AN ABSTRACT OF THE THESIS OF

Diane Zentgraf for the degree of Master of Science in Applied Anthropology presented on December 14, 2018.

Title: Mid-Nineteenth Century Clay Smoking Pipes from Fort Hoskins (35BE15) and Fort Yamhill (35PO75), Oregon.

Abstract approved: ______________________________________________________

                        David R. Brauner

Over the past 42 years clay smoking pipes have been excavated from two U.S. army posts, Fort Hoskins (35BE15) and Fort Yamhill (35PO75) and curated at Oregon State University. These two forts were established in Western Oregon in 1856 and by 1866 both had been decommissioned. Numerous theses have focused on the lives of the men assigned to the forts, but none have focused on the clay pipe, a ubiquitous find at many historic sites. This simple object can often communicate information about human social, economic and status cultures. The military forts were restricted environments in which daily activities were restrained. One means in which someone could express their individuality was with a pipe.

This thesis examines clay pipes and combines extensive archival research, journals of soldiers stationed at each fort, with comparison data of previous clay pipe research and consultation with experts in the field to help in their identification. The impact of smoking upon the health and psyche of the men within the military milieu of the forts is examined, as is consumer choice, availability of clay pipes and expressions of status. This thesis presents evidence to support definitive and tentative conclusions for the identification of clay pipe manufacturers and conjecture on consumer choice.
Mid-Nineteenth Century Clay Smoking Pipes from Fort Hoskins (35BE15) and Fort Yamhill (35PO75), Oregon

by

Diane Zentgraf

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APPROVED:

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Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

______________________________
Diane Zentgraf, Author
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1. Introduction

Clay smoking pipes have their technological origin in the Americas. They are utilitarian products used by individuals to inhale tobacco (primarily) and along with tobacco, were first introduced into Europe ca. 1492 (Charlton 2004:292-296; Goodman 1993: 37). Clay pipes consist of a ceramic bowl to hold and contain the burning matter and an attached stem used to inhale the smoke from combustion. These pipes were easily broken, sometimes within a day of purchase. They are ubiquitously found in prehistoric Native American sites ca. 3000 B.C. (Peach State Archaeological Society 2018) up to 19th century historic sites throughout the United States. The clay pipes examined in this study date between 1856-1866 from two military forts, Fort Hoskins and Fort Yamhill, Oregon. Archaeological significance of the pipes found at these sites includes the use of pipes as a tool and reflection of personal choice, the evolution in design of pipes during this period, the range of pipe design from plain pipes to ones with elaborate motifs, local and regional cultural influences upon design, and the history and changes in manufacturing through time.

The excavations at Fort Hoskins by Oregon State University beginning in 1976, and at Fort Yamhill in 2003, uncovered numerous clay pipe fragments, a few porcelain pipe fragments, and a single burnt reed stem fragment. Extensive clay pipe research in Western and Eastern Europe has expanded the knowledge of manufacturing by various producers, but research has lagged in the United States. In America, early studies examining clay pipes found in the West revolved around early western cities, such as Old Sacramento (Humphrey 1969), sites of the Fur Trade era (Pfeiffer 1978, 1982), and western forts, such as Fort Union in North Dakota, Fort Union in New Mexico and Camp Floyd in Utah (Jensen 1991; Sudbury 1979, 2009; Wilson 1966, 1971). In the Pacific Northwest, however, there has been little in-depth research on clay pipes. This thesis will present an analysis of the clay pipes within Oregon State University’s collection and explore the provenance of this assemblage. Fort Hoskins and Fort Yamhill operated in the mid-nineteenth century for only a decade, and then were closed, providing a very tight timeline. This collection has been the subject of preliminary analysis by a few Oregon State University researchers, but no in-depth analysis of the complete assemblage has been conducted. Utilizing and building upon previous research at the two forts,
elsewhere in the United States, and in Europe, this study fills in missing information that clarifies and improves our understanding of clay pipes of these forts.

The primary goal of this thesis was to determine the manufacturers and countries of origin for the clay pipes found at Fort Hoskins and Fort Yamhill, and to place them within the local, regional and world trade systems. The time period in which the Oregon forts operated was during the peak of manufacture, motifs and distribution of clay pipes. It was also an era of widespread plagiarism, making it difficult to determine specific clay pipe makers. Production methods were very similar in Europe and the United States, but local and regional fashion can help point towards the country and manufacturer. Understanding countries of origin can help inform on regional and international trade patterns. To identify the sources of these pipes, the entire assemblage was measured, cataloged, and photographed, and every attribute of the bowls and stems were examined in detail and documented. Access to and help from experts as well as available literature, journals and websites in other countries enabled a thorough study and were an immense help in identifying or verifying clay pipe origins and dates.

A second goal of this study was to place these pipes within the context of a western military fort setting to help understand the economic and social implications. The degree of embellishment and quality of design of the pipes was examined to determine differentiation of economic and social status. Although the range of goods available to soldiers from the fort sutler would have been limited, it was expected that the distribution of pipe styles should vary with economic and military status. Further, the soldiers’ country of origin was used compared to the country of pipe manufacture to determine if there was any association.

A final goal was to determine the overall effect smoking had on the health of the soldiers and how smoking may have affected the behavior of the men in a restricted environment. A review of research and medical literature on the negative physiological effects of tobacco on the body and brain is compared to previous research and medical data analysis of the hospitals and soldier’s health at the two forts. Combining this information with journal entries from both forts provides an overall view of how tobacco smoking may have affected the soldiers’ health and conduct at the forts.
2. Chronology and Theoretical Perspective

The research and analysis of the clay pipe assemblage from Fort Hoskins and Fort Yamhill is descriptive, empirical and inferential, with a tentative hypothesis considered during the analysis and conclusion. The primary analysis primarily focused on determining where the clay pipes were made and by whom. In addition, a comprehensive review of literature was undertaken to understand the correlations between 19th century clay pipes and the following sociopolitical factors: 19th century domestic and international trade, trade routes, the medical and physiological effects of tobacco smoking, smoking and the military, social norms, status, and consumerism.

The short time period during which Fort Hoskins and Fort Yamhill were in operation, combined with the pipe styles, can provide a means in determining archaeological site chronology at other Pacific Northwest archaeological sites. Early research in Europe and the United States focused on clay pipes as dating tools with interpretive approaches developing later. There is a long history of using ceramics to develop chronologies in archaeology (Sinopoli 1991:74). As a ceramic, clay pipes can be a valuable index tool to assist in assessing archaeological site chronology by using key characteristics (Higgins 2017:4.0). Archaeological sites that are of indeterminate age, complex, or with multiple stratigraphic levels, may be differentiated with clay pipes used as chronometric devices to help establish time lines. Previous clay pipe researchers have used archival research, comparative descriptions and dates of manufacture to develop typologies (for English, German, and Dutch pipes), as relative chronological indexes for dating clay pipes. However, for mid-19th century clay pipe assemblages found in the Pacific Northwest of the United States, it is difficult to identify manufacturer and challenging to establish the terminus post quem and terminus ante quem. This is due to the long history of clay pipe production, the numerous manufacturers in many countries, prodigious variety of different designs, and widespread plagiarism of popular designs.

As with other disciplines, the collection of data is needed to quantify and observe patterns before developing theories (South 2002:25). Hypothesis and theories have been postulated for dating English clay pipe stem bore diameters, using statistical methods. It was found that stem bore diameters consistently decreased in dimension from 1620-1780, however, this is not seen in pipes manufactured after 1800 (Harrington 1954; Binford
1962; Hanson 1971). In the *Archaeology of Smoking and Tobacco*, Fox (2015) examines how Consumer Theory can help to enlighten the role human desire and choice had in promoting changes and adaptation of past cultures and societies. Vihlene (2004) used Taphonomic Theory in her study of the human remains of soldiers killed at the Bighorn battlefield in Montana, specifically the odontological evidence of the effects of tobacco use, including clay pipe use. Clay pipes can be used to correlate past behavior as seen with female DNA on a clay pipe stem from the 19th century Boston saloon in Virginia City, Nevada (Dixon 2006). Additionally, further hypotheses have been developed to inform and expand on trade histories (Pfeiffer 1982), cultural identity (Alexander 1986; Hull 2016) and subversive political acts (Hartnett 2004).

The 19th century clay pipes were manufactured in the home industry as well as mass produced in factories. Mullins (2011:2) reflects on the influence of mass-produced items on people’s views of themselves and others. He writes that the past effects of inequality associated with inanimate objects have been used to define identities while at the same time perpetuating deep-seated inequalities. In the United States of America (hereafter termed America), these same objects have “shaped the way we collectively voice our positions within cultural, social, class, gendered, and nationalist collectives” and the “acquisition of things to confirm, display, accent, mask, and imagine who we are and whom we wish to be,” (Mullins 2011: 2-4). Thus, objects can be a means to express collective identification (Mullins 2011: 43). Bourdieu postulated that social actors look at rules and creatively manipulate them to their own needs (Johnson 2010:108). These ideas can be utilized and associated with clay tobacco pipes studies to develop theories in future research.

The military milieu of Fort Hoskins and Fort Yamhill was a male universe, with military protocols managing all aspects of their lives from their uniforms to their movements. Military rules and regulations governed rank and status, whereas military codes of conduct promoted conformity of individuals into a cohesive company. When confined to the fort, soldiers were limited in purchasing goods to the sutler store; however, when on leave often purchased goods from local retailers in Corvallis, Salem or Portland. Bowyer (1992) examined Fort Hoskins from a theoretical perspective of rank and status, concluding that the officers’ higher status was observable in the locations of
artifacts within the fort. This research will address the association of clay pipes with the status and rank of soldiers. The journals of Corporal Hilleary and Corporal Bensell provide an insight into status and rank thereby facilitating and substantiating pipe data and patterns that may be seen with this assemblage.

The artifact assemblage at Fort Hoskins and Fort Yamhill is a rich accumulation of mid-19th century clay pipe imagery, types and styles. Historical archaeology can help to identify and inform our understanding of pipes brought to Oregon by soldiers or, purchased from sutlers or local retailers. The individual purchase of clay pipes may empower soldiers’ individuality through the symbolic display of politics, culture and status. This first step in identification of the clay pipes will allow further studies in development of theories and understanding of clay pipes within the Pacific Northwest, and the broader historical, social and world trade context.
3. History of Smoking

There are currently no historical documents that prior to the introduction and manufacture of clay pipes in the 16th century, that early Europeans ever used any type of smoking pipe (Gačić 2011:25). The history of smoking in the Old World included the use of hemp (cannabis sativa). Hemp is known to have been cultivated in China around 5000-3000 B.C. (Barker 2009:199) and used by the steppe nomads for its narcotic effects in the first millennium B.C (Barber 1991: 17). Herodotus (1987:307 [450 B.C.]) reported that the Scythians would inhale smoke from hemp seed as part of a cleansing ritual and for pleasure. In Africa, Bushmen smoked hemp, called dakka in the local dialect, before tobacco was introduced (Dunhill 1969:111, 112, 116). Corti (1932:23) writes that the Greeks and Romans inhaled smoke from coltsfoot (Tussilago farfara), for medicinal purposes and that Pliny recommended inhaling medicinal herbs through a reed (Arundo spp.). Barber (1992:17-19) notes that ancient civilizations across Europe and East Asia smoked hemp from pots in the first millennium B.C. Despite its ancient popularity, neither hemp nor any other plant smoked ever became as widely consumed as tobacco.

3.1 The History of Tobacco

3.1.1 Consumption and Social Norms

Tobacco is in the genus Nicotiana, a division of the Solanaceae (nightshade) family which consists of 95 species, the majority (74) of which are native to the Americas, mostly in South America (Winter 2000:90). Domestication and cultivation of tobacco is thought to have occurred around 8000 years ago, reaching the Eastern Woodlands of North America between 500 B.C (Barker 2009:244) and 160 A.D (Winter 2000:4). Only two of the 95 species of Nicotiana became widespread, Nicotiana tabacum in tropical regions and Nicotiana rustica in South America, Mexico, the eastern woodlands of the United States and Canada. Oregon has two native tobacco species, Nicotiana quadralvis (Winter 2000:110-121) and Nicotiana attenuata which is found east of the Cascade Range (Hitchcock and Cronquist 1973: 411). Tushingham et al. (2012: 1397-1407) combined chemical analysis of residue from Native America stone pipes and fragments with experimental techniques to confirm that Nicotiana species were
being smoked by hunter-gatherers on the southern Pacific Northwest coast by A.D. 860.

The coastal Oregon tribes, the Siuslawans, Coosans and Takelma, set aside land and time to cultivate tobacco (Goodman 1993: 24). They fertilized the plant, which requires intense and careful cultivation with salmon bones and protected it from the wind with brush fencing. When mature, it was harvested and dried. A few tribal words used for tobacco are: *kiusa* (Alsea), and *chiyusin* (Siuslaw/Lower Umpqua). (Tobacco on the Oregon Coast 2012). Lewis and Clark spent time on the Columbia River and wrote in their journals that Chinookans smoked bearberry (*Arctostaphylos uva-ursi*), also called kinnikinick, mixed with tobacco. These Oregon tribes planted tobacco in specially prepared fields, but never near villages where it might accidentally be harvested too early (Cutright 1989:267). Other plants blended with tobacco were: manzanita (*Arctostaphylos manzanita*), Pacific dogwood (*Cornus nuttallii*), madrone (*Arbutus menziesii*), salal (*Gaultheria shallon*) and red willow bark (*Salix lasiandra*) (Rubin 1999:213).

To Native Americans tobacco was considered to have supernatural powers, and origins. The primary use of *Nicotiana* species by prehistoric Native Americans was as a hallucinogen in shamanistic rituals and as an intermediary to communicate with spirits in religious ceremonies (Paper 1988:4-5). Because tobacco was predictable, non-life-threatening and has a short half-life (Goodman 1993: 24-25) it was used for medical and social roles as well (Winter 2000: 305). Tobacco was consumed not only by smoking but also “chewed, imbibed as a tea, inhaled as snuff, injected as an enema, eaten as a jelly” (Meyer 2009: 233-234), used as an appetite suppressant, used as toothpaste to whiten teeth, and applied topically to aid in healing of wounds and burns (Charlton 2004:292-296). Native American tobacco use varied by culture. In many cultures only the shaman used tobacco for healing and religious ceremonies (Lock et al, 1998:5-6), whereas some Iroquois were said to smoke it daily and frequently (Winter 2000:74). In Oregon among the Wishram, the shaman would take five puffs before beginning a healing ceremony, to make “lively his or her spirit” (Rubin 1999: 213). Smoking was not something to be done casually, but only with a spirit’s directive; without this the smoke would stay in, choke the person, and make them weak and ill (Rubin 1999: 213).

The origin of the word “tobacco” is one of the misnomers in history. The word is thought to be derived from either the Caribbean Taino people’s word for a two-pronged
pipe that was used to inhale smoke, or from their word for rolled tobacco, *tabacos*. When Columbus landed on an island in the Bahamas the indigenous people, the Taino, offered him dried leaves which were smoked through a Y-shaped cane pipe tube in their noses (Charlton 2004:292-296; Goodman 1993: 37). However, there is a similar word originating from the Arabic word *tabbaq* that Spanish and Italian used to describe medicinal herbs before Columbus landed in America (Fox 2015: 20; Russo et al. 2011: 560; Winter 2000:56).

The colonization of America introduced Europeans to tobacco and its use. It is acknowledged that Sir Walter Raleigh and Thomas Hariot were the earliest enthusiastic smokers, and it is reported that they helped to popularize it in Queen Elizabeth’s court and with her nobles (Apperson 1914:14-26; Ashton and Stepney 1982:15; Burns 2007:24; Fox 2015:20; Hariot 1951:C3 [1588]; Robert 1952:5). However, it wasn’t until 1612, when John Rolfe successfully grew tobacco in Virginia and exported the first commercial crop, that tobacco became a highly marketable commodity. Within two years, 1250 pounds were shipped back to England, and by 1628, export had reached 370,000 pounds (Lock et al. 1998: 8).

It was in the 1570s, with the exchange of tobacco between Native Americans and Europeans on the eastern coast of America, and the integration of tobacco into European society, that the process of assimilating the tobacco exchange between the two cultures was complete (Goodman 1993:47). Europeans first encountered Native Americans smoking with small clay pipes in Florida and Virginia, likely influencing the same style and composition of pipes used by the first Europeans (Fox 2015:20, 39). The Cherokee people made clay pipes from local clay and made pipe stems out of sourwood (*Oxydendrum arboretum*), as the pith was easily removed (Hamel and Chiltoskey 1975:11, 56). As early as 1558 when tobacco was first introduced to England that the first clay smoking pipes began being made (Ayto 2012:4).

After its introduction to Europe, the diffusion of tobacco around the world occurred quickly. By circa 1595 it had reached India; by the early 1600s it reached Japan, China, Persia, and the Ottoman Empire, and then Africa not long after (Goodman 1993:51-52; Braudel 1973: 190). Up to the 1600s tobacco was considered a health benefit for combating illnesses, but this began to change when King James I wrote
Counterblaste to Tobacco published in 1604. King James detested tobacco and wrote that since it originated from “base corruption and barbarity,” that is, from the indigenous people of North America, it was a plant of the devils’ making and was not the panacea for illnesses it was believed to be at the time (Corti 1932:77-83; James I 1604). However, when the plague reached its height in the 17th century, smoking was encouraged as a disinfectant and preventative measure (Corti 1932:166-167). This debate over tobacco’s negative or positive health impacts continued into the 20th century.

The debate over tobacco and smoking also affected the Europeans’ social view of tobacco use by women and children, which vacillated between acceptance and denunciation, respectability and immorality, and a benefit or detriment to health (Apperson 1914:25-235; Fox 2015: 55-57; Lock et al, 1998:78-84). When tobacco was first introduced into Europe its use was acceptable and in fact encouraged. Many essayists of the time believed that smoking was good for the fetus: however, Goodman (1993:61) reports that in 1633 James Hart wrote that children and pregnant women should not use tobacco. Apperson (1916: 33) writes that smoking in the 17th century was not limited to age, sex, or social class. Goodman (1993:61-62) notes that there is little written evidence from this time of women and children smoking and therefore cultural bias towards this cannot be determined.

In the United States, however, a visitor in 1686, M. Durand, recounted how everyone smoked throughout the day, “men, women, girls & boys from the age of seven years” (Robert 1952:99). Initially tobacco was expensive and considered a high society pleasure, but with its production expanding throughout North America and in Europe, prices dropped precipitously by the mid-1600s. It wasn’t until the second half of this century that availability and a rise in personal income, allowed more people to afford it (Goodman 1993: 63-64). As the use of tobacco grew, its moral stigma began to develop (Gilman and Xun, 2004:15).

It should be noted that imagery and data on women and smoking in America should not be compared to Europe. In Dutch Calvinistic society, paintings often show men and women smoking in immoral settings such as taverns (Fox 2015: 58). Julia King (2007:17) reviewed archaeological evidence surrounding 17th century women’s domestic sphere in the Chesapeake region and compared it to women in Europe. She concluded
that women in western Europe who smoked were looked upon with contempt, whereas in America it was common for women to smoke, and there is no indication of the same social stigma. King (2007:17) noted that 22% of females’ teeth displayed pipe wear facets, and Phung et al. (2009:77) found that many of the remains of men, women and young adults in the Chesapeake colonies, had circular notches in their teeth caused by clenching a clay pipe in their teeth.

The 18th century highlighted the value placed on tobacco as a currency and a commodity in the American colonies. The American Revolution was financed with loans from France. Tobacco was used as collateral, and afterwards, a tobacco tax helped to repay the loans (Russo et al. 2011:563). Military leaders promoted tobacco for personal and economic benefits. When George Washington was asked by civilians how they could help with the war effort he is said to have replied, “If you can’t send money, send tobacco.” (Burns 2007:94). Tobacco was used as soldiers’ pay, with which they purchased food, clothing, and weapons, and smoking helped relieve and distract from the harshness of war. Soldiers smoked whenever they had a spare moment, and when tobacco was in short supply or not sent to them by their families, they begged their compatriots to share. When not shared, blows were thrown in frustration (Burns 2007:93-95). It was not uncommon for people to raise their own tobacco for family and personal use (Robert 1952: 75).

The 18th century also saw the rise of other forms of tobacco used by Colonial Americans and Europeans alike. Smoking and snuff taking in the eighteenth century evolved from a fashion statement to a custom, resulting in a continual and steady expansion. Snuff was first used by the French (Robert 1952: 100) as a way for high status people to separate themselves, the refined and respectable, from the common people, who were thought of as crude and coarse (Corti 1932: 149, Goodman 1993:81). The French were considered colonial allies during the American Revolution, with American high society adopting the snuff habit (Robert 1952:100). In contrast, pipe smoking was considered to be used only by the common people. Snuff was so popular that its use increased to account for half of the English market by the end of the century, when it dropped to 1%, followed by a resurgence of pipe smoking which grew to 60% by mid-century (Meyer 2009:236).
In the 19th century, the lower classes still preferred pipe tobacco and chewing tobacco, as they were the cheapest, whereas the more expensive snuff and cigars were the domain of the upper classes (Goodman 1993:93, 98-99). Apperson states (1916:156): “By the 19th century, the use of tobacco had become an accepted custom among most European American males.” Contrary to this, within the White House, both Andrew Jackson’s and Zachary Taylor’s wives smoked a pipe, but when cigarettes were introduced, it was considered inappropriate for women to smoke (Brooks 1952: 220, Whelan 1984:36). Tobacco was smoked, inhaled and chewed; but generally, not in the presence of women. During the Victorian era, smoking was considered a social vice not to be done publicly, but in discreet places.

Katie Wynias’ (2013:33) thesis on smoking as a shared and social practice, revealed that during the fur trade era, tobacco and smoking were both important cultural means for doing business at the Hudson Bay Company on the Columbia River. Tobacco was not only a highly sought-after trade good for personal use but was also a means to forge bonds and maintain trade relationships through a shared practice in ceremonial customs (Wynia 2013:19). Meyer (2009:238) reflects on the idea that the practice of women smoking in the West may not have been stigmatized as it was elsewhere. Wynia (2013: 33) noted that Catherine, the wife of Pierre Pambrun, along with many pioneer women, smoked a pipe. Her husband tried to convince her to stop by using diamond earrings as an enticement, but to no avail. In an 1891 advertisement of A. Coolot’s, the Young Ladies Standard Cigar Factory founded in 1856, featured Cameo and Vanity Fair cigarette brands for women (Meyer 2009:238). Kelly Dixons’ (2005: 144-145) archaeological research of the African American-owned Boston Saloon in Virginia City, Nevada, found female (thought likely to be of African descent) DNA on a clay tobacco pipe stem. Though not considered a respectable location, the saloon pipe does show women’s use of tobacco in a public location. Archaeology of saloons in Virginia City revealed the frequent co-occurrence of tobacco pipes and alcohol together in social settings, crossing ethnic and social classes (Dixon 2005:13-114).

During the 19th century changes in styles of smoking began to take hold, with the more expensive cigar, pipes made from meerschaum and porcelain, and 1850 pipes made of briar (*Erica arborea*, a fire-resistant root), all became a symbol and image of a
cultured elite person (Duco 2004:9-10; Robert 1952: 95). The first cigarettes were rarely smoked before the Civil War as the social convention at the time felt that real men smoked cigars and pipes or chewed tobacco, but cigarettes were only for ‘sissies and dudes’ (Rapaport 2014:41). It was not until 1839 with the cultivation of a new milder tobacco, called Bright tobacco, and machine manufacturing of cigarettes in New York in 1880, that they became a common smoking habit (Lock et al. 1998:16, Rapaport 2014:40).

3.1.2. Use of Tobacco in the Military

Within the military, tobacco has been the soldiers’ product of choice to help dissociate from the rigors, stresses and horrors of war and to provide some comfort (Apperson 1916:174; Rapaport 2014: 26). The general camp stench of body odors, latrines and death, could be masked with smoking (Rapaport 2014:26). In *Hard Tack and Coffee*, a personal reflection of a soldier’s life during the American Civil War the illustrator, Charles W. Reed (a member of the ninth Massachusetts Battery and topographical engineer on General Warren’s staff, fifth corps, Army of the Potomac), frequently shows soldiers smoking in various military settings (Billings 1982[1887]). Billings (1982:66[1887]) writes that soldiers had one “pastime-the proverbial soldier’s pastime of smoking”, and a pipe was their ever-present companion. Robert (1952:119) states that there were three influences that helped promote smoking in all American wars, “(1) absence of family restraints, (2) indulgence by way of escape from the fatigues of military life, and (3) quickened imitativeness accompanying the massing together of people.” The typical soldier carried everything on his back that he would need or want, this included tobacco pouches and pipes (Rapaport 2014:20). Soldiers were sometimes sent to forage for food and finding tobacco in drying sheds would help themselves liberally to it (Billings 1982:238-239[1887]). Billings (1982:67[1887]) notes that it was common and widespread to make smoking pipes out of mountain laurel (*Kalmia latifolia*) as mementos of camps or battlefields. Often soldiers made pipes from clay, roots, corn cobs and stone to relieve the boredom and monotony of long hours (Rapaport 2014: 101). During the American Civil war, a northern prisoner of war recalled how pipes were made from local clay found in the prison yard (Rapaport 2014: 106).
During lulls in fighting, it was not uncommon for Confederate tobacco and Union coffee to be swapped through the picket lines (Robert 1952: 120). Union soldiers could buy “navy tobacco, of the blackest sort, one dollar and a quarter a plug” (Billings 1982 [1887]: 225). Confederate soldiers had one benefit that Union soldiers didn’t: tobacco. It became a part of their rations. The Confederate Congress, after two earlier failed attempts, passed a rations act in 1864, it states:

CHAP. LXXI. —An Act to provide tobacco for the army.
“The Congress of the Confederate States of America do enact, That there shall be furnished to every enlisted man in the service of the Confederate States one ration of tobacco, under such regulations as the Secretary of War may establish. APPROVED February 17, 1864” (Robert 1952:120).

Before the Civil War, tobacco was an established ration issued by sailors in the United States Navy (Brooks 1952: 221). Vihlene (2008: 31) notes that Federal troops did not get this benefit until after the Civil War, but it wasn’t free. They had to pay for it. On March 3, 1865, the Subsistence Department was reorganized by an Act of Congress, which also authorized tobacco to be issued “at cost to enlisted men, not to exceed sixteen ounces per month, and could be issued on credit” (Skirbunt and Robinson 2008:65). Vihlene (2008:56) examined tobacco use by the Seventh Cavalry during the 19th century. She found that over a 16 year period, from 1867-1882, the percentage of soldiers taking tobacco rations was 86.6 percent. This provides insight into Western United States soldiers’ tobacco use and provides a basis for helping to understand the likely percentage of tobacco use by other western military companies. Vihlene (2008:64) reports that the American public had a significantly lower consumption of tobacco than soldiers. The social act of bonding in the military results from the necessity of “protecting each other’s back”. For young recruits, observing and imitating older veterans use of tobacco, was one way for them to bond with the other soldiers. The highly successful and admired military strategist General Ulysses S. Grant was never without a cigar and people appreciative of his success supplied him with them, so many that he never had to buy his own (Burns 2007:126). Unfortunately, the painful end of his life in 1885 was due to throat cancer (Whelan 1984:39). Life in the military was associated with “heavy drinking, laying with prostitutes, and smoking” (Rapaport 2014:79, Vihlene 2008:70). To illustrate the importance of tobacco to soldiers, Pvt. Thomas Coleman of the Seventh
Cavalry remarked that “Tobacco the weed that every soldier likes eaven [sic] better than he [sic] does Whiskey” (Liddic 1979:13) and another soldier states “if ever anything causes a mutiny in the army, it will be the want of tobacco” (Coulter 1950:460). During times of tobacco shortage, soldiers resorted to unsatisfactory alternatives such as white oak bark, dried tea leaves, crushed coffee grounds, moss and a combination of chickory, cabbage and sumac leaves (Barton and Logue 2002:133-134, Lord 1969:49).

3.1.3 Physiological and Medical Impacts of Smoking

From the initial introduction of tobacco into Europe through the 20th century, controversy surrounded its health benefits. Initially tobacco was thought to be a panacea for many illnesses. In 1571, a physician in Seville, Spain, Nicolas Monardes wrote a book on American medicinal plants in which he reported that tobacco could cure 36 different illnesses (Russo et al. 2011:562). Jean Nicot de Villemain the French Ambassador to Portugal, brought the tobacco plant from Portugal to France and recommended its use to Catherine de’ Medici for headaches (to honor Nicot it was suggested the plant be named *Nicotiane*) (Hatch 1942:106, Kell 1965:102, Russo et al. 2011:562). In 1614, during an outbreak of the plague in London, doctors recommended smoking as a disinfectant because they had observed that there was a lower incidence of the disease by habitual smokers than the rest of the population (Corti 1932: 89). During an 1831 cholera epidemic in Berlin, smoking was recommended as a preventative means against the disease (Corti 1932: 228). During the American Civil war, wounded and dying men asked for and were given tobacco because it was believed to provide comfort to the wounded and solace to the dying (Rapaport 2014:51).

In the 16th and 17th century, Europeans believed that for an individual to remain healthy the theory of balancing ‘humours’ was to be followed. It was the belief that the human body was made of air, fire, earth and water, and there had to be a balance of hot, cold, wet, dry, which were linked to the four seasons. Smoking was believed to help maintain this balance by drying up excess fluids (Kell 1965:103). Opponents of tobacco believed that the opposite occurred, and that tobacco led to an imbalance and drying up or dissipating of heat. Elderly people were told not to smoke because they were already
dried up, and therefore, there was an increasing chance of early illness and disease (Kell 1965:104).

Tobacco plants produce nicotine as a defense against insects, and for this reason nicotine is extracted and used worldwide as a pesticide (Russo et al, 2011:559). The Hudson Bay Company at Fort Vancouver, Washington, positioned tobacco leaves between fur bales to kill insects that ingested the leaves (Wynia 2013:20-21). Initially, medical arguments against tobacco’s use focused on the various types used, such as sniffing snuff versus inhaling, but not tobacco itself (Meyer 2009:236). The earliest scientific study looking at the effects of tobacco was done by John Hill (1761), who published *Cautions against the Immoderate Use of Snuff*, in which he advised against the use of snuff because it could cause nose cancers. In 1859, French physician E. F. Bouisson alluded to the cause of cancer in the buccal cavity from heat and tobacco from smoking (Bouisson 1859: 539-559; Schmeck 1964:66). Scientific testing continued in the 19th century that helped clarify the negative health effects of nicotine; combined with increasing knowledge of the pathophysiology of diseases, this new concept of illness resulted in the invalidation of the humoral view in medicine (Goodman 1993:85, 115-117).

Tobacco contains over 4000 chemicals, including many of which are carcinogens, tar and carbon monoxide, that are linked to addiction and other medical effects, but nicotine is the primary component causing addiction. Nicotine is rapidly absorbed through the skin, alveoli of the lungs, and mucosa of the oral cavity and nose. It then enters into the pulmonary circulation system and then the systemic circulation system, before being metabolized by the liver and excreted by the kidneys (Ignatavicius & Bayne 1991: 560, 1992; Lehne 1990: 124). Bruijnzeel (2012: 1418-1441) studied the relationship between tobacco addiction and dysregulation of brain stress systems. He demonstrated that heavy smokers (with high serum levels of nicotine) have a higher level of cortisol and ACTH (adrenocorticotropic hormone). ACTH is made in the pituitary gland (produced when the body is stressed) and the adrenal glands make cortisol (which helps the body manage stress). Normally, when ACTH rises, cortisol drops and when cortisol levels rise ACTH decreases, but smoking disrupts the regulation of these hormones. During the first few minutes of smoking the smoker experiences the highest
level of rush or high feelings, but within 30 minutes this sensation disappears (Bruijnzeel 2012: 1424). When levels of nicotine in the body are high or low, smokers adjust their smoking behavior to maintain a consistent level (DHHS 2010: 111). Some factors that may cause nicotine addiction are “(1) neuroadaptations that occur with the persistent use of nicotine (e.g. tolerance), (2) withdrawal symptoms experienced when intake of the drug is stopped, and (3) the effects of nicotine that reinforce dependence” (DHHS 2010:116). Continued use may be reinforced by the positive effects of the drug, as well as the negative effects, such as withdrawal symptoms, or the relief of these negative effects. Nicotine is now known to cause cancer at 18 different organ locations, such as lung and oral cavity membranes (Russo et al, 2011:569), larynx, esophageal, and contributes to cancers of the bladder, pancreas, kidney, and stomach (Ignatavicius & Bayne 1991; 561; Tverdal & Bjartveit 2011: 123-130). Other negative health effects are coronary artery disease, respiratory disease (such as chronic obstructive pulmonary disease), decreased lung function, airflow obstruction, paralyzed cilia action (in the respiratory tract), atherosclerosis and peripheral vascular disease, stroke and chronic inflammation (DDHS 2010:408; Ignatavicius & Bayne 1991: 1992, 2088, 2189, 2205; Winter 2000: 331-340).

