AN ABSTRACT OF THE THESIS OF

Ella M. Peterson for the degree of Master of Arts in Interdisciplinary Studies in Applied Anthropology, Design and Human Environment, and Art presented on December 10, 2008.

Title: Recognizing Individual Potters in Historic Oregon Site A Visual and Chemical Analysis of Early Oregon Redware.

Abstract approved:

David R. Brauner

This paper discusses research concerning redware vessel sherds found in an archaeological excavation at Oregon's historic Champoeg State Park, and comparative artifacts from four known Oregon and Washington late nineteenth pottery production sites. Visual and Instrumental Nuclear Activation Analysis comparison studies were conducted on samples from each site. The New Brunswick Model was the method of artifact evaluation. Finding the individual idiosyncratic behaviors in material culture was the theoretical approach. Visual attribution was only successful in one instance. INAA yielded one statistically viable attribution of a Champoeg vessel to a nineteenth century Oregon potter. However, this research can be used to expand knowledge about each site, provide evidence to assist in dating the site and contribute to our understanding of economic distribution patterns in the mid-nineteenth century Willamette Valley.

Recognizing Individual Potters in Historic Oregon Sites
A Visual and Chemical Analysis of Early Oregon Redware

by
Ella M. Peterson

A THESIS

Submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Arts in Interdisciplinary Studies

Presented December 10, 2008
Commencement June 2009

Master of Arts Interdisciplinary Science of Ella M. Peterson
Presented on

APPROVED:

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Major Professor, representing Applied Anthropology

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Director of Interdisciplinary Studies Program

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Dean of the Graduate School

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Ella M. Peterson, Author

ACKNOWLEDGEMENTS

My most heartfelt and grateful words of thanks must go to my best friend, my husband, Dolf Peterson. Without his constant encouragement and support I could not have gotten through this process. When I was expounding upon my incompetence, he was vehemently enumerating my abilities and his faith that I would finish my project in good time and at my own pace.

My mom, Mary Jane Brown-Willis was a constant source of encouragement. She was always there cheering me on. Her countless hours of editing are gratefully acknowledged.

Jessica Hale, friend and fellow graduate student, encourage me to go beyond visual analysis on this project. She introduced me to Dr. Leah Minc and the INAA process. She also taught me to prepare samples. Beyond that, Jess has been a constant source of encouragement and comradeship throughout graduate school.

There are numerous faculty members at Oregon State University, who have had a profound influence on my life. They too have given me encouragement, listened to my complaints, and instilled confidence where there once was none. None deserves more credit for my completion of this document than Dr. David Brauner, my major professor. He reiterated countless times the importance of my work and his faith in my ability to reach my goal. The very fact that he did not understand my lack of confidence gave me confidence. Dr. Elaine Pederson encouraged me to strive for excellence, complemented my work and helped that small kernel of confidence begin to grow. She has been a mentor throughout. Dr. Barbara Loeb gave me the gift of seeing the individual in the material objects they produce—a gift that was put to good use in this endeavor. Lastly, I would like to thank Dr. Leah Minc for her patience in teaching me the very rudimentary concepts I needed to know to grasp the INAA process. Without her indulgence, her willingness to include my project in her lineup of many projects waiting for analysis, we might never have begun to build a chemical analysis database for northwest redware. I owe her a debt of gratitude.

Finally, I would like to thank Blaine Schmeer, Harvey Steele and Dick Pugh for allowing me access to their collection, for trusting me to abscond with a sizable portion of it, and for their patience through countless interviews. I hope that this endeavor is worthy of that trust.

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Chapter 1: INTRODUCTION

This project is a comparative evaluation of redware artifacts recovered from an historic archaeological site, and vessels produced by four early Oregon potteries. The study began with a small assemblage of artifacts recovered from an archaeological site in Oregon's historic Champoeg State Park. Artifacts recovered include seven partially cross-mended flowerpots which became the catalyst for this research.

The redware flowerpots, which were the catalyst for this Northwest pottery project, were found in an archaeological site, excavated in the summers of 1990 and 1991. Excavation was conducted by the Oregon State University anthropology department. The site is within the boundaries of Champoeg State Park, located approximately twenty miles southwest of Portland, Oregon. (Figure 1) As the site of one of Oregon's earliest settlements, Champoeg State Park is of considerable historic significance. It is not surprising, therefore that considerable archaeological excavation has been conducted there.

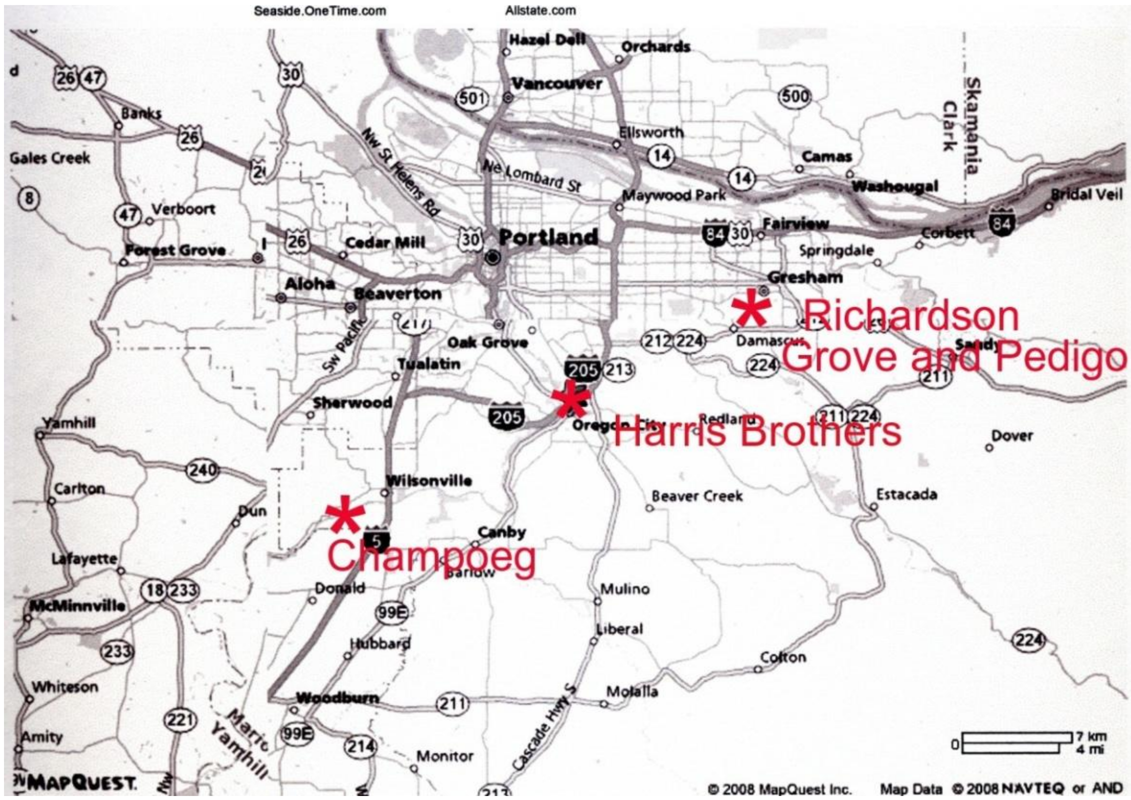


Figure 1: Oregon map showing Champoeg and pottery sites. (MapQuest 2008)

Dr. David Brauner was conducting a field school on the west side of Champoeg Creek in 1990. Coincidentally, the Oregon State Parks Department was building a walking path on the east side of the creek. The Parks Department crew located historic artifacts and stopped construction of the path while Dr. Brauner investigated the site. A survey of the site was conducted, and artifacts were recovered. The following summer, when the field school resumed on the west side of Champoeg Creek, a group of students were dispatched to continue sampling at the site recorded as ORMA27.

There were few artifacts found at ORMA27—certainly not the abundance of cultural material peculiar to other Champoeg sites. Just over 500 catalog numbers were assigned, although individual artifacts such as shards of flat glass, were often grouped together under one number. Flat glass and brick sherds were predominant. Several pieces of blue transferware called "Washington Vase," dating from 1834 to 1854, (Williams 1999: 84) were also found. One hundred eighty five artifacts of low-fire redware pottery sherds were excavated as well. With the excavation completed, Dr. Brauner was able to ascertain that the site appears to be the footprint of a small cabin.

Although the work of cataloging and cross-mending the artifacts began in 1991, time constraints left the project incomplete. The collection from ORMA27 was housed in the Oregon State University archaeological archives until the fall of 2004, when this researcher resumed cataloging and cross-mending the artifacts.

Only the blue transferware sherds, and a few nails indicated an approximate occupational time period for ORMA27. Research was conducted in the Marion County deed records for evidence of property ownership during the second half of the nineteenth century. These records indicate Robert Newell, and later, Donald Manson, were the owners from sometime in 1843 or 44 until 1880 (Hanson 1967: 195, 226). This period encompasses the date for production of the transferware sherds. The small cabin known only by its site designator, ORMA27, was most likely the property of Manson at the time of occupation. Further archival investigation did not yield any information about who had once lived at the ORMA27 location. Both Manson and Newell are known to have built homes in other locations on the property. It is possible the cabin was occupied by employees of Manson. There are, however no extant records to ascertain employee occupation. It then became necessary to explore other avenues for historical information the site's artifacts could reveal. Attention began to turn toward the redware sherds. Questions about who made the flowerpots, and when, were asked, forming the first research question for the project. A thorough investigation of the redware would be required. A model to direct the investigation was also necessary.

In early 2005, the researcher was introduced to the New Brunswick Model of artifact analysis. The Model is organized into phases of information gathering. Each step must be completed before progressing to the next. This requires a complete "sensory engagement" with the artifact, noting material composition, construction, function, then provenience and value (Smith 1985: 35).

In conjunction with the New Brunswick Model, aspects of Carlo Ginzburg's Conjectural Paradigm were incorporated into the artifact analysis. Ginzburg applied this label to a method of 'seeing' when searching for clues (Ginzburg 1980: 7). Application of this paradigm to redware sherds found on French Prairie is an unusual approach. Ginzburg however, stressed the necessity of searching for the smallest clues when solving a mystery. Since the paradigm is homogeneous with the New Brunswick Model, it was included.

Using the two analysis methods, research was directed toward the unique composition and construction of each redware vessel. The slow cleaning, cataloging, and cross-mending process allowed the researcher to 'get to know' the redware. What appeared to be six partial flowerpots (as indicated by drain holes in the base of several of the vessels) emerged. Two small sherds of another redware vessel are probably part of a flowerpot as well. Each vessel is unique, in its own right. There are different shapes, color variations, and even fingerprints in the body of two of the vessels. The redware pieces appear to have been made by at least three different potters, possibly in different potteries. An effort to find who produced these vessels began with step two of the New Brunswick Model--which requires locating comparative data (Smith 1985: 35). Comparative data for redware vessels from the second half of the nineteenth century, which were also made in Oregon, is not abundant. A comparative collection, however, does exist.

