.942	0.386	0.001	0.002	2.362	0.397	0.154	0.239	0.600	3.767	0.168	0.079	0.798	0.217	0.001
33 Purysburg 38JA158	2	Rifle	pb399	513	1050	2543	1362	19	1018699	6941	9125	2298	5404	28502	280	0.190	0.018	0.000	0.002	2.352	12.403	0.223	0.457	0.037	3.971	5.274	0.008	1.107	0.122	0.028
33 Purysburg 38JA158	2	Rifle	pb397	711	630	1758	1399	53	816935	6110	6968	1737	3942	9338	387	0.422	0.076	0.000	0.002	2.269	5.376	0.409	0.363	0.067	4.012	2.369	0.031	1.012	0.223	0.011
33 Purysburg 38JA158	2	Rifle	pb149	786	957	2442	783	153	1031232	7183	7884	2376	5270	16813	411	0.313	0.047	0.000	0.002	2.218	7.076	0.331	0.403	0.057	3.318	3.190	0.064	1.028	0.173	0.016
33 Purysburg 38JA158	2	Rifle	pb11	188	359	1639	863	269	715172	6144	6469	1564	3290	5701	379	0.577	0.033	0.001	0.002	2.104	3.645	0.120	0.230	0.063	4.136	1.733	0.172	1.048	0.242	0.008
33 Purysburg 38JA158	2	Rifle	pb53	504	895	1676	1025	63	1045062	7911	7114	2239	472	1196	259	0.395	0.421	0.000	0.002	2.104	0.534	0.225	0.400	0.748	3.177	2.534	0.028	0.749	0.116	0.001
33 Purysburg 38JA158	2	Rifle	pb283	1803	1036	1733	1491	113	1118829	6830	7994	2961	5121	5674	275	0.903	0.318	0.000	0.002	1.729	1.916	0.609	0.350	0.183	2.700	1.108	0.038	0.585	0.093	0.005
33 Black Swamp, SC	2	Rifle	pb116	122	932	1696	857	101	1004328	8179	7136	1959	2252	5247	217	0.429	0.023	0.000	0.002	1.150	2.678	0.062	0.476	0.178	3.643	2.330	0.052	0.866	0.111	0.005
33 Purysburg 38JA158	2	Rifle	pb278	1085	1098	3151	5159	119	1192847	6493	12455	3433	3381	78788	488	0.043	0.014	0.000	0.003	0.985	22.950	0.316	0.320	0.014	3.628	23.303	0.035	0.918	0.142	0.066
33 Black Swamp, SC	2	Rifle	pb208	213	1148	2152	725	329	1023876	7478	7540	2027	1886	2968	381	0.635	0.072	0.000	0.002	0.930	1.464	0.105	0.566	0.387	3.720	1.574	0.162	1.062	0.188	0.003
33 Purysburg 38JA158	2	Rifle	pb340	502	1808	1974	1575	5	1529215	9401	8732	5576	4225	1951	324	2.166	0.257	0.000	0.001	0.758	0.350	0.090	0.324	0.927	1.566	0.462	0.001	0.354	0.058	0.001
33 Purysburg 38JA158	2	Rifle	pb387	1154	913	2905	1345	17	949421	5612	10274	2863	2026	56451	404	0.036	0.020	0.000	0.003	0.708	19.717	0.403	0.319	0.016	3.589	27.863	0.006	1.015	0.141	0.059
33 Purysburg 38JA158	2	Rifle	pb328	14	1396	3078	4163	86	163983	2461	48305	1825	1113	875842	497	0.001	0.000	0.003	0.019	0.610	479.913	0.008	0.765	0.002	26.468	786.920	0.047	1.687	0.272	5.341
33 Purysburg 38JA158	2	Rifle	pb302	846	1273	1912	3223	191	1220477	7733	8430	3838	1937	7559	531	0.256	0.112	0.000	0.002	0.505	1.970	0.220	0.332	0.168	2.196	3.902	0.050	0.498	0.138	0.006
33 Purysburg 38JA158	2	Rifle	pb324	360	1692	1813	3946	119	1332398	6872	9480	4978	2126	16302	381	0.130	0.022	0.000	0.001	0.427	3.275	0.072	0.340	0.104	1.904	7.668	0.024	0.364	0.077	0.012
33 Purysburg 38JA158	2	Rifle	pb245	266	801	1786	15621	1	941454	6242	7125	2112	778	7953	273	0.098	0.033	0.000	0.002	0.368	3.766	0.126	0.379	0.101	3.374	10.222	0.000	0.846	0.129	0.008
33 Black Swamp, SC	2	Rifle	pb117	480	1041	1948	870	236	1078894	7844	7435	2072	552	1390	492	0.397	0.345	0.000	0.002	0.266	0.671	0.232	0.502	0.749	3.588	2.518	0.114	0.940	0.237	0.001
33 Purysburg 38JA158	2	Rifle	pb348	667	1664	2442	1314	90	1348646	7231	8796	4829	1170	8758	383	0.134	0.076	0.000	0.002	0.242	1.814	0.138	0.345	0.190	1.821	7.485	0.019	0.506	0.079	0.006
33 Purysburg 38JA158	2	Rifle	pb253	321	1670	1965	1978	150	1261944	8050	8403	3433	821	5648	297	0.145	0.057	0.000	0.002	0.239	1.645	0.094	0.486	0.296	2.448	6.879	0.044	0.572	0.087	0.004
33 Purysburg 38JA158	2	Rifle	pb131	839	823	1616	750	106	1014864	7479	6830	2137	445	1114	396	0.399	0.753	0.000	0.002	0.208	0.521	0.393	0.385	0.739	3.196	2.503	0.050	0.756	0.185	0.001
33 Purysburg 38JA158	2	Rifle	pb193	79	959	1692	2543	67	1038193	6296	7700	2618	543	1153	468	0.471	0.069	0.000	0.002	0.207	0.440	0.030	0.366	0.832	2.941	2.123	0.026	0.646	0.179	0.001
33 Purysburg 38JA158	2	Rifle	pb329	147	906	2669	2094	224	1022665	7366	7124	2611	395	2458	269	0.161	0.060	0.000	0.003	0.151	0.941	0.056	0.347	0.369	2.728	6.223	0.086	1.022	0.103	0.002
33 Purysburg 38JA158	2	Rifle	pb65	213	712	1485	997	87	903151	5304	6944	2811	423	1145	200	0.369	0.186	0.000	0.002	0.150	0.407	0.076	0.253	0.622	2.470	2.707	0.031	0.528	0.071	0.001
33 Purysburg 38JA158	2	Rifle	pb388	215	510	1465	975	38	705928	6132	5720	1393	173	921	226	0.188	0.233	0.000	0.002	0.124	0.661	0.154	0.366	0.554	4.106	5.324	0.027	1.052	0.162	0.001
33 Purysburg 38JA158	2	Rifle	pb44	345	988	1532	933	63	1041288	7790	7322	2127	263	1017	226	0.259	0.339	0.000	0.001	0.124	0.478	0.162	0.465	0.971	3.442	3.867	0.030	0.720	0.106	0.001