The type and risk of health effects from tobacco depends on how deeply the smoke is inhaled and how often. The exclusively pipe smoking individual who puffs on pipes, has a lower risk for many smoking-related diseases (DHHS 2010: 362). However, Brown et al., (1993: 1163-1167) reported that pipe smokers had a higher incidence of chronic cough and phlegm, a higher prevalence of chronic bronchitis with resulting mortality rates, and an increase in respiratory infections, influenza, pneumonia and peptic ulcer disease (Winter 2000:332).

Bruijnzeel’s (2010:1418-1441) study of cigarette smokers’ physical and psychosocial addiction, found that life stressors affect brain systems with the initiation of smoking for stress relief, relaxation, boredom relief and enjoyment. He found that “smoking activates brain stress systems and over time induces a dysregulation of these systems. This can lead to an increase in perceived stress levels.” Bruijnzeel also reviewed studies that reported the positive reinforcement to smoking including a suppression of appetite, “mild euphoria, relaxation, and improved attention and working
memory”, while cessation or interrupted smoking led to “depressed mood, increased
anxiety, and impaired memory and attention” and “exposure to stressors leads to increase
craving for cigarettes and smoking.” Bruijnzeel also found that tobacco withdrawal is
exhibited by a “decrease in positive affect, an increase in negative affect, craving for
tobacco, irritability, anxiety, difficulty concentrating, hyperphagia, restlessness, and
disruption of sleep”, with the most severe withdrawal symptoms occurring during the
first week of cessation, but with the return to smoking the smoker’s cognitive level
returns to pre-cessation levels (Bruijnzeel 2010: 1423). In addition, smokers have a risk
for developing depression, anxiety disorders and PTSD increases (Bruijnzeel 2010:1434).
Knowledge of the effects of tobacco’s use and withdrawal can help to comprehend
soldiers’ reactions at Fort Hoskins and Fort Yamhill as recorded in the journals of
Corporal Hilleary and Corporal Bensell. Smoking for soldiers was a social interaction,
solace and form of bonding from living in remote western outposts, during stressful
situations, such as war or threat of violence, and to help relieve boredom of their daily
routine.
4. The History of Fort Hoskins and Fort Yamhill

4.1. Natural Setting

Fort Hoskins (Figure 1) and Fort Yamhill were established in 1856 in the eastern foothills of the coastal range in western Oregon. Fort Yamhill is located 31 miles west of Salem, on the eastern boundary of the Grand Ronde Reservation, established in 1855, on the northwest slope of a hill with clear views to the northwest and southeast (OPRD 2004). Fort Hoskins is located in Kings Valley where it is situated on a large bench between two hills with open views of the valley and up the Luckiamute River (Ferguson and Miller 2000). Both forts were strategically located next to main trails that led from valleys in the east to the coast on the west, enabling close monitoring and control of traffic coming or going through the areas. The north-south distance between the two forts is about 45 miles.

The climate in this area is strongly influenced by the Pacific Ocean. Generally, the daily average summer temperature is above 62°F and the winter is below 52°F. Areas closer to the Pacific Ocean have more rainfall and moderate temperatures (Redmond and Taylor 1997: 25; Pojar and MacKinnon 2004: 13). Redmond and Taylor (1997) identify the forest type in these areas as a seasonal rain forest because this area has cool, dry summers (with less than 10% of the yearly rainfall occurring), with natural catastrophic wildfires occurring infrequently about every 100 years.

Fort Hoskins and Fort Yamhill were built in what was historically open Woodland habitat, characterized by a continually or semi-open canopy of deciduous or mixed deciduous-conifers and oak savanna which is dominated by grasses with drought-resistant trees interspersed (Ferguson and Miller 2000: 6, OPRD 2004: 26). This area was routinely burned by Native Americans to maintain open areas that were easy to move through for both game animals and humans. Burning inhibited growth of trees and shrubs that competed with fire-resistant oak trees, without burning, plant succession would result in a climax of closed-canopy forests. Burning also promoted growth of camas meadows, berries, nuts, root vegetables and encourage and maintain forage plants for deer and other game (Ferguson and Miller 2000:6, OPRD 2004:19, Pojar and MacKinnon 1994:21).
Figure 1. Extant Painting of Fort Hoskins ca. 1850-1860.

4.2 Military and Political Context

In 1855 President Franklin Pierce signed an executive order establishing the Coastal Reservation for Native American tribes of Oregon, but the result was its separation into two smaller sections (Brauner 2006:22-23). Joel Palmer, the Superintendent of Indian Affairs for Oregon Territory, did not want the tribes near white settlements because some settlers and newspapers were calling for complete genocide. He called for consolidating the numerous small tribes onto the reservations because their numbers had been reduced from disease, starvation and violence, therefore, to protect these vulnerable populations they were joined together on the reservations (Brauner 2006: 25-30). In the end, 27 different tribes and bands were placed in the Grand Ronde reservation (OPRD 2004: 26) and at the Siletz Agency part of the Coastal reservation, 27 different tribes and bands were located (Confederated Tribes of Siletz Indians 2018).

Fort Yamhill and Fort Hoskins were built to monitor the tribes, restrict and control traffic passing through the area and provide protection to Native Americans from violence by white settlers (Eichelberger 2010: 25-26, OPRD 2004: 12). Fort Yamhill was built on the eastern boundary of the Grand Ronde Reservation (OPRD 2004). Location of the fort allowed transportation access to Portland and nearby communities for
contractors, construction material, supplies, socializing and church services (OPRD 2004: 12). Fort Yamhill consisted of officers’ houses, adjutant’s office, guardhouse, quartermaster and Commissary storehouse, barracks, mess hall and company kitchen, laundress houses, bake house, stables, blacksmith shop, carpenter shop, hospital and sutlers’ store. Fort Hoskins, built five months after Fort Yamhill, was located near the small settlement of Kings Valley, 18 miles east of Siletz Agency of the Coastal Reservation (Confederated Tribes of Siletz Indians 2018). Both forts were located with transportation access to nearby settler communities in order to have access to resources and community (Brauner and Stricker 2006: 44-45; OPRD 2004:12). Fort Hoskins consisted of officers’ houses, soldiers’ barracks, warehouse, bakery, laundress houses, hospital, guardhouse, company store, company office, stables, blacksmith shop, carpenter’s shop, munitions, and the sutlers’ store and stables (Brauner and Stricker 2006: 51, Ferguson and Miller 2000: 5).

Between 1856 and 1861, the forts were manned with regular troops, but with the advent of the American Civil War, these troops were sent east to fight for the Union, and Oregon Volunteer Infantry manned the forts until their closure by 1866. In 1861 the forts were almost closed but remained open due to anxiety over attack from multiple parties (Brauner and Strickler 2009: 63). First, the local population feared renewed conflict between the Native tribes and white settlers. There was a strong movement of Southern sympathizers in western Oregon called the Knights of the Golden Circle. There were rumors of an impending revolt by this secret society composed of Confederate supporters, although this never occurred (Brauner and Stricker 2006; 63). Another concern was a threat of attack by Confederate ships along the Pacific Coast or on the Columbia River. At the beginning of the Civil war there were no fortifications along the Oregon coast, as all appropriation money had been spent fortifying Fort Point and Alcatraz in San Francisco Bay, California (Hunt 1951:234). Additionally, because the Union’s Navy was engaged in a blockade of Confederate ports along the East Coast, the Pacific squadron was small. The fear of Confederate attack was confirmed in 1864 when Captain James I. Wadell of the Confederate navy attacked gold laden ships along the Pacific Coast (Sinclair 2004: 45-46). Lastly, there was fear that British ships based in British Columbia would take advantage of the weak military defenses in the Pacific
Northwest and raid American territory. Although Great Britain and the United States had settled their boundary conflict in 1846, conflict continued up to 1871 over international boundaries surrounding the San Juan Islands; in Washington Territory.

In 1858 General William Selby Harney (who was anti-British) became the commander of the Department of Oregon, and in 1859 he nearly incited war between Great Britain and the United States over the San Juan Islands (Sinclair 2004: 36-39). The international boundary was unclear and there was conflict between the Hudson Bay Company (HBC) and American settlers on the island over land claims (Hunt 1951:23, Sinclair 2004, 38-39). An American killed an HBC pig and “The Pig War” began with British authorities threatening to evict all Americans as trespassers. As a result, the Americans asked Brig. Gen. William S. Harney for military protection. Without orders Harney sent troops to San Juan Island, and on Vancouver Island Governor Douglas made an official protest. Three British warships were sent to the area, but eventually cooler heads prevailed. It wasn’t until the Second Treaty of Washington in 1871 that the conflict ended, and the San Juan Islands were incorporated into Washington territory (Sinclair 2004: 38-39).

4.3 The Forts’ Soldiers

One way to investigate the cultural milieu of Fort Hoskins and Fort Yamhill is to examine what countries and parts of the U.S. soldiers stationed at the forts originated from. Shablitsky (1996: 45, Table 4.5) provides information on Oregon volunteers from the 1st Oregon Infantry and Companies B and F who were stationed at Fort Hoskins from December 29, 1864 until on April 10, 1865. Table 1 is a reconstruction for this study showing countries of origin for the 2% of the total population of soldiers from countries other than the United States. Of those from the United States, 9.64% (75) of men were from Confederate States.
Table 1. Countries of Origin for Non-American Soldiers Stationed at Fort Hoskins December 1864-April 1865.

The different companies stationed at Fort Hoskins can be seen in Table 2, and Figure 2 presents the location assignment of different companies at both forts. Schablitsky (1996:22-23) notes that Fort Hoskins was built to house two companies of soldiers, with one company of soldiers typically consisting of 70-80 men. Eichelberger (2010: 38) reports that Fort Yamhill generally housed one company averaging 71 men. As Figure 2 shows, the F 4th Infantry, D 4th California Volunteers and C/D 1st Washington Territory garrisons served at both forts. Because of the minimal distance between the two forts, it was not uncommon for individual soldiers of both forts be sent back and forth between them for communications and temporary duty. Bensell notes in his journal that “Lieuts Garden & Davison detailed on a Court Martial at Fort Hoskins” (Barth 1959: 66), and on “July 1, 1863. Clear. Start for Ft. Hoskins” and he continues to the Siletz Block house on July 2, 1863, returning to Fort Hoskins July 6, 1863, then to Fort Yamhill on July 7, 1863 (Barth 1959: 94-95).
Table 2. Companies Stationed at Fort Hoskins (Brauner and Stricker 2006: 62).

<table>
<thead>
<tr>
<th>Company</th>
<th>Commander</th>
<th>Date Garrisoned</th>
</tr>
</thead>
<tbody>
<tr>
<td>G, 4th Infantry</td>
<td>Captain Auger*</td>
<td>July 25, 1856 - June 25, 1861</td>
</tr>
<tr>
<td>F, 4th Infantry</td>
<td>Lt. Wheeler</td>
<td>March 22 - April 8, 1857</td>
</tr>
<tr>
<td>B, 9th Infantry</td>
<td>Captain Dent*</td>
<td>April 18 - April 30, 1857</td>
</tr>
<tr>
<td>F, 4th Infantry</td>
<td>Captain Floyd-Jones</td>
<td>June 19, 1857 - Jan. 19, 1858</td>
</tr>
<tr>
<td>F, 4th Infantry</td>
<td>Captain Floyd-Jones</td>
<td>Oct. 5, 1858 - June 14, 1861</td>
</tr>
<tr>
<td>B, 9th Infantry</td>
<td>Captain Dent*</td>
<td>June 20, 1861 - Nov. 1, 1861</td>
</tr>
<tr>
<td>B, 2nd California Infantry</td>
<td>Captain Schmidt*</td>
<td>Nov. 1, 1861 - July 14, 1862</td>
</tr>
<tr>
<td>D, 1st Washington Infantry</td>
<td>Captain Seidenstriker*</td>
<td>July 14, 1862 - April 4, 1863</td>
</tr>
<tr>
<td>D, 4th California Infantry</td>
<td>Lt. Garden/Captain Scott*</td>
<td>April 4, 1863 - Oct. 8, 1864</td>
</tr>
<tr>
<td>B, 1st Oregon Infantry</td>
<td>Captain Palmer*</td>
<td>Dec. 29, 1864 - April 10, 1865</td>
</tr>
<tr>
<td>F, 1st Oregon Infantry</td>
<td>Captain Walters</td>
<td>Dec. 29, 1865 – April 10, 1865</td>
</tr>
</tbody>
</table>

*Base Commanders

Figure 2. Garrisons Stationed at Fort Yamhill and Fort Hoskins, 1856-1866 (Adam 1991: 81).

4.4. Health in the Forts

In the mid-19th century medical care and medications were still rudimentary at best, but the understanding of germ theory was on the brink of discovery, soon to be followed by antibiotics and new pharmaceuticals to combat diseases. The historical period when Fort Hoskins and Fort Yamhill were in operation was a time when doctors
believed in the idea of “malignant miasmas” that is, that air infused with smells of decaying animals and plants resulted in disease. Trussel (1996:85) noted that the health problems seen by medical staff would be similar at both forts as they were in “similar geographical and environmental locations, played the same role on the frontier, conducted the same daily activities, and even shared and exchanged personnel on a regular basis.”

The discovery of bacteria occurred in 1683 when Anton van Leeuwenhoek, a Dutch merchant who built his own microscope, discovered bacteria which he called “animalcules”. In 1860, a British physician John Lister building from Louis Pasteur’s work using heat to reduce bacteria in wine and milk, developed antiseptic techniques for wound care and aseptic techniques for surgery (Brought to Life 2018, Taber 1989). However, it was not until 1876 (well after the Civil War) when Robert Koch proved that bacteria caused disease, that science started to look towards the development of new pharmaceuticals in the battle against infection and disease (Nouria 2017).

To try and understand the soldiers’ health conditions at the forts as related to smoking, information about the men, and current medical knowledge was gathered. No data could be found on how many men smoked or how long any of the men had been smoking at Fort Hoskins or Fort Yamhill. However, a review of contemporary western soldiers use of tobacco can be utilized. An estimate of the possible number of soldiers who used some form of tobacco can be extrapolated from Vihlenes’ (2008:56, 76) data for percentage of the men in General George Custer’s Seventh Cavalry who took tobacco ration between 1867-1882, which was 86.6%, of this 25% used smoking tobacco. Using this percentage, a rough estimate of the 875 Oregon Volunteers at Fort Hoskins would be approximately 758 used some form of tobacco and 219 would have smoked. The average age of the 875 Oregon Volunteer men stationed at Fort Hoskins was 26 (Shablitsky 1996: 38), but there were 269 men (30.74%) between the ages of 30-54, of these between the ages of 30-39 there were 205 or 23.43% and between 40-54 there were 64 or 7.31% (Shablitsky Figure 4.1), which can be reasoned to be similar for Fort Yamhill. Vihlene (2008: 65) notes that children as young as eight years old were using tobacco. If soldiers started smoking at this young age, physiologically they could potentially have health related problems associated with smoking tobacco.
Trussell (1996) and Wesseler (2017) examined the archaeological and historical perspective of the hospital, medicine and medical personnel at Fort Hoskins and Fort Yamhill. Both utilized archival records and made comparisons of the forts’ soldiers’ health, finding that compared to their eastern compatriots serving in the military, in general, their diet and health were better (Trussell 1996: 93, Wesseler 2017). Trussell (1996: 76-77) noted that the medical records were incomplete. Eichelberger (2010: 38) reported that Fort Yamhill was built to house one company averaging 71 men and Shablitsky (1996: 22; citing Hoop 1929:346) noted that one company consisted of 70-80 men. Trussel (1996: 84, 91-92) noted that a total of 11 companies had been stationed at Fort Hoskins during its operation, with a total of 1329 illnesses. Wesseler (2017:63) noted a total of 812 illnesses were recorded in Fort Yamhill’s medical records during its period of operation. The medical data from both forts reveals that the percentage of primary illnesses potentially related to tobacco use were similar. Fort Hoskins digestive illness were 17.57% and respiratory 14.60% (Trussell 1996:84), Fort Yamhill digestive illnesses were 13.3% and respiratory 17.49% (Wesseler 2017:64). Table 3 presents total number of cases for bronchitis, catarrh (mucus, phlegm, discharge), laryngitis, pneumonia, odontology, and gastritis. There are twelve differentiations of respiratory ailments at Fort Yamhill compared to only five at Fort Hoskins, suggesting that the considerable difference in number of cases of catarrh and bronchitis between the two forts may be due to the level of knowledge and skill of the medical personnel. In contrast, odontalgia, tooth pain from caries (cavities), infection or trauma was the same at both forts with eight cases (Trussell 1996:82, Wesseler 2017:177).
Using today’s medical knowledge as a lens to view the forts’ medical records, several links between smoking and health can be inferred. In the 19th century the health consequences of smoking were not understood. Though people acknowledged that smoking reduced the appetite, produced euphoria, and increased attention span, they did not know much about the negative health effects. As noted earlier (Brown et al., 1993, DDHS 2010, Ignatavicius & Bayne 1991, Russo et al, 2011, Tverdal & Bjartveit 2011, Winter 2000), today it is well known that some of the consequences of smoking tobacco include higher risk of chronic cough and phlegm, chronic bronchitis, respiratory infections, asthma, influenza, pneumonia, cardiopulmonary disease, cancers, Type 2 diabetes, chronic obstructive pulmonary disease, vision loss, and decreased wound healing, as well as, oral health issues such as increased dental caries, severe gum disease, sepsis and peptic ulcer disease (Center for Disease Control 2017). Research also shows that in addition to active smoking, even “passive smoking increases the risk of many human diseases including heart and lung disorders” (Coen et al., 2006:330), which has implications for soldiers living in close quarters. Smokers are also more likely to be carriers of meningococcal disease, “Staphylococcus aureus, tuberculosis, Streptococcus pneumoniae, and group B beta-haemolytic streptococci” (Coen et al., 2006: 334). As a result of smoking, within the respiratory tract, bacterial adherence to the epithelial lining of the upper respiratory tract is strengthened, and circulatory function is impaired (Coen

Table 3. Illnesses Enabled or Exacerbated by Smoking (Trussel 1996: Table 9.1 and Table 9.2, Wesseler 2017: Table1).

<table>
<thead>
<tr>
<th></th>
<th>Fort Yamhill 1859-1866</th>
<th>Fort Hoskins 1857-1865</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cases</td>
<td>Bronchitis (acute and chronic) 70</td>
<td>Bronchitis (acute and chronic) 7</td>
</tr>
<tr>
<td></td>
<td>Catarrh 18</td>
<td>Catarrh 177</td>
</tr>
<tr>
<td></td>
<td>Laryngitis 5</td>
<td>Laryngitis 4</td>
</tr>
<tr>
<td></td>
<td>Pneumonia 16</td>
<td>Pneumonia 7</td>
</tr>
<tr>
<td>Odontopathy</td>
<td>8</td>
<td>Odontopathy 8</td>
</tr>
<tr>
<td>Gastritis</td>
<td>7</td>
<td>Gastritis 4</td>
</tr>
<tr>
<td>Percentage</td>
<td>Digestive Illnesses 13.3</td>
<td>Digestive Illnesses 17.5</td>
</tr>
<tr>
<td>Respiratory Illnesses</td>
<td>17.49</td>
<td>Respiratory Illnesses 14.60</td>
</tr>
</tbody>
</table>
et al., 2006: 330-331). In addition to health issues common to soldiers such as seasonal nutritional deficiencies, food borne illness from rancid food (Barth 1957: 11), poor hygiene, and allergies, smoking could have further weakened vulnerable immune systems and exacerbated illnesses and diseases.

There were times when tobacco was in short supply leading to withdrawal symptoms. Bensell writes in his journal “Aug 24, 1862…Tobacco has given out, none to be had for love or money. Old chewers very cross in consequence. I shall soon see if men can’t live and grow fat without the use of this weed. Many persons say Tobacco regulates the system” (Barth 1959:46). Today it is known that tobacco withdrawal results in craving tobacco, irritability, anxiety, trouble concentrating, hyperphagia, restlessness, sleep disruption, increased depression, and PTSD. Bensell writes on August 27, 1862, “Lt Davison drilled Compy Drill. Made several mistakes, got mad as usual. Order Pvt Reed to the Guard house for inattention” (Barth 1959: 47). The unavailability of tobacco for soldiers may have contributed to confrontations between soldiers and, between soldiers and officers. Shablitsky (1996:89) writes that officers were constantly being verbally and physically abused by soldiers, “Private Daniel Friel of Company G, 4th Infantry was accused of striking Sergeant W.C. Walker of Company G. On a second occasion Private Friel was recorded as stabbing Sergeant John Kaley of company F, 4th Infantry, with a knife.” Though it is acknowledged that alcohol helped play a part in abuse and violence at the forts, smoking and withdrawal should receive more historical attention as it was used conjointly with alcohol and had significant affects on mental health. Though 19th century medical records do not reflect an understanding of the medical implications and association of smoking, historians and anthropologists should take this into consideration when trying to understand past human health and behavior.

Tooth staining on the lingual surfaces of teeth in the remains of soldiers provide bioarcheological evidence on teeth damage due to tobacco use in soldiers of this era, such as those killed at the Battle of the Bighorn under General George Custer (Vihlene 2008). Additional odontological indicators provide evidence for the use of clay pipes, including concave dental abrasion in the form of wear facets from repeated and extended use and consistent placement of the clay pipe in the same location (Phung, King and Ubelaker 2009:73, Vihlene 2008:9, 76). The light weight of clay pipes allowed people to clench the
pipe between the teeth and use both hands for working. Duco (2004:9) notes that because of the fragility and high breakage rate of clay pipes, heavy smokers could potentially go through several hundred clay pipes in their lifetime, and the affects from continually using fresh pipes with their coarse texture would grind down teeth. Willey (1997:43) examined ten skeletal remains of Seventh Cavalry soldiers from the Custer Battlefield (today called Little Big Horn Battlefield National Monument) and reported that tobacco use was pervasive and “There are two possible indications of tobacco use. The temporal line, the origin of the temporalis muscle which is used in closing the jaw and chewing, is well developed and has bony exostoses (Figure 33). Although there are other possible explanations, these exostoses are consistent with clenching a pipe stem between the teeth or chewing tobacco. Another indication of tobacco use is tooth staining”. This form of tooth damage has also been encountered on skeletal remains from 17th century colonial sites. King (2007:17) and Phung (2009:77) describe skulls of men, women and young adults with wear facets from smoking clay pipes. In addition, tar from the combustion of botanicals, especially tobacco, and heat from the clay pipe itself can cause dark staining (Vihlene 2007:11). Kvaal and Derry (1996:28-30) found that in the House of Correction prison (operated from 18th - 20th century) in Oslo, Norway, skeletal remains of a seventeen year old prison inmate had shown clay pipe dental abrasion evidence. The eventual wearing down of teeth can result in exposure of the pulp cavity, resulting in bacteria moving into the cavity, and causing abscess formation, pain, and even sepsis and death (Figure 3) (Sepsis Alliance 2018).

Figure 3. Tooth Wear Facets and Abscess (Phung, King and Ubelaker 2009: Figure 4).
5. Sutlers and Transportation of Merchandise

The sutler was a primary source of tobacco for soldiers to buy at both forts. The sutler (or post trader) was a civilian merchant who sold food and dry goods to soldiers. A sutler was appointed or approved by the Secretary of War, attached to an army, regiment or post, and was accountable to the Council of Administration composed of three commissioned officers. He paid a monthly tax of up to 10 cents per man credited to the company fund, was subject to price regulations to prevent over charging (not well enforced) and, was restricted as to the types of goods that could be sold. The sutler could take credit from soldiers, but not more than half their monthly pay, with balances paid when the pay master arrived (Davis 1971:44, Eichelberger 2010:53, 95). Sutlers were often despised for the poor quality and inflated price of their products, but they did offer a valuable service by selling food items and dry goods not provided by the army (Skirbunt and Robinson 2008:48). Not all sutlers were like the above description, as some tried to be fair in their business dealings with the soldiers, but these seem to have been the exceptions (Skirbunt and Robinson 2008:49).

Sutlers sold supplies beyond the rudimentary ones provided by the army’s Quartermaster and commissary of subsistence (Eichelberger 2010:42, Skirbunt and Robinson 2008:49). In 1862, Congress detailed the items sutlers could sell including food items, such as milk, butter, fresh and dried fruits, and non-food items, for example, needles, thread, tobacco and clay pipes (Delo 1998:109; Skirbunt and Robinson 2008:48-49). In addition, within the forts a committee made up of three officers called the Council of Administration, prescribed the sutlers inventory and prices (Eichelberger 2010:96). Tobacco in particular was in great demand; however, it was not until 1865 that tobacco was included in the rations and could be bought with credit, but it was not to exceed sixteen ounces per month (Skirbunt and Robinson 2008:65). Before this time, Congress would not approve of a tobacco ration because soldiers were not paid on a regular basis, and therefore, had no money to buy tobacco; and since sutlers were excluded from active engagements, no tobacco was available to buy. Soldiers had to go for weeks without tobacco and if they did find some to buy, it was often at extremely inflated prices, sometimes amounting to two week’s pay for one tobacco plug (Lord 1969:48-49). Sutler price lists are rare because they did not want any constraints on being able to raise their
prices. Sutler profits ranged from 66% to 300% (Lord 1969:57-60). A rare 1863 sutler price list details the cost of two plugs of tobacco at $0.25 and a pipe (unknown type) costing $1.00. An enlisted man’s monthly pay was between $13 and $19, and officers made between $45 and $110 per month (Barth 1959: xi, Bowyer 1993:50). Additionally, there were times when soldiers went up to nine months without pay (Barth 1959:66). Hilleary notes on April 25, 1865, “My appetite is hard to satisfy or the fare is scant to-day. Eatables demand high prices. A soldier can eat up all his wages and not be a glutton either” (Nelson and Onstad 1965: 59). There were times when tobacco was not available for soldiers to buy, “No Tobacco to be had. Sutler says he’ll not purchase any and sell it on credit. Why don’t Capt Scott make him keep certain articles among which is Tobacco? This is the Law” (Barth 1959:60).

Sutlers ordered their merchandise from companies in large coastal cities like San Francisco (Stuckman 2015) then had the supplies shipped to Oregon. The sutler order list from Fort Vancouver in the 1850s, includes goods received from a San Francisco merchant named Folger and Tubbs (Stuckman 2015). Trade routes from New York or Boston around Cape Horn to San Francisco (Figure 4) could take six to eight months, but when the Panama Railroad was completed in 1855, the time was cut to one month (California Gold Rush 1848-1858). The period between 1840 and 1860 was the heyday for fast moving clipper ships, designed for carrying highly profitable cargo over long distances around the world (Vaucher 2014). The shipping of goods across the continent by the transcontinental railroad would not be available until 1869 (California Department of Parks and Recreation [CDPR] 2018).

The era of coal driven steamships began initially in 1830, but without reliable coal depots, the United States continued to use sailing ships until 1890. Coastal routes close to refueling depots were possible by ca. 1850, with coal driven steamships taking over as passenger and mail ships (Vaucher 2014). Bensell (Barth 1959:141) writes in his journal on April 23, 1864, at Alsea Agency (near Coos Bay, Oregon), “You can see for miles to the seaward and often see the Ocean Steamers passing North.” Products were brought to Portland or Vancouver Barracks via the Columbia River, taken by steam boat up “the Willamette River to Dayton over land by wagon to Fort Yamhill or down to Corvallis then by wagon to Fort Hoskins. All other transportation of goods and personnel from
Weil’s Store, Ballston, Lafayette, Salem, Dallas, Corvallis, Fort Hoskins and Fort Umpqua to Fort Yamhill was by wagon, horseback or foot along the already existing roads and trails” (Eichelberger 2010:20-21).

Figure 4. Sea Route Distances to California.

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The large European manufacturers exported clay pipes to the large eastern ports in New York, Baltimore, and New Orleans before distribution elsewhere, including West Coast port cities (Sudbury 2009:159). Large European clay pipe manufacturing firms sent traveling representatives with printed sales and product catalogues to potential wholesale and retail customers. The first simple pipe catalog appeared just before 1820; after 1820 complete catalogs developed with full size illustrations depicting pipes (Duco 2004:10-11). Whether any catalogs made it to the wholesalers and retailers of the west coast of America needs further research, but it is doubtful that they were available to individual sutlers. During the American Civil War, the Union blockade of New Orleans would have required shipments to the West Coast to bypass this stop. Sudbury (2009:171-172) presents an 1857 advertisement by the Heye Brothers of New York,
selling Dutch and German Clay pipes, but by 1858 they were selling only pipe clay. Sudbury (2009: 172) speculates that this may reflect an increase in domestic production and availability of America pipes which made selling high quality pipe clay more profitable than reselling imported pipes. American pipe makers gained a foothold in the domestic market as it would have been cheaper for retailers to buy and resell local pipes than to import more expensive European pipes.

The competition for clay pipes sent to America was intense, Stam (2010: 2201-2212) discusses the competition between Westerwald, Germany and Dutch pipe makers for the overseas markets. Interestingly, because transport of goods overland was difficult and expensive, pipe makers in the Westerwald region shipped their product to overseas markets through Dutch ports. Cheap pipes were sent to America, while the better quality ones from Gouda, were exported to Scandinavian countries. It was found that even during the American Civil War, though European exports were affected, there appears to have been an overall increase in imports of clay pipes. Cheap Westerwald pipes exported to England were re-exported to America and other English colonies, but a growing competition in the 19th century from Canada as well as Scotland (which produced even cheaper pipes), sharply reduced Westerwald pipe imports.

However, it was the American market for clay pipes that was the most important to Europeans, and the demand from industrial workers was such that no monopoly developed by any one company or country. During this time, few expensive and fashionable French pipes were exported to the United States, as these clay pipes were fragile and easily broken, and workers wanted cheap, durable ones. Fleming (1923:244) recounts a letter written by T. Carlyle in 1840 in which he complained that his pipes arrived broken, “the wretched people having packed them in a deep box (instead of a broad shallow one) and with sawdust (in place of fine hay) the whole concern arrived here in a state of dust, and ruin”. Between 1864-1866, 95% of clay pipes from 7 out of 8 manufacturers in Germany were exported to the United States and only 5% were sold to the local market (Stephan 1995:136); the number of pipes exported just from Uslar, Germany peaked at 11 million in 1866 (Sudbury 2009:206).
6. A Short History of Clay Pipes

6.1 Native American History of Clay Pipes

The history of clay pipe manufacture goes far back into Native American history. It is not known when the first clay pipes were made but use of an early form of ceramic elbow pipe with a reed stem is known to have occurred in the American Southeast. C.B. Moore recovered early reed stem elbow pipes in the 1890s at the Shield’s Mound in Jacksonville, Florida (Figure 5) as well as early effigy pipes at the Dunn’s Creek Mound in Jacksonville, Florida, and attributed them to the Woodland Period (3,000 B.C.-1670 A.D.) (Peach State Archaeological Society 2018). Native Americans manufactured clay pipes in a multi-unit design in which a separate stem made of reed, wood or other material, was inserted into a short stem socket of the ceramic bowl.

![Figure 5. Elbow Pipe.](image1)

![Figure 6. Expanding Bowl and Stem.](image2)

It was during the Mississippian period (A.D. 800-1540) that pipes became common across the Southeast. Through time these pipes evolved with more complex forms and design motifs; for example, shape design shifted to an expanded bowl and extended stems with a rounded or pointed end (Figure 6). Other forms from the Early to Middle Mississippian period exhibit geometric and crosshatching on the bowl base, human effigy, fully stemmed pipes (Figure 7), spurs added to the bottom of the bowl (Figure 8), “bean pipes” (Figure 9), and Late Mississippian monolithic axe pipes (Figure10); (PSAS 2018).
6.2 The Dispersion of Clay Pipes

It was approximately 1558, after tobacco was brought to England, that the first clay smoking pipes were made in Europe (Ayto 2012: 4), their design initially influenced by Native American styles (Fox 2015:20, 39). Tobacco News and Information (2018) reports that in the 16th century wherever Portuguese had trading posts along their sea routes, from the east African continent to India, they planted tobacco for personal use, gifts and for bartering. Robinson (1985: 150) states that in the late 1500s, Englishman Sir John Hawkins, a privateer and African slaver had with him a reed stem pipe. Archer and
Bartoy (2006:12, citing Hakluyt 1589) report that English sailors under Hawkins observed native Floridians using pipes made of cane and earthen cups to smoke, as well as soldiers in a nearby French colony. Spanish sailors brought tobacco and pipes back from the New World on their return to Spain. It is believed that Portuguese or Spanish sailors brought tobacco to the coastal city of Istanbul between 1580 and 1610 (cf. Baram 1991:142), along with tobacco they must have had instruments for smoking and introduced these as well. These pipes most likely would have been of Native American origin and style. Baram (1999:142) notes that tobacco pipes spread quickly throughout the Turkish empire with pipes being made from earthen colored clay and having a detachable wooden or reed stem. Early in the 17th century the short shanked, separate long-stemmed clay chibouk pipe appeared in Turkey (Robinson 1985: 152-153); these were most likely from Africa, and made from local clays, often in red colors. It was also in this century that pipe makers’ guilds were established in Turkey. Overall, the eastward spread of clay pipes included single unit pipes (bowl with attached stem) through Europe and the reed stem across Africa and the Eastern Mediterranean (Robinson 1985:151).