In the fall of 2005, the members of the Northwest Pottery Research Center were enlisted to assist with the project. The Center, in West Linn, Oregon, is maintained by a small research group. Blaine Schmeer, Harvey Steele and Dick Pugh (who conceived and maintain the Center) are hobbyists, interested in Oregon history, particularly Oregon pottery. They continue the research begun by Dr. Daniel Scheans at Portland State University. The Center houses redware artifacts from excavations of a number of early Northwest potteries and waster dumps. The three historians have done considerable research into early farmer-potters and their wares—pouring over public records and old newspapers, talking to locals and enlisting help from current landowners. Their work in saving this part of Oregon history cannot be overemphasized. They most graciously lent the Oregon State University's historical archaeology laboratory large quantities of their collections for study.

Schmeer and Pugh examined the pottery sherds from Champoeg and hypothesized that some of the vessels came from an early pottery in Damascus, Oregon--the Richardson/Grove site (Figure 1). Schmeer offered to lend a selection of artifacts from the site to Oregon State University for further study. Over a period of six months, more than one thousand pieces of redware were examined and categorized. Eight hundred and seventy fragments with identifying markers such as partial rims, handles, lids or jug sherds were selected for further study. Rim fragments provided the best clues for comparison with the Champoeg flowerpots. One hundred seventy nine rim fragments were eventually chosen as the subjects of concentration. The researcher chose to concentrate on rim fragments because they were the best identifying markers to compare with the Champoeg vessels.

There is currently no definitive way to know which potter (Richardson or Grove) produced which piece of redware. Schmeer, Pugh and Steele, however, believe that Richardson produced pottery on the east side of Richardson Creek and Grove on the west side. Since one sherd signed by Grove was found on the west side, and there are two waster dumps and kiln sites this is a logical assumption. All the fragments from this collection were from the west side of the creek.

The progression of analysis using the New Brunswick Model was applied to the Richardson/Grove artifacts. Observable data and construction methods were recorded. Function of the sherds could seldom be ascertained with certainty, however an attempt was made to make an attribution. Similarities and differences between the rim configurations, fabric composition, and quality of the sherds from the Richardson/Grove site and the Champoeg flowerpots were observed.

Following the New Brunswick Model, it is necessary to examine as many similar artifacts as possible in the time allowed. Since examination of the Richardson/Grove sherds had been at the suggestion of Schmeer, there was the possibility of bias. A decision was made to continue research with sample collections from three other pottery sites.

Schmeer agreed to lend the anthropology department a selection of sherds from three other pottery sites. John and Steven Harris' site in Canemah, Oregon, (Figure 1) Edward Pedigo's site, also in Damascus, Oregon, (Figure 1) and Samuel Grove's pottery site in the Eden Valley town of Farmington, Washington (Figure 2) were chosen. Two of the sites were excavated by Dan Sheens, of Portland State University, and the Oregon Archaeological Society, along with Schmeer, Pugh and Steele. The Grove site, in Washington, has never been excavated. Its artifacts, however, are washing into a creek due to bank erosion. Schmeer conducted a surface collection, with permission of the land-owner, during a research visit a number of years ago. The recovered artifacts are housed in the Northwest Pottery Research Center's archives. Much smaller quantities of sherds were examined from the Pedigo, Harris and Eden Valley sites due to time constraints.

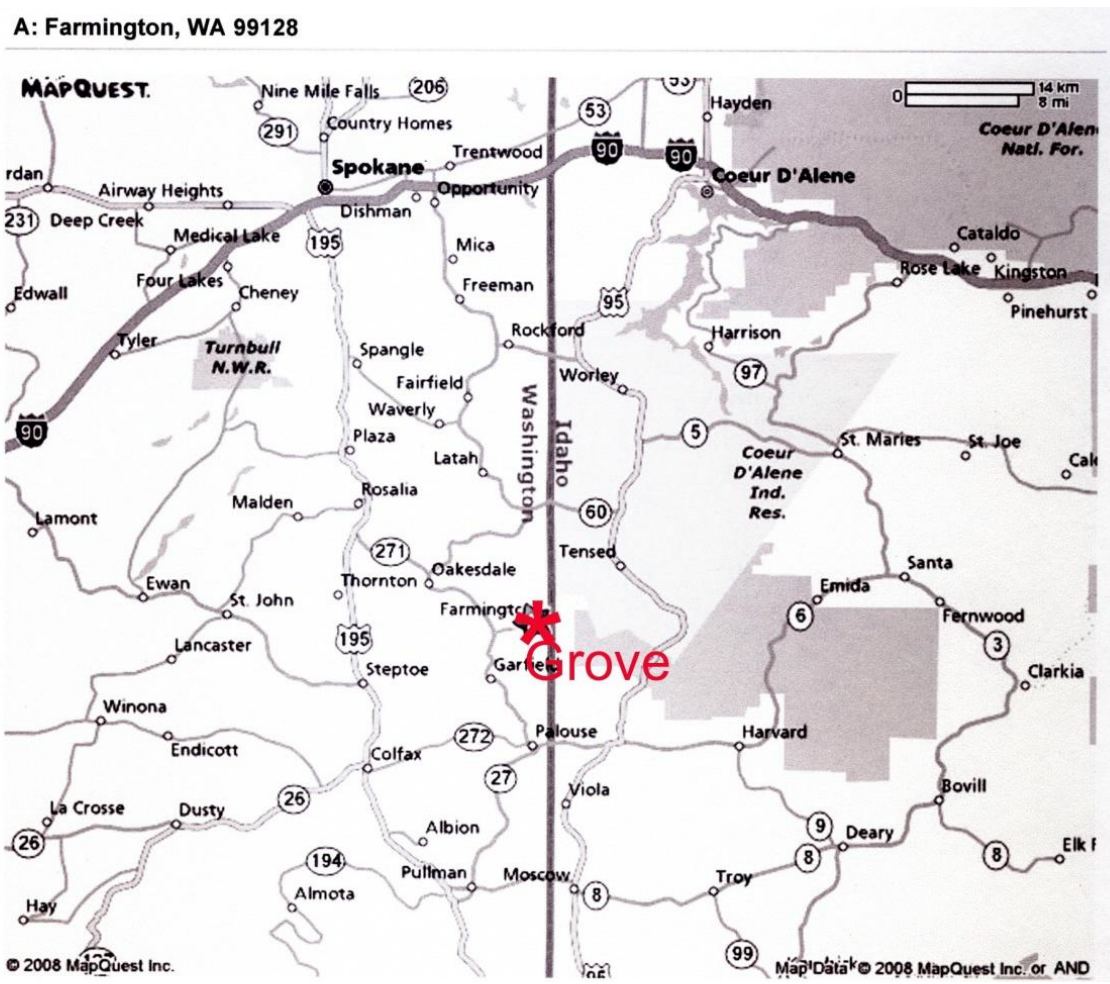


Figure 2: Eastern Washington. Site of Grove's pottery. (MapQuest 2008)

Boxes of sherds from each of the potteries were transported to Oregon State University where they were cleaned and sorted. The sherds had not previously been sorted by the Northwest Pottery Research Center participants. Estimating the quantity of rim fragments in each box was not possible. The samples, with the exception of the Eden Valley sherds, were selected randomly.

The sample collection from the Harris brothers waster dump contained 76 large sherds. The Pedigo waster sample contained 792 sherds, mostly small unidentifiable pieces. The Eden Valley 86 sherd sample was predominantly rim sherds, as well as a variety of handles, bases and lids, selected by the researcher. The composition of the sherds from the three potteries was similar to the Richardson/Grove waster dump collection. There was an adequate variety of rims, handles, lids, bodies and unidentifiable sherds to provide examples of each potter's, (or group of potters') work. Like the Richardson/Grove site, there were many standard nineteenth century utilitarian vessels present.

After completion of evaluation of the three additional waster dumps, comparative processes began. Rim fragments were grouped according to shape. A sample from each grouping was sketched, with the assistance of a contour gauge.

The comparative process gave good indication that three, of the Champoeg flowers pots were most similar in style to samples found in the Richardson/Grove waster dump. Three of the Champoeg vessels did appear to have been made by the same potter, although not one of those selected for study. One of the Champoeg vessels also appeared to have been from the Harris pottery. A similarity between a small number of samples from the Richardson/Grove site, Pedigo site and the Grove site in Farmington was noted. These sherds are unique in their rim style—and very similar to decorative pieces found in the Richardson/Grove waster. Since Grove worked at each of these potteries at some point in his lifetime, a hypothesis about his, and others', unique artistic rim style began to evolve. In fact, rim styles for each of the potters appears to be somewhat unique.

Unfortunately, visual attribution of rim style, without further scientific analysis is purely supposition. The chemical makeup of samples from each of the pottery sites and the Champoeg vessels would be required to corroborate any proposed style attribution hypotheses. This led to an investigation of methods for identifying the chemicals in ceramic artifacts. The technique of instrumental neutron activation analysis or, INAA became a focus. INAA is arguably the most comprehensive and sensitive method of evaluating ceramic materials.

Instrumental Neutron Activation Analysis has been used "to determine the provenance of archaeological materials" for the past 50 years (Speakman 2007: 1). Ceramics are one of several types of archaeological materials that can be successfully sourced using this analytical method. INAA is, not readily available to the average graduate student. It was, therefore, fortunate that Dr. Leah Minc has recently begun an archaeometry (INAA) program at the Oregon State University

Research Nuclear Reactor. She was kind enough to provide assistance and the use of equipment for the sourcing part of this project.

There is, traditionally a long waiting line for Dr. Minc's expertise. However, irradiation and recording of data on the Champoeg vessels was complete in the fall of 2007. Samples from the pottery wasters were also processed into appropriate samples. These were irradiated in January of 2008. After resulting data from each of the sample irradiations was combined, Dr. Minc developed interpretive graphs from that information, using cluster analysis and bivariate plots.

At Dr. Minc's suggestion, the researcher also evaluated the inclusions found in the remaining pieces of sample ceramics and located, through soils maps, possible clay sources for each pottery. A microscope and camera were used for seeing and recording each sample's unique inclusion characteristics. Alex Nyers, a fellow graduate student photographed the samples. This was helpful for understanding both macro and micro elemental concentrations in each sample, and in evaluating the data produced using INAA.

As the northwest pottery project progressed, it was necessary to create formal hypotheses that might be researched. With each successive research question came a new hypothesis. Below are clear statements of the three proposals that were the driving impetus behind this project:

Hypothesis 1: The idiosyncratic behaviors exhibited by potters, as evidenced by subtly detected differences in their pottery, can visually distinguish the work of nineteenth century Oregon potters from each other.