33 Purysburg 38JA158	2	Rifle	pb353	356	1475	2038	1278	49	1273504	8128	8228	3213	316	1725	358	0.183	0.206	0.000	0.002	0.098	0.537	0.111	0.459	0.855	2.561	5.459	0.015	0.634	0.111	0.001
33 Purysburg 38JA158	2	Rifle	pb181	822	948	1866	929	75	1047943	7895	7350	2392	226	1206	452	0.187	0.682	0.000	0.002	0.094	0.504	0.344	0.396	0.786	3.073	5.336	0.031	0.780	0.189	0.001
33 Purysburg 38JA158	2	Rifle	pb327	394	726	1812	2548	93	876607	7211	6740	1962	163	2439	272	0.067	0.162	0.000	0.002	0.083	1.243	0.201	0.370	0.298	3.435	14.963	0.047	0.924	0.139	0.003
33 Purysburg 38JA158	2	Rifle	pb307	812	786	1573	1016	59	943011	7176	7013	2375	139	1374	276	0.101	0.591	0.000	0.002	0.059	0.579	0.342	0.331	0.572	2.953	9.885	0.025	0.662	0.116	0.001
33 Purysburg 38JA158	2	Rifle	pb77	443	778	1587	803	109	952518	6639	6916	1976	110	1274	293	0.086	0.348	0.000	0.002	0.056	0.645	0.224	0.394	0.611	3.500	11.582	0.055	0.803	0.148	0.001
33 Purysburg 38JA158	2	Rifle	pb233	361	1242	1684	973	8	1170616	8131	7321	2941	153	2023	307	0.076	0.178	0.000	0.001	0.052	0.688	0.123	0.422	0.614	2.489	13.222	0.003	0.573	0.104	0.002
33 Purysburg 38JA158	2	Rifle	pb213	746	779	1668	1107	1	965110	7429	6862	2003	91	1371	241	0.066	0.544	0.000	0.002	0.045	0.684	0.372	0.389	0.568	3.426	15.066	0.000	0.833	0.120	0.001
33 Purysburg 38JA158	2	Rifle	pb95	794	851	1757	770	92	1020389	7789	7053	2131	40	1210	342	0.033	0.656	0.000	0.002	0.019	0.568	0.373	0.399	0.703	3.310	30.250	0.043	0.824	0.160	0.001
33 Purysburg 38JA158	2	Rifle	pb320	365	1740	1998	882	88	1399999	8777	8076	5144	93	1844	217	0.050	0.198	0.000	0.001	0.018	0.358	0.071	0.338	0.944	1.570	19.828	0.017	0.388	0.042	0.001
33 Purysburg 38JA158	2	Sprue, gang mold	pb21	372	957	1841	815	97	1025655	6234	7459	3016	2357	1172	256	2.011	0.317	0.000	0.002	2.104	0.389	0.123	0.317	0.817	2.473	0.497	0.032	0.610	0.085	0.001
33 Purysburg 38JA158	2	Sprue, gang mold	pb429	210	544	1550	1477	56	714770	3571	7308	1900	8672	824	291	10.524	0.255	0.000	0.002	2.104	0.434	0.111	0.286	0.660	3.846	0.095	0.029	0.816	0.153	0.001
33 Black Swamp, SC	2	Buckshot	pb211	104	447	1596	483	155	619765	4958	5832	1305	85	798	502	0.107	0.130	0.001	0.003	2.104	0.611	0.080	0.343	0.560	4.469	9.388	0.119	1.223	0.385	0.001
33 Purysburg 38JA158	2	Buckshot	pb380	477	274	1400	524	112	511102	4401	5483	1204	39	535	258	0.073	0.892	0.001	0.003	2.104	0.444	0.396	0.228	0.512	4.554	13.718	0.093	1.163	0.214	0.001
33 Purysburg 38JA158	2	Buckshot	pb402	230	299	1344	689	93	535067	4676	5339	1208	1983	746	215	2.658	0.308	0.000	0.003	2.104	0.618	0.190	0.248	0.401	4.420	0.376	0.077	1.113	0.178	0.001
33 Purysburg 38JA158	2	Buckshot	pb377	187	387	1355	884	88	578884	4819	5591	1335	79	742	291	0.106	0.252	0.001	0.002	2.104	0.556	0.140	0.290	0.522	4.188	9.392	0.066	1.015	0.218	0.001
33 Purysburg 38JA158	2	Case shot	pb150	185	1092	1908	857	134	1090715	8107	7100	2265	349	1385	360	0.252	0.134	0.000	0.002	2.104	0.611	0.082	0.482	0.788	3.135	3.968	0.059	0.842	0.159	0.001
33 Purysburg 38JA158	2	Case shot	pb8	342	1361	1698	690	31	1170617	7230	8242	3390	338	1305	168	0.259	0.262	0.000	0.001	2.104	0.385	0.101	0.401	1.043	2.431	3.861	0.009	0.501	0.050	0.001
33 Purysburg 38JA158	2	arleville or British Stand	pb358	946	1495	2009	1283	132	1302575	8523	8827	3615	4115	1808	300	2.276	0.523	0.000	0.002	2.104	0.500	0.262	0.414	0.827	2.442	0.439	0.037	0.556	0.083	0.001
33 Purysburg 38JA158	2	Flat disc	pb98	380	461	3526	12617	50	733700	3061	10447	2361	10364	48243	330	0.215	0.008	0.000	0.005	2.104	20.433	0.161	0.195	0.010	4.425	4.655	0.021	1.493	0.140	0.066
33 Purysburg 38JA158	2	Impacted ball	pb228	192	1203	1982	1373	140	1187266	7624	8831	3350	3861	18567	388	0.208	0.010	0.000	0.002	2.104	5.542	0.057	0.359	0.065	2.636	4.809	0.042	0.592	0.116	0.016
33 Purysburg 38JA158	2	Impacted ball	pb231	546	976	2494	695	93	1071603	6622	11741	2915	5146	71669	402	0.072	0.008	0.000	0.002	2.104	24.586	0.187	0.335	0.014	4.028	13.927	0.032	0.856	0.138	0.067
33 Purysburg 38JA158	2	Impacted ball	pb140	153	1004	1680	998	53	1075544	7022	7880	2610	2050	6538	334	0.314	0.023	0.000	0.002	2.104	2.505	0.059	0.385	0.154	3.019	3.189	0.020	0.644	0.128	0.006
33 Purysburg 38JA158	2	Impacted ball	pb26	257	1325	1753	2519	39	1145281	7849	7784	2612	680	1606	353	0.423	0.160	0.000	0.002	2.104	0.615	0.098	0.507	0.825	2.980	2.362	0.015	0.671	0.135	0.001
33 Purysburg 38JA158	2	Melted lead	pb321	244	1550	2121	2385	149	1320287	7435	8346	4975	5685	3497	416	1.626	0.070	0.000	0.002	2.104	0.703	0.049	0.312	0.443	1.678	0.615	0.030	0.426	0.084	0.001