From the 17th to 18th century the pipe bowl design evolved from a limited number of simple styles to a wide range of shapes, colors and styles (Baram 1999:143). Then in the 19th century standardization occurs and there was again a more limited number of styles. Topić and Milošević (2012: 18-19) report that bowl decorations including letters, geometric patterns, and floral and leaf designs were incised or in relief from the mold, while bowl shapes included cylindrical, ribbed or with flower calyx-shaped base, and disk-shaped bases, and the stems were designed with a variety of different shapes and bite ends. Topić and Milošević (2012:19) have also found pipes in Dubrovnik, Croatia with combined design styles of different countries, including Turkey, Austro-Hungarian and Italian. Al-Houdalieh (2008:459) noted that Ottoman clay pipes changed shape through the centuries because of local variations and fashions, some disappeared, new ones were created, and popular styles continued. Other manufacturers of different countries, for example France, copied these styles and included them in their repertoire of sales products (Duco 2004:17).

6.3 Raw Material for Clay Pipe Manufacture
For all general purposes, smoking pipes are a ceramic which are made of clay. To the manufacturer, the most important characteristic of clay is its ability to be shaped and molded. Sinopoli (1991:10) defines clay as,

“a very fine-grained sediment, with particles sizes of less than two-thousandths of a millimeter. These small particles become plastic and sticky when combined with water, permitting the material to be molded into a range of shapes. The molded forms maintain their shape as they dry and when heated to high temperatures are hardened into durable objects.”

Two clays critically important for the manufacture of clay pipes are Kaolin and White Ball Clay. Kaolin (also called china clay) fires to a very white color, but it must be mixed with ball clay to make it malleable and durable, otherwise it is a brittle, weak clay (Industrial Minerals Association North America [IMANA] 2018). Different deposits around the world vary in their properties and composition of minerals, but it is the fine, manageable particle size, flat shape, and soft non-abrasive texture of kaolin clay that gives it commercial value (The Kaolin and Ball Clay Association UK [TKBCAUUK] 2007). Numerous kaolin deposits lie under the Atlantic and Gulf Coastal Plains, the largest of which is located in the South Carolina-Georgia-Alabama belt (Patterson and Murray 1984:11) (Figure 11). In Oregon, there is an erosional remnant of a large kaolinitic deposit at Hobart Butte south of Cottage Grove, Oregon, thought to have formed from transport from higher elevations to the east (P&M 1984:35).
The second common ingredient of clay pipes is white ball clay. The term “ball clay” dates back to English mining methods when clay was extracted in cube shapes of approximately 22-30cm and weighing 30-50 pounds. With repeated handling the corners were knocked off resulting in a more rounded ball shape (Hosterman 1984:C8; IMANA 2018). White ball clay is a very rare secondary clay formed through the erosion of a kaolinite-rich parent rock which is transported and mixed with other clay minerals, sands, gravels and vegetation, depositing the ultra fine particles in a deep layer and where there is little erosion such as beneath freshwater, swampy areas or brackish marine basins. Here, organic acids and chemicals from decaying vegetation break down the particles into even finer sizes (TBCHS 2016; IMANA 2018). The dominant mineral composition of ball clays is 20-80% kaolinite, 10-25% mica, and 6-65% quartz (IMANA 2018). The best grade ball clays have negligible amounts of quartz sand, silt, and iron oxide, may be rich in carbonaceous matter, and have colors ranging from nearly white, to pink to brown, or gray to black, but when fired, are almost white (Hosterman 1984:C8). Worldwide, high quality ball clay deposits are rarer than kaolin deposits (IMANA 2018). The ultra fine particles in ball clays act as a binding agent which enhances the high green strength, plasticity and molding in pre-fired ceramic production and when fired permanent physical changes occur such that it becomes dense and vitreous (Hosterman 1984: C8;
TBCAUK: 2007).

In the United States (Figure 11) the two states with the highest concentration of white ball clay are Tennessee and Kentucky (Patterson and Murray 1984:7,40). Ball clay was first mined in the United States in 1860 near Paris, Tennessee for local potters (Hosterman 1984:C8). Outside the United States, ball clay is found in England; Germany; France, and other countries further east. Globally, the most important deposits of white ball clay are found in three areas of England; the largest in Dorset and two smaller deposits in parts of Devon. The commercial production of ball clay began in the early 17th century when Staffordshire potters recognized its characteristics, but Dorset and possibly Devon clays were used to make crude pottery in the Roman era (The Kaolin and Ball Clay Association UK (2007). It was Sir Walter Raleigh’s introduction of tobacco in the 16th century and the subsequent need for a plastic ball clay for tobacco pipes that instigated the beginning of the international ball clay trade (TBCHS 2016). In a comparison of ball clays between the United States and England, English ball clays have low shrinkage, high dry strength and vitrify at a lower temperature. In the United States, Kentucky ball clays have lower carbonaceous matter and Tennessee ball clays fire the whitest (Digital Fire 2018).

Tobacco pipe clays became entrenched in the English economy and were important exports by the 1630s. In 1662, the importance of this trade became apparent when Charles II implemented an act against its export out of the country. This act declared that export of tobacco pipe clays was forbidden with the penalty of three shillings per pound of clay (Raithby 1819[1662]). This law continued until the second half of the 19th century when it was repealed, and exports began again to North America and throughout Europe (TBCHS 2016). There were potters from England who were familiar with ball clays, and who emigrated to the United States and Canada, where the markets for ball clays grew with the new ceramic industries.
7. Production

The manufacture of clay smoking pipes was similar in Europe and the United States; although pipe designs, motifs, and quality, varied somewhat, for the most part, distinctions between European and American pipes were minor, such as use of different trimming tools, or glaze colors. Commercial production of clay pipes began in England in the late 16th century, and in the United States and the European continent in the early 17th century (Robinson 1985:150-151). This section will address basic terminology and information about pipe production and styles from the United States and European countries.

7.1 Terminology

Basic terminology for pipes describes structure relative to the position of the smoker. The back of the pipe faces the smoker, the front is on the side of the bowl away from the smoker, left and right align with the smoker’s perspective. Figure 12 below represents the terms used for the different parts of a pipe.

![Smoking Pipe Terminology](image)

Figure 12. Smoking Pipe Terminology (Bradley 2000:105, fig. 3).

Examples of mouthpiece ends (called bites in Europe and bit in the United States) and found at Fort Hoskins and Fort Yamhill are illustrated in Figure 13 (Higgins 2017:6.5) and in Figures 14-16; and, in Figure 14, Raised Rounded; Figure 15, Flared; and Figure 16, Raised Rounded and Flat.
7.2 Production Techniques

The production of clay pipes (Figure 17) was documented by Andrew Ure (1864:867-869; from Ayto [2012: 12]). The clay is worked with water to a fine paste, allowed to settle in pits, or passed through a sieve to remove grit. It is then allowed to sit until the water evaporates and it develops into a doughy consistency, and then kneaded to
align the clay particles and remove air bubbles until the clay has a uniform consistency. Child labor was common in early European pipe production, such as in Gouda, the Netherlands, where pipe makers always worked with at least one child to perform a simple task (De Vries and Van der Woude 1997:605). These children were employed to roll a piece of clay on a plank into a basic pipe shape, a thin stem, thick bowl shape, then it was allowed to dry for a day or two. The child then arranged two or more dozen on a board for the pipe maker to finish.

Figure 17. Basic Clay Pipe Manufacture (Ayto 2012: 12).
Before firing, a makers’ mark (a number, letter, symbol or combination thereof) would have been applied to the pipe by impression, relief, or ink. These marks were placed on the bottom of the spur or heel, the side of the spur, the bowl body, or the stem. However, in 19th century pipes, it is not uncommon to find pipes without maker’s marks. Other decorations were done before firing as well, such as molding, relief, stamped decorations, and rouletting of dentated patterns around the rim or stem (Gojak and Stuart 1999:39). Molded designs can help with gripping a pipe as well as dispersal of heat through a greater surface area. After pipes were fired, pipe makers often burnished, milled, rouletted, and applied paint or enamel to different areas of the pipes to increase their value. To prevent a smokers’ lips from sticking to the stem end, pipe makers would apply a glaze (Figures 18 and 19), varnish, enamel or red wax (Hume 1970:302, Sudbury 2009:126-128). Ayto (2012:24) states that red wax was used after 1875. When the entire process was complete, the pipes were packed for shipment in crates and barrels, which were filled with chaff, bran, or saw dust. A students’ expense book dating 1849-1854 from Leiden, Netherlands, records the purchase of a basket containing 160 pipes for between 60-80 cents (Brongers 1964:40).

Figure 18. Magnification of Glaze at 20.00 mil (BE15-B625).
Figure 19. Magnification of Bite End with Pooling of Glaze at 500.00 um (BE15-B625).

From a historical perspective Duco (2004: 9) outlines three periods from the first initial development of clay pipes and introduction to Europe, and the second a period of consolidation from 1700-1800 with long and short clay pipes associated with wealthier elite and moderate-income smokers, respectively, with little change in design. The third
phase beginning around 1820 saw radical changes because of the introduction of new types of tobacco and other forms of smoking, as well as meerschaum and briar pipes. As a result, the clay pipe industry had to adapt to changing fashion trends. In *Century of Change: The European Clay Pipe, its Final Flourish and Ultimate Fall*, Duco chronicles the sales and product catalogues from European countries beginning with the seventeenth century and progressing up to the twentieth century, revealing the various fashion changes (Duco: 2004).

7.3 Pipe Production in America

Tobacco pipes have been manufactured in America since the 1600s in the home cottage industry. The advent of the industrial revolution increased pipe production as well as specialization in design (Sudbury 1979:215). The 19th century American clay pipe industry was dominated by reed stem pipes, the primary pipe form produced from 1840 until the early 1900s. Reed stem pipes are usually made from local clay sources ranging in color from orange to red (Bradley 2000:118). Walker (1975:97) remarked that central European stub-stemmed pipes originated from Turkish pipes, and that American reed stemmed pipes reflect a central European tradition. The reed stem pipe maintains its basic shape with its eventual reintroduction back into the United States, but with design influences of various countries.

There is little information about white clay pipe production in the United States, as pipe makers may not have been able to compete with the inexpensive British and European white clay pipe imports (Dallal 1986:44). There are only a few American white clay pipe makers found in the literature; George Brooks of Maine, listed in 1850-1860 business directories; in 1858 a Mr. J. Richards of Philadelphia; Thomas Smith of New York, New York (1842 – 1884), William Masters, New York City (1865 – 1888), and Barney Springs (1850-1890) who worked in Indiana, Boston, New York City and Rochester, New York (Barber 1893: 341; Reckner and Dallal 2000; Sudbury 1979:175; and Watkins 1950:166). In addition, there is scant information on designs and styles produced by these makers.

Research surrounding 19th century European and American clay smoking pipes found in America has been slowly growing (Gartley 2009; Jung 1987, 1988, 1989, 1996;
There are five principal centers of pipe production located in Virginia, New Hampshire, New York, and Ohio (Figure 20; Sudbury 2009:189). By the time Fort Hoskins and Fort Yamhill were in operation, however, only four manufacturers were in productions, with the main product being reed stem pipes.

The growing clay pipe industry in the United States during these years can be seen from patent dates. A list of tobacco related patents from the United States Patent Office from 1858-1899 was compiled by S. Paul Jung (1987). In 1861, there were two patents for smoking and tobacco pipes, one in New York and the other in Maine. In 1862, the number increased to eight in Maryland, New York, Pennsylvania, Rhode Island and Washington D.C. In 1863, there were four patents given in Maryland and New York. In 1864, this jumped to 10 in the same states and including Massachusetts and New Jersey, and in 1865, there were 17 patents given.
The four primary mid-nineteenth century American clay pipe manufacturers are in Pamplin, Virginia; Akron, Ohio; Point Pleasant, Ohio and New Hampshire. The following provides information about the manufacturers and clay pipes produced.

**Pamplin, Virginia.** Clay pipes have been made by cottage industries in Virginia since the 18\textsuperscript{th} century when settlers arrived, with local clays available for use (Hamilton and Hamilton 1972:4-5). Pamplin, Virginia is reported to have had a cottage clay pipe industry in 1740 (Sudbury 1979:206) prior to the opening of the Pamplin Pipe factory (ca.1879-1951). The makers dug their own clay, used their own molds and fired their own pipes. Some cottage industry pipes were sold to local stores and then either sold at the store or sold to wholesalers (Thompson 1969:15), as there was a local railroad for transportation of goods (Hamilton and Hamilton 1972: 4-5). Home industry individuals were given ½ cent each in trade for commodities (Hamilton & Hamilton 1972:6). There is archaeological evidence that J.R. Franklin & Co., of Pamplin obtained pipes locally and shipped them to Fort Benton, Montana on the steamboat Bertrand, when it sank in the Missouri river at Port La Force, Nebraska on April 1, 1865 (Hamilton & Hamilton 1972:5, Sudbury 2009:87). In 1968-1969 excavations were conducted exposing the steamship Bertrand (Petsche 1974). This steamship was carrying wood boxes of home industry pipes from Pamplin to “Vivian & Simpson, Virginia City, Montana.” Stenciled on the box was “The Celebrated Virginia/J.R. Franklin & Co./Sole Agents For The Manufacturers Pamplins Depot, Appomattox County” (Hamilton and Hamilton 1972:5, 27, Pfeiffer 2006:101-102, Sudbury 2009:85-93).

The pipes are described as all the same type and kind, having a smooth, plain design, and made of grayish-tan clay mottled with brick red and brown, with two pipes being made of a pinkish-gray tan color, with rounded stem ends (Jung 1996:21). One feature noted is a raised dot at the bottom of the bowl, this is due to its formation of an indentation on the bottom of a wooden bowl stopper (also called a plunger or reamer) resulting from its being turned on a lathe, the end being pressed in by an extension on the lathe to hold wood still when rotating (Jung 1996:21). As a comparison, S. Paul Jung Jr, (personal communication, 2018) described raised dots on Pamplin pipes as being small, but a J.M. Watkins of Powhatan, Virginia who made pipes during the Civil War period, had pipes with a larger raised dot, close to about 3/16 inch at the bottom of his bowls.
Home Industry molds were made of oak lined with lead (Walker 1974:101), the pipes were then put in iron pots to dry, or sun dried on a board in the summer; when ready the pots were placed in an outdoors stove and surrounded with seasoned (so it would not smoke) chestnut logs and set on fire. When the fire was completely burned out, the pipes were removed and cooled, and finished by rubbing bee’s wax or mutton tallow and polished with a wool cloth (Hamilton and Hamilton 1972:8). Pipe reeds were made from *Arundinara gigantea*, from the Great Dismal Swamp of Virginia. These reeds were cut into 12-foot lengths, dried for six months, cut to length from five to ten inches, reamed out and the ends tapered to fit a pipe shank; when done they were packed in barrels in alternating layers of sawdust or pine needles (Hamilton and Hamilton 1972:12, Walker 1974:102). Figure 31 and Figure 32 are samples of undecorated reed stem pipes recovered from the Steamboat Bertrand in 1969.

Factory manufacture of clay pipes did not occur in this area until the third quarter of the 19th century. The Pamplin Smoking Pipe and Manufacturing Company operated in Pamplin, Virginia, and operated from 1878 to the mid-twentieth century (Hamilton & Hamilton 1972:22).

**Akron, Ohio.** Brothers Calvin J. and Edwin H. Merrill opened a pottery factory by 1847 in Akron and in addition to pottery, made clay pipes. In 1861, Edwin H. and his son Henry E. Merrill established The Akron Pottery factory making pipes which continued in their name until 1894, when the company was sold to the Akron Smoking Pipe Co. (Akron Porcelain and Pottery Company 2017, Murphy and Reich 1974:53). An important invention designed sometime before 1847, by Calvin J. and Edwin H. Merrill was a machine to mold clay smoking pipes and bottles (Blair 1966: 3, Sudbury 1979:184). By 1850 the company was reported to have made 280,000 pipes; unfortunately no pipes have been found nor information on the type or styles of pipes made by this company.

**Point Pleasant, Ohio.** In 1849, Cornwall E. Kirkpatrick bought a pottery factory from the previously deceased owners’ heirs and it is believed that the factory made tobacco pipes beginning in 1849 up to 1890. Thomas and Burnett (1972) reported the dates as 1849-1856 with Nathan S. Davis (1856-1874) as the owner. At the factory, over 60 different styles were produced, ranging from plain, parallel lines, geometric, Zig Zag,
Chevron, Chriss-Cross, circles and dots (called Punctate), to more complicated designs such as, anthropomorphic, Turbaned mustached male, and leaves and floral motifs. The pipes stems are round (Jung 1996:21). Murphy (1976:26) provides good descriptions of Point Pleasant types and notes that the Zig Zag (ca. 1861), Turbaned Male Effigy (ca. 1862), Punctate, Chevron, and Crisscross were being produced in the early 1860s. Murphy (1976:13) reports that the surface color can vary as a result of prolonged firing or high temperature and can range from tan, gray and “chocolate brown”, with some pipes having a dull surface color ranging from orange-red to gray; mottling of color can be seen on some pipes. Pipes produced here have been found on a sunken Union gunboat, the Cairo which sank in 1862 in the Yazoo River near Vicksburg (Murphy 1976:12, Sudbury 2009:189).

**New Hampshire.** John Taber and John Taber Jr. may have been the first in the United States to produce clay pipes exclusively. S. Paul Jung (1996) wrote a comprehensive book on the Taber’s and the various locations where the pipes were made. John Taber senior is believed to have been making clay pipes in Maine from 1840-1860, but only one pipe has been identified; after 1860 there is no further information about the father (Jung 1996:23-24). Interestingly, a pipe identical to one of his pipes was also made in the Pamplin, Virginia area, suggesting that there may have been connections between Taber’s and pipe manufacturing in Virginia. (Jung 1996:23).

John Taber Jr. made pipes from 1850-1912 at different locations in New Hampshire (Sudbury 1979:170-172, Jung 1996: 24-25), including Endicott Street in Wolfeboro, (ca. 1853-1864) and Beaver Brook, East Alton, (ca. 1864-1866) (Jung 1996:10). He shipped his pipes out of state to a New York wholesale pipe importer William Demuth & Company (Jung 1996:24-25, Wilson 1961:127). Taber Jr. was a machinist and inventor, with patents for a brick kiln and a tile or brick pressing machine and, he may have made his own tight-fitting molds which had a highly polished interior that made a very smooth surface on his pipes (Jung 1996:14, 17, 21). Features of his pipes include colors ranging from buff to red and an interior bowl base with a raised dot or mold mark made from the bowl plunger (Jung 1996:37). Other diagnostic features include a flat bowl rim and stem ends as they were cut off with a knife; in addition most Taber’s pipes do not show evidence of trimming of the bowl or seams probably due to his
tight-fitting molds (Jung 1996:20-21). Taber was very secretive about his formula for his clay mixtures, mixing his clays early in the morning before any workers arrived. He used local clay near his factory, red clay from Virginia and imported white clay from England, and possibly Holland (Jung 1996:19). Styles of pipes made include a, “Punch” pipe, US Grant (a copy of German pipe with same design), a simple geometric anthropomorphic design, and a knobby style that is most frequently encountered on archaeological sites (Jung 1996:24).

7.4 Pipe Production in Austria

The Austrian Empire (1804-1867) encompassed what is today, Austria, the Czech Republic, the northeast corner of Italy, Slovakia, Hungary, Serbia, Slovenia, Croatia, Bosnia and Herzegovina, Romania, and parts of the Ukraine, Moldova and Bulgaria, reaching to the western edge of the Ottoman Empire. Much information about pipe manufacturing in Austria comes from research at archaeological sites in central and eastern Europe in the last 20 years (Bielich and Curny 2009, Gacic 2011, Morgenroth 2001, Topic and Milosevic 2012, Vysohlid 2007, Zoltan 2001).

Reed stem clay pipe manufacturing began in the Austro-Hungarian Empire during the last quarter of the 17th century (Gačić 2011: 31), utilizing local clays in Northern and Western Hungary (Gačić 2011:31, citing Ridovics 2009:64). During the 19th century, the pipe making was concentrated in Wiener Neustadt, Theresienfeld and Pernitz, in the southern section of Austria, with strong connections to production centers in Hungary. Twenty pipe making workshops have been identified by Bielich and Curny (2009: 342-348), including pipe makers S. Boscovitz, Anton Partsch, Jacob Reinitz, S. Seiler, Károly Zachar, Anton Ress, Michael Honig, M. Amstätter and Joseph Schmidt.

The Hapsburg dynasty required pipes be marked with a maker’s mark in the early 19th century (Bielich and Curney 2009:358). In the literature these are termed Austro-Hungarian pipes and are characterized by a consistent form that was repeated with very little change (Gacic 2011:54). The most common pipe form is termed a Schemnitz pipe and is described as made of good quality clay in molds and having a narrow “tall cylindrical head (with either round or polygonal cross-section) profiled like a shell at the bottom” (Gacic 2011:54). These pipes were popular and often copied (Figure 21).
and are described as having muted colors, reddish to black in color, marbled black-grey color, often mixed with white clay

Figure 21. Examples of Schemnitz Pipes (Morgenroth 2000: figure 2).

(Gacic 2011: 54, Rapaport 2018), having a marbled appearance from a mixture of different color slips (Gusar 2008:142) and a transparent glaze (Rapaport 2018). Maker’s marks are found on the stem and lower part of the bowl (Gusar 2008:142).

In this region, just as seen in western Europe, there was a mixing of various regional styles. Topić and Milošević (2012:19) reported that a pipe found in Dubrovnik, Croatia had a mixture of styles from three regions: Turkey, Austro-Hungarian Empire and Italy, but it is thought to have been made in Northeastern Italy. Bielich and Curny (2009: 351) noted that there were a number of pipe makers who relocated from the main production areas of Austria to Banska Stiavnica, Slovakia (also called Schemnitz in German and Chemnitz in English), and it is from this town that the pipes get their name (Bielich and Curny 2009:351, Morgenroth 2000: 53).

The history of one pipe maker in this region is as follows. In 1830, Matthias Amstätter opened a pipe factory in Wiener Neustadt which was taken over by his son-in-law Anton Ress in 1837, producing 6,000 pipes a day by 60 workers (Morgenroth 2000:55). By 1867, it is thought that this industry ended except for a few small workshops which continued making pipes (Zoltan 2001:92). Pipes made by this factory have been found from Mostra street in Nitra, Slovakia with ‘Amstatter’ and a trademark of a two-headed eagle within a round incuse on the right side of the stem. On the flat
surface of the rim is imprinted “WIENER NEUSTADT”, and the outside edge of the rim is wheel decorated (Figure 22) (Bielig and Curny 2009:352). Matthias Amstätter pipes have also been found in other areas of Slovakia (Zoltan 2001:87) and pipes produced by his son-in-law Anton Ress (Figure 23) have been found in Croatia (Gusar 2008), Serbia (Gačić 2011, Lučić 2012), and Slovakia (Zoltán 2001).

Figure 22. Nineteenth Century Bohemian Pipe (Výšohlid 2009: Figure 6).

Figure 23. Austro-Hungarian Pipe by A. RESS (Gačić 2011, cat.198, p. 133).

7.5 Pipe Production in Canada

Bradley (2000:117, Sudbury 1980:1:6) reports that the pipe-making industry in Canada began in Montreal about 1840 and parallels the single-unit techniques of the British industry. Pipe makers used white ball clay with maker’s name on the left side of the stem and the city where manufactured on the right side.

Some pipe makers immigrated from Scotland bringing their skills with them. William Henderson arrived in Montreal, Canada in the 1840s, opening one of the largest Canadian firms, Henderson and Son factory, making pipes from 1846-1876, then selling the company to his nephew, William Henderson Dixon (Roy 2007: 42, 44, Smith 1986:57-58, Walker 1971:25). The second largest manufacturer was Robert Bannerman of Montreal, but large-scale production did not begin until 1870, therefore this firm may
be disregarded (Smith 1986: 57). Another firm was founded by two brothers in Quebec, William and David Bell, immigrants from Scotland who made smoking pipes and other clay products such as drain pipes. This company began making smoking pipes in 1862 or 1863, but only part time (Walker 1971:30). This company was a small producer and probably made pipes for the local market; it is highly doubtful that they exported in large quantities. After 1870, the clay pipe market declined due to competition with meerschaum and more durable briar pipes as well as the increasing popularity of cigars and cigarettes. As a result, several pipe makers moved to America, creating a connection between Canadian pipe makers and the United States. One of these was Robert Bannerman, who late in 1870 moved his business to Rouse’s Point, New York to avoid United States import taxes on Canadian goods (Sudbury 1980, 1:4).

7.6 Pipe Production in England and Scotland

Research of clay pipes began in Great Britain in the early 20th century and is ongoing today. As reported earlier, production of clay pipes began in London, England about 1558 using white ball clay imported from other areas of England (Oswald 1975: 12-13). Later sites of pipe manufacturing include Bristol, Broseley, Liverpool, Plymouth, York, Edinburg, and Glasgow to name a few, with over 10,000 pipe makers documented to date (Davey 1979, Higgins 2009, Oswald 1975). The single unit pipe was made by families for the local community, and many were not sold beyond 20 miles of manufacture, unless there was nearby transportation via river or coastal routes (Oswald 1979:62). However, by the mid-19th century a larger and wider consumer market became available with the expansion of railroads (Higgins 2017: Section 5.0). Local and regional manufacturing did vary in design style complicating dating methods (Oswald 1975:1-3). Walker (1966:96) noted that in England, pipe makers placed their initials on pipes, but there was no register of maker’s marks.

Adrian Oswald (1975:40) developed a general typology to help in dating and identifying pipes from Great Britain (Figure 24 and 25), with pipe numbers 25-30 (Figure 25) common export types to the United States, and mainly found there. However, due to the great variety of shapes produced after 1850, this typology is of little use (Oswald 1975:38), but it is a good starting point. Oswald (1975:113) lists the primary
19th century location of exporters to the United States as London, Bristol, Liverpool and Glasgow.

A recent publication, the *Guidelines for the Recovery and Processing of Clay Tobacco Pipes from Archaeological Project* by David Higgins (2017) provides a helpful guide to dating English pipes. Mid-nineteenth century pipes continued to be made with a fine white ball clay, without obvious inclusions. The pipe stems were thinner than previous centuries, varied in length, with a bite shape of a nipple or button type (Higgins 2017: section 4.1, Oswald 1975:14). In cross section some long stems have an oval shape and may be curved, with stem bore diameters between 4/64” and 5/64” (Higgins 2017: Section 4.1).

Higgins (2017: section 4.1) notes that stamped marks are found along the length of the stem and molded marks or pattern number placed on the stem side became the most common marking after 1850 (Higgins 2017: section 4.1). Up to 1850, the shape of the pipe bowl has an upright and cylindrical shape, the rim is normally parallel to the stem (Oswald 1975:115), rim milling is no longer done, burnishing the bowls ceases, and rims are not bottered. A botter, also called a mushroom, is a hand tool with a circular button end, is a funnel shape that decreases in size from the wider base upward, attached to the top of the tool is a bronze wheel that forms a roulette or scroll pattern in relief. The button end is inserted into the bowl, twisted and rotated to smooth the rim edge and form the pattern (Oswald 1975:14). English pipes bowls always have vertical striations due to the use of a “stopper attached to the handle of the screw”, that is the stopper is attached to a handle on a gin mill, a machine when pulled down forms the inside of the bowl (Oswald 1975:16-18). Molded decorations are commonly found on bowls as are mold seams, and there is an increasing number of different styles of decorated pipes often with advertisement designs on the bowl (CAFG 2012). On the base of the pipe bowl may be found a spur, a peg, or spike-like protrusion that narrows down to a point, a rounded base or trimmed flat by the pipe maker. Prior to the 18th century, pipe bowls had a flat heel which allowed long pipes to rest in an upright position; spurs then became fashionable from this century onward (Bradley 2000:114-115, Higgins 2017: Section 4.3). Spurs enabled smokers to hold the pipe when the bowl got hot. Long stemmed pipes (up to 36” long) continue to be manufactured up to the twentieth century but with less variation now
Maker’s marks were often plagiarized and, many makers left pipes unmarked; but when found the marks can still help in dating. In the 19th century, about 60% of pipe makers marked their pipes (Oswald 1979: 62). Various methods of maker’s marks include stem stamps often placed lengthwise along the stem, sometimes as an incuse stamped mark, and sometimes in a molded beaded cartouche. Pipe bowls were stamped with a large oval or circular stamp with the maker’s name inside; molded initials can be found on the side of spurs, with the initial for the first name on the left side and last name on the right side. Sans-serif script was used in the mid-nineteenth century and the letter ‘I’ was sometimes used to represent a ‘J’ (Bradley 2000:116-117, Higgins 2017: Section 5.0-5.4, Oswald 1979:62-91).

Scotland’s clay pipe industry developed in the 19th century and this country became one of the leading exporters at that time, with Glasgow and Edinburgh being the main production centers (Walker 1971:23). Scottish pipes were generally made with white ball clay, but local red clays were used at times as well, with wax applied to the bite. Flemming (1923: 241-242) states that pipe lengths varied, with a ‘cuttie’ pipe measuring four and a half inches, and ‘straws’ measuring between six and 30 inches. One example of a straw was the popular ‘churchwarden’ measuring between 16-30 inches long. Flemming mentions that brilliantly colored lead and flint glazes were used, but it is unclear if they were used in the 19th century.

Major producers were McDougall Company, Murray-Davidson and William White and Sons, and these companies are well documented (Fleming 1923, Humphrey 1969, Walker and Walker 1969). The McDougall Company is reported to have begun operation in 1810 (Flemming 1923:243) or by 1846; however, the dating is problematic due to records being destroyed in two early 1900s fires (see Humphrey 1969:18 for personal communication with Walker 1968), and the factory closed in 1967 (Humphrey 1969:18). Murray-Davidson began as the William Murray company in Glasgow (1828-1861/1862) and was later bought by Thomas Davidson (Humphrey 1969:15, Flemming 1923:243). Oswald (1975:205) noted that William Murray was one of the suppliers to the Hudson Bay Companies (located at the site of Fort Vancouver) from 1850-1858. One of the largest and best-known pipe factories was William White & Sons. William White
bought a bankrupted clay pipe factory in 1815 in Glasgow, the operation was managed by his son Thomas White who died in 1847, at which time it was taken over by a grandson (Fleming 1923: 242, Mackenzie Clay Pipe Makers of Edinburgh 2015).

Figure 24. A Simplified General Typology. Flat base to pedestal to spur, pipes 1-9, ca. 1580-1700; 10-13, ca. 1700-1820; 14-15, ca. 1820-1880. [Oswald 1975: Figure 3, G].
Figure 25. Simplified General Typology of Spurred Pipes. Pipes: 16-19, ca. 1610-1710; 20-23, ca. 1690-1800; 24, ca. 1810-1840; 25-27, ca. 1660-1760; 28-30, ca. 1850-1900. [Oswald 1975: Figure 4, G].

7.7 Pipe Production in France

As with the rest of continental Europe, smoking came into fashion in France in the 17th century with production of pipes in the cities of Givet, Lille, Marseille, St. Malo, St. Omer, and Rennes (Amsterdam Pipe Museum 2018). Raphael (1991:29) writes that in the first quarter of the 19th century French pipe makers continued the tradition of making white ball clay, unglazed, simple, plain, long and short stemmed pipes. The white clay was from French sources, but also combined with imported clays from other countries such as Belgian, Germany, and Hungary (Amsterdam Pipe Museum 2018). French pipes imitated Dutch and Austro-Hungarian designs, finishing the bowl rims with a boto made of copper, horn or wood. In the second quarter of the 19th century a new design element, the figural pipe, propelled French pipes into a higher level of artistry and quality than
It was after the Napoleonic period that the figural pipe developed with regular stems, most human figures having some type of hat, cap or turban on top of the head. These pipes were at first unpopular, but by the second quarter of the 19th century they came into fashion with the development of sculptural designs and stub-stemmed bowls (called reed stem in the United States) pipes. They became a reflection of the fashion and status of owners (Duco 2004:12-15, 25), who smoked these types of pipes with a stem made of reed, wood, or other material inserted into the stem end. French manufacturers used a three-piece (sometimes four or five) mold to form the more complex pipes (Ayto 2012:27). French manufacturers hired professionals to expertly create and produce molds. These highly regarded professionals were well paid and had a higher status than the pipe makers; however, the names of these people are unknown (Amsterdam Pipe Museum 2018). The press molds were complicated but so well made that seams between different parts of the mold were not visible (Amsterdam Pipe Museum 2018). As an example of the number of French pipes produced by one company, the Auguste Crétal-Eugène Gallard factory (1850-1863) is documented to have made over ten million pipes in 1853 alone (Amsterdam Pipe Museum).