Hypothesis 2: Using Instrumental Neutron Activation Analysis, trace elements in sherd samples from four historic northwest production sites and one archaeological site can distinguish the fabric make-up of each potter's paste recipe.

Hypothesis 3: The knowledge gained from visual and chemical comparisons between samples from pottery and archaeological sites can be used to expand knowledge about each site, provide evidence to assist in dating the site and contribute to our understanding of economic distribution patterns in the mid-nineteenth century Willamette Valley.

Chapter 2: Historical Background: Methods and Results

Much of the research concerning archaeological artifacts involves archival searches. Archival documents for this project, as is often the case, are not complete. Due to its importance in Oregon history, Champoeg is well documented. However, extant records do not exist for all events, persons, and places in Champoeg history. There are even fewer documents concerning early Oregon potters and pottery. Much of what has been found archivally, is due to years of research by the members of the Northwest Pottery Research Center. Archival information that was available has been outlined in this section. The table below lists the sites, occupants and occupancy time period for each site (Table 1). Also included, are brief sections on historic pottery production methods in nineteenth century Oregon, and the cultural value of flowerpots.

Table 1: Sites, occupants and time periods.

Site	**Occupant(s)**	**Occupancy Period**
Champoeg (ORMA27)	?	? to 1861
Richardson/Grove Site Damascus Oregon	Chevalier Richardson Samuel Grove	1848 to 1854 1856 to 1857
Pedigo/Grove Site Damascus Oregon	Edward Pedigo Samuel Grove	1854 to 1871 185? To 1876
Grove Site Farmington, Washington	Samuel Grove	1876-?

2.1 Champoeg and ORMA27

The old town of Champoeg is located approximately twenty miles southwest of Portland Oregon. It is on the south bank of the Willamette River. The meaning and origin of the name Champoeg according to many sources, is not fully known but may be a mixture of Kalapuya and French language (Speulda 1988: 3). According to Lou Ann Speulda's research, the area that eventually became the town of Champoeg was originally used as a camping and council grounds for various bands of the Kalapuya Indians (Speulda 1988: 3). Retired Hudson's Bay Company employees (both French-Canadian and British) and their Native wives began to settle in the Champoeg area after 1830 (Speulda 1988: 10). A few Euro-Americans arrived prior to the 1842 wagon trains as well. The exact location and time of the first settlement is still debated, and is beyond the scope of this research. However, in 1843 Champoeg became the place where the first provisional government in Oregon Territory was formed (Hussey 1967: 158).

By 1843 Robert Newell had settled at Champoeg, and by 1844 Francis Pettygrove had established a granary and warehouse that competed with Hudson's Bay Company's existing warehouse (Hussey 1967: 198). (Hussey 1967: 114). Eventually Newell and Andre Longtain plated a town on the Champoeg site, which grew and prospered during the eighteen-fifties (Hussey 1967: 198). The merchants who were in business in Champoeg during the mid-nineteenth century were of greatest importance to this research.

During the eighteen-fifties, there were three stores that may have stocked utilitarian redware to supply Champoeg area residents. Hudson's Bay Company began operating a grain receiving warehouse and small store sometime between 1841 and 1844 (Hussey 1967: 109). Robert Newell and John Davis Crawford also operated a general store (Hussey 1967: 205-206), as did Edward Dupuis (Speulda 1988: 19). A record of the inventories for these stores is not available, but Hussey notes that the *Oregon City Spectator* carried an advertisement about Newell's "'very good assortment of Goods & Groceries' " in the October fifth edition (Hussey 1967: 205). The Newell-Crawford Store was in operation until the flood in 1861 (Hussey 1967: 206). A fire destroyed Dupuis' store in 1851 (Hussey 1967: 206). The Hudson's Bay Company's warehouse and accompanying trade shop were out of business by 1851.

There were two main modes of transportation for freight to and from Champoeg during the eighteen-fifties. According to Mills, the keelboats *Mogul* and *Ben Franklin* were hauling freight and passengers to and from Champoeg as early as 1843 (Mills 1947: 12). By 1851 steamboats were being built at Canemah, above the falls from Oregon City (Webber and Webber 1993: 62—65). One of those earliest steamships, the *Hoosier*, began operating on the upper Willamette in 1851 (Hussey 1962: 204). Mills indicates two steamboats, the *Canemah* and the *Franklin* were hauling freight from Canemah to Champoeg by 1854 (Mills 1947: 54). The rate for hauling freight that distance was ten dollars a ton (Mills 1847:

54). Champoeg's proximity to the river indicates that boats were probably the most heavily used type of freight transportation.

Some freight may have been hauled between Newberg and Champoeg during the eighteen-fifties as well. Hussey indicates there was a passable road between the two by 1852, with a ferry crossing the Willamette near Newberg (Hussey 1962: 207. The year 1853 brought a stage line between Salem and Champoeg (Hussey 1962: 207). The stage may have hauled some types of freight. The improving road system most likely encouraged some overland freight hauling.

Champoeg repeatedly experienced flooding however, the 1861 flood seems to have been the death knell for this small town with a population of under two hundred. *The Oregon Statesman* reported in December of 1861 that " 'the flood swept this town entirely clean of houses' " (Speulda 1983: 22). Although Champoeg continued to be a river port, it was never rebuilt (Speulda 1983: 23)

The site known as ORMA27, is on the south bank of the Willamette River and the east side of Champoeg Creek. It is across the creek from the platted town of Champoeg, which was about one-half mile to the west. Champoeg merchandise would have been readily available to the inhabitants of the site.

This site (ORMA27) is within the boundaries of Champoeg State Park, and in the northeast corner of what was once Walter Pomeroy's property (Hussey 1967: 165). Dr. Robert Newell, the most famous of its owners, either bought, or traded for it, sometime in 1843 or 44 (Hussey 1967: 165. Speulda 1988: 15). The piece of property remained in Newell's hands until just before the flood of 1861, when he sold some of his Champoeg land to Donald Manson (Speulda 1988: 23).

After the 1861 flood, Newell began spending more of his time in Idaho, disposing of property whenever he was back at the Champoeg town site (Hussey 1967: 236). He sold the southwest corner of the original deeded land claim to James R. Spencer in November of 1866. The southeast corner was sold sometime during that time as well but it is not known to whom (Hussey 1967: 236).

According to Speulda, Donald Manson, having weathered the 1861 flood, rebuilt his house on a part of the property that was higher than the Champoeg town site (Speulda 1988: 23). In April of 1878, Manson transferred most of his property to his son, Donald Manson Jr. (Marion County Deed Book 23: 284). By that same year, John Hoefer and Casper Zorn were known to have owned the southeast corner of the Newell claim (Hussey 1967: 237). This was the area on Champoeg Creek where a grain mill was located. Donald Manson Junior sold much of his ownership in Newell's original deeded land claim to Hoefer and Zorn in 1896 (Marion County Deed Book 61: 581). Zorn and Hoefer operated a grain mill on Champoeg Creek until the land was deeded to the State of Oregon in 1901 (Marion County Deed Book 1901 72: 242) and 1906 (Marion County Deed Book 1906 91: 395). It then became Champoeg State Park.

Record of the locations of Newell and Manson's houses still exists. They were both on the west side of Champoeg Creek. The Zorn/Hoefer mill is shown close to the old Champoeg – Salem Road, at the southeast corner of the property, on all Champoeg maps (Hussey 1967: 216). No known houses or businesses were built on the east side of Champoeg Creek within the bounds of Newell's deeded land claim. It is therefore not possible to identify the original owners of the little cabin that became ORMA27.

The only knowledge of the cabin's history is from material evidence. It is known to have had a fireplace and windows, since bricks and flat glass are evident in the archaeological record. One sherd of blue Staffordshire transfer printed ware, called "Washington Vase" was found in the site (Williams 1999: 84). This particular pattern of transfer printed earthenware was produced by the Podmore and Walker Company from 1834 to 1854 (Williams 1999: 84). Five small four holed, sew-through, white glass buttons were recovered, as well as six partial machine cut nails. A quantity of flat glass, was found in several areas of the excavation. The only other information about the people who might have inhabited this small cabin on the banks of the Willamette River, are the redware sherds, many of which were cross-mended into seven partial redware vessels. These were to become the catalyst for this project.

2.2 History of the Potters

The history presented here is from primary documents obtained by the researcher, by Blaine Schmeer of the Northwest Pottery Research Center, and from articles written and presented by members of the Center at Northwest

Anthropology Conferences. Schmeer was kind enough to allow examination of documents copies despite their importance in his efforts to complete and publish his own work. His collection includes census, deed, arrest, marriage and newspaper records for each potter.

Artifacts from only four the pottery collections Northwest Pottery Research Center houses were chosen for this research. It must be noted that Schmeer, Pugh and Steele have researched nearly thirty nineteenth century potters in Oregon and Washington. The Center houses collections from many of the pottery sites researched. In addition, Schmeer, Pugh and Steele believe there were many more potters from the time period that have yet to be rediscovered.

2.2.1 Chevalier Richardson

Archival research indicates the land where the Richardson pottery was once located was first owned by Chevalier Richardson from 1848 until 1854 (Oregon Donation Land Claim Records 1854). This property is located on Richardson Creek, near Damascus, Oregon. The pottery is believed to have been on the original Barlow Road, near where it was intersected by Foster Road (Maybee 1962: 12). (Figure 3)

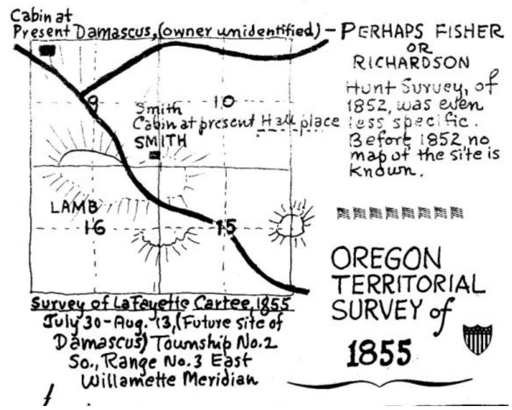


Figure 3: Possible Richardson cabin. (Maybee 1962:12)

Richardson came to Oregon from Warren County, Indiana. He lived in Indiana at least until 1840, since he was listed in the 1840 Warren County census (Schmeer 2005 personal communication). The census indicates Richardson was a potter at that time. Blaine Schmeer obtained this information when he visited Warren County while he was researching the northwest potters. He discussed Richardson with members of the community and photographed pottery produced locally by Richardson (Schmeer personal communication 2005). Local historical records indicate Richardson left his wife and family behind and joined a wagon train to Oregon Territory in 1846 (Steele 1996: 7).