33 Purysburg 38JA158	2	Melted lead	pb167	416	1720	3120	1467	145	1400313	8328	10240	5478	1094	33554	324	0.033	0.012	0.000	0.002	2.104	6.125	0.076	0.314	0.051	1.869	30.671	0.026	0.570	0.059	0.024
33 Purysburg 38JA158	2	Melted lead	pb431	207	713	1753	2933	1	878685	4846	6748	1885	40	1022	272	0.039	0.203	0.000	0.002	2.104	0.542	0.110	0.378	0.698	3.580	25.550	0.001	0.930	0.144	0.001
33 Purysburg 38JA158	2	Melted lead	pb333	433	131	1349	30359	1	201604	225	10633	2190	424	4555	651	0.093	0.095	0.003	0.007	2.104	2.080	0.198	0.060	0.029	4.855	10.743	0.000	0.616	0.297	0.023
33 Purysburg 38JA158	2	Rifle or Fusil	pb5	532	1083	1602	964	174	1153458	7389	7742	3043	6191	1274	227	4.859	0.418	0.000	0.001	2.104	0.419	0.175	0.356	0.850	2.544	0.206	0.057	0.526	0.075	0.001
33 Purysburg 38JA158	2	Rifle or Fusil	pb162	516	796	1740	716	100	916921	7138	7419	2124	2961	4542	403	0.652	0.114	0.000	0.002	2.104	2.138	0.243	0.375	0.175	3.493	1.534	0.047	0.819	0.190	0.005
33 Purysburg 38JA158	2	Rifle or Fusil	pb27	376	1492	2031	1576	135	1285481	8104	8393	3365	4883	2450	264	1.993	0.153	0.000	0.002	2.104	0.728	0.112	0.443	0.609	2.494	0.502	0.040	0.604	0.078	0.002
33 Purysburg 38JA158	2	Rifle or Fusil	pb143	622	671	1865	1174	67	940824	7155	7828	2004	4208	17308	239	0.243	0.036	0.000	0.002	2.104	8.637	0.310	0.335	0.039	3.906	4.113	0.033	0.931	0.119	0.018
33 Purysburg 38JA158	2	Rifle or Fusil	pb101	580	1227	1701	671	75	1092520	7159	7354	3026	1495	1174	234	1.273	0.494	0.000	0.002	2.104	0.388	0.192	0.405	1.045	2.430	0.785	0.025	0.562	0.077	0.001
33 Purysburg 38JA158	2	Rifle or Fusil	pb160	331	797	1768	944	35	915825	7493	6951	1885	115	1187	437	0.097	0.279	0.000	0.002	2.104	0.630	0.176	0.423	0.671	3.688	10.322	0.019	0.938	0.232	0.001
33 Purysburg 38JA158	2	Rifle or Fusil	pb304	965	1118	3026	1282	51	1098486	7077	10875	3460	5945	62672	511	0.095	0.015	0.000	0.003	2.104	18.113	0.279	0.323	0.018	3.143	10.542	0.015	0.875	0.148	0.057
33 Purysburg 38JA158	2	Rifle or Fusil	pb216	366	901	1642	923	34	1051662	7274	7377	2570	1376	3555	439	0.387	0.103	0.000	0.002	2.104	1.383	0.142	0.351	0.253	2.870	2.584	0.013	0.639	0.171	0.003
33 Purysburg 38JA158	2	Rifle or Fusil	pb84	561	1084	1472	1417	33	1121918	7677	7244	2811	81	1385	244	0.058	0.405	0.000	0.001	2.104	0.493	0.200	0.386	0.783	2.577	17.099	0.012	0.524	0.087	0.001
33 Purysburg 38JA158	2	Rifle or Fusil	pb248	241	1176	1896	2364	6	1090394	6519	7580	2663	4378	2430	410	1.802	0.099	0.000	0.002	2.104	0.913	0.090	0.442	0.484	2.846	0.555	0.002	0.712	0.154	0.002
33 Purysburg 38JA158	2	Rifle or Fusil	pb171	1436	1798	2407	867	1	1460621	8971	8761	5820	2934	1825	501	1.608	0.787	0.000	0.002	2.104	0.314	0.247	0.309	0.985	1.505	0.622	0.000	0.414	0.086	0.001
33 Purysburg 38JA158	2	Roundball-pb373	pb373	252	982	1620	793	28	1019911	7254	7434	2317	2913	1271	355	2.292	0.198	0.000	0.002	2.104	0.549	0.109	0.424	0.773	3.208	0.436	0.012	0.699	0.153	0.001
34 Savannah River misc.	6		SR-Carved Ball	53	55	379	766	34	128355	463	1451	40	1653	535	159	3.090	0.099	0.001	0.003	41.325	13.375	1.325	1.375	0.103	36.275	0.324	0.850	9.475	3.975	0.004
35 Shubrick plantation	9		John Allison Shubrick 1 180sec	453	223	2266	3126	98	519792	1892	5635	119	117	1051	313	0.111	0.431	0.001	0.004	0.983	8.832	3.807	1.874	0.212	47.353	8.983	0.824	19.042	2.630	0.002
35 Shubrick plantation	9		John Allison Shubrick 2 180sec	123	274	640	1972	80	542442	2785	5679	148	46	928	158	0.050	0.133	0.000	0.001	0.311	6.270	0.831	1.851	0.295	38.372	20.174	0.541	4.324	1.068	0.002
35 Shubrick plantation	9		John Allison Shubrick 4 180sec	165	216	1741	5642	64	479523	1316	6537	134	87	997	314	0.087	0.165	0.001	0.004	0.649	7.440	1.231	1.612	0.217	48.784	11.460	0.478	12.993	2.343	0.002