Mid-nineteenth century French pipes are known for their exquisite artistry and sculptural quality, infinite variety of designs of famous and fictional people, animals, flowers, modes of transportation, fantasy figures, geometric patterns, and more. These pipes are glazed with the figures eyes coated with enamel, white applied for the sclera and black for pupils. In addition, the white enamel is applied to detail other subtle aspects of the design, such as the edge of a headdress, beards and mustaches; this technique is never found on English pipes (The National Pipe Archive 2018). The head of the figure is usually looking away from the smoker. What also sets them apart from other pipes was the longer these pipes were smoked the darker the clay became, while the white enamel remained bright and stood out in stark contrast to the background (Duco 2004:16-17, The National Pipe Archive [TNPA] 2018). In addition, the older flattened bite now was formed into a knob shape (Amsterdam Pipe Museum 2018). Prices of French pipes are noted to be higher than pipes from other countries. Stam (2010) reports that industrial workers in the United States wanted cheap clay pipes to smoke and as a result the exportation from France to the United States was reportedly, minor.
Pipe producers in France included, Victor Belle, Maison Bonnard, Job Clerc, Auguste Cretal & Eugene Gallard, Louis Fiolet, Blanc-Garin, Constant Duméril Leurs Fils, Louis Fiolet, and Jean Gambier (Leo 1971: 23-31, Raphael 1991:41-55). One of the most famous French manufacturers was the Gambier company. This company made over 2000 different designs (Ayto 2012:27) and was known for very sophisticated and detailed features on their pipes (Amsterdam Pipe Museum 2018). Gambier was known to mix Belgian and French clay with alluviums from Hungary (Voisin, nd). Gambier’s pipes were so popular that they were favored for plagiarism by other companies. As with other firms and countries there was a decline in the pipe market beginning around 1870. This decrease in orders was due to the increased use of cigars, cigarettes, briar and meerschaum pipes; the firm closed in 1926 (Ayto 2012: 27, Duco 2004:67).

7.8 Pipe Production in Germany

Popular white clay stemmed pipes were produced in Germany from the 17th century into the 19th century, surpassing other types of ceramic production (Stephan 1995: 239), with 95% of the pipes being shipped overseas to North America. (Stephan 1995:239). Initially, German manufacturers copied Dutch styles but then focused on other western European countries’ popular styles, becoming formidable competitors (Duco 2004:110). In southern Germany, Mehler (2009: 321) found that 17th and 18th century German Bavaria clay pipes did not follow a chronological progression in form. Mehler (2009:321, figure 2) developed a Bavarian clay pipe typography, defined as “typological orders with non-linear type sequences or typological sequences free of chronological aspects”. This typography separated 17th and 18th century pipes with heel marks into three technical decorations: plain, hand applied decoration and molded decorations, which were then further divided into six types based on a continuum of pipe decorations from least to most decorated. This system works well for these early pipe forms but does not continue into the 19th century and no other typology or typography for this century has been found.

Mehler disclosed that in Bavaria the “production and development of clay pipes was influenced and controlled by the state” (2009: 323-324) with pipes marked not with maker’s marks, but with a consortium mark which was politically motivated to control
production. This system of control appears to have continued into the 19th century, especially in the Westerwald region. What set production organization apart from the other western European countries was the administration of manufacture. Here the retail merchants owned the material and molds used for manufacture, and they required pipe makers to sign up for orders (Duco 2004:110-111). In this way production was maintained at the home or cottage industry level, enabling merchants to pay families minimal prices for products, and then sell pipes cheaper than other countries. This allowed them to gain a greater foothold in the trade networks, selling more pipes and increasing their profits (Duco 2004:110). Beyond the Westerwald region, workshop-like industrial manufacturing were established with as noted earlier, 95% of the pipes being shipped overseas to North America. This dependency on exports, combined with overproduction and competition resulted in a market susceptible to downturns, which is what happened in 1860 leading to the closure of most workshops by 1872 (Stephan 1995:239).

Short stemmed pipes dubbed “Stummelpfeifen,” (reed stem/stub-stemmed) were introduced around 1830 in factories located in central Germany at Grossalmerode (production date from 1650-1872) and Uslar (production date from 1767-1918). They began making a particular style of anthropomorphic pipes specifically for the American market (Gartley 2003: 205-215, Stephan 1995: 166-174, 179-180, 239, Sudbury 2009:68-76). These pipes portrayed fictional people, for example, a philosopher and a female figure, as well as historical figures, such as George Washington, and presidential candidates and presidents like Franklin Pierce (Gartley 2003:205-216 Stephan 1995: 170-171). The clay used for these pipes ranged in color from white, to brown and reddish; they were either unglazed or had a multitude of glaze colors applied; “red, red-brown, red-orange, orange, black, yellow, green, beige or brown” (Gartley 1995:206), with a green glaze possibly specific only to Uslar (Stephan 1995: 186). Gartley (2003:206) reports that in 1834 shipments to the United States from Uslar alone amounted to 4.5 million pipes, and by 1866 the number was 11 million. In addition, Heinrich Goebel, the son of a pipe maker from Grossalmerode moved to the United States acting as a retail salesman, helping to maintain the numbers of pipes imported into the United States. However, it is thought that the American Civil War combined with the emergence and

7.9 Pipe Production in the Netherlands

There is ongoing research into the history and maker’s marks of Dutch pipe manufacturers with missing information and gaps being filled in as Dutch researchers expand on this subject. Dutch pipe making history begins in the 17th century when the English pipe makers fled to the Netherlands, France, and Germany as religious and political refugees, as well as soldiers who had served in Prince Maurice’s armies, bringing with them their pipe making skills and fashion styles (Ayto 2012: 26-28, Walker 1971: 5). Ayto (2012:26) notes that in 1611 the first recorded pipe makers in Holland were two Englishmen. Willem Berends was recorded in 1617 as setting up a business in Gouda, which became a major production center. By the end of the 17th century, Gouda pipe makers had a reputation for making superior single unit white clay pipes (Walker 1971:5). White clay was imported from Germany, Belgium, or England (Brongers 1964:37). Following the establishment of the pipe making industry, fierce competition and lawsuits arose over plagiarism of high quality pipe maker marks. As a result, in 1660 a Guild was established in Gouda which imposed strict rules governing the industry. The Guild required registration with the city for specific marks or motifs associated with specific manufacturers to identify their product (Ayto 2012:26). However, when a maker died, his widow (Schmidt 2014: 307) could inherit the mark if she continued the business, or it returned to the guild and could be sold to someone else. In this way, marks could be used on different types of bowl, by different makers and potentially used for a hundred years or more (Atkinson 1972:181). The city of Gouda’s coat of arms was added alongside maker’s mark to certify authenticity and an ‘s’ for slegte was used as a symbol for a lesser quality of pipe (Atkinson 1972:177, Bradley 2000:117). Overall, Dutch pipe makers were more concerned with their makers marks than decorations. Marks can be found on the side of the spur; on unspurred pipes the mark is found on the base of the bowl and sometimes on the back of the bowl. Maker’s marks can be identified by reference to Merken en Merkenrecht Van de Pijpenmakers in Gouda (Duco 2003) and
Goudse pijpenmakers en hun merken (Van der Meulen 2003), both written in Dutch. Identifying Dutch pipes begins by looking at the shape of the pipe bowl, as Dutch makers developed their own style, an ovoid shape which was continued through the 19th century (Ayto 2012:8,26). Bradley (2000:116) notes that the size of the bowl and the obtuseness of the bowl to stem angle increased with time. Duco (1987:26-28, 56-63) has done extensive research on the evolution of Dutch pipes (Figure 26). Model three the ‘Oval’ (Ovoid), with an obtuse angle greater than 90 degrees, developed around 1730 and remained popular through the end of the 19th century. Model four, the ‘Curved’ bowl also developed in 1730 but didn’t gain popularity until the mid-nineteenth century. As can be seen the angle between the stem and bowl is less obtuse at between 90-100 degrees. Model five a round bottomed type was also created around 1730 without a heel or spur and continued to be produced into the 20th century. It has an obtuse angle; also note that the rim angles away from the stem. Models four and five were not as popular as model three (Duco 1987:156).

From the beginning of Dutch pipe making, long stemmed pipes with an oval head remained popular in the Netherlands and continued to be made (Duco 1987:58); these can measure up to 36” long (CAFG 2012), some with decorations on the stem and bowl which continued into the 20th century. After 1840, short pipes with large bowls and often with a “knobbed mouthpiece” became popular (Duco 1987:157). Nineteenth century Dutch mold-makers were not as skilled as the French in making figural pipes and so did not develop refined effigy pipe styles; mold engravings became more mechanically finished from the use of too many dies, and quality of decorations declined. One aspect of Dutch pipes did not change, they had a finer, glossier finish than English pipes and had milling/rouletting around the bowl rim using a botter for finishing (Bradley 2000:116). The Dutch botter is a wooden disk with a small circular projection that is inserted onto the top of the pipe bowl and turned back and forth to smooth the rim (Walker 1971:10, figure 15). Botters occasionally leave a slight indentation around the external surface of the rim. The rim lies at an angle to the stem; stems being thin, these molded pipes were a higher quality and superior to English pipes (Oswald 1975:115). Walker (1977: 1572) reported that tools used for smoothing the seams had a handled blade with a serrated edge that formed denticulation on the stem between the makers’ names. In addition, due to the
use of a hand stopper, horizontal striations marks are sometimes left on the inside walls of pipes (Oswald 1975:16-18).

In the mid-19th century, cities with pipe production included Aarlanderveen, Gennep, Gouda, Hertogenbosch, Stevensweert, and Weert (Duco 1987: 12). Various Dutch pipe makers include, Adrianus Sparnaay (Sparnaaij in Dutch), his son Frans Simon Sparnaaij, Pieter Goedewaagen & Zoon, Jan Prince, and Pieter Van der Want (Duco 2003, Duco 2004).

8. Methods and Materials

The first systematic archaeological excavation at Fort Hoskins (35BE15; Figure 1) occurred in 1976 by Oregon State University professor Dr. David Brauner and his summer field schools. Brauner and Stricker (1994) report that the sutler store had been heavily disturbed by logging in the past and was not excavated. Just after the fort was abandoned, the contents of the enlisted men’s barracks were dumped onto the slope near the middle of the parade grounds and burned. After the fort was closed, its buildings were sold, and the property returned to private ownership (Bowyer 1993:32-33). A new house built for the Franz-Dunn family may have used scavenged material from the fort’s hospital, which was adjacent to the house (Trussel 1996: 97). A barn had been built on top of the area of the enlisted men’s barracks and half the parade ground had been plowed, otherwise, there was limited disturbance in most areas. In 1964 the area around the flagpole had been dug and bulldozed by Richard Dunn over rumors that gold coins were buried at the base of the flagpole in the middle of the parade grounds and he dug an eight to ten-foot trench here (Brauner and Strickner 1994:127).

In the OSU investigation of 1976, the area around the parade ground was divided into four quadrants consisting of A: officer’s quarters, B: enlisted men’s barracks, C: enlisted men’s privy and D: storehouse, laundry buildings and bakery area. A two meter by 40 meter long trench was excavated parallel to the officer’s quarters in Area A. Three 1x2 meter test pits were dug near the laundry buildings. All excavation and test pits were vertically dug down 10 cm per level, except for Areas B and C which were removed in 20 cm levels. All material culture was mapped before removal, and all excavated dirt was then screened through ¼ inch wire mesh.

In 1993-1994, there was limited archaeological testing done with 17 1x2 meter test pits in the area surrounding the border of the Franz-Dunn house. This house was built just after the closure of the fort, adjacent, to the east side of the fort’s hospital. In 1994, test pits were also placed in the barn area where the enlisted men’s barracks is located.

Fort Yamhill Heritage Park (35PO75) has been systematically investigated by Dr. David Brauner and Oregon State University’s archaeology field schools. Investigation in 2004-2006 focused on the officer’s quarters, in 2005-2008 on the company kitchen, in
2007-2009 the post bakery, in 2013 on the officers’ quarters and in 2016-2017 on the fort’s hospital. Block excavation style used 1m² units being excavated vertically in 10 cm levels and artifacts mapped in place, using ¼ inch wire mesh screens (Eichelberger 2010: Wesseler 2017). Disturbances to the site post abandonment include the dismantling and demolishing of buildings and logging (Wesseler 2017:5, 104). There was looting concentrated at the commander’s house and officer’s privies, due to the presence and fame of American Civil War general Phillip Sheridan who was stationed here during the fort’s construction and while it was active.

During excavations at both forts, numerous clay smoking pipes, a few porcelain pipe fragments and associated hardware were recovered, catalogued, labeled, and curated at Oregon State University. Justin Eichelberger’s (2010) Master’s thesis on food ways at Fort Yamhill included an analysis of indulgences, such as smoking, at the fort. Point-plot maps were made which included clay pipe distribution recovered during the years 2007-2009 from Fort Yamhill’s’ company kitchen and bakery. Clay pipe fragments were found on the southern sides of the exterior wall of the bakery foundation, west-southwest corner, the south-southeast corner and the east-southeast corner, all having alcohol bottle fragments in the immediate area (Eichelberger 2010: Figure E.36). This suggests that the acts of smoking and drinking occurred together. The company kitchen point-plot distribution map (Eichelberger 2010, figure 7.10) displays clay pipes within the building in front of the hearth, as well as along the exterior north wall, with a scattering of alcohol bottle fragments nearby, as well as, a metal spark cap. Thus, there is an association of smoking and drinking, within the building, with socializing occurring in front of the hearth as well as the exterior north side. Descriptions of the pipes were provided (Eichelberger 2010: 316-317, 343-344). This thesis will reanalyze and measure these pipes for a more in-depth analysis.

The primary goals of this analysis are descriptive; to photograph the pipes, to determine who the pipe manufacturers were, and to place the pipes in the social context of these two mid-nineteenth century Pacific Northwest forts, and the broader world trade networks. Access to and help from experts as well as literature, journals and websites in other countries enabled a more thorough study and all of these sources were an immense help in identifying or verifying clay pipes origins.
The initial examination began with gathering and separating the pipes into similar design patterns and style. The general typology for 19th century pipes was used as a starting point (Oswald 1975:38). Next, a publication by Bradley (2000) was consulted for the basic understanding and knowledge required for clay pipe research; this included basic terminology, pipe features, data collection, manufacturing marks, variations in pipe designs of different countries and through the centuries. A recent publication by David Higgins (2017) provides guidelines for British clay pipe analysis, standardization for terminology, and report writing, and was utilized as appropriate for this thesis. For example, descriptions of mouthpiece terminology, was included in the database so that consistency with other clay pipe researchers is maintained. Utilizing these guidelines, a one page data collection form was created by the author to help organize descriptions and measurements for diagnostic purposes (Figure 27).
An Excel database was designed and implemented to organize the large amount of information being gathered, including characteristic data and supplementary comments (see Table 4 for example). The initial design of the data base was built from the data sheet information, then refined. Included in the database were excavation year, site and
location coordinates, followed by pipe fragment descriptions, any maker’s marks, country of origin and date, if known. Descriptions of bite type and any coatings such as glazing are noted as well as decorations and design motifs on bowl or stem fragments. All aspects of the fragments were measured using digital calipers, this included height, length and width. All stem fragments with gaugeable bore holes were measured in 1/64th of an inch using standard drill bits (Figure 28) and tabulated allowing that a single piercing rod would have been used to form each bore hole. Use-wear was noted such as whittling, as well as any tar stains on the interior and exterior of fragments. However, some soils, sunlight, and burning can remove these stains. (Bradley 2000: 127). Fragments that cross-mend (reassembling a bowl or stem fragments) are noted with their artifact number, the number of fragments, and location where found. Munsell color charts for color consistency (Figure 29) were used for glazes, slips and fabric. It should be noted that when clay is fired, the firing temperature can alter the color of the clay and produce a range of colors, therefore, one specific Munsell color was given for each fragment. Lastly, a comment section is provided for any additional information.

Table 4. Artifact Location, Number, Type, Fabric, Maker/Mark.
Artifacts were examined using a 10X hand lens to examine surface details, and at
times a binary microscope. Unusual aspects of pipes were examined using a Keyence
Digital Microscope, and photographed. A light box (Figure 30) was constructed using
cardboard and white tissue paper, and artifacts were photographed using a COOLPIX
4500 4.0-megapixel digital camera. Artifacts were photographed on black or mixed color
sand to allow ease of positioning, artifacts were photographed individually and in groups
with a standard three or five-centimeter scale, as well as close-up details of unusual pipe
morphology. The catalog number of each pipe is included with the image in this thesis.

An extensive library and internet search gathered available literature in the United
States and Europe, as well as web sites connected to pipe research in England, Germany,
the Netherlands and Eastern Europe. This included the *Society for Clay Pipe Research*, the *Amsterdam Pipe Museum*, and Journals including the *Academie Internationale de la Pipe, International Journal of Historical Archaeology*, and *Knasterkopf*. Research articles included titles from England, France, Germany, Netherlands, Turkey, Croatia, Czech Republic, Greece, Hungary, Poland, Scandinavia, and Serbia where Google translate was, if not perfect, invaluable. Extensive review of online catalogs was conducted as well as the purchase of books from European museums and websites. A vital resource was the consultation with generous and supportive clay pipe experts via email in the United States, England and the Netherlands. A general guideline (Appendix A) of identifying features of western European pipes was assembled to assist in determining country of manufacture by attributes. This table was added to throughout the research process and is a tentative research guide.

To determine the minimum number of pipes within the assemblage, the number of unique pipe fragments representing distinct parts of the pipe were counted (Table 5). Utilizing Higgin’s (2017) guidelines, these fragments were separated into bowl, stem and mouthpiece fragments. The bowl fragments were assigned this category if they included any part of the interior bowl or base of the spur regardless of how much stem was still present. A stem is any portion that does not include any part of the interior bowl or base of the spur. Mouthpiece fragments are any section of the stem that has any or all of the bite end. This can be very difficult to determine with confidence and accuracy with cut end stems, because broken stem pieces can appear to be a cut end; therefore, counts may be underestimated. Because the artifact collection includes reed stem and single unit pipes from many countries, the pipe bowl attributes of form and decoration, including glaze or no glaze, were used to determine the minimum number of clay pipes (also termed MNV for minimum number of vessels) for the entire assemblage.
Table 5. Total Clay Pipe Fragments by Fort.

<table>
<thead>
<tr>
<th>Type</th>
<th>Fort Hoskins</th>
<th>Fort Yamhill</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reed Stem</td>
<td>161</td>
<td>40</td>
<td>201</td>
<td>21</td>
</tr>
<tr>
<td>Single Unit</td>
<td>632</td>
<td>86</td>
<td>718</td>
<td>75</td>
</tr>
<tr>
<td>Porcelain</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>.4</td>
</tr>
<tr>
<td>Bowl Fragments</td>
<td>6</td>
<td>2</td>
<td>8</td>
<td>.8</td>
</tr>
<tr>
<td>Stem Fragments</td>
<td>4</td>
<td>23</td>
<td>27</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Total 805 153 958 100

Percent 84 16 - 100

Stem bore diameters of single unit and reed stem pipes were measured using standard drill bits in 64ths of an inch. The results on Table 10 show a wide range of measurements. Single unit diameters range from 4/64th to 6/64th inches and reed stem diameters have a wider range from 14/64ths to the largest at 30/64ths. As can be seen, the largest number of single unit stems had a 5/64ths diameter and reed stems 23/64ths, both types of stems have a range of diameters.
9. The Pipe Assemblage from Fort Hoskins and Fort Yamhill

9.1 Pipes from The United States of America

9.1.1 Pamplin, Virginia

Figure 31. Pamplin Reed Stem Pipe. Figure 32. Pamplin Reed Stem Pipe. (Courtesy of Dean Knudsen, Curator, Desoto National Wildlife Refuge, The Steamboat Bertrand Collection 2017).

The pipe assemblage from Fort Hoskins and Fort Yamhill includes Pamplin plain reed stem pipes fragments with the majority being found at Fort Hoskins enlisted men’s barracks; in addition, two bowl fragments were recovered in the officers’ quarters, one in the officers’ privy, and at Fort Yamhill only one fragment was found in officer’s house two. Though these pipes do not look exactly like the one’s from the Bertrand, they are similar in form. Munsell color hue ranges from 2.5YR, 5YR, 7.5YR and 10YR, with colors ranging from white, pinkish white, pink, reddish yellow, yellowish red, reddish brown, and very pale brown. Hamilton and Hamilton (1972:16-18) did not use the Munsell color charts but reported that the home industry color fabric ranges from light tan, pinkish tan to dull red, to dark brown, while Pfeiffer (2006: 102) reported that the assemblage of Pamplin clay pipes from the Bertrand consisted of two types, the first type consisting of an orange terra cotta and the second a grey/brown fabric. The first occurs in a large variety of color variation as a result of firing processes, but the interior is an even orange color. The second type has a gray/brown fabric and it is reported that the interior diameter of this second type is smaller than the first orange terra cotta type and the angle of the shank to bowl rim is different. The orange terra cotta pipe bowl rim is almost
parallel to the line of the stem (also called a shank), while the gray/brown variety has a
rim at a slight 10-degree angle downward towards the smoker (see also Thompson 1969:
Figure 1d). Neither of the forts’ pipe assemblages have a complete pipe of the second
type to compare bowl size or angle.

The nearly complete pipe in Figure 33E matches the plain, undecorated form of
the Bertrand Pamplin pipes with the bowl and stem tapering from top to bottom, an elbow
shape, and in cross section, both are round. In addition, this pipe has a raised dot on the
interior bottom of the bowl. The other pipes in the collection reveal that the stem walls
vary in thickness, the bowl rims are smoothed and rounded, except for Figure 33F, which
is trimmed at a flat downward angle. Figure 33F has a Munsell color 7.5YR 7/6 reddish
yellow fabric, a wider bowl, but similar form with a tapering shape. In Figures 33 and
34, these stem fragments have a Munsell color hue range from 2.5YR 4/4-5/8 (red and
reddish yellow), 5YR 5/6-7/4-7/8 (yellowish red, pink and reddish yellow), 7.5YR 7/4-
7/6-8/2 (pink, reddish yellow and pinkish white), and 10YR 8/2-8/3 (white and very pale
brown), with colors ranging from white, pinkish white, pink, reddish yellow, yellowish
red, reddish brown, and very pale brown. Figures 34C, 34D, 34E, and 34F have remnants
of slip colors ranging from brown to light reddish brown to reddish gray, with firing
clouding noted in Figure 34D and 34E. Figure 35 is a reed stem found in the enlisted
men’s barracks at Fort Hoskins that is tentatively assigned to American manufacture,
having a Munsell color 10YR 4/8 (red) and a thick stem attributed to home industry.
These pipes have been found at other western sites including, Golden Eagle Hotel,
Sacramento, California (Praetzellis, Praetzellis and Brown:1980: Plate 13.1a,c), Bellevue
Farm, San Juan Island, Washington (1853-1860/1870) (Pfeiffer 2006:34), Fort Union,
New Mexico (1863-1891) (Wilson 1966:Figure 5), Fort Union, North Dakota (1829-
1867) (Sudbury2009:85-93), Old Sacramento, California (1852) (Humphrey 1969:24-25),
the Steamboat Bertrand (1865) (Hamilton and Hamilton (1972:5), Fort Laramie,
Wyoming (1834-1890) (Wilson 1971:59), Desoto, Nebraska town site (1854-1870)
9.1.2 Point Pleasant, Ohio.

There are three reed stem pipes that match the ones from Point Pleasant (Murphy 1976), with possible manufacturers being Cornwall E. Kirkpatrick (1849-1856) or Nathan S. Davis (1856-1874; South 1972:1). This pipe style was not found at Fort Yamhill but was found at Fort Hoskins in the officers’ quarters, enlisted men’s privy and barracks, and the hospital. Examples include a turbaned mustached male effigy design, a bowl and
stem fragment with a punctate pattern (raised circles with a dot in the center between two parallel encircling lines in relief) around the rim and stem end, and third a plain fragment with a raised bite rim. One stem fragment (Figure 38) has two metal saggar pins fused within, but with enough adjacent space to allow the pipe to be smoked.

In Figure 36 the variation of external coloration can be seen. Colors vary by the Munsell chart with hues ranging from 2.5YR 3/4-5/4-5/6 (dark reddish brown, reddish brown and red), 5YR 4/3 reddish brown, 7.5YR 5/0-5/4-6/0-6/4 (gray, brown, gray, and light brown), and 10YR 5/2 (grayish brown). Within these hues colors range from a light brown, brown, red, reddish brown, gray, very dark gray and pinkish gray. The pipes are crude with seams not trimmed and rough exterior surfaces (Figure 37). All three types have been dated to the early 1860s by Murphy (1976). Other western sites where Point Pleasant pipes have been found include Fort Lane, Oregon (Tveskov and Cohen 2008), Camp Floyd, Utah (Jensen, 1991:56, 68, 71), Fort Union, New Mexico (1863-1891) (Murphy 1974: Figure 1, Wilson 1966: Figure 5), Kanaka Village/Barrack of Fort Vancouver, Washington (Chance and Chance 1974: Figure 74b, Pfeiffer 2006: Figure 6b, 8l), Columbia River Gorge (Miner et al, 1986: 135: 10-6, l), Fort Union, North Dakota (Sudbury 2009: 83-86), and Old Sacramento (Humphrey 1969: Figure 27). In addition, Wilson (1971: Figure 35) presents pipes found at Fort Sanders, Wyoming (though at the time neither had been identified by maker), that resemble pipes found at a Point Pleasant kiln site by Thomas and Burnett (1972: Figure 8h).
9.1.3 New Hampshire

New Hampshire knobby reed stem pipes made by John Taber were found at Fort Hoskins and Fort Yamhill. At Fort Hoskins they were found in the enlisted men’s barracks and privy, and the hospital. At Fort Yamhill they were found in the enlisted men’s barrack, kitchen, and an officer’s house. Munsell color ranges within the 5YR hue extending from reddish yellow fabric, pink, red, yellow brown, reddish brown, light brown, light gray, gray, and dark gray. Some pipes are unglazed, and others have a clear
glaze, with glazing on the inside. Few of Taber pipes were glazed on the inside, with glazing done only at the Endicott Street location from 1853-1864. (Jung 1996:21). The most popular glaze color is reddish brown, but other colors include very dark brown, yellowish red, very dark brown, dusky red, and reddish yellow. This style has raised dots on the exterior of the bowl and part of the stem, a smooth raised rim, and a spur. The tops of the rims and stems are flat from Taber’s use of a knife for trimming. Other design features are a raised rim found on bowls, stem ends flaring outward, and spurs with a downward narrowing stepped pattern. Several styles of knobby pipes were made at Endicott street, with some having one to six raised dots on the stem. However, no information about why Taber did this has been found; it may be he used different molds, but he discontinued this practice after 1864. Some of the knobby pipes in the forts’ assemblages have two or three raised dots on the stem, Figure 39C and 39D. Knobby pipes have been found throughout the west, including Fort Colville, Washington ca. 1826-1871 (Pfeiffer 1981: 231), Fort Floyd, Utah (Jensen 1991: 64), Fort Union, North Dakota (Sudbury 2006: 93), Bellevue Farm, San Juan, Washington (Pfeiffer 2006: Figure 30a), Golden Eagle Hotel, California (Elling 2010, Pl 13.1b), Pinole, California (1983:Figure 1B), San Francisco (Meyer 2009: Figure 6.17), and Fort Vancouver, Washington (Caywood 1955:Figure 16).

An unusual Taber pipe is a geometric anthropomorphic pipe (Figure 40) found at Fort Hoskins in the enlisted men’s barracks and the hospital. This pipe is unglazed with a reddish yellow fabric (Munsell color: 7.5YR 6/6). Two non-cross-mending fragments (Figure 40B and 40C) are featured in position to show details of facial features as if the bowl were intact. This bowl represents an elongated face with raised dots for the eyes, four for the eyebrows, a simple crude oval shaped mouth, long triangular nose, prominent crude chin, and elongated stepped spur. There are raised dots on the side moving upwards behind where an ear would be. The rim is raised, flat, and with what appears to be a small diamond shape in the center where the seam meets the rim (Jung 1996: Plate 5,3). Pfeiffer (2006: Figure 23g) described similar pipes found at Pinole, California and Lillooet, British Columbia, including the mouth portion of this same pipe (Pfeiffer 1983: Figure 1A). Jung (personal communication, 2017) stated that a complete pipe was found in a ca. 1850 context in Sacramento, California, with ten dots around the base of the
bowl, one dot where the stem joins the bowl, and three vertical rows of dots on the back of the pipe to either side of the seam mold.

A third pipe form (Figure 41 and 42) is often referred as a “Philosopher,” “Hercules” or “Grant” after General Ulysses Grant (born in Point Pleasant, Ohio), and was found at Fort Hoskins in the enlisted men’s barracks. The fabric color is light gray (Munsell color: 7.5YR 7/0), with remnants of a weathered gray slip (7.5YR 5/0). Taber made a similar pipe between 1864-1872 in East Alton, New Hampshire (Jung 1996: Plate 6, Sudbury 2009:214). Although the upper section of this pipe is missing, the base of the eye orbits and the cheeks are present, along with the mouth, chin, and beard and part of the neck wrap. The head forms the bowl, and the neck the reed stem. The wide face has a beard and mustache that are full, lobule-like, with unrefined details, while the neck cravat is wide in design, and the stem is wider than other pipes made by Taber. This may be unique to a particular mold, as other images of this pipe appear to have narrower cravat and stem design. However, the nose is well detailed in design, and the cheeks are well defined. Similar German made pipes are more refined and detailed than this pipe (Stephan 1995: 169-174, color chart 11 and 12). This pipe has been found in the Columbia River Gorge, Washington (Minor et al, 1986: Table 10-6, figure 10-7 b-c). In a ca. 1850 privy in Baltimore, Maryland a similar pipe with a tan body and red slip was found (Sudbury 2009: 214, figure 13). Similar pipes, but with more refined features, have been found at Fort Sanders (Wilson 1961: Figure 36F), Fort Union, New Mexico (Wilson 1966: Figure 6D), and Camp Floyd, Utah (Jackman 1991: Figure 8E). This pipe is tentatively associated with Taber manufacture.
Figure 39. Taber Pottery Bowls and Stems


Figure 41. Bearded Male Effigy, Right View Bowl (BE15-B507).

Figure 42. Bearded Male Effigy, Anterior View Bowl (BE15-B507).

9.1.4 Unknown American Manufacturers

A unique pipe found in the enlisted men’s barracks and officer quarters at Fort Hoskins is shown in Figures 43, 44 and 45. This pipe is tentatively attributed to an unknown American pipe maker during the American Civil War period, 1861-1865. It is unglazed and made of white ball clay. There is a generalized image of a Union Double-Ended Gunboat, wrapping around the left, front, and right sides of the bowl. Canney
(1990: 109-120) writes that these ships were built at the beginning and during the Civil War.

The right half of this pipe bowl is largely missing, but a shallow relief image shows a smoke stack with at least two puffs of smoke coming out located on the front seam. No pilot house is discernible. On the front right edge of the remaining bowl, there is a partial image of a sidewheel with at least two paddles showing at the water’s edge. No sails are visible, but multiple stays can be seen attached to the masts and to the fore or aft edges of the ship. On the back of the bowl there is a Union Shield with 12 or 13 stars, four groupings of three and four vertical stripes and a flag drooping from a flagpole mid-center top of the shield. There are vertical laurel leaves on either side of the shield tied together with a ribbon at its base; this ribbon encircles forward on the bowl to the left and right. The left ribbon has unreadable letters, “H SC…” near its end (Figure 43A). The pipe stem is a sharply horizontal oval shape, plain and without a maker’s mark. One stem has a fingerprint on the inferior side (Figure 43C). Oxidation on the bowl can be seen on the left side of the bowl of one pipe, see Figure 43A and 45. This exact pipe was found on the Columbia River, intact and with a stem cross-mended onto it (Minor et al., 1986: Figure 10-7h, i); unfortunately, the curating facility could offer no information on it.

There are no other similar pipe images like it in any of the European catalogs, including England and Scotland, of known American manufacturers, nor in wholesaler or importer catalogs.

Fragments of the last pipe (Figure 46 and 47) style found at Fort Hoskins in the enlisted men’s barracks and the hospital, is also tentatively attributed to an unknown

* There were three classes of ships which evolved and improved upon with each class, the Octorara Class (1861), Sassacus Class (1862) and the Mohongo Class (1863). Photo images of the Octorara class show a cruiser stern and bow which match the image on the pipe, the sterns of the Sassacus and Mohongo class show a plumb stern and bow due to a protective frame. These ships were designed for narrow inland passageways and river service; therefore, the stem and stern lines were identical to allow them to quickly reverse course without turning the ship around. These steamers were built with minimal rigging in the fore and aft, being dependent upon their engines and a paddle wheel located amidships. They had one or two octagonal, round or square pilot house and a rudder on each end (Canney 1990:109).