Richardson then enlisted in the Oregon First Volunteers and went to Eastern Washington to assist in the aftermath of the Whitman Massacre (Schmeer, personal communication 2005) “He was in the Volunteers for about six months. Copies of his ration slips are still in the state archives, where he got a weekly ration of plug tobacco and military accessories” (Schmeer, personal communication 2005). Lottie Maybee, a granddaughter of Damascus pioneers, indicates that Richardson then took out a "quaintly irregular land claim in the future area of Damascus" (Maybee 1962: 13). She did not record the date of that purchase.

After settling on Pottery Creek, (now Richardson Creek) Chevalier produced pottery until 1854. Steele states, "Chevalier Richardson was indicated as a 'Porter' (apparent misspelling for 'Potter' on the 1850 census)" (Steele et al. 2000: 5). The Northwest Pottery Research Center found further information in the memoirs of John Roger James, an early settler who came with his parents to Oregon. He was eleven years old when, on September 1, 1851, his family encountered Richardson. According to James:

"The rain was coming down very steadily. We came to a cabin in the woods with a big fireplace; no one at home and the door open. We could not resist the temptation, so we went in and built a big fire and turned the cattle loose to browse. After a while, near dusk, a tall man came in with a rifle over his shoulder. He smiled good naturedly and made us welcome. . . He had a small pottery plant, that being his business in the east. His name was Richardson" (W.P.A. 1938, No. 5841).

The next available information about Richardson is an arrest record. Richardson was jailed in Hillsboro for killing his neighbor's steer. (Clackamas County Circuit Court Files, 1854) His property was then sold to Robert Random to pay for his food, lodging and fines. By this time, records indicate, he was believed to be a dangerous man (State Archives, Richardson Estate, No. 74).He was released into the custody of Judge Peter Reneerson and fades from written history.

Schmeer, Steele and Pugh believe the Richardson documentation to be the earliest for any potter in the Northwest (Steele 1996: 4).

2.2.2 Samuel Grove

Before coming to Oregon, Samuel Grove lived in Licking County, Ohio. He is recorded in the 1850 Ohio census as being nineteen years old. His mother Nancy, brother, Reuben and sister, Malinda are also recorded (Ohio Census 1850: No. 1596). There is no mention that Grove was a potter in Ohio.

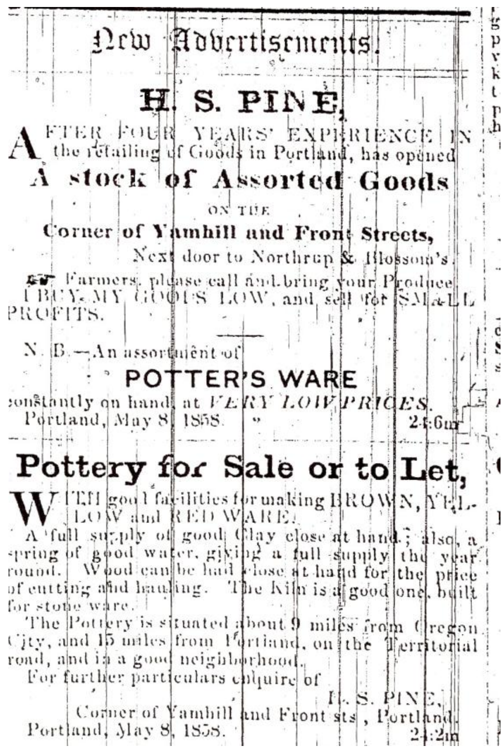
The next record of Grove is when he purchased Richardson's farm and pottery facility in 1856. The Richardson pottery site was sold by Robert Random to Samuel Grove sometime in 1857, although he occupied the site for at least a year before (Oregon State Archives: Notification No. 3436, Book C: 39). Schmeer provided copies of contracts signed by Grove indicating he was in the business of pottery production from 1856 until 1857. The 1856 Territorial Assessment Roles list Grove as a potter (Steele et al. 2000: 5). He also formed a partnership with Hiram S. Pine (Steele 1996: 3). Pine, who owned a retail establishment in Portland, advertised pottery for sale in the 1856 *Oregon City Enterprise*. It read:

> "GLAZED WARE. . .Mr. Pine of the firm of Pine and Grove, has presented us with some nice specimens of glazed ware from their pottery on Clackamas. They are turning out crocks of all kinds, such as milk pans, jars, churns, flower vases, &c., &c." (Steele 1996: 5).

Due to evidence found during early excavations of the Richardson/Grove site, Schmeer, Pugh and Steele believe Grove chose the East side of Richardson

Creek to settle on, while Richardson had lived and worked on the West side. Evidence found during early excavations by Dr. Daniel Scheans tends to validate this opinion (Schmeer, personal communication 2005). Certainly distinctive pottery styles were found in each place. Kiln furniture, waster piles and other evidence of two production sites were also found (Schmeer personal communication 2005).

The Clackamas County deed book indicates Grove deeded the interest in his property to Pine in 1857 (Clackamas County Deed book C: 135). *The Oregon Weekly Times*, an early Portland newspaper also documents the sale in the May 16, 1857 edition. The reason Grove deeded the property to Pine is not known. Clackamas County Court records (which listed several large contracts, and a lawsuit for not fulfilling those contracts) disappeared from the archives some time in 1970 and have not been located (Schmeer, personal communication 2005). It is possible contract default is the reason Hiram Pine acquired the deed to Grove’s property. An advertisement run by Pine in the *The Oregonian* in 1858 shows Pine was selling “potter’s ware,” possibly from the Grove pottery. (Figure 4)


New Advertisements.

H. S. PINE,

AFTER FOUR YEARS' EXPERIENCE IN the retailing of Goods in Portland, has opened

A stock of Assorted Goods

ON THE

Corner of Yamhill and Front Streets,

Next door to Northrup & Blossom's.

Farmers, please call and bring your Produce. I BUY MY GOODS LOW, and sell for SMALL PROFITS.

N. B.—An assortment of

POTTER'S WARE

constantly on hand, at VERY LOW PRICES.
Portland, May 8, 1858. 24:6m

Pottery for Sale or to Let,

WITH good facilities for making BROWN, YELLOW and RED WARE.

A full supply of good Clay close at hand; also, a spring of good water, giving a full supply the year round. Wood can be had close at hand for the price of cutting and hauling. The Kiln is a good one, built for stone ware.

The Pottery is situated about 9 miles from Oregon City, and 15 miles from Portland, on the Territorial road, and is a good neighborhood.

For further particulars enquire of

H. S. PINE,
Corner of Yamhill and Front sts, Portland.
Portland, May 8, 1858. 24:2m

Figure 4 Hiram Pine advertisement. (*The Oregonian* 8 May 1858)

The advertisement directly below indicates Pine was seeking someone to rent the pottery. His description is helpful today, giving clues concerning Grove's pottery. It reads:

> "Pottery for Sale or to Let, With good facilities for making BROWN, YELLOW AND RED WARE.
>
> A full supply of good Clay close at hand; also a spring of good water, giving a full supply the year round. Wood can be had close at hand for the price of cutting and hauling. The Kiln is a good one, built for stone ware.
>
> The Pottery is situated about 9 miles from Oregon City and 15 miles from Portland, on the Territorial road, and is a good neighborhood. . ." (*The Oregonian* 8, May 1858).

Samuel Grove did not disappear from the Clackamas County scene after losing his pottery. It appears he purchased a piece of property near where Edward

Pedigo would eventually settle, and began farming (Maybee 1962: 15). Maybee calls him “Captain Samuel Grove” for unknown reasons (Maybee 1962: 15). The 1856 census lists Grove as a single male, (Schmeer personal communication 2005) but by 1870, he is listed as a farmer, age 35, with a wife named Mary (Pedigo) age 22 (Clackamas County Census, Rock Creek Precinct, 1870: 4). They had one child, Elva, age two, and a hired hand, S.S. Johnson, age 20 (Census 1870: 4). Numerous Pedigo family records indicate that Samuel married Mary Clarinda “Matilda” Pedigo on September 9, 1866. The place of this marriage is only indicated as, Oregon (Pedigo Family 2007). By this time Grove, who was a farmer, was evidently assisting his father-in-law with his pottery business during the off-season (Pugh et al. 2000: 2). When Pedigo left for Eden Valley, Washington in 1871, Grove stayed on and continued to produce pottery until 1876 (Pugh et al. 2000:2).

According to the *Polk County Itemizer Observer*, “The potter shop at Damascus, Clackamas County, belonging to Mr. Grove, was destroyed by fire last Friday morning; loss about $200” (*Itemizer Observer* 1876: 2). Following the fire, Grove and his wife Mary left Damascus and moved to the Eden Valley area in Washington. In the 1880 U.S. Census of Manufacturers, he is listed as living in Farmington (Steele 1996: 5). According to Steele, Grove “established the factory with a capital of $1000 and employed three. . .” (Steele 1996: 5). Although the pottery was equipped with newer mechanization, Schmeer, Steele and Pugh believe Grove continued to make pottery by hand (Schmeer personal communication 2005). Schmeer was able to find the location of Grove's property in the Whitman County archives. A surface collection of the area was then conducted (Schmeer personal communication 2005). None of the collected pottery sherds show evidence of mechanism. All of those found indicate a potter's wheel was used to produce them.

According to Schmeer, much of the property surrounding Samuel Grove's lot, was owned by the farmers who left Oregon with Edward Pedigo (Steele 2000: 8). Schmeer also found, and interviewed, descendents of Samuel Grove. They are still in possession of some of Grove's pottery pieces. Local antique shops in Garfield, Washington also carry some of Grove's pottery, which were identified by local collectors (Schmeer, personal communication 2005).

Samuel Grove died in 1887. During probate, his will indicated he owned, "4 work horses, 2 yearling colts, 3 milk cows, 2 calves, 1 buggy, 1 set of harness, 2 plows, household furniture worth $50, and $866.92 in the bank" (Steele et al. 2000: 8). No mention of his pottery equipment or inventory was made. His estate was valued at $2182.92 (Steele et al. 2000: 8).

2.2.3 Edward Pedigo

According to Steele, Edward Pedigo,

> "was born in Virginia in 1805. He was an active farmer-potter in Iowa as early as 1838, in Wapello County. He moved his family to Oregon in 1854

> and was recalled for his 'stout red bean pots' that 'never left the place until they were just right.' He named the town of Damascus. . . .Pedigo was not only a community leader and successful farmer there, but he moved his family along with a large group of neighbors to the Palouse in 1871. . ." (Steele et al. 2000: 9).