35 Shubrick plantation	9		John Allison Shubrick 3 180sec	250	178	2038	2590	23	496623	1874	5815	101	123	1317	236	0.093	0.190	0.000	0.004	1.218	13.040	2.475	1.762	0.135	57.574	10.707	0.228	20.178	2.337	0.003
36 Belle Terre Farm, NJ	8	British Standard	227DS-11 Dan S	56	49	151	254	68	33889	180	41	30	479	89	24	5.382	0.629	0.001	0.004	15.967	2.967	1.867	1.633	0.551	1.367	0.186	2.267	5.033	0.800	0.003
36 Belle Terre Farm, NJ	8	British Standard	227DS-4 Dan S	58	86	135	296	66	33155	206	32	17	68	639	16	0.106	0.091	0.000	0.004	4.000	37.588	3.412	5.059	0.135	1.882	9.397	3.882	7.941	0.941	0.019
36 Petticoat Bridge, NJ	8	British Standard	PB9B25-1 Dan S	55	83	166	331	84	37728	241	50	38	35	156	13	0.224	0.353	0.000	0.004	0.921	4.105	1.447	2.184	0.532	1.316	4.457	2.211	4.368	0.342	0.004
36 Belle Terre Farm, NJ	8	British Standard	227DS-12 impact Dan S	44	43	138	484	52	29409	103	36	44	23	86	15	0.267	0.512	0.001	0.005	0.523	1.955	1.000	0.977	0.500	0.818	3.739	1.182	3.136	0.341	0.003
36 Belle Terre Farm, NJ	8	Charleville	9D27-1 Dan S	132	69	129	416	54	32524	162	32	17	399	1245	20	0.320	0.106	0.001	0.004	23.471	73.235	7.765	4.059	0.055	1.882	3.120	3.176	7.588	1.176	0.038
36 Craig Road Site, NJ	8	Fusil	9L26-1 Dan S	62	293	162	455	98	16710	238	38	46	567	76031	19	0.007	0.001	0.001	0.010	12.326	1652.848	1.348	6.370	0.004	0.826	134.093	2.130	3.522	0.413	4.550
36 Belle Terre Farm, NJ	8		227DS-12 Dan S	68	55	137	600	44	32736	182	35	32	17	96	10	0.177	0.708	0.000	0.004	0.531	3.000	2.125	1.719	0.573	1.094	5.647	1.375	4.281	0.313	0.003
37 Spring Hill Redoubt, 9CH70	2	British Standard	sh30a	265	857	1957	2065	104	969626	6036	7258	2139	5852	1080	352	5.419	0.245	0.000	0.002	2.736	0.505	0.124	0.401	0.794	3.393	0.185	0.049	0.915	0.165	0.001
37 Spring Hill Redoubt, 9CH70	2	British Standard	sh30	632	1395	1926	1818	1	1338018	7720	8130	4759	2351	1984	783	1.185	0.319	0.001	0.001	0.494	0.417	0.133	0.293	0.703	1.708	0.844	0.000	0.405	0.165	0.001
37 Spring Hill Redoubt, 9CH70	2	British Standard	sh19	1018	1612	2153	3612	71	1310397	6417	8085	4993	435	1613	1075	0.270	0.631	0.001	0.002	0.087	0.323	0.204	0.323	0.999	1.619	3.708	0.014	0.431	0.215	0.001
37 Spring Hill Redoubt, 9CH70	2	British Standard	sh126a	161	1414	2008	1164	1	1201311	6654	8055	3671	161	1467	1380	0.110	0.110	0.001	0.002	0.044	0.400	0.044	0.385	0.964	2.194	9.112	0.000	0.547	0.376	0.001
37 Spring Hill Redoubt, 9CH70	2	British Standard	sh73	343	827	2649	1079	35	890889	5866	6927	1885	53	1120	440	0.047	0.306	0.000	0.003	0.028	0.594	0.182	0.439	0.738	3.675	21.132	0.019	1.405	0.233	0.001
37 Spring Hill Redoubt, 9CH70	2	Charleville	sh30b	481	1770	2164	2598	1	1362246	7716	8442	5146	6818	1573	390	4.334	0.306	0.000	0.002	1.325	0.306	0.093	0.344	1.125	1.640	0.231	0.000	0.421	0.076	0.001
37 Spring Hill Redoubt, 9CH70	2	Charleville	sh126	603	1157	1759	4194	93	1127569	6536	7846	3274	1215	1408	1795	0.863	0.428	0.002	0.002	0.371	0.430	0.184	0.353	0.822	2.396	1.159	0.028	0.537	0.548	0.001
37 Spring Hill Redoubt, 9CH70	2	Charleville	sh19b	812	1472	2692	2374	203	1309966	5502	8413	5029	896	4591	1086	0.195	0.177	0.001	0.002	0.178	0.913	0.161	0.293	0.321	1.673	5.124	0.040	0.535	0.216	0.004
37 Spring Hill Redoubt, 9CH70	2		sh97	171	687	7266	3636	102	788466	3316	8687	3075	138	13655	351	0.010	0.013	0.000	0.009	0.045	4.441	0.056	0.223	0.050	2.825	98.949	0.033	2.363	0.114	0.017
37 Spring Hill Redoubt, 9CH70	2		sh19a	136	1793	1939	1139	65	1406668	8059	8355	4916	271	4833	535	0.056	0.028	0.000	0.001	0.055	0.983	0.028	0.365	0.371	1.700	17.834	0.013	0.394	0.109	0.003
38 Stark Farm 22OK778	6		22OK778 MD 011 180sec	164	441	1123	1792	114	303752	2344	22873	190	37541	300564	223	0.125	0.001	0.001	0.004	197.584	1581.916	0.863	2.321	0.001	120.384	8.006	0.600	5.911	1.174	0.990