Images of these ships show them with two identical masts equal distances from the fore and aft of the ship and a mid-ship smoke stack.
American pipe maker.

Fragments of the last pipe (Figure 46 and 47) style found at Fort Hoskins in the enlisted men’s barracks and the hospital, is also tentatively attributed to an unknown American pipe maker. No other pipe images like it appear in European or British catalogs or import and wholesaler catalogs. In researching this pipe no other similar ones have so far been found in the United States. These fragments are all made of a white clay, with a glaze Munsell color of 2.5YR 8/4 (pale yellow). On top of this glaze and splotched over the raised design, is a bright pine green glaze that does not go down into the fabric, nor does it have a matching Munsell color, in addition, there is a 10YR 3/6 (dark yellow brown) glaze. Consulting with Susan Bourque (Oregon State University, Craft Center Managing Director/ Gallery Curator, personal communication, 2018), it was determined that this overglaze is a Polychrome tri-color glaze. All the fragments possess the same glaze coloring and may belong to the same pipe. There is a bowl fragment with a raised keel noted on Figure 46C. In Figure 47 a Union soldier can be seen wearing a forage cap copied from the French “kepi” hat, along with a frock coat that goes down about two-thirds of the distance between the hip and the bend of the knee (Lord 1995:292, 305), that is open at the front with the left leg coming forward as if in motion. There are no insignia on the shoulders; seven buttons are visible on the front of the coat, possibly a cartridge box on the left hip, and the soldier is holding a sword with his left hand and pointing it forward and downward. There is an image of a prancing horse in low relief, in front of and facing away from the soldier, with decorative brown and green glaze over the image. In the upper left-hand corner of the fragment is a color controlled brown glaze image of a horse and rider wearing a hat. An unknown relief design is just below the horse. A partial swallow-tailed guidon banner is situated above the soldier and the man on the horse.

The glazing style and colors on this pipe fragment resemble the Bell style, that of an influential 19th century pottery family (Brothers 2012; BFPWCMFA). John Bell who is noted to have continually learned new techniques and developed innovative glaze recipes (BFPWCMFA 2008). He was the only potter in the area to have used cobalt blue by itself and rarely with copper and manganese in polychrome glazes (Figure 48) (Brothers 2012:4, Comstock 1994:107). He produced glazes that rivaled “Rockingham,
mocha, Wheildon, spatter ware and Bennington wares” (BFPWCMFA 2008). It is also noted that John Bell often imitated fashionable English and European pottery imports that were popular with the social elite (BFPWCMFA 2008). Wiltshire (1975:33) provides an image of pottery made by John Bell that had a popular 19th century, patriotic motif of a spread-winged eagle on utilitarian ware. Comstock (1994:figure 3.38) presents a photo of a reed stem pipe mold inscribed with John Bell 1828, as well as a lead, manganese, and copper-glazed earthenware cup demonstrating his glazing method over the top of a low relief sprig (low relief shapes made separately applied before firing) design (Comstock 1994: figure 4.149).

Potters often copied other potters’ popular styles and glazes. Rice and Stoudt (1929:41) noted that skilled pottery artisans learned their trade at the Bell’s pottery in Strasburg, Virginia and took these skills to other nearby states of West Virginia, Kentucky, and Tennessee. It is not unconceivable that these potters migrated to other nearby states as well. This pipe (Figures 46 and 47) is tentatively attributed to the Pennsylvania region or nearby northern states and not to Virginia or other southern potteries due to the political conflict of the American Civil War. Pipes made by Eastern manufacturers have been found by Reckner and Dallal (2000:30), who found a molded white ball clay pipe in Five Points, New York City (ca. 1850-1884) attributed to a Thomas Smith of New York City, New York. Barber (1893:341-342) writes that in 1858 Mr. J. Richards of Philadelphia, Pennsylvania made good quality white clay pipes of varying stem lengths and that Charles Kurth of Brooklyn, N.Y., was making short stemmed white clay pipes for the presidential campaigns in 1888 and 1892.
Figure 43. Union Double-Ended Gunboat Bowls and Stems (A:35BE15-10-2436A/B, 2316; B:BE15-B47, C: BE15-A1192).

Figure 44. Posterior View Close-up of Union Shield on Back of Bowl (B:BE15-10-2436A/B, 2316).

Figure 45. Anterior Bowl, Union Double-Ended Gunboat (A:35BE15-10-2436A/B, 10-2316).

Figure 47. Bowl Close-up of Soldier and Horse (G:BE15-B642).

Figure 48. John Bell Pottery.

9.2 Pipes from Canada

Within the collections there is one unglazed pipe found in the kitchen at Fort Yamhill, that may be associated with a Canadian maker (Figure 49). Kenyon (2008:80-89) describes similar Canadian pipes made of white clay and with four bands. The first
and upper band of this bowl has remnants of fine vertical lines running from the rim downward between band two and three, continuing to the bottom of the bowl. Band two has thick vertical fluting alternating with the fine lines from band one; the base of the wide flutes appears to have been trimmed or were part of the mold design. The third band replicates the subtle fine lines of band one, which become more prominent in forming band four. The front and rear bowl seams are present. This popular style has been found in Canada and the United States. This style of pipe has been observed labeled with both HENDERSON/MONTREAL lengthwise on the stem. William Henderson arrived in Montreal, Canada in the 1840s, opening one of the largest Canadian firms, Henderson and Son factory, making pipes from 1846-1876.

In a Müllenbach and Thewald, Höhr, ca. 1908 catalog dating to 1908, pipe #537 is of the same style. This catalog is from the Westerwald Region of Germany which copied many other maker’s pipe styles. Duco (2004:110) reports that the Westerwald region began putting out catalogs in the mid-nineteenth century, but few of these are known and there is little information about this region’s manufacture until after 1900. There is the possibility that this style is in an earlier 19th century German catalog that has not yet been discovered and is considered here as an option.

A pipe maker in Hull, England, Joseph Henderson Scott operated a clay pipe business from 1839-1855 or later and made a similar style (Davey 1979:98), but there is no known connection to the Henderson family of Montreal. Heard (2018) located a similar pipe that may have been made locally by Elizabeth Reffell (ca. 1810-1840) in Suffolk, England. Robin Smith (personal communication) who has specialized in Henderson marks and pipes, reports that Henderson always marked their pipes and believes this may be a Scottish pipe. There is a similarly designed pipe made in Glasgow by Duncan McDougall, but the third band is in a half-rounded relief (Davey 1987: Figure 14, number 14). This pipe style has been discovered at Fort Sanders, Wyoming (Wilson 1971: Figure 30-F, G), Fort Lennox (Quebec), Sault St. Marie, Simcoe Co., (Kenyon and Kenyon 2008:80-9), and at Bellevue Farm, Washington (Pfeiffer 2006: Figure 14h).
9.3 Pipes from Europe

9.3.1 Austro-Hungarian

One Austro-Hungarian pipe (Figure 50 and 51) was found in the enlisted men’s privy at Fort Hoskins. This Schemnitz-style pipe is made of white ball clay with a very pale brown, nearly clear glaze. The characteristic design of this Austro-Hungarian pipe style is described as having a tall cylindrical bowl with a shell shape base, made of terra cotta red, black and marbled with a glazed surface, and with a ringed neck (Gačić 2011:33-34). A descriptive word, cannalures, used by researchers studying Turkish, Austro-Hungarian and Italian pipes, describes fluting or grooves surrounding a surface. The edge of the stem rim of this pipe possesses small shallow horizontal cannalures around the edge circumference. There is a rolled ring going around the stem end which curls into a decorative curlicue on the back where the seam would be; below this is a gently curving upward design possibly a finger rest to aid in holding the pipe. The bowl is missing, but where the bowl would meet the stem there is an outline of a scallop or flower calyx design. The makers mark found on the stem points to this pipe being made by Anton Ress, as “A. RESS” within an elongated oval, is impressed along the stem.
(Figure 52). Just to the left of this is a round incuse with a double headed eagle (vague), the Austro-Hungarian empire symbol. Gusar (2008: 142-144) states that pipes with this stamp have been found in Zadar, Croatia, Italy, Hungary, and Slovenia. Anton Ress pipes have also been found at the Petrovaradin Fortress, Serbia (Gačić 2011:132), Slovakia (Bielich and Čurný, 2009: 352), and a probable copy of this maker’s pipes were found in Krakow, Poland (Puziuk 2015:58). In researching this pipe, no other similar pipes were found in the United States, nor in the Pacific Northwest. As noted in Table 1, there were volunteer soldiers from Austria, Germany, and Prussia present at Fort Hoskins. There is the possibility that this pipe was brought with the soldier.
9.3.2 England/Scotland

Only one pipe style found in the enlisted men’s barracks at Fort Hoskins has been identified as originating from Great Britain. No complete British pipes or stems with partial bowls are within the artifact assemblage. The Scottish pipe stems are plain, unglazed with the top and bottom seam smoothed. One side of the stem has a mold impressed “MURRAY” within a rectangular cartouche and on the opposite side also impressed in a rectangular cartouche is “GLASGOW” (Figure 61). These pipes were made by William Murray, who lived and worked from 1830-1861 in three locations; from 1843-1861, pipes were made at Caledonian Pipeworks, 33 Garngadhill (Davey 1987: 105). In 1862, the company was bought by Thomas Davidson who operated at the same address until 1887 (Davey 1987:102). Pipes made by Murray have been unearthed at the Trojan site (1851-1968) on the Columbia River (Warner and Warner 1975:109), Fort Vancouver Kanaka Village/Vancouver Barracks (Chance and Chance 1974: figure 73b), Martinez Adobe, Pinole, California (Pfeiffer 1983: figure 1G), and Old Sacramento (Humphrey 1969: figure 2 and 3). Use wear can be seen on figure 61 F where there is tooth wear on the left side of the stem, and figure 61G has a bending break on the right side of stem end.

9.3.3 France

Numerous pipes have been identified as being made in France. A uniquely vented pipe style was found in the Fort Hoskins enlisted men’s barracks. This reed stem pipe effigy design consisted of one complete and five bowl fragments (Figure 54). The fabric color of these pipes all key out on the Munsell color chart to 5YR 6/6-7/6 (both reddish yellow) and 10 YR 7/3-7/4 (both very pale brown). Of these fragments, four are unglazed and three have a 5YR 2.5 (black) glaze on the exterior and interior surfaces. As seen in Figure 54C, the face and eye display remnants of the black glaze. Figure 54E, a rim fragment, has a thick coating of this black glaze. As seen in Figure 55, a unknown design and rim fragment, also has the same black glaze. The remaining fragments do not show any colored glaze over the face or eyes. There are no maker’s mark on any of the pipe fragments. These pipe fragments are unique because they have an anterior, vertical channel that opens at the top, front bowl rim, and connect to an opening at the mouth. Figure 55 is also thought to be of this same style, but of an unknown design. At least four of the fragment rims appear to accommodate a lid (Figures 54A,C,E, F). The one complete pipe (Figure 54F, 57, 58 and 59) is of a high quality, with fine details of the face and hat.

A French patent (Figure 60) was found for this design. On February 4, 1856, an Invention Patent was given to Crétal-Gallard for 15 years, Patent No. 26 226, for: "a Pipe with reverse air hole." French clay pipes made by Crétal-Gallard are considered to have been extremely rare (Amsterdam Pipe Museum 2018). This pipe uses a brass lid without air holes to prevent smoke from escaping from the bowl; instead smoke was forced to exit through the pipe effigy’s mouth (Amsterdam Pipe Museum 2018, Raphael,1991:87). The Crétal factory was founded by Jacques-Francois Crétal in 1818; after his death his widow took over its management, and then in 1850 it was signed over to her son Auguste. In 1853, Auguste became joint owner alongside Eugène Gallard with the resulting company name of Crétal & Gallard, which operated until 1863 when it declared bankruptcy. The factory is reported to have focused more on rural smokers rather than urban ones, and produced a wide variety of subjects with attention to details (Amsterdam Pipe Museum 2018).
In a recent article, the German firm, Gebrüder Ziegler of Ruhla, also made reed stem pipes with a vertical vent hole comparable to these pipes (Haan 2017: Afb. 6a-b). This firm is thought to have been established in 1767 in Ruhla, becoming an important “producer, manufacturer, importer and exporter of tobacco products and goods” and considered to be a ‘free city’ where no restrictions were placed upon employees in the surrounding villages (Haan 2017:141). The company followed fashion trends closely and actively put out innovative products, such as human effigy, vented pipe bowls (Haan 2017:142). Haan (2017: 141-144) notes that only one 19th century catalog by this company has been found, but it is believed that at least one more was produced with effigy pipes having the sclera painted white and pupil black, or having glass eyes. The catalog shows pipe photos with an exterior glaze of the same glossy, black coloring as seen in Figure 54C and E, and Figure 55G. Haan (2016: 8-10) reports that the pipes made in Ruhla were cast in plaster molds and that pipe drawings in the catalog suggest that they had glass eyes. The fabric color of the Ziegler pipe appears to be a terra cotta red whereas the Fort Hoskins pipes have a Munsell color 5YR 6/6-7/6-7/8 (reddish yellow) fabric. The high sculptural quality of the Alexander II face (Figure 58 and 59) points to French manufacture, but one or more pipes may actually have been made in Ruhla. Tentatively these pipes are associated with French production, but German manufacture cannot be ruled out.

In researching these pipes only one other has been found in the United States. This effigy pipe was unearthed at Fort Union, New Mexico. It is of a bearded male soldier, it had a pink unglazed fabric, and it had an anterior vertical vent hole. The Fort Union pipe had white “paint” on the beard, mustache, chin strap and cornias of the eyes and scrolls on either side of the shank, with black paint for the eyebrows and pupils. The lower lip is dark red. The number “187” is in relief on the left side behind the chin strap (Wilson 1966:figure 6F). French pipes are known to have white enamel for the sclera and black enamel for the pupil, as well as on other areas of the pipe (see section 7.7 France). Further research is needed to help clarify the differences and determine country of origin.

The first pipe (Figure 54F, Figure 57, Figure 58 and Figure 59) is a 99% complete reed stem pipe of Alexander II, who reigned as Czar of Russia from 1855-1881. This is a
generalized military pipe image, as photos of him rarely showed a beard. This pipe was found at Fort Hoskins; the date range for this pipe is 1856-1863 reflecting the date of the fort as well as when Crétal & Gallards factory went bankrupt. This earthenware has a Munsell color of 10YR 7/3 (very pale brown) fabric with no evidence that it was ever glazed. There are no maker’s marks or mold numbers on it, and it was very lightly used with a very faint tar staining on the interior and rim of the bowl, the exterior showing evidence of burning. The superior view (Figure 57) reveals the air hole that runs down the anterior fabric. At the rim opening there is an indentation made on the posterior aspect of the smoke vent hole which forms a channel for the smoke to move through when the cap is closed. The facial features are well defined and sharp, as is the hair, bilateral side curls located just below the hat and the top of the chin strap, full beard, mustache, collar, wide chin strap and military hat. The base of the stem-bowl junction has an oblanceolate leaf shape with smooth double-rimmed margins. Figure 54E matches the anterior superior portion of the hat as seen on Figure 54F. It has a fabric color of Munsell 5YR 6/6 (reddish yellow) and a shiny black glaze on the exterior and interior, with Munsell color of 5YR 2.5/1 (black). This fragment retains part of the braiding, hat rim and rim of the bowl, and part of the left side vertical smoke vent hole. Figure 54A,B,and C have a fabric color 5YR 7/6 (reddish yellow) and 10 YR 7/3 (very pale brown), with the unglazed fragments showing light use. These fragments represent the same effigy of a feathered, turbanned African or North African male. Two fragments are unglazed and one has remnants of a black glaze. The center of the turban has a center circle surrounded by four others, possibly representing jewels. The noses on two of the fragments are wide and with full lips on one fragment. One fragment (Figure 54A and 56A) has an intact smoke vent hole on the indented rim, also with an indentation on the posterior of the hole, to channel smoke down when a lid is closed. In Figure 56B, the smoke channel can be seen running behind the nose and exiting at the mouth. As seen in Figures 54C and 56C, this fragment has a black glaze on the exterior and interior with some glaze seen in the partial smoke vent hole. The pipe in Figures 54D and 56D, does not have an indented rim; however, it does have a vertical smoke vent hole with posterior indentation to channel smoke. The upper portion of the face has bilateral frown lines, the left eye and a very small section of the upper left nose. This unknown male effigy has
faint remnants of glaze that was a dark color, possibly black, but is now worn and faded to a pinkish gray on the interior and exterior.

An additional fragment, Figure 55G, was found during analysis that has the same black glazing (5YR 2.5/1 black) and fabric color (5YR 7/8 reddish yellow), but does not match the design of the other pipes. This small fragment appears to be a bowl rim fragment with a smooth rounded top, which may accommodate a cap; it is similar to the rim fragment in Figure 54E and not similar to the stem end of the intact pipe in Figure 54F. This portion is 4mm in thickness and may be part of an anterior bowl rim, possibly the front portion of a vertical smoke channel.


Figure 55. Unknown Bowl Rim Fragment (G:BE15-B1863).

Figure 57. Alexander II, Superior View of Bowl (F:35BE15-10-9814).

Figure 58. Alexander II, Front View of Bowl (35BE15-10-9814).

Figure 59. Alexander II, Right Side View of Bowl and Stem (35BE15-10-9814).
The pipe illustrated in Figure 61 was found in two of the officers’ houses at Fort Yamhill. This unglazed pipe is made of white ball clay and has a fin on the anterior and posterior mold seams of the bowl. This fin begins in low relief and gradually increases in height from the top and bottom of the bowl towards the mid-center ending in high relief.
The bottom fin section still present is seen on the bowl base at the stem bowl junction (Figure 61A). Faint boror marks can be seen on the interior and exterior of the bowls rim. The bowl and stem have a white, burnished slip, and very faint mold seams can be seen on the superior and inferior surfaces of the stem. There is an impressed stamped maker’s mark on the top of the stem, going from left to right around the stem. This maker’s mark angles in a proximal direction with the word ‘Paris’, and just below this at the same angle is an ‘F’ and ‘C’ (Figure 62 and 63) The area between the ‘F’ and ‘C’ is worn. Langouet et al., (1980:108, figure 19-45) discovered a pipe at St. Malo, France that is identical to this pipe. This pipe type is attributed to Francis Cretal of Rennes, Brittany who at times used a Paris mark (personal communication, David A. Higgins; Higgins 2010:45). There were three companies with the same family name in the Rennes region of France. The Amsterdam Pipe Museum (2018) reports that one of these companies used an impressed stamped mark of ‘F. CRETAL AINE ET CIE A ST. MALO’ on their pipe stems. Similar pipes of this style, without the Cretal mark, have been found at Old Sacramento (Humphrey 1969: figure 39), Bellevue Farm, San Juan Island (Pfeiffer 2006:38), Fort Vancouver, Washington (Caywood 1955:61, Ross 1976:815), Fort Sanders, Wyoming (Wilson 1971: Figure 28c).

Figure 61. Anterior and Posterior Fins, Bowls and Stem (A:35PO75-HH-18, 35PO75-HH-27, B:35PO75-01-087, 35PO75-01-059, C:35PO75-01-07-36).
The next pipe, shown in Figure 64, 65 and 66, was found in an officer’s house at Fort Yamhill. It is an unglazed single unit pipe made of white ball clay and of unknown French manufacture. French production is deduced on the quality of the effigy features and the white enamel for the sclera, on the mustache, beard and rim of the headdress, and black enamel for the pupils and eyebrows (Duco 2004:16-17). The facial features are not stern, but smiling. There is a remnant of a single unit stem with small diameter bore hole. This pipe has been smoked moderately with black tar on the inside surface of the bowl. This image was not found in any of the French catalogs currently available. It is tentatively noted to be a Bedouin male. Similar styles can be found in Gambier Digital catalog, Number 629 and 658 (Esveld 2014), Gisclon 1829 catalog Number 271, Bedouin (PKN Society for Research of Historical Tobacco Pipes 2017). This pipe type was not found in research of sites in the western United States.
Figure 64. French Bedouin, Front Bowl (35PO75-H2-13-3990).

Figure 65. French Bedouin, Right Side Bowl (35PO75-H2-13-3990).

Figure 66. French Bedouin Left Side Bowl (35PO75-H2-1-3990).

The single unit, unglazed white ball clay pipe in Figure 67 is tentatively assigned to French manufacture. This pipe was found in the enlisted men’s barracks, as well as was a fragment (35BE15-10-3685) from the left side of the lower portion of another bowl with the identical leaf pattern, fine low relief dots and part of the inverted loop. Two other bowl fragments (not shown) were found; one from the officers’ privy (BE15-E218) is from the front right side of a lower bowl with a partial acanthus leaf, fine relief dots and part of the inverted loop. The other fragment (BE15-A104) was found in an officer’s house and is a partial upper and lower bowl fragment. This delicately designed, well-made pipe has a high finish on the smooth portion of the bowl and botor markings on the exterior and interior surfaces of the rim. There are small pearl shapes horizontally placed and level, encircling the circumference of the oval shaped bowl. Inferior to this is an acanthus leaf in relief wrapped around the base of the bowl and facing towards the stem. The leaf margins are entire and raised, with a single vein through the centers. Over the face of the lower bowl are fine low-relief dots that fill in the open spaces and bilaterally over this area are identical inverted loops. The spur is in the shape of a pointed leaf curl, with fine raised pearls along the margins. The upper back and front mold seams are not visible having been smoothed. The front mold seam at mid-leaf has diagonal hatch marks from trimming, as does the mid center of the spurs. Similar, but not identical, pipes can be seen on page 20 of the 1840 Hasslauer and L. Fiolet Successseurs de Gambier catalog (Amsterdam Pipe Museum 2018); this image shows fine low relief dots between
leaves, and has a similar bowl shape, but the spur is a standard spur. Gambier Digital Catalog (Esveld 2014), No. 271 has a similar design as the above pipe description, and Gambier 1894 catalog (PKN Society for Research of Historical Tobacco Pipes: 1894: 33) exhibits pipes with this style of curled spur. Similar pipes with this curled spur have not been found in the western United States.

![Figure 67 Acanthus Leaf, Left Side Bowl (35PO75-B1048).](image)

The next pipe found, seen in Figures 68 and 69, was found in the enlisted men’s barracks at Fort Hoskins. It is an unglazed, reed stem pipe made of white ball clay and made by Gambier (Figure 70). This pipe is titled “Taitien” ca. 1858 (Esveld 2014: figure 567) and labeled ‘Maure, Barbe Fourchure, Tête petite’ (Moor, Forked beard, Small head). Comparing this design to the online Gambier catalog, it is believed to be a petite style. In the image in Figure 68 just to the left of the base of the beard can be seen a design element believed to be part of the model number. In the larger pipe image, the model number is enclosed in a relief frame, but rests further back on the stem. There are remnants of enamel on the teeth as seen in Figure 69. This unusual pipe has not at this time been found in the western United States.
This next melon-shaped single unit pipe in Figure 71 is made of white ball clay and is unglazed. All but two fragments were retrieved from Fort Hoskins enlisted men’s barracks; one complete bowl was found in the enlisted men’s privy and a bowl fragment was found at the hospital. This style is described in the Gambier Digital Catalog (Esveld 2014) as having vertical curved ribs and termed ‘Neogen melon.’ Other terms used to describe it are ‘melon’, ‘wide cockles’ and ‘fluted.’ No maker’s mark was discovered on
any fragments. In the online Gambier Digital Catalog, there are several identical pipe styles described with bowl and stem measurements. Gambier made five different designs, four pipes match this pipe and one in particular matches the bowl’s height dimensions: Gambier number 25, bowl height is 2.6 cm, number 691 (grande=large); number 693 (moyenne=regular) bowl height is 3.5 cm, and number 695 (petit=petite) bowl height is 3.2cm. The bowl height for the Fort Hoskins bowls ranges from 3.1-3.26 cm, thus number 695 is the closest; Gambier terms this pipe ‘Neogen melon, petite’. Of these pipes, at least two pipes had heavy interior tar build up and the others showed light to moderate use. The pipe from the enlisted men’s privy appears to have been very lightly used before loss. Similar pipes have been found at Bellevue Farm, San Juan Island, Washington with Gisclon/M.E./a impressed into the stem (Pfeiffer 2006:38, figure 3b), the Golden Eagle Hotel, Sacramento, California (Eling 1980:plate 13.1d) with Gisclo/M.E./a Paris impressed into the stem, and at the Five Point Site, NYC (Reckner and Dallal 2000:41) but without a maker’s mark and with crosshatch marks on the mold seams. At this time there are two possible French pipe maker’s for this pipe style, Gisclon and Gambier.

Figure 71. ‘Neogen melon, petite’, Right Side Bowl and Stem (A: 35BE15-10-1873, B:35BE15-B660, C:35BE15-10-6435, D:BE15-B441).
This next pipe style was found in the enlisted men’s barracks at Fort Hoskins. It is an unglazed, single unit pipe made of a bright white ball clay. In Figures 72 and 74, an acanthus leaf can be seen in high relief covering the seam on the front and back of the bowls base. The consistent color of the interior and exterior surface of the bowl has a Munsell color code of 7.5YR 6/6 (reddish yellow) due to controlled oxidation during firing. There is a faint botor mark on the exterior bowl rim, in addition the rim is slightly raised. The color over the entire bowl is even, but there is evidence of burning post deposition with fire clouds on the front right bottom and left back of the bowl (Figure 72 and Figure 74). The high relief over the mold seams extends downward and blends into an acanthus leaf (Figure 74). The acanthus leaf has smooth, slightly raised leaf margins and is made up of a total of seven leaflets, one terminal leaflet and three pinnate opposite leaflets. The mid-rib vein in the center of the leaf has diagonal cross-hatchings along its length. The interior area of the leaf is composed of parallel low-relief dots on each leaflet. To display how this pipe style looks, Figure 72A and Figure 72B are displayed together, but do not cross mend. The bottom leaf design of both are of the same design with diagonal cross hatchings on the mid-rib vein that extend down past the basal aspect of the design onto the stem for one centimeter. Infilling of the design consists of low-relief parallel dots along the length of the partial leaf. On the superior aspect of the stem there are impressed letters (Figure 73) probably “PARIS”. Below this are worn and illegible lettering. The surface has some vitrification on it. Langouet et al., (1980:108, figure 19-43, 45) reported similar pipes made by Cretal of St. Malo and it is tentatively associated with the Cretal factory. No other pipes like this have been found at other sites in western United States.
The next grouping of unglazed single unit pipe stems (Figure 75) do not have associated bowls. These stems were found at Fort Hoskins in the enlisted men’s barracks, hospital, officer quarters, and an officers house dump. Five of the seven are made of white ball clay and two of a red colored clay (Munsell color 2.5YR 5/6 red). The stems are marked with incuse block letters of “PONNET” “PARIS” perpendicular to and encircling the stems. The stems in Figure 75A, D, and F were found in the enlisted men’s barracks, Figures 75C and G in the hospital, Figure 75B in the Officers quarters and Figure 75E in Officers House three dump. Four (Figure 75A,B,C, and D) of the stems are burnished, but are otherwise plain.
Figure 75E is tentatively associated with “PONNET” based on partial letters that match the lettering style of the other stems. This stem has a high relief perpendicular line encircling the stem, measuring 2.5mm wide, and diagonal hatchmarks along top and bottom mold seams. Between the hatchmarks are three parallel raised lines that are parallel to the stem, approximately 1.2mm apart and with a series of raised dots on top of the lines and measuring 1.4mm in diameter. These parallel dotted lines are connected with perpendicular lines which also have a single dot on them. The areas between the hatchmarks and the parallel lines is smooth.

Pipes in Figures 75F and 75G appear to have the exact same design and are believed to be of the Chinoises style as seen in the wholesaler’s catalog of the Saillard firm in Besancon, France (Duco 2004:27, figure 39), as well as a similar Gambier stem design (Duco 2004:46, figure 93, number 1273). The pipe in Figure 75F has “PONNET” encircling perpendicularly to the stem. There are four acanthus-style leaves parallel to the stem, the edges are entire and slightly raised in relief, each with a mid-rib vein and with a leaf apice with a slight point on the rounded end. The two leaves located over the mold seam have diagonal cross hatch marks down their centers. Between the leaves are four, single rows of raised dots that have opposite bilateral extensions. Figure 75G appears to be the adjoining upper stem portion just prior to the bowl stem junction. There are four, single rows of raised dots with a partial leaf apice between two of these and at the base of the leaves is a high-relief perpendicular line encircling the stem, measuring 2 mm wide. Moving proximally from this line is a bilaterally symmetrical acanthus leaf with the center leaf on the top of the stem. There are very faint diagonal cross-hatch marks on the seam mold lines, over the top center leaf and bottom leaf, as well as a single large high relief dot. Both Figures 75F and 75G have a Munsell color of 25YR 5/6 (red). All the stems have a small bore hole diameter of 1.58mm or 4/64th. No information about this company is found in any European literature and no pipes of this type have been found at sites in the Western United States.
A pipe stem fragment found in the enlisted mens barracks at Fort Hoskins has letters encircling it perpendicular to the stem (Figures 76 and 77). It is a single unit white ball clay pipe with a glaze color of Munsell 7.5YR 6/4 (light brown). The upper letters discernible are a “DU..” and below this is “…as…”; to the left of this and level with it are the letters “…er…..”. There are no discernible letters between the “er” and “as”. This pipe is believed to be made by the French manufacturer Duménil of St. Omer. On the Amsterdam Pipe Museum (2018) collection, pipe number APM 00.730 (ca. 1860-1880) has lettering encircling the stem which compares to this pipe. It is possible that the words on this pipe stem are “Duménil a St. Omer.” Pipes from this manufacturer have been found at Camp Floyd, Utah (Jensen 1991:35), Columbia River Gorge (Minor et. al. 1986:Figure 10-6p, 10-6q), Fort Vancouver, Kanaka Village/Vancouver Barracks (Pfeiffer 2006:Figure 5j), Golden Eagle Hotel, Sacramento, California (Elling 1980: Figure 13.1g), Old Sacramento, California (Humphrey 1969:Figure 5a and 5b).
Figure 76. ‘…er…,” on Stem, Possible Dumeril (BE15-B18).

Figure 77. ‘Du…’ and ‘…as…’ on Stem, Possible Dumeril (BE15-B18).
9.3.4 Germany

Pipes made in Germany are well represented in this assemblage. The pipe in Figure 78 appears to have been a pipe style popular with both enlisted men and officers. Examples of this type were excavated in the officers’ quarters, officer’s dump, officer’s privy, as well as the enlisted men’s barracks and privy. There were a total of ten fragments found with two in each site location listed above. This unglazed white ball clay pipe has burnished and polished bowls and stems, with botor marks on the bowl rims. There is a raised fin with a half rounded end 3mm in height that begins at the bowl-stem junction on the bowl bottom. This fin covers the front seam from the base of the bowl upwards, slowly decreasing in height until blending into the bowl surface at the rim. From the bowl-stem junction proximally at 8 mm are a series of three semi-rounded bands in high relief perpendicular to the stem. The first band is 4.7mm wide, the second 2mm wide and the third is 1.3mm wide. Parallel to the stem is a fluted design encircling the stem. This fluting is bordered proximally by another perpendicular band in relief measuring 1.3mm wide. The remainder of the stem to the bite is smooth. There are diagonal hatch marks on the top and bottom stem mold seams, beginning at the bowl-stem junction. These hatchmarks do not extend to the end of the stem, but end at the tooth wear. There is no maker’s mark on these pipes. A pipe style that matches these precisely is seen in an undated Mullenbach and Thewald catalog (PKN Society for Research of Historical Tobacco Pipes 2017:6, number 251). However, the images display pipes with ‘Germany’ on the stem, so it likely the catalog was published after 1890. The McKinley Tariff Act of 1890 required the country of origin to be clearly marked on imported goods. Similar styles relatively alike can be found in J.J. Knoedgen catalog (PKN SRHTP 2017:6, number 44); however, in the catalog, the fin only goes halfway up the front of the bowl and the stem decoration is not similar. The French pipe maker Gisclon made a somewhat similar pipe that was found at the Golden Eagle Hotel in Sacramento, California (Elling 1980:plate 13.1e), but the bowl style did not match this pipe. A pipe matching this type was found at the Five Points site in New York City (Reckner and Dallal 2000:87, number 300), but none have been found in the Western U.S. This pipe is identified as German and tentatively manufactured by Mullenbach and
Thewald, which was founded in Hoehr-Grenzhause in 1830 in the Westerwald region, where there was and is a clay quarry still in operation (PKN SRHTP 2017).

In the enlisted men’s barracks at Fort Hoskins (Figure 79), sixteen unglazed white ball clay pipes were found consisting of the image of a frowning, bearded Orthodox Jewish man, with long sidelocks (also called payot or peyes), and a tall hat with what appears to be fur trim at the base. The stems have diagonal cross-hatching on the bottom seam, going proximally for 1.5 – 2mm from the bowl stem junction. The bowl rim is indented and appears to be designed for placement of a spark cap. This pipe is found in a Mullenbach and Thewald in Höhr, Grenzhausen, Germany catalog, ca 1830-1850, page 19, number 19 (PKN SRHTP 2017). This pipe style has at this time, not been found at any other sites in the Western United States.