Pedigo family records corroborate Pedigo's birth date and place, as does the 1860 census for Clackamas County, Oregon (Clackamas County Census 1860 Reel 653-1055: 150). A family member interviewed Mr. Pedigo in 1894, when he was 89 years old. His interview revealed nothing of his pottery making, but he did discuss his marriage. He indicates that he and his family moved to Kentucky when he was very young. There, he says, "I found my true-love Miss Lettie Gill (Lettice, born in 1806, Barren County, Kentucky) one of Kentucky's best women, and the State was famed for good women, you know. We got married in the year 1826 and she proved to be a faithful helpmate to me, standing by my side through prosperity and adversity for over 50 years" (Pedigo Family 2006).

During the time he lived in Oregon, Edward Pedigo's farm and pottery businesses were located on what is now Sunnyside Road, about one mile North of Damascus, Oregon (Figure 1) (Schmeer personal communication 2005). Maybee reported, in 1962, that Pedigo,

> "brought suitable clay from a slope that came later to be known as the Peake place. A fine spring on the Pedigo claim made good provision for his home and nearby slope and even furnished a large watering trough on the north side of the road. Ed carefully turned out bean pots and jars. His market grew with his product for the ring of many axes could be heard, opening clearings for dwellings and farms that could use his wares.
>
> Albert Cook, whose life spanned across pioneer years, until recent times used to tell how Ed Pedigo's stout red pots never left the place until

they were just right. Those with flaws were broken and returned to the soil (Maybee 1962: 15).

Maybee also indicates that Pedigo was the one who eventually named Damascus. According to her, men were meeting at the store to decide on a name for the post office and school. Someone suggested that they should wait to make a decision until Ed Pedigo arrived, "'(w)hen he comes, lets ask him what to name it'" (Maybee 1962: 16). As the story goes, Pedigo had been thinking along such lines on his ride to the store. Maybee indicates,

> "The Place of New Beginning somehow haunted his mind. That was it. . .A place of beauty and boundless prosperity, like a secret garden. . .It was appropriately so for most of the settlers. The bloody sorrows of grim Antietam, Chickamauga and Gettysburg were now but sad memories; so also the privations of the immigrant marches, stretching half-a-year-eastward into Missouri. . .Well, didn't it remind him of Saul of Tarsus who set out for Jerusalem only to become a wholly new man in a new place because he met the Savior outside the Syrian Damascus. Saul even had to have a new name for himself, after that. He became 'Paul'" (Maybee 1962: 16).

In 1871 Edward Pedigo and fellow Oregon farmers moved to Eastern Washington. It is likely that they chose to go there for religious reasons. They organized the Eden Valley Church of Christ in 1878. This group was eventually incorporated into the Disciples of Christ in 1889 (Pedigo Family 2006).

Edward Pedigo died in 1894, in Garfield Washington, where he lived with one of his daughters. His obituary indicates that he had been an exceptionally kind and loving man who had worked hard his entire life and had gone out of his way to help others. He appears to have been a much-appreciated part of both the Garfield and Eden Valley communities (Pedigo Family 2007).

2.2.4 John and Stephen Harris

John and Steven Harris came to Oregon from Newton Township, Musgingham County, Ohio. Stephen is listed on the 1850 Ohio census as twenty-two years old and a member of his father's household (Ohio Census 1850: No. 1596). The Ohio area from which they came was then known as "one of the nation's pottery centers" (Steele 1996: 5). William P. Harris, John and Stephen's father, was well known in the Zanesville area as a potter and brick maker (Steele 1996: 5).

By 1855, the two brothers were in Oregon. Stephen Harris was appointed appraiser when the Richardson pottery was sold (Steele 1986: 5). Steele believes this indicates some prior knowledge about pottery. Since John and Stephen's father was a potter, both probably worked for him at some time. It is no surprise then, that John and Stephen were reported producing "stoneware at the old Barlow sawmill site, on the east bank of the Willamette River and a half mile south of the village of Canemah" (Figure 1) (Steele 1996: 5).

By February of 1858, the Harris brothers had moved their business into the town of Canemah. Record of the purchase of part of John McLoughlin's estate can be found in the Clackamas County deed records (Schmeer, personal communication 2005).

Canemah, which eventually became incorporated into Oregon City, was a busy ship-building town when the Harris brothers arrived in 1858 (Webber 1993: 62). According to Mills, stern-wheelers were first produced in Canemah in 1851 (Mills 1947: 21). Most ran the upper Willamette River, above the falls at Oregon City. They transported both passengers and freight (Mills 1947:21). The growing population, as well as the possibility of shipping pottery up the Willamette must have been irresistible to the Harris brothers, who hoped to build a booming commercial business.

The Canemah enterprise did not last very long, however. In the fall of 1858, the Harris brothers suffered a kiln fire and lost their entire inventory. Excavations conducted during the summer of 1994, by the Oregon Archaeological Society and Dr. Daniel Scheans, (Figure 5) indicate that the kiln had contained approximately 1500 pounds of redware. The kiln was 87.5 feet square and contained 47 jars, and 63 churns with lids. Of the 110 vessels excavated by the Society, 37 were stamped with the Harris brothers' logo (Schmeer, personal communication 2005). Samples of ceramics taken from the kiln fire are shown below (Figure 6).

Figure 5: 1994 Harris kiln excavation, Oregon City, OR. (Schmeer)

Figure 6: Samples from Harris kiln fire.

The fire must have been too great a loss to overcome because the brothers sold their Canemah land shortly thereafter. The Deed records for Clackamas County indicate that on December 15, 1858 John and Stephen Harris sold their land in the town of Canemah to Daniel Harvey (Clackamas County Deed Records Book A 1858: 400).

A Stephen Harris is reported to have married someone named Marian on June 1, 1859 (*The Oregonian* 1 June 1859). It is not known if this refers to the same Stephen Harris who was the Canemah potter. John's name can again be found in the county records, when he was arrested for selling spirits in Yamhill, Oregon (Clackamas County Court Files: 1871). It is also known that John Harris was refused membership in the Oregon City Oddfellows at about this time—possibly because of his arrest (Schmeer, personal communication 2005). Nothing further is known of the two Harris brothers. It is possible that they returned to Ohio or left the area.

2.3 Pottery Technology

2.3.1 Defining Redware

The term redware refers to the color which results when firing clay vessels which contain high iron contents. The resulting ceramics fall into the category of earthenware. The color of these vessels post-firing, are various shades of terra-cotta. Unglazed terra-cotta flowerpots that can be found today are good examples of the color variations that occur due to different amounts of iron in the clay. According to Greer, red-brown colors indicate more iron in the clay, while whiter colors indicate less iron (Greer 2005: 14).

Opinions vary on the firing temperatures that produce redware vessels. Rice indicates that terra-cottas are generally fired under one thousand degrees Celsius. She states that earthenwares are fired from nine hundred to twelve hundred degrees Celsius (Rice 1987: 86). Chaviarria places the firing temperatures between nine hundred and eleven hundred degrees Celsius (Chaviarria 1994: 30). The vessels which result from such low temperature firings are relatively porous, as they were not fired at a temperature high enough to vitrify the clay (Rice 1987: 231).

McConnell states that porous redware ceramics were produced from surface clays, which are abundant and readily accessible in many parts of the world (McConnell 2003: 18). Leslie Haskins, (an anthropologist who conducted interviews for the W.P.A. during the depression) interviewed Amos Ramsey, son of Barnet Ramsay in the 1930s. According to Haskins, Barnet Ramsay "is believed to have been the first potter to establish a shop in Oregon" (Milligan Vol 4. 1984: 59). Amos reported on the source of his father's clay;

> "The clay used was just the 'Blue Muck' that is found at a depth of a foot or two all over the lower [Willamette] valleys. He dug it as it was used. None was brought from a distance" (Milligan Vol 4. 1984: 61-62).

The abundance of high iron content clays available and the relative low firing temperatures necessary to produce sturdy utilitarian wares, would have allowed early American colonists to manufacture such vessels in simple kilns with minimal difficulty (McConnell 2003: 18). This technology required the skills to erect kilns, locate clays and build turning wheels and other equipment. These skills were what Oregon and Washington potters brought with them when they came west.

2.3.2 Ceramic Construction

No primary documents were found discussing the Harris brothers', Samuel Grove's, Chevalier Richardson's, or Edward Pedigo's methods of production. Again, Leslie Haskins' interviews with Amos Ramsay became invaluable for ascertaining possible nineteenth century Oregon pottery technology. Amos Ramsay, who was born in 1864, remembered his grandfather, Barnet's, old pottery wheel and many more details about the pottery. Ramsay owned Peoria Pottery, was one of the most productive in the state during the second half of the nineteenth century. The Peoria Pottery was located eighty five miles southwest of Portland, near the town of Peoria, Oregon. In Amos' description of the wheel, he reported:

> "I remember his potter's wheel well. It was built with a big horizontal lower wheel from the center of which rose a shaft about four feet long. On the top of this shaft was a second smaller wheel or circular tray on which my grandfather would place the soft clay to shape it. Then he would take his thumbs and fingers and just raise the clay up to form a jug or jar. It was amazing how quick he could form it into shape. As he worked the clay

> with his fingers he would revolve the whole by turning the lower, big wheel with his foot. . . The big lower wheel which turned the ‘working tray’ on grandfathers machine was about four feet across. . . After he had shaped the vessel to suit his desire he would put it inside of a big brick kiln and there let it dry for three or four days. Then he would build a hot fire in the kiln and burn it hard. . .At this pottery, I remember, he made flower pots, jugs, milk crocks, bowls and etc.” (Milligan Vol 4. 1984: 61-62).

It appears that Mr. Ramsay was describing a kick wheel, also called a compound or double wheel (Rice 1987: 135). This is a very old style of potter’s wheel and it is probable that all the potters in this study made and used a similar one. According to Rice, these wheels consisted of “a wheel head and a flywheel joined by a vertical axle and mounted with separate bearings in such a way as to prevent oscillation” (Rice 1987: 135). Rice indicates that the upper wheel is raised to accommodate the potter’s working height. The lower flywheel is then kicked, causing the upper wheel to turn as well. Speed of rotation is controlled by “the rate at which the potter kicks the wheel” (Rice 1987: 135).

A photo (Figure 7) of a potter’s wheel similar to the one described above, was published in an article by Cornelius Weygandt in *Antiques* magazine in June of 1946. The family of the potter pictured, Jacob Medinger, had been using the facility for at least two generations at the time of this photograph (Stradling and Stradling 1977:32).