38 Stark Farm 22OK778	6		22OK778 MD 011	37	65	415	626	27	101158	750	7660	82	12432	99889	73	0.124	0.000	0.001	0.004	151.610	1218.159	0.451	0.793	0.001	93.415	8.035	0.329	5.061	0.890	0.987
39 Tar Bluff, SC	8	British Standard	Tar Bluff bb 2 Allison	89	59	151	320	60	34236	88	33	16	412	262	26	1.573	0.340	0.001	0.004	25.750	16.375	5.563	3.688	0.225	2.063	0.636	3.750	9.438	1.625	0.008
39 Tar Bluff, SC	8	British Standard	Tar Bluff bb 3 Allison	30	72	130	178	74	36711	235	23	11	88	127	25	0.693	0.236	0.001	0.004	8.000	11.545	2.727	6.545	0.567	2.091	1.443	6.727	11.818	2.273	0.003
39 Tar Bluff, SC	8	British Standard	Tar Bluff bb Allison	42	71	140	221	62	34787	136	32	38	61	813	8	0.075	0.052	0.000	0.004	1.605	21.395	1.105	1.868	0.087	0.842	13.328	1.632	3.684	0.211	0.023
39 Tar Bluff, SC	8	Charleville	Tar Bluff french Allison	87	72	177	191	47	32869	184	24	23	770	2674	3	0.288	0.033	0.000	0.005	33.478	116.261	3.783	3.130	0.027	1.043	3.473	2.043	7.696	0.130	0.081
39 Tar Bluff, SC	8	Charleville	Tar Bluff french 2 Allison	47	69	170	130	81	35080	234	30	32	47	135	22	0.348	0.348	0.001	0.005	1.469	4.219	1.469	2.156	0.511	0.938	2.872	2.531	5.313	0.688	0.004
39 Tar Bluff, SC	8	Charleville	Tar Bluff french 3 Allison	35	74	152	186	67	37248	241	53	25	26	106	16	0.245	0.330	0.000	0.004	1.040	4.240	1.400	2.960	0.698	2.120	4.077	2.680	6.080	0.640	0.003
40 De Hita-Gonzales Site, 8SA7	8		SA7-4 92-98-164 Cobb	44	59	160	162	63	32252	157	28	17	162	173	81	0.936	0.254	0.003	0.005	9.529	10.176	2.588	3.471	0.341	1.647	1.068	3.706	9.412	4.765	0.005
40 De Hita-Gonzales Site, 8SA7	8		SA7-4 92-98-408 Cobb	60	63	166	305	63	31510	119	48	28	27	80	115	0.338	0.750	0.004	0.005	0.964	2.857	2.143	2.250	0.788	1.714	2.963	2.250	5.929	4.107	0.003
40 De Hita-Gonzales Site, 8SA7	8		SA7-4 92-98-57 Cobb	38	53	117	194	51	33712	173	44	31	24	114	43	0.211	0.333	0.001	0.003	0.774	3.677	1.226	1.710	0.465	1.419	4.750	1.645	3.774	1.387	0.003
41 Ximenez Fatio Site, 8SA34	8		SA34-2 1974-85 Cobb	47	59	123	183	76	25722	102	27	15	265	164	19	1.616	0.287	0.001	0.005	17.667	10.933	3.133	3.933	0.360	1.800	0.619	5.067	8.200	1.267	0.006
41 Ximenez Fatio Site, 8SA34	8		SA34-2 1980-170	76	63	145	231	54	29790	140	26	16	63	144	49	0.438	0.528	0.002	0.005	3.938	9.000	4.750	3.938	0.438	1.625	2.286	3.375	9.063	3.063	0.005
42 Palm Row Site, 8SA36	8		SA36-4 FS46 Cobb	30	70	125	256	52	30807	119	31	33	168	957	28	0.176	0.031	0.001	0.004	5.091	29.000	0.909	2.121	0.073	0.939	5.696	1.576	3.788	0.848	0.031
43 Ximenez Fatio Site, 8SA34	8		SA34-2 1974-15 Cobb	45	28	65	115	30	13976	41	33	26	14	90	28	0.156	0.500	0.002	0.005	0.538	3.462	1.731	1.077	0.311	1.269	6.429	1.154	2.500	1.077	0.006
44 22OK1172	5		22OK1172 MD 002	105	144	426	737	70	402643	2741	3936	117	247	507	100	0.487	0.207	0.000	0.001	2.111	4.333	0.897	1.231	0.284	33.641	2.053	0.598	3.641	0.855	0.001
45 Fountain of Youth, St. Augu	8		8SJ31-West FS172 Cobb	36	81	123	202	75	33461	186	33	29	304	91	19	3.341	0.396	0.001	0.004	10.483	3.138	1.241	2.793	0.890	1.138	0.299	2.586	4.241	0.655	0.003
46 King George Statue	6		NY 1878.4 Rod	2967	49916	16996	43895	17245	3022780	92933	35049	24542	467	52527	4487	0.008891	0.056485	0.0014844	0.0056226	0.0190286	2.140290115	0.12089	2.033901	0.95029	1.42812	112.477516	0.7027	0.6925271	0.18282944	0.0173771
46 King George Statue	6		NY 1878.4 interior 1	2902	44456	18903	98489	17599	2974868	82381	33805	25502	767	65390	13469	0.01173	0.04438	0.0045276	0.0063542	0.0300761	2.564112619	0.11379	1.743236	0.67986	1.32558	85.2542373	0.6901	0.741236	0.52815465	0.0219808
46 King George Statue	6		NY 2001.185 Front 4	3291	51496	15188	45549	17811	2988854	95116	37596	25816	485	82408	12183	0.005885	0.039935	0.0040761	0.0050815	0.0187868	3.192128912	0.12748	1.994732	0.62489	1.45631	169.913402	0.6899	0.5883173	0.47191664	0.0275718