The next pipes within the collection are eleven pipes with an alligator/crocodile motif (Figure 80) on the stem. These pipes were excavated at Fort Hoskins, with nine found in the enlisted men’s barracks, one in an officer’s quarters and one in the officer’s house dump. These unmarked, unglazed white ball clay pipes were made in the Westerwald region of Germany, in the beginning of the second half of the 19th century (Stam Ruud personal communication). This pipe imagery probably evolved from an older pipe style with either the biblical Jonah being swallowed by a whale or Sir Walter Raleigh being attacked by an alligator/crocodile from the 17th century (Stephan1995:139, Duco 1987:92-93, Duco 1985:1, number 2, figure 41). The narrow-shaped bowl is burnished and polished with irregular rouletting around the rim. Perpendicular to the stem is a stylized alligator/crocodile with the mouth open towards the bowl; its teeth are backwards-facing and there is a brow in relief on top of the stem, between the eyes. Small, low-relief closed circles, as well as, half-rounded and half-serrated motifs that
imitate scales. The design has areas separated by rings perpendicular to and encircling the stem. Proximal to this and bilaterally on the stem sides are two sharply shaped ovals with overlapping closed circles within. There are diagonal crosshatch marks located on the top and bottom mold seams. Similar pipes can be found in Mullenbach and Thewald, ca. 1830-1850 catalog, page 4, number 6 (PKN SRHTP 2017) and in Gebruder Spang (1884-1970) post-WWII catalog, page 11, number 135 (PKN SRHTP 2017). Currently, this pipe style has not been found in other sites in the Western United States.

A nearly intact effigy pipe (Figures 81, 82 and 83) was found in the privy at Fort Yamhill; it is a good quality, unglazed, white ball clay pipe. This pipe’s male face is well executed with a mustache and beard, an intact nose and mouth, and the eyes are worn. A turban rests on the head angling downward on the posterior of the bowl and covers the top portion of the ears bilaterally. There is a total of fourteen six-point stars, seven on both the left and right sides of the turban (Figure 82). The turban has a knot in the front center; above the turban is a flat rim and encircling this in a counter-clockwise direction are raised letters “UNITED STATES” on the right side and “OF AMERICA” on the left side. At the junction of the bowl and stem is a scallop design encircling the neck, with
the scallops decreasing in size moving down the stem and then ending. The top of the stem is smooth and there is no maker’s mark (Figure 83). A similar pipe as this one can be seen in an 1838 Blanc-Garin in Givet, Andennes, catalog (page 13, style number 136) (PKN 2018). This catalog displays images of their pipes (as well as pipes from Belgium and Holland) that have a similar design, but with a plain rim sans lettering. An early version of this style was made by French manufacturer, Gambier located in Givet. In the 1840 Gambier catalog a very similar pipe style in Serie 11, Number 150, is labeled “Pacha” (PKN 2018). This style had a smooth rim and no stars on the turban and the décor around the neck has a simpler linear design. Other French pipe makers also made this style; Louis Fiolet at Saint-Omer France displays a “Se Pacha” Number 10 in an 1846 catalog and in an 1843 wholesaler catalog, Saillard in Besancon also presents a “Pacha” pipe (PKN 2018).

A circa-1850 iron mold with this design, including the lettering around the bowl rim, was used by the Grossalmerode factory in Germany (Stephan 1995: 165,169). The mold design has no maker’s mark. This pipe matches the description of the Grossalmerode pipe. The pipe is determined to be made by the Grossalmerode company. This pipe has been found in Rome, New York (Hanson 1971: Figure 2e), Five Points, New York City (Reckner and Dallal, 2000:95), and Whitefish Island, Sault Ste. Marie, Ontario (Conway 1986: 66-67), but at this time it has not been found in the western United States.

Figure 81. ‘UNITED STATES OF AMERICA’, Anterior Bowl (35PO75-OO-70/80).

Figure 82. Right Side Bowl and Stem (35PO75-OO-70/80).
Politicians were commonly portrayed as pipe figures. Figure 84 and 85 consists of four reed stem effigy pipes of United States presidential candidates, as well as “Turk” and “Philosopher”/”Hercules” effigies. These pipes were excavated at Fort Hoskins in the enlisted men’s barracks and at Fort Yamhill in the kitchen and one of the officer houses. These pipes were produced exclusively for the United States market in Uslar and Grossalmerode, Germany from the 1840s-1850s up to 1870 (Pfeiffer et al., 2006: 9-28, Stephan 1995:183, 185-186, Sudbury 2009:68-69). Stephan (1995:185-186) notes that an 1870 accounting book of Carl Meseke’s from Uslar no longer mentions the Presidential pipes, but they are mentioned in his account’s between 1860-1870.

The pipes in Figure 84A and 84B represent Henry Clay (1777-1852), an unsuccessful presidential candidate in 1824, 1832, and 1844. The lettering is in block form with “HENRY” on the left side of the stem and “CLAY” on the right side. Encircling the base of the head on the figure’s collar, are alternating a single flower head with two bilateral leaves and a six-point star. Stephan (1995:186) notes that this pipe was made in Uslar only. Figure 84A (found in the kitchen of Fort Yamhill) has a Munsell color of 5YR 6/6 (reddish yellow) with a clear glaze. The pipe in Figure 84B found in the enlisted men’s barracks at Fort Hoskins was exposed to a fire post-deposition, with the glaze revitrified and reduction noted on the fabric. This pipe has a Munsell color of 7.5YR 4/0 (dark gray).
The pipes in Figure 84C and D (both found in the enlisted men’s barracks at Fort Hoskins) have in block lettering, “PRESIDENT” on the right side of the stem and “FR. PIERCE” on the left side, for President Franklin Pierce (1804-1869) president from 1853-1857. This pipe also has alternating six-point stars, a single flower and two leaves bilaterally on the collar encircling the stem. This effigy has a high forehead, a distinctive hair style and does not have laurel leaves encircling the head. These pipes were made in Grossalmerode and Uslar (Stephan 1995:170-171,186). Sudbury (2009:70-71) identified Franklin Pierce reed stem pipe fragments found at Fort Union, North Dakota that had the maker’s initials of C·P (Carl Christoph Pabst of Uslar) below the word PRESIDENT; however, this pipe does not have these initials. Figure 84C has a Munsell color of 5YR 6/8 (reddish yellow) with a clear glaze and Figure 84D shows revitrification and burning, with reduction of the fabric to a 7.5YR 6/0 gray color.

The pipe in Figure 84E has block lettering on the left side of the stem, “LEW.” and on the right “CASS”, for presidential candidate (1844) Lewis Cass. There are no stars or flowers on the figure’s collar. This style was made in both Uslar and Grossalmerode. This fragment was found in the enlisted men’s barracks; it has a fabric color of Munsell 5YR 7/8 (reddish yellow) and a clear glaze. Figure 84F was found in an officer’s house at Fort Yamhill. Written in block letters in relief on the left side of the bowl is “ROUGH AND READY”, which was President Zachary Taylor’s (1849-1850) nickname, although his name does not appear on the pipe stem. This pipe does not have alternating single flower and two leaves with six-point star on the collar. It is unknown if this pipe was made at Grossalmerode and/or Uslar, but is identified as German made.

In Figure 85, are fragments found in the enlisted men’s barracks and pipes Figure 85A, B, and C match the facial features of President Franklin Pierce pipes (Stephan 1995: 170-171). Figure 85D is also attributed to Grossalmerode and/or Uslar, and is a partial fragment of the turban of the Turk’s head with a jewel decoration (Stephan 1995: 166,172). Figure 85E was found in officer’s house two at Fort Yamhill and is discussed below.

The pipes in Figure 88 were found in the enlisted men’s barracks at Fort Hoskins. Figure 88A is another Franklin Pierce pipe, containing a complete back portion of the bowl, demonstrating detail of the hair styling; the front has the face’s mouth and part of
the right eye. On the left side of the partial reed stem are the block letters “FR. PI….” and on the right side are “…….NT”. On the collar encircling the stem are alternating single flower with two leaves and six-point star. This pipe has been burned post deposition, with fire clouds noted externally and internally.

The pipes in Figure 88B and C represent what has been referred to as both “Hercules” or “Philosopher” (Stephan 1995:169, 170, 172, 186, Abb. 228); in the United States it has been referred to as a “Grant” pipe after General Ulysses Grant (Sudbury 2009:148-152). It represents a full-bearded man with a ringlet in front of the left ear and on the right side wavy hair in front of the ear. A neck wrap also differs from the left and right sides of the stem. On the right side of the stem the layers are regular and curve similarly; on the left side, there are three rows of folds, appearing to fold back onto itself. These two pipes appear to possibly have had two different artists each designing one side of the pipe, or one artist who was experimenting with different designs. Stephan (1995:186) found that Uslar differed from Grossalmerode with some pipes being light yellow, not quite white, as well as, having light, dark, and medium brown glazes. Figure 88B and 88C have a fabric color of 10YR 8/4 (very pale brown), with pipe 88B having a glaze color of 10YR 7/6 (yellow). The fabric in Figure 88B is a mixing of different colored clays, there are streaks of reddish-brown colored clay seen in both sides of the bowl breaks. This can be seen in a magnified image taken with a Keyence Digital Microscope at a magnification of 100x (Figure 87). Figures 88B and 88C are associated with Uslar and not Grossalmerode.

Figure 85E is a partial reed stem or bowl fragment with a green glaze over a fabric color of 7.5YR 7/4 (pink). The glaze is a pine tree green which does not match precisely any colors on the Munsell soil color chart. This is an unknown bowl rim or reed stem end with 1mm wide flutes with two narrower parallel flutes inbetween. This fragment contains a similar design as the Grossalmerode reed stem of a female figure (Stephan 1995:Abb 224, Abb 226, Abb 228 and Farbtafel 11). This fragment is tentatively associated with German manufacture.

Figure 86 is a fragment from an unknown presidential candidate pipe, having a Munsell color of 10YR 5/3 (brown) fabric with a clear glaze. This color is known from Grossalmerode and Uslar (Stephan Farbtafel 12, 186). These effigy pipes have been
found throughout the western United States, Fort Union, North Dakota (Sudbury 2009:68-75), Columbia River Gorge (Minor et al., 1986:figure 10-7b), Nevada City, California (Bell 2004:52-54), Bellevue Farm, San Juan Island, Washington (Pfeiffer 2006: Figure 13e), Fort Sanders, Wyoming (Wilson 1971:36A, 36B,36E), Orange Street cistern in New Orleans (Pfeiffer et al., 2006:17), Louisiana, Fort Lane, Oregon (Tveskov and Cohen 2008:77-78), Camp Floyd, Utah (Jensen 1991: 46-63), Old Sacramento, California (Humphrey 1969: 25), Fort Union, New Mexico (Wilson 1966:figure 6D) and the Walker Ranch, Texas (Hudson et al., 1974:Figure 17a)

In Figure 89, are shown several porcelain pipe fragments of unknown manufacturer, that are tentatively attributed to German manufacture. Royal Bensell writes in his journal that Lieutenant Herzer knocked ashes out of his “immense German pipe” (Barth 1959:148), which was likely to have been a large porcelain pipe. Germany excelled in making porcelain pipes (Rapaport 1979: 37-48). Porcelain pipes became fashionable during the 1850s (Bradley 2000:121). The Meissen (Meissen 2018) porcelain factory was first established in the Albrechtsburg Castle, Meißen, Germany in 1710. Porcelain bowls became very hot when smoked, which led to the development of multi-section pipes and the use of wood stems. This factory used experienced silversmiths and enamellists to decorate with an overglaze painting to apply artistic scenes. Walker (1977:66-68) reports that porcelain pipes probably spread throughout Germany during the Seven Years’ War (1756-1763) with France, and that manufacturing of porcelain pipes started in the mid-18th century, and in England beginning in 1814. However, these pipes were not popular in England as they gave too hot and strong a smoke. Walker (1977:68) writes that porcelain pipe production began in the 1870s from the Ruhla area in Germany, with porcelain pipes were made more than any other type.

One porcelain pipe fragment (Figure 89A) was found in the kitchen of Fort Yamhill. It is a rim fragment and is nondescript except for what appears to be a hand etched indented rim. The porcelain fragment in Figure 89B was found in an officer’s house at Fort Yamhill; it has a mold-made rounded rim. There is a wear pattern on the rim, possibly from the use of a metal spark cap. It also has a brown glazing on the bottom edge of the fragment, for decoration. At Fort Hoskins officers’ quarters, a rim fragment was found (not photographed). It is weathered and plain, with a slightly
rounded rim. The porcelain fragment in Figure 89C was found in the enlisted men’s barrack at Fort Hoskins. This fragment is interesting because it does not have the typical German shape. This pipe is an imitation of an Ottoman style conical bowl shape that was copied in the Austro-Hungarian Empire and central Europe, where a variety of materials were used, including porcelain (Higgins 2014: 30-38, Figure 20, No. 56, Figure 23, No. 63 and Figure 28, No. 68). Porcelain pipes have been found throughout the western United States including Fort Laramie, Wyoming (Wilson 1971:Figure 2A-B), Fort Sanders, Wyoming (Wilson 1971:Figure 37), Fort Union, New Mexico (Wilson 1966:Figure 6, G-H), Bellevue Farm, San Juan Island, Washington (Pfeiffer 2006:Figure 12c), Kanaka Village/Vancouver Barracks, Fort Vancouver, Washington (Pfeiffer 2006:Figure 6e), Fort Union, North Dakota (Sudbury 2009:Figure 91-92), and Camp Floyd, Utah (Jensen 1991:Figure 3).
9.3.5 The Netherlands

Seven different Dutch pipe types were found at the forts. These pipes are made of white ball clay, are unglazed, and some exhibit burnishing and polishing. Figures 90 and 91 are pipes made by the Dutch manufacturer Adrianus Sarmass of Gouda, The Netherlands, and were found at Fort Hoskins in the enlisted men’s barracks and officer quarters. The bowl is of the round-bottomed style (Duco 1987: 26-27), with very little stem present. Figure 90A was very lightly used before being broken. The exterior is burnished, and hand-applied rouletting is seen around the rim (it is not perfectly horizontal but rises at an angle with the ends not meeting); the rim is smoothly rounded with botour marks on the inside of the rim, with a pronounced roll on the inside lip. Inside the bowl on the anterior surface is a raised negative of the maker’s mark that is impressed
on the exterior bowl surface. The base of the bowl is not well smoothed as there is a small lump of clay from production error. There is trimming along the superior and inferior seams with hand applied diagonal hatch marks. On the exterior surface of the back of the bowl is a hand-applied maker’s mark of a windmill in relief, within an impressed circular incuse. This windmill is called ‘de molen’ for the mill (see Figure 91 for close-up). This maker’s mark was owned by the son of Adrianus Sparnaay, Frans Simon Sparnaay (Dutch spelling Sparnaaïj) 1839-1880, then became known as ‘Firma F.S Sparnaaij & Zoonen’, from 1880-1902 (Duco 2003:147). Van de Meulen (2003:55) notes that Frans Simon Sparnaay retained this mark up to 1861, then F. Sparnaay & Zoon owned it from 1865-1869. In 1848, Frans Simon Sparnaay requested a series of brand marks for his Gouda factory, presenting as a manufacturer and merchant, and his right as a merchant to trade types and brands of all kinds (Duco 2003:57).

Another Sparnaay pipe as seen in Figure 90B exhibits a heavy tar build-up on the bowl interior and external rim and hand-applied rouletting just below the rim is horizontal and well placed with the ends meeting. The bowl’s exterior has noticeable burnish marks, and is smooth and polished. The anterior surface has been burned and revitrified, and retains a red-brown staining. The bowl’s posterior has an impressed circular incuse with a relief windmill. A partial stem attached with diagonal hatch marks appears over the top and bottom seams. A rectangular cartouche parallel to the stem with molded relief of “A SPARNAAY” appears on the left side and on the right is “IN GOUDA”. Adrianus Fransz Sparnaaij manufactured pipes from 1814-1859 and was the father of Frans Simon Sparnaay (b. 1821-d. 1907), who manufactured pipes from 1838-1880. Parallel rows of evenly spaced lines encircle the stem and alternate within these and connect them with fine perpendicular lines. The distal encircling line contains, adjacent to it and in front of the bowl, two rows of a five-point diadem design encircling the stem. Duco (1987:113, figure 590) notes a 19th century Dutch pipe with this design, except the points of the diadem are pointing in the opposite direction. Figure 90C is a partial stem also with “ARNAAAY” on the left and “INGOUD” on the right. The end has been whittled and smoothed as a result of breaking, and then reused. A pipe with the windmill mark has been uncovered at the 19th century Five Points Site, Block 160, New York City (Reckner and Dallal (2000:22), a stem with ‘A SPARNAAY’ ‘INGOUDA’
was found at Rome, New York (Hanson 1971:98), and a pipe bowl fragment with the windmill was found at Fort Vancouver, Washington (Chance and Chance 1974:72 and Figure 73g).

The pipe shown in Figure 92 was found in the kitchen at Fort Yamhill. It has a small diameter oval-shaped stem fragment and demonstrates lines in relief running parallel to and down the length of the stem. One seam has diagonal hatch marks over it as is common on Dutch pipes. On one side appears ‘F.S. SPARNAAY’ and the opposite has ‘INGOUDAHOLL…’ (should read ‘INGOUDAHOLLAND’). There appears to be a raised dot just before the ‘F’. Duco (1987: 117) writes that after 1860, decorations on the bowl and stem have dull geometric and linear motifs, as well as rows of pearls and ribs which reflect the mechanical characteristics and frequent use of striking stamps. This pipe is tentatively acknowledged as an F.S. Sparnaay made pipe, but the possibility of it being a plagiarized cannot be discounted at this time. No other pipe stems with this exact design have been found in literature or sites in the western United States.

The pipe shown in Figure 93 is a partial stem fragment found in officer quarters at Fort Hoskins. It has a series of fine diagonal cross-hatching on the left and right sides of the stem. The letters ‘F.S. S…’ in a ‘forte’ font, are seen on the left side and to the right of the cross-hatching marks. The cross-hatching design has been found on pipe stems attributed to F.S. Sparnaay. This style has been found from the 19th century Five Points Site, Block 160, New York City (Reckner and Dallal (2000:65,86), is seen on pipe number 606 in De Nederlandse Kleipijp (Duco 1987:118), and figures 35 and 36 in Goudse pijpenmakers en hun merken (van der Meulen:17). There are no diagonal hatch marks over the top and bottom seams and is tentatively assigned to Dutch manufacture. No similar pipes have been found in literature or the western United States.

Figure 94 displays pipe stem and partial bowl fragments found in the enlisted men’s barracks and officer quarters. They have been lightly to heavily smoked and have diagonal hatch marks over the top and bottom seams. These pipes are imitation copies of A. Sparnaay design as seen in Figure 90. Two features set them apart: a capital ‘R’ lying on its back between the left side of the bowl and stem design, the feet of the ‘R’ are pointing towards the stem, and a raised dot after the ‘A’ of the word GOUDA on the right side of the stem (see Figure 95). Duco (2003: figure 391) lists a plain ‘R’ used from
approximately 1696-1705, but no owner of this mark is listed, with no other information found about this mark. The unusual orientation and placement of the R and the raised dot after the A of GOUDA, suggests it was probably not likely made by a Dutch firm. Other countries that place a letter on the side of the stem include, France and possibly Germany. This unique clay pipe mark has not been found in any catalogs or site in the western United States.

The pipe in Figures 96 and 97 is plain with a botor mark around the partial well-defined rim, that has a half rounded exterior edge and a heavy buildup of tar on the interior surface. Faint burnish marks are noted on the exterior bowl surface opposite of an interior seam. There is a slight raised edge from the remnants of an unknown raised design just below the external burnish marks. Fort Union, North Dakota (Sudbury 2009:163) and the Trojan Site (1851-1968) on the Columbia River (Warner and Warner 1975:109) reported a plain pipe with a botor marked rim.

Figure 90. A. SPARNAAY, IN GOUDA, Bowl and Stem Fragments A:35BE15-A1486, B:35BE15-A1485, C:BE15-B281).

Figure 91. Dutch Molen Mark on Back of Bowl (B:35BE15-A1485).
Figure 92. F. S. SPARNAAY, IN GOUDA HOLLAND on Stem (35PO75-KI-07-1111).

Figure 93. F. S. S, on Stem (BE15-A777).

Figure 94. Plagiarized A. SPARNAAY on Left Side Stem
(A:BE15-B570, B:35BE15-10-4063

Figure 95. Close-up of ‘R’ and ‘.’ on Stem Fragments
9.4 Unknown Makers

9.4.1 Peter Dorni

Peter Dorni pipes are a type of pipe that was popular and produced by many manufacturers in several countries. The pipes in Figure 98 were found at Fort Hoskins in the enlisted men’s barracks, the hospital and the enlisted men’s privy. These single unit pipes are unglazed and made of white ball clay. They have diagonal hatch marks covering the superior and inferior mold seam lines. On the proximal end of the stem is a single row of a three-leaf plant shape encircling the stem. The stems are smoothed, but the one bowl fragment was not. The decorations are not clean and sharp, but poorly done. Peter Dorni pipes were made in France, Germany, Holland, and Scotland (Bradley 2000:118, Davey 1987:Figure 15-23, Stephan 1995:148-149, Sudbury 2009:10,168-169). There are two Peter Dorni pipe types in the collection, both of which use block letters spelling “PETER” on the left side of the stem and “DORNI” on the right side of the stem. Both are in relief, framed within a rectangular raised cartouche, and have encircling parallel relief lines which are perpendicularly joined with fine alternating parallel lines (Figure 98 and 99). Peter Dorni pipes made by German manufacturers have what appears to be two encircling rows of oak leaves, and Dutch pipes have a cross design and double row of a five point star Stephan (1995:147-149, 148). Pipe makers in the Westerwald region made cheap copies of pipes with French and Dutch maker’s marks. A review of Peter Dorni pipes in German catalogues (Mullenbach and Thewald 1900, Remy Hilgert 1906 and Ausgabe 1910) shows various proximal ornamentations of a four equal armed.
cross, a wavy line with a dot in the trough, and plain without a pattern (PKN Society for Research of Historical Tobacco Pipes 2017). Sudbury (2009:10) writes that the French pipe firm, Gambier in Givet had four different molds in operation at the same time. Other producers of Peter Dorni pipes include Dutch makers, A. Sparmaay and sons and J&G Prince of Gouda (Walker 1977:296), and the firm Goedewaagens (Duco 1985: VII-4-7). Scottish pipe maker; MacDougall lists Peter Dorni pipes on an 1875 price list (Sudbury 1980:46).

The person who was Peter Dorni remains unknown. At one time it was thought that Pieter Van Doorne of Deft, Holland (1759) was Peter Dorni, but this was later disproved (Mayer 1994:10, 12). Alternatively, Peter Dorni was thought to be from the Westerwald region of Germany (Stephan 1995:185), while Humphrey (1969:15; citing Omwake 1965:130) reported he was from northern France. To date, it is still unknown who Peter Dorni was and what country he was from.

Figures 99 and 100 shows three stem fragments which have two rows of triangles indented in each corner (see Figure 100). One example of this pipe type was found at Fort Hoskins in the enlisted mens’ barracks, and at Fort Yamhill in an officer’s house and enlisted men’s barracks. This pipe style has not at this time been found in the literature review or online European catalogs. This pipe may be of Dutch manufacture, as Duco (1985:V-1-10, IX-1-1) does show Dutch pipes with a design of a series of triangles on the stem. However, these stems do not have the diagonal cross hatch marks on the mold seams as seen on Dutch and French pipes. The bite end shown in Figure 93A has a rounded end with whittling marks. Peter Dorni pipes have been found in the eastern United States and in the west, Fort Union, North Dakota (Sudbury 2009:10-11) and Old Sacramento (Humphrey 1969:15-17).
Figure 98. Peter Dorni with Three Leaf Pattern, Right Side Stem Fragments. (A:35BE15-10-3197, B:35BE15-10-8416, C:ORBE15-Q50,D:35BE15-10-10635).

Figure 99. Peter Dorni with Triangle Pattern, Stem Fragments. (A:35PO75-06-06-94, B:35PO75-BA-271,C:BE15-B1).
9.4.2 TD pipes

TD pipes, as seen in Figures 101 and 102, are commonly found in archeological sites throughout the United States. This style has been produced since the 18th century and is believed to have originally been the initials of a pipemaker (Bradley 2000:112); later, these initials evolved into a trademark to signify a type of pipe (Walker 1966: 86). These pipes are made of unglazed, white ball clay. At Fort Hoskins and Fort Yamhill there are four types of pipes with TD in relief on the back of the bowl; none have maker’s marks. At Fort Hoskins, these pipes were found only in the enlisted men’s barracks, but at Fort Yamhill they were found in the enlisted men’s barracks, kitchen, officer’s house, and the dump.

These pipes were plagiarized by many different manufacturers, in different countries and possibly in the United States (Walker 1966:91). In England alone there were seven makers with these initials from the 17th century to the mid-19th century (Walker 1966:96, 100). Pfeiffer (2006:41) notes that in the Western United States, archaeological sites dating after 1830 commonly have pipes with the TD encircled with stars, which is thought to have been developed to appeal to American patriotism (Walker 1966: 89). These pipes may be German as all four types have the same form and quality as presented by Stephan (1995:159). However, Jackson et al., (1991:105-106) excavated a factory kiln waste site in Bristol, England that contained plain pipes with TD, this site was sealed for housing construction in 1845.

In Figures 101A and B, the pipes are plain with the letters T and D on either side of the back mold seam and with no other decorations. Both of these pipes are weathered.
and have very little tar on the interiors. The rims are flat, with that shown in Figure 101A having some trimming down and around the rim. The exterior’ mold seams were not trimmed. These pipes have been found at Fort Vancouver Barracks/Kanaka village, Washington (Chance and Chance 1974:Figure 72e, Pfeiffer 2006:Figure 4e), Fort Colville, Washington (Pfeiffer 2006:Figure 18), Fort Laramie, Wyoming (Wilson 1971:16), Fort Sanders, Wyoming (Wilson 1971:Figures 25,26,27), Trojan site, Oregon (Warner and Warner 1975:108), Golden Eagle Hotel, California (Elling 1980:Plate 13.1h), Old Sacramento, California (Humphrey 1969:28), Fort Union, North Dakota (Sudbury 2009:52).

The pipe shown in Figure 101C has a TD encircled with 13 six-point stars, a plain rim, and with odd-pinnately compound leaves, bilateral of the front mold seam. The top left three stars are worn, possibly from holding the pipe. The mold seams are not trimmed. The interior and rim of the bowl is heavily blackened from smoking. This pipe style has been found at Fort Vancouver, Washington (Caywood 1955:Figure 16), Old Sacramento, California (Humphrey 1969:26), Martinez Adobe, Pinole, California (Pfeiffer 1983:Figure 1H), Columbia River Gorge, Washington (Minor et al., 1986:135), Bellevue Farm, San Juan Island, Washington (Pfeiffer 2006:15a), and Fort Union, North Dakota (Sudbury 2009:38).

The pipes illustrated in Figures 101D and E have a TD encircled with 13 six-point stars, with stars encircling the rim, and odd-pinnately compound leaves on the front mold seam. Both show heavy use with black tar on the interiors and bowl rims, with the mold seams not trimmed. This pipe style has been found in San Francisco and Oakland, California (Meyer 2009: 254), Old Sacramento, California (Humphrey 1969:25), the Golden Eagle Hotel, California (Elling 1980:Plate 13.2a), and Fort Union, North Dakota (Sudbury 2009:37).

Lastly, Figure 101F is believed to be a front bowl fragment of a TD pipe; it has cross hatching in relief over the bowl surface with a pinnately compound leaf pattern on the mid-front mold seam. This pipe was lightly used, with a light gray tar on the interior. Similar pipes have been found at Old Sacramento, California (Humphrey 1969:26), the Golden Eagle Hotel, California (Elling 1980:Plate 13.2c), and Columbia River Gorge, Washington (Minor et al., 1986:135)
Figure 103 is an image showing the TD on the back of the bowl fragments.

Figure 101. TD Pipes Bowls. 35BE15=A:B348,B:10-6329,C:35PO75-H01-08-489, D:35PO75-KI-06-1501, 1086,E:H1-08-439,F:BA-08-1658).

Figure 102. TDs Bowls Front and Right Side, with Detail of Stars and Floral Designs (35PO75=D:KI-06-1501/1086, E:H01-08-439, F:BA-08-1658).
9.4.3 Unidentified Makers

Numerous pipe fragments cannot be identified to a known manufacturer or country of origin. These fragments are too small, makers marks are unreadable or there are no identifiable features. The two unglazed pipes in Figure 104 are made of white ball clay and were found in the enlisted men’s barracks at Fort Hoskins. They both have parallel rows of fine dots in relief beginning at the stem bowl junction and follow the contour of the bowl upwards towards the rim. Between the rows of dots are very faint raised parallel lines. The top and bottom mold seams are crudely smoothed. On both bowl fragments, there is a production mark, an indentation at the anterior junction of the spur and bowl that appears to have been made when the seam was smoothed from the bowl rim to the stem (Figures 104 and 105). There is a “2” leaning forward on the left base of the bowl, just above the spur (Figure 105). This is a low quality pipe. This style of marking a pipe is similar to Scottish pipe makers, placing the model or mold number on the base of the bowl. The Associated Tobacco Pipe Maker’s Society of Scotland and Ireland presents a price list for various manufacturers (Davey 1987:142-163). A No. 2
pipe was made by D. McDougall’s and titled “Rough Head”, while Thomas Davidsons is “R Head”, and Waldie’s is “Straw.” In Manchester and Liverpool, England a pipe design called “pellet,” with a parallel vertical design on the bowl, combined with floral decoration was made with three variations using two molds, but with stem lettering (Davey 1987: Figure 30, No. 102). However, the number ‘2’ was the maker’s mark of Jan van Baalen from 1825-1869, and a pipe attributed to this firm had a similar bowl decorations (Duco 2003:187, Figures 603,604). Belgium, France, and Germany had been copying the Gouda style pipes since the early 19th century. This pipe may be a plagiarized copy of a Dutch pipe, but the manufacturer remains unidentified at this time.

These next pipes (Figures 106 and 107) all single unit and made with white ball clay, were found at Fort Hoskins in the enlisted men’s barracks and the hospital. They have small bowls and are of Dutch, French, or German manufacture. All exhibit moderate use charring on the interior bowl surfaces. The pipe shown in Figures 106A and 107A was found at the hospital and may be of Dutch manufacture, as seen by the burnish marks and polishing on the bowl and stem. The bowl rim is thin and rounded, with a level rouletting and botor mark. The pipe shown in Figures 106B and 107B has a bright white clay fabric, was glazed, and has a thin rounded rim. It was exposed to high heat after loss, to the extent that, the exterior glaze is revitrified; it has a Munsell color 10YR 8/4 (very pale brown) and was found in the enlisted men’s barracks at Fort Hoskins. The pipe shown in Figure 106C and 107C is from the enlisted men’s barracks;
it has a bright white fabric, an exterior Munsell color of 5 YR 7/4 (pink), with blackened areas from burning on the exterior, and a thin rounded rim. This pipe has a flat based spur with an indecipherable maker’s mark (Figure 108).

Figure 106. Small Bowls, Right Side. A: ORBE15-Y33, B: 35BE15-10-5521 C: 35BE15-10-9794.

Figure 107. Small Bowls, Posterior View (A: ORBE15-Y33, B: 35BE15-10-5521 C: 35BE15-10-9794).