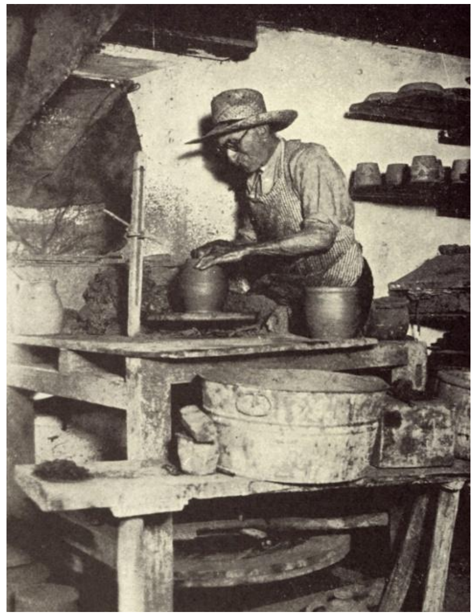


Figure 7: A mid-20th century pottery working with 19th century tools.
(Stradling and Stradling 1977: 32)

Clay preparation was another subject on which archival information was available. Mr. Ramsay discussed his grandfather's clay preparation during his interview with Haskins:

> "To prepare the clay for use he had a sort of mill (Pug Mill). It was built with a big center core armed with knives. To this was hitched a horse at the end of a long sweep and he would drive the horse around and mix the clay until it was ready for use" (Milligan Vol 4. 1984: 61-62).

Most of the reviewed sources on pottery manufacturing discussed similar pug mills.

No information on the tools Oregon potters used to create their hand thrown vessels was found in local historic record. However, a diagram was found in Greer's publication. (Figure 8) Although the uses are not discussed, these tools appear to be incising, shaping and smoothing tools as well as a twisted wire pull, "which is pulled through the pot straight from the side to side" (Greer 2005: 68) to remove the vessel from the wheel. This drawing helps clarify shapes, incision lines, and other marks found on the project ceramics.

2.3.3 Economic and Social Value of Redware

Understanding the value an artifact held within the social network of the original owner is an important part of archaeology. It is also important within the context of the New Brunswick Method of artifact analysis. An item that is highly valued (both monetarily and socially) today, by antique collectors, may have been an item that was utilitarian, commonly owned, and of little value to its owner. Such was probably the case with redware kitchen vessels and flowerpots. These values may have been different in the Oregon Territory.

The social value for redware pottery in mid to late nineteenth century Oregon is difficult to determine. There is a scarcity of documents that mention pottery. A search through several years of *The Oregonian* and *The New York Times* yielded no advertisements for crockery or pottery, other than Mr. Pine's 1858 advertisement in *The Oregonian*. (*Oregonian* 8 May1858) H. S. Pine thought highly enough of Grove's wares that he advertised them as being available. On the other hand, the advertisement has none of the Victorian hyperbole normally associated with advertisements of that period.

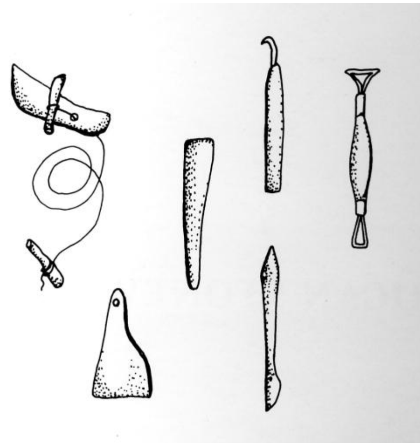


Figure 8: Potters tools. (Greer 2005: 4)

When Samuel Grove's Damascus pottery burned down, it did rate an article in the *Polk County Itemizer Observer*. Since the *Itemizer Observer* was published a considerable distance from Damascus, this would indicate, that as a whole, the pottery was of some economic value. However, no clues as to social or monetary value of the individual pottery pieces are available in the article.

Not even the way the potters referred to themselves reveals any consistent social value or standing. As stated above, Richardson is listed in the 1840 Warren County, Indiana census as a potter. By 1850 he is listed in the Clackamas County, Oregon census as a potter as well. Grove, however, is not called a potter in the 1850 Licking County, Ohio census (Schmeer personal communication 2005) and he is listed as a farmer in the Oregon 1870 census. (Clackamas County Census 1870: 367) The 1880 U.S. Census of Manufacturers lists Grove as a potter when he lived in Farmington. The 1860 Clackamas County census also lists Edward Pedigo as a farmer, (Clackamas County Census 1870: No 382) despite later being recalled for his 'stout red bean pots that never left the place until they were just right' (Maybee 1962). Since Richardson called himself a potter on the census and was known for his perfectionism, he evidently did value his potter status. Grove and Pedigo may have held less esteem for their sideline profession. It is not clear what value the public placed in the potter or his wares. The products were inexpensive utilitarian ware that was possibly taken for granted by the user.

Georgianna Greer did publish an 1862 wholesale price list from the Bennington pottery which offers a glimpse of monetary values for redware pottery (Greer 2005: 59). Although the Bennington pottery was located in Vermont, the pricelist is informative. One gallon flowerpots are valued (wholesale) at $5.50 per dozen. Quart sized flowerpots are valued at $1.50 per dozen (Greer 2005: 59). Similar products, once shipped to Oregon, would have become considerably more expensive, this may have added value to locally produced ceramics and contributed to the social standing of local potters.

Drawings of flowerpots were found in 1889 and 1890 publications of *The Ladies' Home Journal* (*LHJ* 1889 September: 16, 17 1890 March: 19, 20). These magazines were published much later, however, than the period of concern for this research. No discussion on the flowerpots themselves was included in any of the articles.

Flowerpots are also mentioned in much earlier documents. Thomas Jefferson's Monticello papers mention, but do not discuss, flowerpots. The account book for 1791-1803 lists three sizes of flowerpots that were purchased (Betts 1985: 170). A later installment mentions flowerpots and a trowel (Betts 1985: 280). A letter to Bernard Peyton, written in February of 1821 requests fifty "earthen pots. . .for covering plants" (Betts 1985: 596). These documents were written, of course, much earlier than settlement of the Oregon Territory. The flowerpots mentioned appear to be of little economic importance to Jefferson, who was wealthy. Further research would be required to find the possible importance of those same flowerpots to individuals of lesser means.

Both the social and monetary value of the seven flowerpots from Champoeg are unknown. It is possible that the cabin was merely storage for the Donald Manson family. It is also possible that it was leased or rented by someone. The flowerpots could have been of considerable value to such individuals.

It is clear that the monetary, and historic, value for antique nineteenth century utilitarian ceramics has continued to increase since the pieces were produced. As Lottie Maybee reported in 1962,

> A Pedigo bean jar made about 100 years ago in Damascus is maybe more fascinating to an Oregonian than a similar artifact dug from the seventh level of a Syrian excavation" (Maybee 1962: 15).

Today intact redware vessels from the late nineteenth century are of considerable monetary value to antique collectors. According to Greer, old earthenware vessels "have now a second destiny—to be treasured, admired and preserved. . .Attics, cellars, barns, and even trash heaps have been scrounged for surviving pieces of early ware. . .The interest in old pots has increased steadily over the past fifteen to twenty years" (Greer 2005: 261-261). According to Blaine Schmeer, simple redware jugs and crocks produced by nineteenth century Northwest potters can bring hundreds of dollars in the market (Schmeer personal interview 2005). The means to collect and display antiques is currently a method of displaying wealth. There is also considerable social interaction between collectors and historians who enjoy and value these old ceramics.

The value of these artifacts, for the purpose of this research, must also be mentioned. The Northwest Pottery Research Center's collection is of great importance to research projects such as this. The value of waster sherds today comes in the form of the information they contain. The potters who produced these imperfect vessels, which they rejected and threw into their waster piles, would probably be somewhat astonished at the value researchers place in these objects today.

2.4 Literature Review

2.4.1 Ceramics References

Prudence M. Rice's book, *Pottery Analysis A Sourcebook* was consulted for virtually all aspects of the research. Rice thoroughly explains clay processing, tempering, and manufacturing technology. Terminology for pottery characteristics (including diagrams) are discussed in detail. Explanations about kiln technology, including oxidation and reduction and the chemical cause for various colors are explained. Rice's introduction to Instrumental Neutron Activation Analysis also began the research on that subject.

Orton, Tyers and Vince's work, *Pottery in Archaeology* was not used extensively for this project. However a diagram of a double wheel was helpful, as well as an inclusion size estimation chart. The Power's Scale of Roundness, found in this text, was less accurate than the Wexler scale, which was used. A discussion on social status was also somewhat useful.

Ceramics for the Archaeologist by Shepard, was used as a supplement to Rice's book. Shape analysis is more detailed and better explained in this text than in Rice's. A section discussing rim profile was particularly useful for this project. There are also a number of cautions on searching for individual potters through aesthetic aspects of pottery design. Most of the cautions were aimed toward the study of prehistoric vessels, however the advice was useful.

The *Munsell Soil Color Charts* were used for standardization of ceramic and glaze colors. This 1975 version was helpful but lacked some colors. Future investigations would benefit from a newer, more detailed version of the charts.

The Art of the Potter, by Georgianna Greer, was particularly useful for understanding vessel form and function, as well as photos of kilns and an example of an early twentieth century working pottery. It includes previously published articles by archaeologists, museum curators and avid collector/experts, (often a rich source of information) as well as photographs and names of various vessels and their uses. Greer's book was also valuable for understanding form, function, vessel names and tool uses. Photos and descriptions of extant production facilities were also helpful.

Information on inclusions, how to document them and what to look for was found in Rice, *Pottery Analysis a Sourcebook*, and Orton, *Pottery in Archaeology*. Most helpful was direction from Dr. Minc and Dr. Brauner.

2.4.2 History References

Articles by the members of the Northwest Pottery Center, Dick Pugh, Blaine Schmeer and Harvey Steele, as well as an interview with Blaine Schmeer in 2005, were invaluable for tracking down primary documents on the potters' lives. All of the Pottery Center's sources were checked for accuracy and further information. These included references in the *Oregon Times Weekly*, the *Polk County Itemizer Observer*, the *Oregon City Enterprise*, *The Oregonian*, the Clackamas County Circuit Court records, the Clackamas and Marion County deed books, Oregon State Archives, and the, Ohio, Indiana, Iowa and Oregon Census.

Information on Champoeg has been researched for many years. This research relied on J.A. Hussy's *Champoeg: Place of Transition*, and Speulda's

Champoeg, A perspective of a Frontier Community in Oregon, 1830-1861 as well as verbal information from Dr. David Brauner.

Mills and Webber and Webber provided information and photographs of Canemah and the stern-wheelers that traveled the Willamette.

Chapter 3: RESEARCH METHODS

Research methods for this project include a selection of theoretical approaches, methods and types of analyses drawn from many different disciplines, from art history to archaeometry. The researcher proposes that this approach facilitates an effective, in fact, revealing approach to the analysis of extant historic material culture. The various modes of 'seeing' the artifact yielded information that might have gone unnoticed using traditional methods. The following is an explanation of the research methods used for this research.