46 King George Statue	6		NY 2001.185 Front 4	3291	51496	15188	45549	17811	2988854	95116	37596	25816	485	82408	12183	0.005885	0.039935	0.0040761	0.0050815	0.0187868	3.192128912	0.12748	1.994732	0.62489	1.45631	169.913402	0.6899	0.5883173	0.47191664	0.0275718
46 King George Statue	6		NY 1878.4 Rod 2	3118	44288	18939	59233	17424	2961910	114676	32456	25313	339	46386	4492	0.007308	0.067219	0.0015166	0.0063942	0.0133923	1.832497136	0.12318	1.749615	0.95477	1.28219	136.831858	0.6883	0.7481926	0.17745822	0.0156608
46 King George Statue	6		NY 1878.4 back 1	2948	48233	12358	29239	16999	2967353	90425	36098	24810	404	58818	93435	0.006869	0.050121	0.0314877	0.0041647	0.0162838	2.370737606	0.11882	1.944095	0.82004	1.45498	145.589109	0.6852	0.4981056	3.76602177	0.0198217
46 King George Statue	6		NY 1878.4 edge 1	2880	46441	19137	59383	17369	2952735	97927	33709	25519	445	61829	7302	0.007197	0.04658	0.002473	0.0064811	0.017438	2.422861397	0.11286	1.81986	0.75112	1.32094	138.941573	0.6806	0.7499118	0.28613974	0.0209396
46 King George Statue	6		NY 1878.4 front 2	3095	50222	17501	69057	17291	2985570	88097	35849	25620	626	64765	7121	0.009666	0.047788	0.0023851	0.0058619	0.024434	2.527907884	0.1208	1.960265	0.77545	1.39926	103.458466	0.6749	0.6830991	0.27794692	0.0216927
46 King George Statue	6		NY 1878.4 edge 2	2871	46545	17419	44660	17325	3043818	90709	33369	25775	286	50470	4915	0.005667	0.056885	0.0016147	0.0057227	0.011096	1.958098933	0.11139	1.80582	0.92223	1.29463	176.468531	0.6722	0.6758099	0.19068865	0.0165811
46 King George Statue	6		NY 2001.185 Front 3	2910	51532	14278	49331	16865	3019864	92113	37200	25213	306	60677	10299	0.005043	0.047959	0.0034104	0.004728	0.0121366	2.406575973	0.11542	2.043866	0.84928	1.47543	198.29085	0.6689	0.5662952	0.40847975	0.0200926
46 King George Statue	6		NY 1878.4 back 2	2873	47195	17351	38416	17016	3005297	91246	35007	25585	651	73745	2874	0.008828	0.038959	0.0009563	0.0057735	0.0254446	2.882352941	0.11229	1.844636	0.63998	1.36826	113.27957	0.6651	0.6781708	0.11233144	0.0245383
46 King George Statue	6		NY 1878.4 back 3 patina	2857	48933	12317	95140	17004	3017023	76583	33520	25919	20	30798	2040	0.000649	0.092766	0.0006762	0.0040825	0.0007716	1.188240287	0.11023	1.88792	1.58884	1.29326	1539.9	0.656	0.4752112	0.07870674	0.0102081
46 King George Statue	6		NY 1878.4 front 1	3271	53768	15351	44671	16216	2957606	104326	38579	25022	422	67698	7219	0.006234	0.048318	0.0024408	0.0051903	0.0168652	2.705539126	0.13072	2.148829	0.79423	1.5418	160.421801	0.6481	0.6135001	0.28850611	0.0228895
46 King George Statue	6		NY 2001.185 Back 2	3480	49107	15115	37119	16765	3011227	87274	36966	26092	999	88041	1708	0.011347	0.039527	0.0005672	0.0050195	0.0382876	3.374252644	0.13337	1.882071	0.55777	1.41676	88.1291291	0.6425	0.5792963	0.06546068	0.0292376
46 King George Statue	6		NY 2001.185 Back 4	2494	30882	12151	1484782	11739	2287385	68472	26759	26213	410	51160	6362	0.008014	0.048749	0.0027813	0.0053122	0.0156411	1.951703353	0.09514	1.178118	0.60364	1.02083	124.780488	0.4478	0.4635486	0.242704	0.0223662
46 King George Statue	6		NY 2001.185 Back 3	2455	12883	8595	2872104	8878	1558522	43504	17839	25569	1050	42975	2941	0.024433	0.057126	0.001887	0.0055148	0.0410654	1.680746216	0.09601	0.503852	0.29978	0.69768	40.9285714	0.3472	0.3361492	0.1150221	0.0275742
46 King George Statue	6		NY 2001.185 Back 1	2405	21262	11194	1645212	12510	2146862	47027	22144	26625	701	52529	2916	0.013345	0.045784	0.0013583	0.0052141	0.0263286	1.972920188	0.09033	0.798573	0.40477	0.8317	74.9343795	0.4699	0.4204319	0.10952113	0.0244678