Figure 108. Unknown Maker’s Mark on Base of Spur (35BE15-10-9794).
In Figures 109, 110, and 111 is shown an elegant reed stem pipe design of a female form. This pipe was found in the enlisted men’s barracks at Fort Hoskins. The large bowl is relatively thick with the fabric Munsell color of 7.5YR 5/4 (brown). The dress is an 1850-1870 Crinoline style outdoor dress with a hooped or dome-shape skirt, drop shoulders, open sleeves with engageantes, detachable collar, button-up front, and four frilly layers of fabric; the waistline appearing to sit at the waist and the hands held within a muff (Tortora and Marcketti 2015:363-373). The mold seam lines are difficult to discern as they are incorporated into the dress design. The details are well executed and realistic. The manufacturer is unknown and anything similar to this has not been found in literature, online catalogs or in the western United States.
The next pipes are of two turbanned effigies that were found in the enlisted men’s barracks at Fort Hoskins. The pipe in Figure 112 includes partial facial features, the left eye, partial left brow and left nose bridge. The features appear crude, the rim is moderately thick, and the fabric is a Munsell color 5YR 7/6 (reddish yellow), and faint remnants of glaze are seen, but the color is not clear. The interior exhibits long use with dark charring, as well as burning on the exterior. This fragment appears to have broken at the front and back mold seams. The pipe in Figure 113 is a partial bowl in the shape of a turban with a thin smooth rim. The fabric Munsell color is 7.5YR 7/6 (reddish yellow). These two pipes are not of the same design, as the turban shown in Figure 112 has a shallow downward angle, while the turban folds of Figure 113 are at a more vertical angle. The manufacturers are unknown for both of these pipes; but French manufacturers had many turbanned male effigy pipes (Esveld 2014, Figure 158), but this style was also made in Germany (Stephan 1995: Farbtafel 12). No pipes with these design motifs have been found in the western United States.
This next pipe made of white ball clay has a plain bowl (Figure 114 and 115) and was found in an officers’ house at Fort Yamhill. The spur is missing and the stem to bowl juncture is at an obtuse angle of $160^\circ$. This pipe style compares to Dutch basic model three, an obtuse angled oval shaped bowl, often called an ovoid that originally had a long stem. This style developed from the previous Dutch Funnel shape model around 1730 and became very popular between 1740 and 1840, then declined in popularity but remained in use until the end of the 19th century (Duco 1987:27). The French copied this Dutch style (Esveld 2014: Figure 135), and in an 1838 Blanc Garin catalog (PKN 2018) numerous pipes of this style can be seen. The manufacturer remains unknown. A similar style was found imported by the Hudson Bay Company at the Fort Vancouver, Washington (Ross 1976: Figure 389b).

Figure 114. Plain Obtuse Angle, Right Side Bowl Fragment (35PO750-H1-11-585).

Figure 115. Plain Obtuse Angle, Left Side Bowl Fragment (35PO750-H1-11-585).
The pipe in Figure 116 is an effigy bowl fragment found in an officer’s house at Fort Yamhill. The fabric Munsell color is 5YR 7/6 (reddish yellow), the glaze has a Munsell color of 10YR 6/2 (light brownish gray). It is composed of the right and front section of the chin, lower lip, and right nasolabial fold of an unknown figure. From the large, strong chin portrayed, it is determined to be a male effigy. This fragment has been burned with noticeable black on the exterior and interior, and the glaze has been revitrified. The manufacturer is unknown and no known pipe of this style has been found in the western United States.

![Figure 116. Effigy Chin Bowl Fragment. (35PO75-H3-06).](image)

This next fragment (Figure 117) is a partial bowl fragment made of white ball clay of an indeterminant animal’s head. It was found in the kitchen at Fort Yamhill. What appears to be hair was modeled in relief on the right side of the bowl behind the right eye, and some type of grooved decoration is visible on a possible rim above the head. There are smoothing marks mid-center and between the eyes. The French manufacturer Constant Dumeril (ca. 1845-1886) specialized in animal heads “in a fairy-tale sphere, fluctuating between naturalism and fantasy, realism and stylization” (Duco 2004: 50 and figures 114-117). No other comparable pipes of this type could be found in the western United States.
These next earthenware pipe fragments (Figure 118) were all found at Fort Hoskins in the enlisted men’s barracks, officer house dump, and officers’ quarters. The fabric color is Munsell 2.5YR 5/6 (red). Figure 118A illustrates a bowl rim fragment from the officers house dump; it has a line of relief dots connected with lines in relief that appear to encircle the bowl about mid-bowl. Beneath this are several paisley shapes and below these are two short curving rows of joined dots in relief. Between these dots are very low relief dots covering the surface. The rim is smoothed and rounded. This pipe has a moderate amount of charring on the interior walls and is blackened on the exterior. There is a remnant of burnt, shiny blackened glaze.

The pipe in Figure 118B was excavated from the enlisted men’s barracks and is similar to pipe A in decoration style. The fabric Munsell color is 7.5YR 6/4 (light brown). Encircling the bowl about mid-bowl is a line of dots in relief connected with lines in relief. There are dots in relief in an unknown pattern that are connected and to the left of these is a floral design. This pipe has dark charring on the interior bowl surface.

The pipe in Figure 118C was found in the officer’s quarters, and has a Munsell color of 7.5YR 7/6 (reddish yellow). It is a reed stem with two half-rounded rim design and has a flat rim. There is a floral design on the stem of a five-petal flower and right leaning large leaf. These fragments could not be identified with pipes from any other sites in the western United States.
The fragments in Figure 119 are single unit stem, reed stem and bowl fragments found in the enlisted mens’ barracks at Fort Hoskins. The item in Figure 119A is a white ball clay reed stem with a relief design of diamonds with raised dots in between the diamonds, and these encircle the base of the raised bite end. The item in Figure 119B is a white ball clay bowl fragment with a partial flat rim, without rouletting or botor marks that may be English/Scottish. It has a circular pattern with some sharp design elements on top of it.

The item in Figure 119C is an earthenware stem and base of bowl. It has a fabric color of 10YR 5/1 (gray), and glaze color of 2.5YR 5/4 (dark reddish brown) on the exterior and interior. The top seam is not trimmed. The rim end is stepped. This pipe is similar to Point Pleasant pipes in fabric and glazing and so is tentatively assigned to Point Pleasant manufacture.

The item in Figure 119D is a partial single unit white ball clay stem. It has diagonal parallel impressed lines that are perpendicular to the stem on one side, with a light smoothing down the mid-center. On the left and right side of this decoration are what appear to be rectangular cartouches with worn unreadable lettering and what looks like a tiny mold imparted pipe image within and at the end of one of the rectangles (Figure 120). Oswald (1975:Figure 12) notes the English use of small pipe images, though they were on the sides or base of spurs and in multiples of three. These symbolic images were used singly or with initials on opposite sides of spurs and continued from
the 18th century into the 19th century when spurs became smaller and marks were placed on the stems and back of bowls. These often reflected local styles (Oswald 1975:71). Scottish pipe makers normally put the makers name in block capital letters on the stem, and often the mold imparted name is incused with a frame in relief surrounding it (Davey 1987:73). Fragments shown in Figure 119A, B and D could not be identified with pipes from any other sites in the western United States.

Figure 120. Smoking Pipe Mark on Stem Fragment 119D (BE15-B373).

The items in Figure 121 are the rim ends of reed stem pipes. Each had markings that may help to identify them in the future. The item in Figure 121A was found in an officer’s house at Fort Yamhill; this earthenware pipe has a fabric Munsell color of 7.5YR 7/2 (pinkish gray). The exterior and interior are glazed with a Munsell color of 7.5YR 3/0 (very dark gray). The exterior glazing has revitrified from post-depositional burning. Figure 122 is a closeup of the letters on the item in Figure 121A that appear to be an “FIOL…” but the third letter is indistinct. This may be the French manufacturer Fiolet.

The item in Figure 121B was found in the enlisted men’s barracks at Fort Hoskins; it has a fabric color of 7.5YR 5/4 (brown) and Munsel glaze color of 5YR 3/2 (dark reddish brown). This may be from a Lewis Cass pipe, the “S” shape is similar to one in the collection (Figure 92E). German manufacturers did use these colors for their presidential candidate pipes (Stephan 1995: 184).

The item in Figure 121C was found in the enlisted men’s privy at Fort Hoskins; it has a fabric color of 10YR 5/2 (grayish black) and a glaze that was revitrified with a color of 7.5YR 2/0 (black). It has a flat, double half-rounded rim, a variety of dots in relief over the stem, a flat raised panel parallel with the stem and with a half-rounded serrated edge on one side; on the opposite side there are two rounded decorations that
could be numbers or letters. A close-up of this image is seen in Figure 123.

The item in Figure 121D was found in the enlisted men's barracks at Fort Hoskins. It is a white clay reed stem with numbers which are probably the model number and are either “363”, “383”, “365”, or “385”. A close-up of these numbers can be seen in figure 124. These fragments could not be definitively identified with pipes from any other sites in the western United States.

**Figure 121.** Miscellaneous Reed Stem Ends. (A:35PO75-H1-13-4090, B:35BE15-10-240, C:BE15-C168, D:BE15-B126).

**Figure 122.** Close-up of Lettering on Reed Stem, Possibly ‘FIOL…’ (A:35PO75-H1-13-4090).
The item in Figure 125 is a white ball clay, burnished stem fragment found in an officer’s house at Fort Yamhill. It has two design elements on the stem, a crescent or “J” shape, and a five petal flower that probably represents the Tudor Rose. The Tudor Rose derives from the War of the Roses in 1485 and symbolizes the House of York’s white
rose and the House of Lancaster’s red rose combined. This design was brought to the Netherlands by English pipemakers when they emigrated there (Dallal 2004:212). The crescent shape was used as a mold mark by Dutch manufacturers (Duco 1987:78 Figure 393). In the poorer quality pipes, this type of decoration is used on the side of spurs and initially one or a few dots were used, then they were combined with a crescent or six-pointed star (Duco 1987:79 and Figure 537). This pipe stem may be Dutch, but it remains unidentified and no other comparable pipes of this type could be found in the western United States.

Figure 125. Impressed Tudor Rose and Crescent Stem Fragment (35PO75-02-06-111).

These next white ball clay fluted bowl fragments (Figure 126) were found in the enlisted men’s barracks at Fort Hoskins (Figure 126A and 126B) and Fort Yamhill (Figure 126C). Figure 126D was found in an officer’s house at Fort Hoskins. Similar bowls have been found at Fort Laramie (Wilson 1971: Figure 6, 7, and 30), Fort Union, New Mexico (Wilson 1966: Figure 3), Fort Vancouver (Ross 1976: Figure 387 and 390), and Old Sacramento (Humphrey 1969: Figure 11, 16-21). Fluted style pipes were made and copied by many manufacturers and these fragments remain unknown.
The item in Figure 127 is an earthenware partial bowl fragment found in the enlisted men’s barracks at Fort Hoskins. It has a half-rounded rim, with botoe marks on the exterior. This fragment appears to be a partial side face of an unknown effigy. Just below the rim is a large round low-relief eye; a defined human nose is below this and an open mouth or facial hair. This pipe remains unidentified and no other comparable pipes of this type could be found in the western United States.
The item in Figure 128 is a white ball clay bowl fragment found in the enlisted men’s barracks at Fort Hoskins. It has dots in relief, just below and encircling the flat rim. This pipe remains unidentified, further research may discover similar rim design, but at this time no other comparable pipes of this type could be found in the western United States.

Figure 128. Rim Dot Pattern on Rim Bowl Fragment. (BE15-B354)

The item in Figure 129 is a single unit plain white ball clay bowl found in the enlisted men’s barracks at Fort Hoskins. This is a “TD” pipe like those seen in Figures 101-103. What is unusual about this bowl is the small face impressed into the right side, done during production and before firing. It was heavily used with black tar residue on the interior and on top of the flat rim. The surface is not well smoothed. Manufacturer is unknown and no other pipe with a manually made face has been found in literature. This pipe is tentatively attributed to English/Scottish manufacture as determined from the flat cut rim, poor quality and finish. Similar pipes have been found at Fort Laramie, Wyoming (Wilson 1971: Figure 4.24-27) and Old Sacramento (Humphrey 1969: Figure 43).
There are within the collection numerous plain white pipe bowls (Figure 130) without design or makers’ mark that tentatively attributed to English or Scottish manufacture as determined from the flat cut rim, poor quality and finish. Similar pipes have been found at Fort Laramie, Wyoming (Wilson 1971: Figure 4,24-27) and Old Sacramento (Humphrey 1969: Figure 43).

Two brass spark caps, also called spark arrestors and wind caps (Bradley 2000: 123), were found at Fort Hoskins (Figure 131) in the enlisted men’s barracks (Figure
131A) and in the officers’ house dump (Figure 131B). These were used on component pipes such as porcelain, wooden, and clay pipes (Figure 62). The base of the cap was attached to the rim of a pipe, with a hinge on the cap allowing it to open and close, and a clip to keep the cap closed. These have been found at Lower Fort Gary, Selkirk, Manitoba and Fort Walsh, Saskatchewan (Bradley 2000: 123).

Figure 131. Superior View of Spark Caps. (A: 35BE15-10-2129, B:BE15-E536)

The item in Figure 132 is a partial wooden reed stem found mislabeled as a clay pipe stem in the collection. This stem was found in the enlisted men’s privy at Fort Hoskins. It is blackened from being burnt and there are five diagonal slash marks on one side. In Figure 133 the growth rings can be seen surrounding the pith that has been removed. Reed stems do not usually survive in soil, but carbonization from burning most likely made it more durable.
Figure 132. Wood Reed Stem (BE15-C31).

Figure 133. Growth Rings of Wood Reed Stem, End of Fragment.
10. Data Summary

Summaries of data are presented in the following tables. Table 6 is a summary of pipe types, decorations, MNV (minimum number of vessels [clay pipes]) and locations where found. There is a total of 192 different pipe types found at Fort Hoskins and Fort Yamhill. Location lettering is the same as used in the database; see key below. Table 7 is a summary of pipe types for both forts combined, and Table 8 provides preliminary percentages of pipe types per country.

Table 6. Summary Locations of Pipe Types

<table>
<thead>
<tr>
<th>Type (Hoskins)</th>
<th>Decoration</th>
<th>MNV</th>
<th>Location (Y: Yamhill, H: Hoskins)</th>
</tr>
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<tbody>
<tr>
<td>Effigy</td>
<td>Presidential Candidate Unknown</td>
<td>4</td>
<td>(2-KI/Y;1-Hosp/H;1-OQ/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Henry Clay</td>
<td>3</td>
<td>(1-H1/Y;1-KI/Y;1-BA/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Philosopher/Grant</td>
<td>2</td>
<td>(2-BA/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Turbaned Turk</td>
<td>1</td>
<td>(1-BA/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Franklin Pierce</td>
<td>3</td>
<td>(3-BA/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Zachary Taylor</td>
<td>1</td>
<td>(1-H2/Y)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Lewis Cass</td>
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<td>(2-BA/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Green Glaze/Stem</td>
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<td>(1-H2/Y)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Orthodox Jewish Male</td>
<td>16</td>
<td>(15-BA/H;1-Hosp/H)</td>
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<tr>
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<td>Philosopher (other)</td>
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<td>(1-BA/H)</td>
</tr>
<tr>
<td>Effigy</td>
<td>Geometric Face (Taber)</td>
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<td>(1-Hosp/H;1-BA/H)</td>
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<tr>
<td>Effigy</td>
<td>Alexander II (Cretal)</td>
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<td>Unknown Image (Cretal)</td>
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</tr>
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<tr>
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<td>(1-K/Y;1-P/Y)</td>
</tr>
<tr>
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<td>Female Dress</td>
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<td>Gambier/Maure Face</td>
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<td>(1-BA/H)</td>
</tr>
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<td>Designation</td>
<td>Count</td>
<td>Details</td>
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<td>--------------------------------------------------</td>
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<td>Bedouin</td>
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<td>(1-H2/Y)</td>
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<td>Point Pleasant Turban Male</td>
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<tr>
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<td>(2-EP/H;2-OQ/H;2-BA/H;2-OP/H;2-OHD/H)</td>
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<td>Paisley Dot Lines</td>
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<tr>
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<td>Pearls and Lines</td>
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<td>(2-BA/H)</td>
</tr>
<tr>
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<td>Front/Back Keel (F. Cretal)</td>
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<td>Anton Ress</td>
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</tr>
<tr>
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<td>(1-BA/H)</td>
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<td>TD Plain</td>
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</tr>
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<td>TD Stars Rim/Circle Stars</td>
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<td>(1-H1/Y;1-KI/Y)</td>
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<td>(1-BA/Y)</td>
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<td>TD SBJ/Design Unknown</td>
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<td>(1-KI/Y;1-DMP/Y)</td>
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<td>(1-KI/Y)</td>
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<td>(2-OQ/H)</td>
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<td>Military Soldier/Horse</td>
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<td>(1-BA/H)</td>
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<tr>
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<td>(1-OQ/H;3-BA/H)</td>
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<tr>
<td>Gunboat/Flag</td>
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<td>Unknown/Color Control</td>
<td>1 (1-HOS/H)</td>
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<td>Animal Features</td>
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<td>Melon</td>
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<td>Floral/Acanthus Leaf (Cretal)</td>
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<tr>
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<td>Plain</td>
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<td>Obtuse Angle</td>
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<td>Small/Pink</td>
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<td>Porcelain</td>
<td>Plain/Color Control</td>
<td>4 (1-H1/Y;1-KI/Y;1-BA/H;1-OQ/H)</td>
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**TOTAL** 192

---

*Note*: Symb/Geom is an abbreviation for Symbolic/Geometric, Symb/Natur is an abbreviation for Symbolic/Naturalistic, and Symb/Patrio is an abbreviation for Symbolic/Patriotic.

**Key:**
- BA: barracks
- L: laundress
- BD: bakery
- OHD: officer house 3 dumb
- DP: dump
- OO: privy
- EP: enlisted privy
- OP: officer privy
- H: house
- OQ: officer quarters
- HOS: hospital
- WH: warehouse
- KI: kitchen
Table 7. Summary Pipe Types

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<thead>
<tr>
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<th>Total</th>
<th>Percentage</th>
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<td>Effigy</td>
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<td>28</td>
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<tr>
<td>Geometric</td>
<td>33</td>
<td>17</td>
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<td>Symbolic</td>
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<tr>
<td>Plain</td>
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<td>Porcelain</td>
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<td>100</td>
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The preliminary percentages of pipe types per country is presented, as some pipes could not be determined by country with certainty.
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<th>Country</th>
<th>Type/Style</th>
<th>Number</th>
<th>Total</th>
<th>Percentage of Total</th>
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</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Schemnitz</td>
<td>1</td>
<td>1</td>
<td>1/63 = 1.59%</td>
</tr>
<tr>
<td>Canada</td>
<td>Four-Band Fluted</td>
<td>1</td>
<td>1</td>
<td>1/63 = 1.59%</td>
</tr>
<tr>
<td>England/Scotland</td>
<td>Murray</td>
<td>1</td>
<td>1</td>
<td>1/63 = 1.59%</td>
</tr>
<tr>
<td>France</td>
<td>Cretal</td>
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<td>14/63 = 22.22%</td>
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<td>F. Cretal</td>
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<tr>
<td></td>
<td>Bedouin</td>
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<tr>
<td></td>
<td>Maure, Barbe</td>
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<tr>
<td></td>
<td>Melon</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plain with Acanthus</td>
<td>1</td>
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<tr>
<td></td>
<td>Ponnet</td>
<td>3</td>
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<td></td>
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<tr>
<td></td>
<td>Dumeril</td>
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</tr>
<tr>
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<td>Bowl Anterior Fin</td>
<td>1</td>
<td>13</td>
<td>13/63 = 20.63%</td>
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<tr>
<td></td>
<td>Orthodox Male</td>
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<tr>
<td></td>
<td>Alligator/Crocodile</td>
<td>1</td>
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<tr>
<td></td>
<td>USA on Rim</td>
<td>1</td>
<td></td>
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<td></td>
<td>Presidential</td>
<td>4</td>
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<td>Philosopher</td>
<td>1</td>
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<td></td>
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<tr>
<td></td>
<td>Porcelain</td>
<td>2</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Turban</td>
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<td>Netherlands</td>
<td>A. Sparnaay</td>
<td>1</td>
<td>5</td>
<td>5/63 = 7.94%</td>
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<td>Copy A. Sparnaay</td>
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<td>12/63 = 19.05%</td>
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<td>------------</td>
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<td>----------------------</td>
</tr>
<tr>
<td>of America</td>
<td></td>
<td></td>
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<td>3</td>
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<td></td>
<td>Taber</td>
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<td></td>
<td>Peter Dorni</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pearl and Line</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Small Bowls</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Woman’s Dress</td>
<td>1</td>
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<td></td>
<td></td>
<td>Turk Turban</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unknown Turban</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td>Chin</td>
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<td></td>
<td></td>
<td></td>
<td>Animal</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Paisley Dot Line</td>
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</table>

|            |   |   | TOTAL                |                      |
|            | 61| 63|                      |                      |

63/63 = 100%
11. Discussion and Conclusion

The primary goal of this research was to identify the manufacturers of the clay pipes from Fort Hoskins and Fort Yamhill, and to place them within the local, regional and world trade systems. The mid-nineteenth century was the peak in clay pipe production and variety of design motifs, as well as widespread plagiarism which made it difficult to determine specific clay pipe makers. The majority of these pipes are decorative with designs ranging from plain to elaborate motifs and displaying local and regional cultural influences upon design. This study helps to fill in missing information that clarifies and improves identification of clay pipes and have a better understanding of regional and international trade patterns as well as how they reflect personal choice. A few surprises included a pipe from the Austro-Hungarian Empire, a beautifully detailed female form in a period dress, and numerous French pipes, when they are believed to have seldom been exported to the United States. Additionally, tobacco on the health of the soldiers and how it may have impacted their health and mental well-being is considered.

This research has the potential to inform on the business practices of sutlers at forts. Currently, there is not enough data about sutler business practices at Fort Hoskins and Fort Yamhill, to address this. However, there is potential to inform or expand on theories about consumer behavior and choice within the Pacific Northwest and during the Civil War period. In this setting however, consumer choice theory cannot differentiate the economic breakdown and choice between officers and enlisted men, because it appears to be the same for both. Additionally, it was found that clay pipes are not a good marker of status as clay pipes were found in both enlisted men’s and officer’s locations. Therefore, this analysis addresses the clay pipe assemblage at two military forts during their short period of occupation. The analysis of the clay pipe artifacts will help to refine stratigraphic dating of military sites, especially when occupation spans a long time period.

Clay smoking pipes used by soldiers at Fort Hoskins and Fort Yamhill were bought from fort sutlers, who procured them from established suppliers in port cities such as San Francisco. The wide variety of extant clay tobacco pipes reveals that they were a favorite purchase item from sutlers and merchants in nearby cities, and that smoking was
a favorite past time of soldiers (Eichelberger 2010:238). The two forts’ existence began near the end of the California gold rush (1848-1858:2018) when there was an extensive global trade to California with ships bringing goods from around the world. Wholesalers and retailers could offer a wide variety of goods to consumers during this time, though at exorbitant prices. During the American Civil War, rapid inflation peaked approximately 1864-1865, then quickly decreased after the Civil War (The Conference on Research in Income and Wealth 1960: 142-143).

The mid-19th century was the peak in the manufacture and variety of clay pipes. This was a period of mass production resulting from the industrial revolution. In addition, improvements in transportation helped to fuel the trade in consumer goods and consumption worldwide. The primary countries that the pipes from Fort Hoskins and Fort Yamhill originated from were America, France and Germany. Some pipes also came from Austria, Canada, The Netherlands, England, and Scotland, and there is evidence that soldiers were making an unknown type of pipe at Fort Hoskins.

The volunteer soldiers stationed at the forts were recruited from the West Coast, many from California, but also included a small number of men from Confederate states. The countries from which non-American volunteer soldiers originated include all the countries in which the pipes were manufactured. The countries with the highest percentages of known pipe manufacture origins are France (22%), Germany (20%), and America (19%; Table 8).
A review of 19th century patents and designs (Jung 1987: Table 1) in the United States indicates that the number of patents filed for tobacco pipes steadily increased from two in 1861 to seventeen in 1865, reflecting the increase in American manufacture. France was reportedly exporting a minor number of pipes to America (Stam 2010), Germany was outpacing the Dutch in exports to America, and American producers were increasingly gaining in the market.

The assemblage from Fort Hoskins and Yamhill includes a large percentage of pipes from France, which refutes prior research showing that few pipes were exported from France to America. One possibility may be that during the Gold Rush in California, the more expensive French pipes were imported and later acquired by the sutlers. If French styles were not popular with the miners and other workers in California, or they were overstocked, they may have been sold to the sutler to reduce over-supply.

Scotland is known to have exported substantial quantities of pipes to America; however, the low number of Scottish pipes currently identified at the forts, does not reflect this trend. The low number of pipes from the United Kingdom in general may be a result of Britain’s strong support for the Confederates during the American Civil War and the threat of a British invasion up the Columbia River. These threats may have
prejudiced soldiers stationed at Fort Hoskins and Fort Yamhill against products from England. Other forts in the West, in contrast, have large collections of pipes from English and Scottish pipe makers. Fort Vancouver had contracts with companies in these two countries; but little information exists concerning supply sources to Fort Union (Pfeiffer 2006:12, Sudbury 2009: 104). There is the possibility that the unknown makers of the TD, Peter Dorni Pipes and unknown pipes may be from Scotland or England. The reasons for the low number of English and Scottish pipes at Fort Hoskins and Fort Yamhill remains unclear and warrants further research.

Overall, Fort Yamhill (Table 11) had 40 (31%) reed stem fragments, 86 (67%) white ball clay fragments, and two (2%) porcelain fragments, while Fort Hoskins (Table 12) had 161 (20.2%) reed stem fragments, 632 (79.5%) white ball clay fragments and two (.3%) porcelain fragments. The majority of pipes are decorative, with less than 10% being plain. Of the total percentage of pipes found, 87% are from Fort Hoskins, and 13% are from Fort Yamhill. The greater number of pipe fragments from Fort Hoskins than from Fort Yamhill is due to additional excavations occurring at Fort Hoskins over time compared to Fort Yamhill. Fort Yamhill may have many unexcavated pipe fragments still to be found, especially at the site of the sutler’s store. Additional excavations here may help to sort out what pipes were purchased from the sutler versus what pipes were bought outside the fort.

Analysis of the pipes collected from the two forts reveals a greater number of pipe fragments from Fort Hoskins than Fort Yamhill. This is due to additional excavations over time at Fort Hoskins compared to Fort Yamhill. Fort Yamhill may have many unexcavated pipe fragments still to be found, especially at the site of the sutlers store. Additional excavations here may help to sort out what pipes were purchased from the sutler versus what pipes were bought outside the fort. Of the complete assemblage, there were three styles, all made of white ball clay; the Male Orthodox Jew, Murray of Glasgow and the Melon shaped pipe, that were found only at Fort Hoskins enlisted men’s barracks. Further excavations would be needed to determine if these styles can be found in other locations at the fort.

There were indications of low economic status among smokers at both forts, evidenced by the reuse of broken stems with whittling marks, and heavy use of tobacco
among smokers, with substantial charring on the inside of bowls and around the rims. In addition, teeth marks on the stem ends, from clenching a pipe between the teeth, provide evidence of smoking while working. One complete pipe (BE15-C117) found in the enlisted men’s privy shows patterns of heavy use, reuse by whittling and teeth marks. However, this pipe style was also found in an officer’s house, dump and privy. The remains of expensive high-status pipes, such as Meerschaum and briar, were not found at either fort. As seen in Bensell’s journal, Sargent King accused Private Espy of stealing his Meerschaum pipe (Barth 1959: 157), and Lieutenant Herzer knocked ashes out of his “immense German pipe” (Barth 1959: 148), this would have been a porcelain pipe. These two types of pipes would have been more affordable by higher ranked soldiers and officers who were paid at a higher scale. It is unlikely that briar pipes would have survived the Oregon soil environment and Meerschaum, if not broken and disposed of, would have been kept and taken with its owner. Though there is no artifactual evidence of status and rank for pipes in general, Bensells’ journal does reflect this fact within the military and social milieu of the forts.

Examination of stem bore diameter of the pipes did not reveal substantial evidence regarding country of manufacture. Earlier attempts to use stem bore diameters and regression formulas to help date archaeological sites resulted in mixed results. J. C. Harrington’s’ (1954:10-14), noticed a pattern to English pipes of a decreasing stem bore diameter, measured in 1/64 of an inch increment, from 1620-1800. However, Bradley (2000) notes, samples from 1750 and forward had inconsistent results; therefore, dating after 1750 is not recommended. In addition, Higgins (1995: 50) reported that clay smoking pipes found in the 1656 wreck of the Vergulde Draeck off Western Australia, had stem bore holes made by two different sized mold wires, and advises caution when using this dating method, suggesting that it should be used as an aid combined with other methods and tools for dating. Stem bore diameters from both forts not used as a dating guide as there is concern over the reliability of dates obtained from 19th century pipes. As can be seen in Table 10 stem bore diameters ranged from 4/64th-6/64th, with 5/64ths being dominant, and reed stem pipes had an even wider range from 14/64ths-30/64th. Bore diameters did follow a general trend in relation to country of manufacture: American patriotic pipes had a bore diameter of 4/64ths, French and Scottish pipes had
4/64\textsuperscript{th} or 5/64\textsuperscript{ths} diameter, Dutch and TD pipes had a 5/64\textsuperscript{ths} diameter, German and Peter Dorni pipes had 5/64\textsuperscript{ths} or 6/64\textsuperscript{ths} bore diameters, and plain pipes had all three bore diameters. Reed stem bore diameters ranged from 14/64\textsuperscript{ths} to 30/64\textsuperscript{ths}.

Table 10. Number of Pipes per Stem Bore Diameter in 1/64\textsuperscript{th} inch.

![Bar chart showing number of pipes per stem bore diameter in 1/64\textsuperscript{th} inch.]

The total clay pipe fragments (Table 11 and Table 12) and bowl to stem summary (Table 13 and Table 14) by fort were tabulated in order to examine stem to bowl fragment ratios, which have been used to understand where pipes smoked and smoker mobility. Past studies analyzing use areas, have mapped the ratio of bowl to stem fragments to help understand spatial patterns of pipe smoking, levels of a population’s mobility, and to gain insight into the daily lives of a population. Ritchie (1978:135-136) postulated that the functional pipe bowl remains intact longer than a pipe stem, and that pipe stems do not necessarily indicate smoking, but could result from shipping breakage, or breaking en route between areas where smoking occurred. If a population is restricted, such as in a fort, the bowl to stem fragment ratio will be high, resulting from discard in these areas versus over a wide area for a mobile population. For single unit pipes, which
after 1780 averaged six to eight inches long, there should be 1.5-2 stem fragments for every bowl fragment. Therefore, an index for each fort may be determined for the amount of pipe use as well as where the pipes were used. Wynia (2013:117) used GIS to analyze clay pipe fragments distribution at the village site of the Hudson Bay Company. She was able to show spatial patterning of smoking behavior and social aspects of smoking.

Using the single unit summaries and Ritchie’s bowl-stem ratio index calculations, it was determined that Fort Hoskins has a total bowl to stem ratio of 330/302, with a ratio index of 1.1, and Fort Yamhill had a total bowl to stem ratio of 45/41, with a ratio index of 1.1. These calculations were made at the fort level rather than for individual areas, because there was too much variation among fragments found in individual areas; for example, the enlisted men’s barracks at Fort Hoskins had a 291:251 ratio, where Fort Yamhill had a 2:4 ratio. The overall ratio index as used does illustrate that clay pipes were being equally and intensely used at both forts. Eichelberger (2010) used GIS to show frequency distributions of tobacco pipes in relation to other indulgent artifacts such as alcohol bottles. Fort Yamhill’s company kitchen and elsewhere at the fort revealed spatial patterning and social gathering areas within the fort. From both of these analysis systems a broader view of social and behavior patterns can be determined. Smoking was concentrated in the forts and in certain areas associated with other indulgent behaviors, such as alcohol use.