3.1 Theoretical Background

Two theoretical approaches were used for the northwest redware project; middle range theory and theory of the individual. Middle Range theory, as with any archaeological evaluation, was the skeletal form that supported the project at its most elemental level. The basic premise of archaeology is to breathe life into static artifacts. Middle Range theory seeks to reawaken the past through information gleaned from material culture. There are a number of approaches to successfully energize an artifact collection. One method is through archival research for the producer or the consumer of the artifact. Lacking comprehensive archival information, such as journals, drawings or photographs however, a successful investigation for clues of the maker or user's presence can be conducted with the artifact itself. The redware sherds used in this project were first and foremost, evaluated for clues about who produced them. The theory that artifacts mirror some aspect of their maker's (or user's) personality and idiosyncratic behaviors, is highly compatible with hand produced vessels. Such vessels exhibit individual characteristics unique to a particular potter. The search for evidence of the individual pottery maker became the major focus of the project.

3.1.1 Theory of the Individual

The concept of a theory of the individual, or the possibility of actually seeing some part of the individual in artifacts he or she used or made, is not new. A discussion on the visibility of the individual in archaeological sites was the subject of an entire book in the nineteen-seventies. The volume is a compilation of thoughts on the subject by several prominent archaeological theorists. In *The Individual in Prehistory*, Fred Plog wrote that while most archaeological theory incorporates some form of discussion on the individual, "theories that systematically link the variable behavior of individuals to the patterned behavior of social aggregates are virtually nonexistent" (Hill, Gunn 1977: 15). Plog chooses to call theory of the individual, theory of form, and makes a distinction between form and style. According to Plog, "some design elements are shared by the population of [a] region. . .some by the inhabitants of localities within that region, some by the inhabitants of individual sites, . . .others are unique to households, perhaps to individuals" (Hill, Gunn 1977: 18). The researcher argues all of these elements are visible in the collections examined for this project.

Plog does not clarify his meaning for the word form. It was decided for this project form will be designated as the shape and structure of ceramic vessels. According to Greer, the “primary form of an object follows its function. . .but many, many variations are seen with each specific grouping” (Greer 2005: 55). Certainly traditional early American forms seen in Greer, (Greer 2005) and Stradling (Stradling and Stradling 1977) are mirrored in Oregon collections. These either evolved, or were replicated from earlier European forms. The four Oregon waster sites also give evidence of elements that are uniquely individual.

Muller, also a contributor to *The Individual in Prehistory*, strengthens Plog’s theory in a discussion of Bernhard Berenson’s research concerning stylistic identification of individual artists. Berenson indicates that artists tend to fall into habitual behaviors when painting “unimportant” items (Hill, Gunn 1977: 24). This concept is pursued further in section 3.2.2 concerning the Conjectural Model. Muller dubs individual variations in form “microstyles” (Hill, Gunn 1977: 26). Again, the researcher argues that this concept is applicable to the artifacts in this project.

According to Hill, individuality, “in motor performance and artistic expression has been so well confirmed that no one would doubt it. But equally significant is the fact that much of this individuality is subconscious” (Hill, Gunn 1977: 56). Hill’s research indicates that these motor performances change little through time (Hill, Gunn 1977: 57). He also believes these attributes are rarely shared with others, as they are nearly impossible to teach (Hill, Gunn 1977: 56).

3.1.2 Middle-Range Theory

Binford's original middle range theory is diametrically opposed to the theory of individuals. In fact, according to Tschauner, Binford argues, "the archaeological record is not a product of individual behaviors, but a precipitate of long-term institutions" (Tschauner 1996: 9). In fact, he calls Schiffer's attempt to reconstruct systems from individual behavior "classic inductivist illusion" (Tschauner 1996: 9). However, the basis of Binford's theory (that archaeological data are static, and it is the archaeologist's responsibility to ask questions, do research and offer, to the best of his/her ability, a dynamic view of that past) is the goal of this research. Archaeologists should always attempt to offer possible links, between the static material culture and the dynamic society to whom it once belonged (Johnson 1999: 49). It is not necessary to adopt Binford's belief that a behavioral connection to a particular artifact in one culture constitutes the same behavior in another culture.

Later discussion on middle-range theory goes beyond Binford's original thoughts. Ian Morris offers an historical interpretation of middle-range theory. Morris believed that, "because of the multivalency and ambiguity of meaning of material culture, written texts and oral traditions are the only means by which archaeologists can directly access all but the simplest and most general ideas from the past" (Trigger 2006: 510). This may be a bit extreme, however, it does point to the caution one must maintain when examining historical archaeological material culture. Inferences may be made from the artifact and the oral and written record. It is simply important to maintain an open mind and be willing to change should more information become known.

With Binford's basic concept of middle-range theory in mind, this project progressed to a study of the artistic, or of form, as Plog calls it. Prown, who subscribes to a generalized idea of middle-range theory, offers Irving Lavine's inclusive approach. Lavine, an art historian, states, "anything man [sic] made is a work of art, even the lowliest most purely functional object" (Prown, Haltman 2000: 12). Prown believes artifacts are, "the only class of historical events that occurred in the past but survive into the present. They can be re-experienced; they are authentic, primary historical material available for first-hand study" (Prown, Haltman 2000: 12).

Prown successfully unites Middle Range theory and the Theory of the Individual when he cites Gay. According to Gay, there are three determining causes for how an artifact will ultimately turn out. The first two, craft (tradition) and society (culture) are both applicable to the artifacts in this research project. The third cause, however is most pertinent to the approach chosen for this study. That cause is personality, or as Prown puts it, "the individual psychological makeup of the person who made the object; it might be entirely conformist and therefore reflective of contemporary society, or it might be quirky and eccentric, producing an original, novel, or idiosyncratic result" (Prown, Haltman 2000: 13). In this project, it was possible to see both conformist and idiosyncratic results—often in the same vessel.

Prown's philosophy was influential during this project. His most influential statement was, in the end, about style. He states, "[s]tyle is most informative about underlying beliefs where their expression is least self-conscious; and a society is less self-conscious in what it makes, especially such utilitarian objects as houses, furniture, or pots. . ." (Prown, Haltman 2000: 14).

3.2 Artifact Analysis

The artifact analysis of the redware sherds from ORMA27 was conducted using three specific approaches, the New Brunswick Model, the Conjectural Paradigm and Instrumental Neutron Activation Analysis (INAA). The New Brunswick Model and Conjectural Paradigm require the researcher to pay close attention to shape, artistic input from the maker, texture, similarities and differences, and to try to answer questions about the potter(s) who made these vessels. INAA became the litmus test, providing scientific data to compare with initial possible conclusions.

3.2.1 The New Brunswick Model

The New Brunswick Model, was the first guide to analysis (Smith 1985: 31). The Model provides a systematic progression of steps to follow when assessing an artifact. Samples from each vessel in the study as well as samples from the selected pottery wasters were tested. Instrumental Neutron Activation Analysis was used to determine their distinctive geochemical elemental fingerprints.

The New Brunswick Model is both positivistic and conjectural in nature. Richards, Martin-Scott and Maguire, who used the New Brunswick model to conduct historic quilt research, state, "(w)hen studying. . .any artifact in a systematic manner one becomes literate in the nonverbal language that it speaks. One learns to recognize or read all the 'clues' that might indicate all of the significant details about this object. Ideally, the examination will help to develop a fuller understanding of the value of the artifact. The research will also help the researcher gain 'an historical perspective on the everyday lives of ordinary people'" (Richards et al. 1990: 149-150.)

Application of the New Brunswick Model to actual artifacts proved useful, and an article on the Model was eventually published in the *Material History Bulletin*. The group developed the Model using archaeological methodology, which came closest to the class objective (Smith 1985: 31). According to Richards, Martin-Scott, and Maguire, the students' theoretical base evolved from Leslie

White's divisions of culture—material, social and mental (Richards et al. 1990: 149). The Model is based on a previously published model by E. McClung Fleming, and also draws useful information from a model published by Jules Prown (Smith 1985: 31).

The New Brunswick Model is organized into phases of information gathering. Each step must be completed before progressing to the next. The steps are 1. Observable Data, 2. Comparative Data, 3. Supplementary Data and 4. Conclusions. There are also five sub-steps that must be followed. They are: Material, Construction, Function, Provenience and Value. Each of these sub-steps also contains a list of data that must be obtained. The detail of this analysis method provided ample sensory contact with both the vessels from ORMA27 and the subsequent comparative artifacts, that details of design, texture, shape, fabric characteristics and post-depositional information were not overlooked. Below is a chart of how the New Brunswick students organized their research. (Table 1)

Table 2: The New Brunswick Model analysis chart.

Analysis Procedure	Material	Construction	Function	Provenience	Value
Step 1 Observable Data (examination of the single artifact)					
Step 2 Comparative Data (comparisons made with similar artifacts)					
Step 3 Supplementary Data (other sources of information introduced					
Step 4	Conclusions				

(Smith 1985: 35)

This method "encourages the historian to discard, as much as possible, preconceived notions about the artifact under study and to begin by studying the artifact itself." (Smith 1985:35). Sensory engagement with the artifact prior to further investigation is also expected.

The questions within the sub-steps Material, Construction, Function, Provenance and Value are somewhat redundant if used during every step. It is not possible to know the answer to a number of the questions until the comparative stage or the supplementary data stage. Despite this criticism, questions that were not applicable during some steps, were thought provoking for later research questions. The questions, therefore, will be presented in their entirety in the Observable Data step. Only applicable steps will be presented during subsequent steps.

Step 1 Observable Data

When evaluating Observable Data, which is step one, the researcher is expected to gather data through "sensory engagement" (Smith 1985: 35). Material, composition, construction, function, provenience and value (social and economic) are all evaluated by observing, measuring, and recording visually available facts about the artifact. Only after completing a thorough examination of the artifact, is it permissible to proceed to the second step.

Using this step, the individual aesthetic form of the redware flowerpots became apparent. It did not seem likely that one person had created all of them. Redware was a low-value disposable product in the nineteenth century. Little time was spent on creativity of design. The individuality which appears to have been expressed, was probably unconscious.

With the prospect of the Richardson/Grove collection analysis at hand, a contour gauge was obtained. Each of the flowerpot rims were measured inside and out and a cross-sectional drawing was made. The curves, undulations, angularity, draglines, and other design elements became more visible through cross-sectional views. Later, after organizing the Damascus collection into rim-type groupings, a representative piece of each group was also measured with the contour gage and a cross-section was drawn. The contour gage made it possible to measure something aesthetic in nature—the form of a utilitarian vessel. Wall thickness, rim depth, and length of the sherds were also measured.

Material:

The first sub-step of the Model is labeled Material and consists of five questions. It is important to consider each of the questions with no outside input from research. However, basic knowledge gained from education in the field of historical archaeology was unavoidable and was used by the researcher.