Federal Financial Report

(Follow form Instructions)

OMB Number: 4040-0014
Expiration Date: 01/31/2019

1. Federal Agency and Organizational Element to Which Report is Submitted: United States Department of Interior, National Park Service

2. Federal Grant or Other Identifying Number Assigned by Federal Agency (To report multiple grants, use FFR Attachment): P16AP00371

3. Recipient Organization (Name and complete address including Zip code)

Recipient Organization Name: The LAMAR Institute, Inc.

Street1: P.O. Box 2992

Street2:

City: Savannah

County: Chatham

State: GA: Georgia

Province:

Country: USA: UNITED STATES

ZIP / Postal Code: 31402-2292

4a. DUNS Number: 0549086400000

4b. EIN: 58-1537572

5. Recipient Account Number or Identifying Number (To report multiple grants, use FFR Attachment): 124

6. Report Type

- ☐ Quarterly
- ☐ Semi-Annual
- ☐ Annual
- ☒ Final

7. Basis of Accounting

- ☒ Cash
- ☐ Accrual

8. Project/Grant Period

From: 09/15/2016 To: 09/15/2017

9. Reporting Period End Date: 09/15/2017

10. **Transactions**	Cumulative
(Use lines a-c for single or multiple grant reporting)	
Federal Cash (To report multiple grants, also use FFR attachment):	
a. Cash Receipts	0.00
b. Cash Disbursements	0.00
c. Cash on Hand (line a minus b)	0.00
(Use lines d-o for single grant reporting)	
Federal Expenditures and Unobligated Balance:	
d. Total Federal funds authorized	32,000.00
e. Federal share of expenditures	32,000.00
f. Federal share of unliquidated obligations	0.00
g. Total Federal share (sum of lines e and f)	32,000.00
h. Unobligated balance of Federal Funds (line d minus g)	0.00
Recipient Share:	
i. Total recipient share required	0.00
j. Recipient share of expenditures	0.00
k. Remaining recipient share to be provided (line i minus j)	0.00
Program Income:	
l. Total Federal program income earned	0.00
m. Program Income expended in accordance with the deduction alternative	0.00
n. Program Income expended in accordance with the addition alternative	0.00
o. Unexpended program income (line l minus line m or line n)	0.00

11. Indirect Expense

a. Type	b. Rate	c. Period From	Period To	d. Base	e. Amount Charged	f. Federal Share
			g. Totals:			

12. Remarks: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation:

Add Attachment | Delete Attachment | View Attachment

13. Certification: By signing this report, I certify that it is true, complete, and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent information may subject me to criminal, civil or administrative penalties. (U.S. Code, Title 18, section 1001)

a. Name and Title of Authorized Certifying Official

Prefix: Mr. First Name: Daniel Middle Name: Thornton

Last Name: Elliott Suffix:

Title: President

b. Signature of Authorized Certifying Official

c. Telephone (Area code, number and extension)

706-341-7796

d. Email Address

dantelliott@gmail.com

e. Date Report Submitted

09/06/2017

14. Agency use only:

Federal Financial Report Instructions

Report Submissions

1) Recipients will be instructed by Federal agencies to submit the *Federal Financial Report* (*FFR*) to a single location, except when an automated payment management reporting system is utilized. In this case, a second submission location may be required by the agency.

2) If recipients need more space to support their *FFR*s, or *FFR* Attachments, they should provide supplemental pages. These additional pages must indicate the following information at the top of each page: Federal grant or other identifying number (if reporting on a single award), recipient organization, Data Universal Numbering System (DUNS) number, Employer Identification Number (EIN), and period covered by the report.

Reporting Requirements

1) The submission of interim *FFR*s will be on a quarterly, semi-annual, or annual basis, as directed by the Federal agency. A final *FFR* shall be submitted at the completion of the award agreement. The following reporting period end dates shall be used for interim reports: 3/31, 6/30, 9/30, or 12/31. For final *FFR*s, the reporting period end date shall be the end date of the project or grant period.
2) Quarterly and semi-annual interim reports shall be submitted no later than 30 days after the end of each reporting period. Annual reports shall be submitted no later than 90 days after the end of each reporting period. Final reports shall be submitted no later than 90 days after the project or grant period end date.

Note: For single award reporting:

1) Federal agencies may require both cash management information on lines 10(a) through 10(c) and financial status information lines 10(d) through 10(o).

2) 10(b) and 10(e) may not be the same until the final report.

Line Item Instructions for the Federal Financial Report

FFR Number	Reporting Item	Instructions
Cover Information		
1	Federal Agency and Organizational Element to Which Report is Submitted	Enter the name of the Federal agency and organizational element identified in the award document or as instructed by the agency.
2	Federal Grant or Other Identifying Number Assigned by Federal Agency	For a single award, enter the grant number assigned to the award by the Federal agency. For multiple awards, report this information on the *FFR* Attachment. *Do not complete this box if reporting on multiple awards.*
3	Recipient Organization	Enter the name and complete address of the recipient organization including zip code.
4a	DUNS Number	Enter the recipient organization's Data Universal Numbering System (DUNS) number or Central Contract Registry extended DUNS number.
4b	EIN	Enter the recipient organization's Employer Identification Number (EIN).
5	Recipient Account Number or Identifying Number	Enter the account number or any other identifying number assigned by the recipient to the award. This number is for the recipient's use only and is not required by the Federal agency. For multiple awards, report this

FFR Number	Reporting Item	Instructions
		information on the *FFR* Attachment. *Do not complete this box if reporting on multiple awards.*
6	Report Type	Mark appropriate box. *Do not complete this box if reporting on multiple awards.*
7	Basis of Accounting (Cash/Accrual)	Specify whether a cash or accrual basis was used for recording transactions related to the award(s) and for preparing this FFR. Accrual basis of accounting refers to the accounting method in which expenses are recorded when incurred. For cash basis accounting, expenses are recorded when they are paid.
8	Project/Grant Period, From**:** (Month, Day, Year)	Indicate the period established in the award document during which Federal sponsorship begins and ends. Note: Some agencies award multi-year grants for a project period that is funded in increments or budget periods (typically annual increments). Throughout the project period, agencies often require cumulative reporting for consecutive budget periods. Under these circumstances, enter the beginning and ending dates of the project period not the budget period. *Do not complete this line if reporting on multiple awards.*
	Project/Grant Period, To**:** (Month, Day, Year)	See the above instructions for "Project/Grant Period, From**:** (Month, Day, Year)."
9	Reporting Period End Date**:** (Month, Day, Year)	Enter the ending date of the reporting period. For quarterly, semi-annual, and annual interim reports, use the following reporting period end dates: 3/31, 6/30, 9/30, or 12/31. For final *FFR*s, the reporting period end date shall be the end date of the project or grant period.
10	**Transactions** Enter cumulative amounts from date of the inception of the award through the end date of the reporting period specified in line 9. Use Lines 10a through 10c, Lines 10d through 10o, or Lines 10a through 10o, as specified by the Federal agency, when reporting on single grants. Use Line 12, Remarks, to provide any information deemed necessary to support or explain *FFR* data.	
Federal Cash (To report multiple grants, also use FFR Attachment)		
10a	Cash Receipts	Enter the cumulative amount of actual cash received from the Federal agency as of the reporting period end date.
10b	Cash Disbursements	Enter the cumulative amount of Federal fund disbursements (such as cash or checks) as of the reporting period end date. Disbursements are the sum of actual cash disbursements for direct charges for goods and services, the amount of indirect expenses charged to the award, and the amount of cash advances and payments made to subrecipients and contractors. For multiple grants, report each grant separately on the *FFR* Attachment. The sum of the cumulative cash disbursements on the *FFR* Attachment must equal the amount entered on Line 10b, *FFR*.
10c	Cash On Hand (Line 10a Minus Line 10b)	Enter the amount of Line 10a minus Line 10b. This amount represents immediate cash needs. If more than three business days of cash are on hand, the Federal agency may require an explanation