Direct comparisons between Fort Hoskins and Fort Yamhill used counts and metric area (m²) excavated (as a constant and independent variable) for comparative analysis. Table 13 and Table 14 display the m² of area excavated for each structure, the fragments count of each structure, the fragments per m² of the site and for each structure (Table 13 and Table 14). The total fragment count is higher at Fort Hoskins than Fort Yamhill. Fort Hoskins contained 793 (4.051 n/m²) of the total pipe fragments, while Fort Yamhill’s is lower at 126 (0.297 n/m²) pipe fragments. Fort Hoskins reed stem fragments count is 161 (0.821 n/m²), and single unit pipe fragments are 632 (3.23 n/m²). Fort Yamhill excavated area of reed stem fragments are 40 (0.095 n/m²), and single unit pipe fragments are 86 (0.202 n/m²). Single unit pipe fragments are more numerous than reed stem fragments.
Analysis of normalized artifact counts per feature at the forts (Tables 11-14) reveals that the officers’ quarters contained similar fragment counts of both reed stem and single unit pipes. Fort Yamhill officers’ quarters had 21 (0.94 n/m²) reed stem fragments, and 45 (0.203 n/m²) single unit pipe fragments; Fort Hoskins officers’ quarters had 11 (0.086 n/m²) reed stem fragments, and 38 (0.297 n/m²) single unit pipe fragments. However, the enlisted men’s barracks at Fort Yamhill contained 3 (0.094 n/m²) reed stem fragments and 6 (0.188 n/m²) single unit fragments; Fort Hoskins enlisted men’s barracks contained 131 (9.34 n/m²) reed stem fragments and 542 (38.69 n/m²) single unit pipe fragments. The hospital at Fort Yamhill had 2 (0.077 n/m²) reed stem fragments and 4 (0.154 n/m²) single unit fragments; Fort Hoskins hospital had 13 (0.282 n/m²) reed stem fragments and 25 (0.294 n/m²) single unit pipe fragments. Overall, the fragment counts at the officer’s quarters at both forts was similar, but the enlisted men’s barracks revealed a substantial difference. The hospital at Fort Hoskins had almost twice as many fragments than Fort Yamhill. Further excavations of the barracks and the hospital at Fort Yamhill may help to clarify these values. In addition, the area m² of each structure was obtained from previous site maps and data, some of the information may have been missing or incorrect.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Fort Yamhill Artifact Count</th>
<th>Reed Stem Pipe</th>
<th>Porcelain Pipes</th>
<th>Single Unit Pipe</th>
<th>Percent Reed Stem</th>
<th>Percent Porcelain</th>
<th>Percent Single Unit Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen</td>
<td>32</td>
<td>10</td>
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<td>21</td>
<td>31.25</td>
<td>3.125</td>
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<td>3</td>
<td>0</td>
<td>6</td>
<td>33.33</td>
<td>0</td>
<td>66.67</td>
</tr>
<tr>
<td>Privy</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Dump</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Warehouse</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Bakery</td>
<td>8</td>
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<td>0</td>
<td>4</td>
<td>50</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Hospital</td>
<td>6</td>
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<td>0</td>
<td>4</td>
<td>33.33</td>
<td>0</td>
<td>66.67</td>
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<td>86</td>
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<td>Porcelain Pipe</td>
<td>Single Unit Pipe</td>
<td>Percent Reed Stem</td>
<td>Percent Porcelain</td>
<td>Percent Single Unit Pipe</td>
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<td>------------------------------</td>
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<td>------------------</td>
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<td>76</td>
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<td>60</td>
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<td>131</td>
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<td>542</td>
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<td>0</td>
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<td>0</td>
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Table 13. Fort Yamhill Bowl to Stem Summary

**Reed Stem Summary**

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<th>Stem Fragments</th>
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<tr>
<td></td>
<td>(area m²)</td>
<td>n (n/m²/site)</td>
</tr>
<tr>
<td>Barracks</td>
<td>(32)</td>
<td>3 (.007)</td>
</tr>
<tr>
<td>Hospital</td>
<td>(26)</td>
<td>2 (.005)</td>
</tr>
<tr>
<td>Privy</td>
<td>(8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Warehouse</td>
<td>(?)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Officer Quarters</td>
<td>(223)</td>
<td>19 (.046)</td>
</tr>
<tr>
<td>Dump</td>
<td>(8)</td>
<td>0 (0)</td>
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<tr>
<td>Bakery</td>
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<tr>
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<tr>
<td><strong>Total</strong></td>
<td>(411)</td>
<td>38 (.09)</td>
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**Single Unit Pipe Summary**

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<td></td>
<td>(area m²)</td>
<td>n (n/m²/site)</td>
</tr>
<tr>
<td>Barracks</td>
<td>(32)</td>
<td>2 (.005)</td>
</tr>
<tr>
<td>Hospital</td>
<td>(26)</td>
<td>0 (0)</td>
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<tr>
<td>Privy</td>
<td>(8)</td>
<td>2 (.005)</td>
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<tr>
<td>Warehouse</td>
<td>(?)</td>
<td>0 (0)</td>
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<td>31 (.075)</td>
</tr>
<tr>
<td>Dump</td>
<td>(8)</td>
<td>1 (.002)</td>
</tr>
<tr>
<td>Bakery</td>
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<td>0 (0)</td>
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<tr>
<td>Kitchen</td>
<td>(95)</td>
<td>9 (.022)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>(411)</td>
<td>45 (.11)</td>
</tr>
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</table>

Miscellaneous Stem Fragments: 23

Miscellaneous Bowl Fragments: 2

n = number of artifacts fragments

m² = meter square of excavation units

(n/m²/site) = number of fragments per m² per site

(n/m²/structure) = number of fragments per m² per structure
Comparing the different styles of pipes (Table 8) in the complete assemblage, the effigy pipes, which are comprised of both single unit and reed stem pipes, appear to have been the most popular—followed by geometric patterned pipes, symbolic pipes, naturalistic and plain pipes. Overall, however, the commonality of decorative pipes in comparison with plain pipes revealed that novelty was popular among all the ranks of
soldiers. Local and regional cultural fashions were used to design clay pipes, resulting in a wide range of unique artistry and styles. Popular designs were rampantly and unapologetically plagiarized. Regional styles can be determined as can the quality of the pipes made in the various countries and by various producers. The 19th century saw the peak production in both of numbers and styles of clay pipes, as well as widespread imitation by many companies, making determination of manufacturer and country very challenging and at times impossible.

There are in the collection some especially unique pipe styles, including one made in the Austro-Hungarian Empire and a large variety of otherwise uncommon French pipes. This large number of French pipes may reflect a wider export and import trade than has been previously found. Other unique pipes include an exceptional female figure in a crinoline style dress, an American Civil War soldier and horse, and a patriotic pipe with a double-ender gunship. As the American Civil War resulted in soldiers’ separation from their families, the female figure may have been a reminder of family for one soldier. The patriotic pipes may have been a way to show allegiance to the Union, to commemorate historic events, or celebrate the defeat of the Confederacy or Union successes. There are three (possibly four) styles of unique effigy pipes that are vertically ventured through the pipe bowls’ anterior fabric; these are either French or German. These elaborate and presumed more expensive pipes were surprisingly found in the enlisted men’s barracks. If finances were a factor in purchasing the more expensive pipes, it is not indicated at the forts. In addition, since Fort Hoskins and Fort Yamhill were not fighting forts, and soldiers were sedentary for long periods of time, there would have been ample opportunities for soldiers to purchase goods from a wider selection in nearby communities such as Corvallis, Salem and Portland.

Overall, the 192 different pipes found at Fort Hoskins and Fort Yamhill were more varied and numerous than was anticipated, with some of the styles rare and previously unreported. The soldiers at these two forts were confined populations living a monotonous life in remote and strict military environments. The desire for variety and novelty of pipe styles may have provided some small distraction to the enlisted men, that outweighed any concern for expense, and enabled them to exert personal choices. The large variety of pipe styles may reflect the larger trade network on the West Coast.
bringing products to western ports like San Francisco, California. This may have affected the options available to sutlers, but more importantly, it provided soldiers with access to a larger economy through local retailers. It was the soldiers who benefited in the variety of pipe styles, possibly enabling them to display their religious, political and cultural ideologies or prejudices.

There does not seem to be a relationship between soldiers’ pay and the expense of pipes bought, even though there were times when the soldiers were not paid for up to nine months (Barth 1959:66), possibly because sutlers did allow the use of credit for purchasing items at their store. Clay pipes broke easily and were replaced frequently, though a few pipes did show heavy use and care, with reuse marks of whittling of broken stems which can indicate thriftiness or inability to purchase another pipe. Soldiers may not have wanted to be indebted to the sutler for personal or financial reasons. The more expensive meerschaum, briar and porcelain pipes were considered symbols of cultured elites, and from journal entries it is known that some officers at the forts owned these. Porcelain pipes were expensive, but fragments were found not only in officer quarters, but in the kitchen at Fort Yamhill and the enlisted men’s barracks at Fort Hoskins. Possible reasons for a porcelain pipe to be in the enlisted men’s barracks may be that although owned by an officer it was somehow broken there, the smoker was originally from a country where porcelain pipes were popular, the smoker wanted to present themselves as cultured, or it was a way to subtly fight against societal norms. Soldier ethnicity does not appear to be a factor in pipe choice. Native born soldiers and soldiers who were newer immigrants, may have used the display of pipe motifs to exhibit their culture, solidarity with other soldiers, or a subtle means to promote social change.

Within the collection there were samples of organic material removed from pipe bowls. A sample taken from artifact number 35BE15-10-9814 was submitted for analysis to Ray von Wandruszka, Ph.D., Department of Chemistry and Physics at the University of Idaho, Moscow. This sample contained a mixture of black particles which were charcoal and light brown particles A surprising find was butylated hydroxytoluene (BHT), a lipophilic organic compound produced naturally by freshwater phytoplankton including the bacteria blue-green algae (Botryococcus braunii) and three cyanobacteria, Cylindrospermopsis raciborskii, Microcystis aeruginosa, and Oscillatoria sp. (Babu and
Wu 2008:1452). However, this report stated that one of the elements of the tar residue may be similar to BHT and the GC/MS software may have interpreted the data as such. It was concluded that the black particles are probably charcoal, and the light brown particles an indistinct tarry material resulting from some burned organic matter, most likely tobacco (Bodley 2017).

The consequences of smoking on soldier’s health at Fort Hoskins and Fort Yamhill can be inferred from current knowledge, historical medical records and previous research. Billings (1982[1887]) American Civil War recollections reported that smoking was the common pastime of soldiers. Vihlene (2008:56) noted that almost 25% of the soldiers of the Seventh Cavalry smoked using evidence of tooth wear from using clay pipes. When tobacco was in short supply insubordination could result from the effects of withdrawal symptoms in soldiers (Barth 1959:46, Shablitsky 1996:89). A review of previous research of the hospitals at these two forts revealed that illnesses associated with smoking, such as bronchitis, catarrh, laryngitis, pneumonia, odontology and gastritis were recorded in the both forts’ medical records (Trussel 1996: Table 9.1, Wesseler 2017: Table 1).

The ubiquitous clay pipe initially seems mundane, but the information gleaned from them can help inform on different aspects of society, such as culture, social protocols and norms. These two forts were in operation for a decade, making this assemblage a valuable dating tool for other archaeological sites. The use of Google translate as a tool enabled the identification and better understanding of pipes countries of origin. This valuable tool enabled access and translation of foreign literature. This research and the pipe collection at Fort Hoskins and Fort Yamhill, containing pipe types not previously found in the Pacific Northwest, will aid other scholars in pipe identification, and site dating and expand our understanding of the social environment of forts in the Pacific Northwest and broader trade patterns in the region.
12. Future Research

It is believed that more pipes have yet to be found at both forts, particularly at Fort Yamhill, which was the larger of the two forts (Eichelberger 2010:28). Continued research and future excavations at Fort Yamhill will likely uncover a larger assemblage of pipes, help to clarify some of the pipes’ origins, and even reveal previously unknown varieties. Additional potential lies in the analysis of fingerprints on specific pipe types in order to identify their makers. Further studies could include how to clearly identify cut end marks versus clean breaks of stems, or the chemical analysis of pipe residue in order to identify botanicals.

Deeper research is needed in local and national archives to help inform on sutler business actions and transactions, as well as on local and regional retailers and wholesalers in the San Francisco area. This could help expand our understanding about the economics of the sutler business in the Pacific Northwest. Further excavations at the more intact sutler store site at Fort Yamhill could further knowledge about the pipe types sold by the sutler, thereby helping to distinguish which styles were bought from outside retailers. As the sutler store at Fort Hoskins was heavily bulldozed by logging in the past (Brauner and Strickner 1994), little information is likely to be discovered here. Future studies at the forts could include a more detailed analysis of distribution patterns using GIS tools, as has been done by Eichelberger (2010) and Wynia (2013). The distribution throughout the two sites can determine smoking location, cultural and social aspects, consumer behavior, association with alcohol, as well as privacy from officers’ scrutiny or other unforeseen observations. Chemical analysis to determine the chemical signature of glazes and fabric for comparison of the pipes within the assemblage would help determine whether the glaze recipes or clay is from the same source and manufacturer. Given that clay was traded between countries, it may be too complicated to use this method to determine origin of the pipes, but within collections it could help to establish commonality.

This study provides evidence of the popularity of tobacco among the soldiers of Fort Hoskins and Fort Yamhill. The use of tobacco, its health effects and symptoms of withdrawal, can be inferred from the fort’s medical records and Hilleary and Bensells
journal entries. This research provided identification of clay tobacco pipes, and pipe types not previously found, in these two forts in the Pacific Northwest. The novelty of various pipe styles is evident as well as the economic disconnect between soldier pay and purchasing of pipes. Future studies will be able to build off of this knowledge to identify clay pipes and better understand connections between local and international trade.
References Cited

Adams, William Hampton, Gary C. Bowyer, and Dennis Werth.  

Adams, George  

Akron Porcelain & Plastics Company  

Al-Houdalieh, Salah H.A.  

Alexander, L. T.  


Amsterdam Pipe Museum  

Apperson, G. L.  

Archer, Steven N. and Kevin M. Bartoy (editors).  
2006 Between Dirt and Discussion: Methods, Methodology, and Interpretation in Historical Archaeology.  Springer, New York.

Ashton, Heather, Rob Stepney.  

Atkinson, D.R.  

Ayto, Eric G.  
Babu, Bakthavachalam and Jiunn-Tzong Wu.

Baram, Uzi

Barber, E. J. W.

Barber, Edwin Atlee

Barker, Graeme.

Barth, Gunter. (editor)

Barton, Michael and Larry M. Logue (editors)

Barton, R. M.

Beckham, Stephen Dow.

Bell Family Pottery at the Washington County Museum of Fine Art

Bielich, Mário and Marian Čurný
Billings, John D.

Binford, Lewis R.

Blair, C. Dean.
1965 The Potters and Potteries of Summit County 1828-1915. The Summit County Historical Society, Akron, Ohio.

Bodley, Lilian

Boston University Medical Center: Community Outreach Health Information System.

Bouisson E.F.

Bradley, Charles S.

Braudel, Fernand.

Brauner, David R., and Nahani A. Stricker

Brauner, David R., and Nahani A. Stricker.

Brongers, Georg A.
1964 Nicotiana Tabacum, the History of Tobacco and Tobacco Smoking. H.J.W. Becht, Amsterdam.
Brook, Jerome E.
1952 *The Mighty Leaf: Tobacco Through the Centuries*. Little, Brown and
Company, Boston.

Brothers, Ginger
2012 *Strasburg Pottery: Framed Tradition*. Electronic document,
10454542/strasburg_pottery_paper.pdf

Brought to Life
2018 John Lister (1827-1912). Electronic document,
http://broughttolife.scienccemuseum.org.uk/broughttolife/people/josephlister,
accessed April 8, 2018.

Brown, Colin A, Mark Woodward & Hugh Tunstall-Pedoe.
1993 Prevalence of Chronic Cough and Phlegm Among Male Cigar and Pipe

Burns, Eric
Press, Philadelphia.

Bruijnzeel, Adrie W.
2012 Tobacco Addiction and the Dysregulation of Brain Stress Systems.
*Neuroscience and Biobehavioral Reviews* 36:1418-1441. Electronic document,

Bryant, Vaughn M., Sarah M. Kampbell, and Jerome Lynn Hall.
2012 Tobacco Pollen: Archaeological and Forensic Applications. *Palynology*
36(2):208-223.

California Department of Parks and Recreation
2018 Did you know that during the nineteenth century San Francisco. Electronic
MuseumVolunteers/Site Assets/SitePages/Training/TransEmpireHQ.pdf,
accessed April 18, 2018.
California Gold Rush (1848–1858)

Cambridge Archaeology Field Group

Canney, Donald
1990 The Old Steam Navy, Volume One, Frigates, Sloops, and Gunboats, 1815-1885. Naval Institute Press, Annapolis, Maryland.

Caywood, Louis R.

Center for Disease Control

Cessford, Craig.

Charlton, Ann.

Chance, David H. and Jennifer V. Chance.

ChemicalLand21.

Cigar and Pipe Smokers at Risk of Airflow Obstruction.
Clay Heritage


Combes, John D

Comstock, H.E.

Confederated Tribes of Siletz Indians.

Consumer Theory

Conway, Thor

Corti, Count

Coulter, E. Merton

Cutright, Paul Russell.

Dallal, Diane
Dallal, Diane

Davey, Peter

Davey, Peter

Davis, W.N. Jr.

Delo, David M.

Derks, Scott (editor)
2009 The Value of a Dollar; Prices and Income in the US; 1860-2009. Grey House Publisher, Amenia, New York.

De Vincenz, Anna

De Vore, Steven LeRoy, and William J. Hunt, Jr.

De Vries, Jan, and Ad Van der Woude.

Digital Fire
Dixon, Kelly J.

Dobbin, Frank

Duco, D.H.

Duco, D.H. (editor)

Duco, D.H.

Duco, D.H.

Dunhill, Alfred.

Eichelberger, Justin E.

Elling, C. Michael

Esveld, Arthur van
Ferguson, Scott and Mark Miller
Electronic document, https://www.co.benton.or.us/parks/page/document-library, 

Fleming, John A.

Fox, Georgia L.
2015 The Archaeology of Smoking and Tobacco.  University Press of Florida, 
Gainesville, Florida.

Gačić, Divna
2011 The Pipes from Museum Collections of Serbia. Electronic document,  

Gage, Deborah, and Madeleine Marsh.

Gartley, Richard T.
2003 German “Stummelpfeifen” from Excavations in the USA.  In Politics of the 
Fur Trade: Clay Tobacco Pipes at Fort Union Trading Post (32WI17) by J.  
Byron Sudbury, pp. 205-216.  Historic Clay Tobacco Pipe Studies Research 
Monograph Number 2, Ponca City, Oklahoma.

Gilman, Sander L., and Zhou Xun

Glisan, Rodney.
1874 Journal of Army Life. A.L. Bancroft and Company, San Francisco, 
California

Goodman, Jordan.

Goff, J.H.
1959 Thomas Griffiths’ “A Journal of the Voyage to South Carolina, 1767” to  
Obtain Cherokee Clay for Josiah Wedgwood.  Georgia Mineral Newsletter  
12(3):113-122.

Gojak, Denis and Iain Stuart
1999 The Potential for the Archaeological Study of Clay Tobacco Pipes from 
Australian Sites. Australasian Historical Archaeology 17:38-49. Electronic  
Grabert, G. F.

Gusar, Karla

Haan, Ron de
2016 Een unieke en curieuze 19e eeuwse fabriekscatalogus van de Gebrüder Ziegler en Ruhla (A Unique and Curious 19th Century Factory Catalog from Gebrüder Ziegler in Ruhla). In PKN Stichting voor onderzoek historische tabaks pijpen, Jaarboek 2016, edited by Bert van der Lingen and Arjan de Haan, pp. 8-10, Leiden.

Haan, Ron de
2017 Nieuwe vondsten van pijpen uit de Gebrüder Ziegler catalogus (New finds from Pipes from the Gebrüder Ziegler Catalog). In PKN Stichting voor onderzoek historische tabaks pijpen, Jaarboek 2017, edited by Bert van der Lingen and Ewout Korpershoek, pp. 141-147, Leiden.

Hamel, Paul B. and Mary U. Chiltoskey

Hamilton, Henry W., and Jean Tyree Hamilton.

Handler, Jerome S., and Frederick W. Lange.

Hanson, Lee H. Jr.
Hariot, Thomas

Harrington, J. C.

Harrison, Brian Faris.
1990 *Old Post Archaeology: Excavations at Fort Stevens.* Clatsop Community College, Astoria, OR.

Hartnett, Alexandra

Hatch, Charles E. Jr.

Heard, K.

Helbers, G.C., and D.A Goedewaagen
1942 *Goudsche Pijpen* (Gouda Pipes). Drukkerij Koch & Knuttel, Gouda.

Herodotus

Higgins, David A.

Higgins, David A.
Higgins, David A.  

Higgins, David A.  

Higgins, David  

Higgins, David  

Higgins, David A.  

Higgins, David  

Hitchcock, C. Leo and Arthur Cronquist  

Hopkins, Alfred F.  

Hosterman, John W.  
1984 Ball Clay and Bentonite Deposits of the Central and Western Gulf of Mexico Coastal Plain, United States. US Geologic Survey Bulletin 1558-C, USDI, United States Printing Office, Washington, D.C.

Hudson, William R., Warren M. Lynn, and Dan Scurlock.  
1974 *Walker Ranch: An Archaeological Reconnaissance and Excavations in Northern Bexar County, Texas*. Texas Historical Commission, Office of the State Archaeologist Reports Number 26, Austin.

Huijsmans, Anne A.  
2012 *The Clay tobacco-pipes of St. Eustatius*. Bachelor’s Thesis, Archaeology of
Northwest-Europe Faculty of Archaeology, Leiden University, Leiden, Netherlands.

Hull, Katherine L.

Hume, Ivor Noel.

Humphrey, Richard V

Hunt, Aurora
1951 The Army of the Pacific, Its Operations in California, Texas, Arizona, New Mexico, Utah, Nevada, Oregon, Washington, plains region, Mexico, etc. 1860-1866. The Arthur H. Clark Company, Glendale, California

Ignatavicius, Donna D., and Marilyn Varner Bay

Industrial Minerals Association North America

Jackson, Reg, Ian Beckey and Mike Baker

Jackson, W. Turrentine.

James I.

Jensen, Karolyn Jackman
1991 The Smoking Pipes of Camp Floyd, Utah: Types and Varieties. Master’s
Thesis Department of Anthropology, Brigham Young University, Harold B. Lee
Library, Provo, Utah.

Johnson, Matthew.

Jung, S. Paul, Jr. (compiler)

Jung, S. Paul, Jr.

Jung, S. Paul, Jr.

Jung, S. Paul, Jr.

Kenyon, Thomas and Ian T. Kenyon

Kell, Katharine T.

King, Julia A.

Kvaal, Sigrid I. and T.K. Derry

Langouet, Loic, Gwenaël Le Duc and Henri Beillard
Leclaire, Andre et Mariette.  

Lehne, Richard A.  

Leo, Jean.  

Liddic, Bruce  

1998 Ashes to Ashes: The History of Smoking and Health.  Editions Rodopi B.V., Amsterdam-Atlanta, GA.

Lord, Francis A.  

Lord, Francis A.  

Lučić, Biljana  

Mackenzie Clay Pipe Makers of Edinburgh  

Mayer, Robert G.  

Mehler, Natascha  
Meissen

Meyer, Michael D.

Minc, Leah
2015 Ceramic Analysis Course Lecture, Firing Technology Week Three, Oregon State University, Corvallis, Oregon.

Minor, Rick., Kathryn Anne Toepel, and Stephen Dow Beckham

Minton, L.H.
1922 New Jersey’s Part in the Ceramic History of America. Ceramist 2:271

Moerman, Daniel E.

Morgenroth, Walter

Mullins, Paul R

Murphy, James L., and Kurt Reich

Murphy, James L.
1974 Provenience of Seven Reed Stem Pipes from Fort Union, New Mexico. KIVA 39(3-4):249-251.

Murphy, James L.
Museum of Ontario Archaeology  
2014 Ceramic Identification. Electronic document,  
http://archaeologymuseum.ca/ceramic-artifacts, accessed April 1, 2017

Nelson, Herbert B., and Preston E. Onstad (editors).  
1965 *A Webfoot Volunteer: The Diary of William M. Hilleary 1864-1866.*  
Oregon State University Press, Corvallis, Oregon

Nouria, Aria  
2017 The Discovery of Bacteria. Electronic document,  
https://www.aaas.org/blog/scientia/discovery-bacteria, accessed April 8, 2018

Office of the Historian  
2017 French Intervention in Mexico and the American Civil War, 1862-1867.  

Ojibwa.  
2010 American Indians and Tobacco. Electronic document,  

Olsen, William H  

Omwake, H. Geiger.  

Oregon Parks and Recreation Department  
2004 Fort Yamhill State Heritage Area Master Plan. Electronic document,  

Oregon Parks and Recreation Department  
2018 Fort Yamhill State Heritage Area. Electronic document,  

Ortner, Sherry  
Oswald, Adrian

Paper, Jordan.
1988 *Offering Smoke: The Sacred Pipe and Native American Religion.*
University of Idaho Press, Moscow, Idaho.

Peach State Archaeological Society

Patterson, Sam H., and Haydn H. Murray

Petsche, Jerome E.
1974 *The Steamboat Bertrand; History, Excavation, and Architecture.*

Pfeiffer, Michael A.

Pfeiffer, Michael A.

Pfeiffer, Michael A.
1982 *Clay Tobacco Pipes and the Fur Trade of the Pacific Northwest and Northern Plains.* Moscow, Idaho, University of Idaho, Moscow.

Pfeiffer, Michael A.

Pfeiffer, Michael A.

Pfeiffer, Michael A., Richard T. Gartley, and J. Byron Sudbury.
Phung, Thao T., Julia King, and Douglas H. Ubelaker.  

Pierson, Heidi.  

Pinto, Edward H.  

PKN Society for Research of Historical Tobacco Pipes.  

Pojar, Jim and Andy MacKinnon (editors)  

Praetzellis, Mary, Adrain Praetzellis and Marley R. III Brown, C. Michael Elling.  
1980 *Historical Archaeology at the Golden Eagle Site: Clay Tobacco Pipes*. Anthropological Studies Center, Sonoma State University, Rohnert Park, California.

Price, Prudence M.  

Puziuk, Jakub  

Rafferty, Sean, and Rob Mann  
2004 *Smoking and Culture*. The University of Tennessee Press, Knoxville, Tennessee.

Raithby, John. (editor)  
1819 [1662] ‘Charles II, 1662: An Act against exporting of Sheepe Wooll Woolfells Mortlings Shorlings Yarn made of Wool Woolflocks Fullers Earth Fulling Clay and Tobacco pipe Clay’ in *Statues of the Realm*: Volume 5, 1628-
Rapaport, Benjamin

Rapaport, B

Raphaël, Maurice

Raven, Peter H., Ray F. Evert and Helena Curtis

Reckner, Paul F. and Diane Dallal

Redmond, Kelly and George Taylor

Renfrew Museum

Reynolds, John George

Rice, A.H. and John Baer Stoudt.

Risch, Erna
1962 *Quartermaster Support, of the Army, A History of the Corps 1775-1939*,
Quartermaster Historian’s Office, Office of the Quartermaster General, Washington, D.C.

Ritchie, C.F.  

Robert, Joseph C.  

Roberts, Frank H. Jr. (editor)  

Robinson, Rebecca C.W.  

Ross, Lester  

Ross, M. R.  

Roy, Christian  
2007 Premiers regards sur le dépotoir de la fabrique de pipes à fumer Henderson, 1847-1876 (First look at the Dump of the Henderson Smoking Pipe Factory, 1847-1876). *Archéologiques*, no. 20, Québec.

Rubin, Rick  

Russo, Patrizia, Candida Nastrucci, Giulio Alzetta, Clara Szalai.  
Schneck, Harold M. Jr.

Schmidt, Ariadne

Travel Routes to California.

Sepsis Alliance

Shablitsky, Julie M.

Sinclair, Donna L.

Skirbunt, Peter D. and Kevin L. Robinson (editor).

Sinopoli, Carla M.

Smith, Robin H.

Smith, Robin H.
2017 Canadian Clay Tobacco Pipe Industries. Electronic document,

Smith, Stanley, and Stephen T. Rogers.  

South, Stanley.  

Sprague, Roderick (editor).  
1983 *San Juan Archaeology*. Laboratory of Anthropology, University of Idaho, Moscow.

Staddon, Gary  

Stam, Ruud  

Stephan, Hans-Georg  

Stuckman, Emily  

Sudbury, Byron  

Sudbury, Byron  
1980 *Historic Clay Tobacco Pipe Studies*, Volume 1. Ponca City, Oklahoma

Sudbury, Byron  
1983 *Historic Clay Tobacco Pipe Studies*, Volume 2. Ponca City, Oklahoma
Sudbury, Byron  
1986 *Historic Clay Tobacco Pipe Studies*, Volume 3. Ponca City, Oklahoma

Sudbury, Byron  

Thie, Krista K.  

Thomas, B. B, Jr and Richard M. Burnett  

Thomas, Clayton (editor)  

Thompson, William A. Jr.  

The Ball Clay Heritage Society  

The Conference on Research in Income and Wealth  

The Kaolin and Ball Clay Association UK  

The National Pipe Archive  

Tobacco.org: Tobacco News and Information  
Tobacco on the Oregon Coast

Topić, Nikolina and Branka Milošević

Tortora, Phyllis G., and Sara B. Marcketti

Transpacific Project

Travel Routes to California.

Trussell, Timothy D.

Tushingham, Shannon, Dominique Ardura, Jelmer W. Eerkens, Mine Palazoglu, Sevini Shahbaz, Oliver Fiehn.

Tverdal, Aage, and Kjell Bjartveit.

Tveskov, Mark, and Amie Cohen.
2008 *The Fort Lane Archaeology Project*. Southern Oregon University, Laboratory of Anthropology, SOULA Research Report 2008-1, Ashland, OR.

Ure, Andrew
U.S. Department of Health and Human Services.  

Van Hoof, Logan.  

Van der Meulen, J.  

Vaucher, Jean G.  

Vihlene, Shannon Marjorie.  
2008 Custer's Last Drag: An Examination of Tobacco Use Among the Seventh Cavalry during the Nineteenth Century. Master's thesis, Department of Anthropology, University of Montana, Missoula.

Voisin, Pierre  

Vyšohlíd, Martin  

Vyšohlíd, Martin  

Wacke, Aline  

Walker, I.C. and LL. De S. Walker  
Walker, Ian C.

Walker, Ian C.

Walker, I.C.

Walker, Iain C.

Walker, Iain C.

Walker, Iain C.

Warner, Irene, and George Warner.

Watkins, Lura Woodside

Wesseler, Kimberly A.
2017 *A Preliminary Historical and Archaeological Evaluation of Fort Yamhill’s Hospital Site (35PO75)*. Master’s thesis, Department of Anthropology, Oregon State University, Corvallis. Oregon State Library.

Wilson, Rex L.
1971 *Clay Tobacco Pipes from Fort Laramie National Historic Site and Related Locations*. Division of Archeology and Anthropology, Office of Archeology

Wilson, Rex L

Wiltshire, William E. III

Whelan, Elizabeth M.

Willey, P.

Winter, Joseph C. (editor)

Wynia, Katie Ann.

Young, Jason.

Zoltán, Nagy
## Appendix: Tentative Guidelines

<table>
<thead>
<tr>
<th>Differences</th>
<th>England/Scotland</th>
<th>France</th>
<th>Germany</th>
<th>Dutch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaze on Bowl, or Paint</td>
<td>Never glazed, some with paint</td>
<td>Glaze</td>
<td>Glaze</td>
<td>Paint</td>
</tr>
<tr>
<td>Markings on Inside of Bowl</td>
<td>Vertical Striations pervasive</td>
<td></td>
<td></td>
<td>Horizontal Circular Striations, in general</td>
</tr>
<tr>
<td>Type of Marks</td>
<td>Single and double letter with &amp; w/o crown over. Symbols (cross, wheel), 3 letters rarely. Scotland; advertising, place name. Numbers</td>
<td>Names, letters, numbers</td>
<td>Numbers, symbols, names</td>
<td>Numeral w/ &amp; w/o a crown over. Decorative marks (windmill, etc.), sometimes with a crown over, 3 letter marks, Single/double letter w/ &amp; w/o crown, symbols</td>
</tr>
<tr>
<td>Manufacturer marks: Stamped marks</td>
<td>Lengthwise on Stem, rarely on Spur, incuse from mold, frame in relief, w/full name but uncommon, back of bowl, framed. Scotland reliefs initials high up on sides of foot, English of this are lower down on sides of spur</td>
<td>On stem, base of stem</td>
<td>Back of bowl, stem, base of and bottom of side of bowl</td>
<td></td>
</tr>
<tr>
<td>Manufacturer marks: Molded marks</td>
<td>Molded (Block capitals, full name w/road or place name) or patterns marks on side of stem. Most widespread and common.</td>
<td>On stem</td>
<td>Stem, side of spur, encircling stem, base of spur, base and bottom side of spur less bowl.</td>
<td>In relief, generally on one side of spur, base and side of bowl</td>
</tr>
<tr>
<td>Other Marks</td>
<td>Back of Bowl: Incuse w/full name. Large TD relief. Rare: Full name on bowl side.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay colors other than white</td>
<td>Yes, patents for coloring (p.122 1975 Oswald), red Scotland-yellowish</td>
<td>red and black</td>
<td>Red and black</td>
<td></td>
</tr>
<tr>
<td>Enamel to enhance (face features, etc.)</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Reed/Stub Stemmed</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Property</td>
<td>Description</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milling or Rouletting on rim</td>
<td>No after 18th c., but revival during mid-19th c., but poor quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, all periods</td>
<td>Yes, Rouletting all periods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, all periods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seam trimming: smooth or diagonal hatch marks</td>
<td>Smooth Scotland—poorly finished, not polished</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diagonal Hatch Marks</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Denticulation marks on stem between maker’s names, diagonal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Botter (botor) on Bowl rim</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td></td>
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<tr>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burnishing</td>
<td>Rare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Bore Diameter</td>
<td>5/64-4/64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bite end</td>
<td>Some nipple/button ended, flat end cut, flattened (typical for English)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flat end Button, flat end cut, button with clay pulled out from center, nipple</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Button with clay pulled out from center, flat end cut, nipple</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nipple, some flattened</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowl Shape</td>
<td>Varies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Varies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Egg shape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trim of spur base mold line</td>
<td>After 1800 No (labor saving)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plane of bowl lip to stem</td>
<td>Parallel to obtuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>obtuse</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Main Exporters to USA</td>
<td>London, Bristol, Liverpool, Glasgow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Westerwald Region, Uslar, Grossalmerode</td>
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<td></td>
</tr>
</tbody>
</table>

References: Oswald 1975 BAR 14, Davey 1987 BAR 178