FFR Number	Reporting Item	Instructions
		on Line 12, Remarks, explaining why the drawdown was made prematurely or other reasons for the excess cash.
Federal Expenditures and Unobligated Balance: Do not complete this section if reporting on multiple awards.		
10d	Total Federal Funds Authorized	Enter the total Federal funds authorized as of the reporting period end date.
10e	Federal Share of Expenditures	Enter the amount of Federal fund expenditures. For reports prepared on a cash basis, expenditures are the sum of cash disbursements for direct charges for property and services; the amount of indirect expense charged; and the amount of cash advance payments and payments made to subrecipients. For reports prepared on an accrual basis, expenditures are the sum of cash disbursements for direct charges for property and services; the amount of indirect expense incurred; and the net increase or decrease in the amounts owed by the recipient for (1) goods and other property received; (2) services performed by employees, contractors, subrecipients, and other payees; and (3) programs for which no current services or performance are required. Do not include program income expended in accordance with the deduction alternative, rebates, refunds, or other credits. (Program income expended in accordance with the deduction alternative should be reported separately on Line 10o.)
10f	Federal Share of Unliquidated Obligations	Unliquidated obligations on a cash basis are obligations incurred, but not yet paid. On an accrual basis, they are obligations incurred, but for which an expenditure has not yet been recorded. Enter the Federal portion of unliquidated obligations. Those obligations include direct and indirect expenses incurred but not yet paid or charged to the award, including amounts due to subrecipients and contractors. On the final report, this line should be zero unless the awarding agency has provided other instructions. *Do not include any amount in Line 10f that has been reported in Line 10e. Do not include any amount in Line 10f for a future commitment of funds (such as a long-term contract) for which an obligation or expense has not been incurred.*
10g	Total Federal Share (Sum of Lines 10e and 10f)	Enter the sum of Lines 10e and 10f.
10h	Unobligated Balance of Federal Funds (Line 10d Minus Line 10g)	Enter the amount of Line 10d minus Line 10g.
Recipient Share: Do not complete this section if reporting on multiple awards.		
10i	Total Recipient Share Required	Enter the total required recipient share for reporting period specified in line 9. The required recipient share should include all matching and cost sharing provided by recipients and third-party providers to meet the level required by the Federal agency. This amount should not include cost sharing and match amounts in excess of the amount required by the Federal agency (for example, cost overruns for which the recipient incurs additional expenses and, therefore, contributes a greater level of cost

FFR Number	Reporting Item	Instructions
		sharing or match than the level required by the Federal agency).
10j	Recipient Share of Expenditures	Enter the recipient share of actual cash disbursements or outlays (less any rebates, refunds, or other credits) including payments to subrecipients and contractors. This amount may include the value of allowable third party in-kind contributions and recipient share of program income used to finance the non-Federal share of the project or program. Note: On the final report this line should be equal to or greater than the amount of Line 10i.
10k	Remaining Recipient Share to be Provided (Line 10i Minus Line 10j)	Enter the amount of Line 10i minus Line 10j. If recipient share in Line 10j is greater than the required match amount in Line 10i, enter zero.
Program Income: Do not complete this section if reporting on multiple awards.		
10l	Total Federal Program Income Earned	Enter the amount of Federal program income earned. Do not report any program income here that is being allocated as part of the recipient's cost sharing amount included in Line10j.
10m	Program Income Expended in Accordance With the Deduction Alternative	Enter the amount of program income that was used to reduce the Federal share of the total project costs.
10n	Program Income Expended in Accordance With the Addition Alternative	Enter the amount of program income that was added to funds committed to the total project costs and expended to further eligible project or program activities.
10o	Unexpended Program Income (Line 10l Minus Line 10m or Line 10n)	Enter the amount of Line 10l minus Line 10m or Line 10n. This amount equals the program income that has been earned but not expended, as of the reporting period end date.
11	**Indirect Expense:** Complete this information only if required by the awarding agency. Enter cumulative amounts from date of the inception of the award through the end date of the reporting period specified in line 9.	
11a	Type of Rate(s)	State whether indirect cost rate(s) is Provisional, Predetermined, Final, or Fixed.
11b	Rate	Enter the indirect cost rate(s) in effect during the reporting period.
11c	Period From; Period To	Enter the beginning and ending effective dates for the rate(s).
11d	Base	Enter the amount of the base against which the rate(s) was applied.
11e	Amount Charged	Enter the amount of indirect costs charged during the time period specified. (Multiply 11b. x 11d.)
11f	Federal Share	Enter the Federal share of the amount in 11e.
11g	Totals	Enter the totals for columns 11d, 11e, and 11f.
Remarks, Certification, and Agency Use Only		
12	Remarks	Enter any explanations or additional information required by the Federal sponsoring agency including excess cash as stated in line 10c.
13a	Typed or Printed Name and Title of Authorized Certifying Official	Enter the name and title of the authorized certifying official.
13b	Signature of Authorized Certifying Official	The authorized certifying official must sign here.
13c	Telephone (Area Code, Number and Extension)	Enter the telephone number (including area code and extension) of the individual listed in Line 13a.
13d	E-mail Address	Enter the e-mail address of the individual listed in Line 13a.

FFR Number	Reporting Item	Instructions
13e	Date Report Submitted (Month, Day, Year)	Enter the date the *FFR* is submitted to the Federal agency using the month, day, year format.
14	Agency Use Only	This section is reserved for Federal agency use.