The first question asked is, what materials were used to produce the artifact and complete its appearance (Smith 1985: 36)? The researcher assumed that all the artifacts examined were produced from clay (possibly local clay). It was also assumed that the firing process was cool, due to the lack of vitrification of any of the artifacts. Visual examination, porosity when cleaning and texture of the artifacts, as a group, indicated they were all low-fired earthenware, also called redware. According to Newcomb, earthenware is, “fired, unglazed to a temperature high enough to develop sufficient mechanical strength, then coated with a relatively low-melting glaze. . .Earthenware is somewhat porous, is not translucent, and may be decorated by any common process. . .” (Newcomb 1947: 223). Since Newcomb wrote this description in 1947, the description has become more scientific. However, for visual identification, the markers stated are completely adequate.

The second question asked as research progresses is, did the materials used influence the object’s final form (Smith 1985: 36)? Since humans first began to mold and fire clay, the plasticity of wet clay has influenced the final product.

Quality of the clay, amount of temper and skill of the maker all combine to, either limit, or enable creative expression, size of the vessel, shape of the vessel and whether it will withstand firing. The answer for this question, therefore, is assumed to be ‘yes’ for all artifacts examined.

The third question of the Material section asks, are these materials used in similar artifacts? Again, the answer must be ‘yes’ since clay of some sort is used to make all ceramic vessels.

Origination of the clay (the unworked materials) is unknown in the observable data step and can only be answered in the comparative data step and supplementary data steps. Questions about the origin, therefore, cannot be answered during this step unless the vessels had been marked with a makers mark. Even then, the source of the clay may not be known. This question, however, did lead to research questions about who made the vessels.

The fifth question asks if the materials employed suggest trade patterns or practices (Smith 1985: 36). This question cannot be answered unless there is some mark on the artifacts to identify their origin. This must be pursued in later questions, particularly during the supplementary data step.

Construction:

The second step of the New Brunswick Model is a discussion on construction of the artifact (Smith 1985: 36). According to Smith, this step is used to discuss methods used to arrange the raw materials into a finished product. A physical description is required as well. There are twelve questions within this step, some of which cannot be answered without supplementary data. Many of the questions are answerable, however, and require considerable engagement with the artifact.

Question one of the construction section, asks how the artifact was fabricated and finished. A detailed examination is required to adequately address the question (Smith 1985: 36). This step is for measuring, touching, assessing and describing the artifact. In the case of the Champoeg flowerpots and the comparative collections, these evaluations were performed on each cross-mended vessel and each sherd.

Question two of the construction section asks, what construction method was used to create the artifact(s). According to Smith, the tools required to produce the product, and the quality and complexity of the construction must be identified (Smith 1985: 36) During the Observable Data step, this question cannot be definitively answered, but a hypothesis may be reached using the clues at hand. Evidence of a potter's hands and the use of a potter's wheel are visible on nearly every sherd of the Champoeg vessels and the comparative collections. It was therefore assumed that the ceramics were all hand made on a potter's wheel. During later research, records of the type of potter's wheels that might have been used by Oregon potters were found.

The third question ties in with question two. It can only be answered adequately by considering the questions together. It asks, "(h)ow was the object's appearance was affected or influenced by the construction techniques employed?" (Smith 1985: 36). This again, called into play the use of evidence such as the internal rilling, and visible fingerprints, to determine that the vessels were all hand thrown. The vessels are not uniform. The rim, body and base thicknesses vary within the same vessel. Some vessels do not sit perfectly. The rim is often warped, with an uneven circumference, depending on where it is measured. This all lead to a hypothesis that the vessels were hand thrown.

Questions four and five concern ornamentation and decoration. Question four asks for a discussion of ornamentation and decoration. Question five ties to question four by asking, "(h)ow does the ornamentation/decoration affect the artifact's appearance?"(Smith 1985: 36). None of the Champoeg flowerpots were glazed. All but one vessel had a relatively smooth surface considering rapid production methods used for utilitarian ceramics. There was little ornamentation on the seven Champoeg vessels other than the rims. During this period of evaluation, comparisons between the Champoeg flowerpots' rim finishes were evaluated. Three of the vessels' rims have a more decorative appearance. Two vessels have a simple thin rim with virtually no lip. The seventh vessel was finished in a squared off, blunt style very different from the others. These differences in appearance were of assistance when searching for who made the flowerpots.

The comparative collections contained large quantities of sherds with variable finishes, glazing and decoration. With the exception of a few vessels, there was not an abundance of decoration or ornamentation on the sherds. These collections were predominantly typical utilitarian ceramics that could probably be found in any nineteenth century kitchen. Only the minute flourishes that were added by each potter distinguished them from each other.

Question six asks, "(a)re any markings or inscriptions present?"(Smith 1985: 36). This became an important question when the comparative collections were evaluated, since several of the kiln wasters had marked pieces.

Wear and repair of the artifact—the objects of concentration in question seven, can only be answered by indicating that the artifacts were cross-mended post-depositionally. It was not evident that any of the vessels in the comparative collections, (which had been in waster dumps) were ever used. The flowerpots were probably used. However, there was no visible use-wear on any of the vessels to inform the researcher of use or the lack thereof.

The eighth and ninth questions are: "(d)oes the construction of this artifact differ greatly from similar objects?" and "(i)s its design comparable to like objects?" (Smith 1985: 36). During evaluation of the Champoeg collection, the seven flowerpots could only be compared with each other, since no outside research is allowed during the Observable Data step. The comparative collections were selected to answer this question during the Comparative Data step.

Questions ten, eleven and twelve were also addressed during the Comparative Data step and the Supplementary Data steps. They are: “ What stage of development or evolution does this artifact represent when compared with both older and more recent objects of a similar type? (Does the design aid in dating?),” “What degree of sophistication is represented by the artifact? (style, method of construction, etc.)” and “Is the artifact a reproduction?”(Smith 1985: 36).

Function:

There are six questions in the Function section of Observable Data. According to Smith, the goal of the researcher during this part of the analysis is to discern “(t)he reason(s) for the artifact’s production and the use that was made of it. Its effectiveness for the role intended, including attendant social function whether intended or not.” (Smith 1985: 36) Many of these questions may not be definitively answered but only surmised. The questions ask, why the artifact was produced, what function it performed, how well it performed, and how its design, materials, construction methods and ornamentation affected the object’s function (Smith 1985: 36). The researcher is also asked to determine if the artifact’s function might reveal anything about the owner or maker, as well as what its function is today and how that has changed (Smith 1985: 36)

Provenience:

There are six questions included in the Provenance section. The researcher is asked to discuss where and when the artifact was produced and by whom. There are also questions about how the artifact was used, who the original owner was, where the owner lived, the owner's social status and any known subsequent owners. Included in this section is a query about the history of the object, its maker and the owner (Smith 1985: 36)

This group of questions was omitted from the Observable Data step and addressed, in either the Comparative Data step or the Supplementary Data step. It is not possible to know the answers to these questions when, "the . . .model does not allow for the introduction of supplementary information or comparison with other artifacts before the artifact has been studied independently. . ." (Richards 1990: 153).

Value:

The sub-step Value asks five questions. It was decided for this project that the questions asked in this section would be answered in the Supplementary Data step, since it is not possible to know the answers without research. The questions asked concern value of the artifact to the original owner, reflection of social or economic status of the owner, society's value at the time of production, and the cultural value of the artifact (Smith 1985: 36-37).

Step 2: Comparative Data

During step two, the artifact is compared with other similar artifacts—preferably produced by “the same maker or by other manufacturers during the same time period” (Smith 1985: 35). Since there are no marks on the Champoeg flowerpots, the maker is unknown. Finding the potter who produced some of these vessels is the object of this research project. When comparative data was sought for the project, it was found that availability of Oregon redware is limited. Knowledge of the potters is even more limited and little has been published on the subject.

The best available source of comparative collections (from sites of known potteries) for early Oregon potters is the Northwest Pottery Research Center in West Linn, Oregon. Blaine Schmeer, Dick Pugh and Harvey Steele (who founded the Center) are hobbyists who have done extensive research in the field of nineteenth century Oregon ceramics. They participated in excavations of Oregon pottery sites with the late Dr. Daniel Scheans, from the Portland State University department of anthropology, as well as the Oregon Historical Society. Dr. Scheans and the Society allowed the Research Center to house many collections of ceramics from these excavations. Due to the tireless research for archival records, a number of the Oregon potters’ identities, places of origin and pottery locations are now known. Schmeer’s records were relied on heavily throughout this project.

Schmeer, Pugh and Steele agreed to lend the Oregon State University (O.S.U.) anthropology department any of their collection necessary for research. Since their original suggestion was that several of the Champoeg flower pots may have come from the Richardson/Grove site, over eight hundred of the redware sherds from this site were transported to O.S.U. The entirety were cleaned, sorted and evaluated using the New Brunswick Model.

Later, sherd samples from three more waster collections were also transported to O.S.U. for study. The collections from the Pedigo pottery, also located in Damascus, the Harris Brothers' pottery in Canemah, Oregon, and Samuel Grove's pottery in Farmington, Washington were selected for comparative studies. Due to time constraints, a smaller number of samples than from the Richardson/Grove pottery were chosen from each pottery. Cleaning sherds from these collections was only done if necessary to see the sherd clearly.

Most of the questions used during the Observable Data step were tentatively answered during the Comparative Data step. To stay true to the method, no supplementary data may be used at this point. The background of the researcher was relied on for descriptions, function, construction methods and value of the vessels. It was often necessary to acknowledge and evaluate biases. It would have been easy to miss important details in the individual sherds without careful vigilance. Since, prior to this evaluation, an interview had been conducted with Schmeer, bias must be acknowledged on the part of the researcher. A 'picture' of the individual potters was already firmly imbedded when this step began. It is also necessary to state at this time that the biases of Schmeer, Pugh, and Steele probably had an impact on which pottery samples were selected to use. Despite these issues, spending many days in the company of sherds from each potter's hand gave insight into these individuals, their style, artistic bent, and aspects of their personalities that cannot be found in documents and records.

Differences and similarities between the Champoeg flower pots and pieces from the four sample sites, although often subtle, were evident. The Conjectural Paradigm was relied on heavily during comparative work. Sometimes similarities are not even visible in photographs but must be experienced tactilely, through touching and comparing samples carefully. This step was, therefore, time consuming and by no means complete. Due to the sheer mass of the collections, predominantly handles, rims and lid fragments were examined.

Eventually it was determined that handle comparisons could not definitively be attributed to individuals and that direction of identification was discontinued. There were an extremely small number of lids in the samples for each potter. Although one particular lid style has been attributed tentatively to Samuel Grove, the Champoeg flowerpots have no lids for comparison. Several lids in the Harriet Munich collection appear to have been from the Grove pottery site but are a matter for future research. Eventually, since the Champoeg vessels lacked lids, the lids were excluded as the main source of attribution and rims were chosen as the object of concentration. The rim configurations will be discussed in depth in the artifact analysis section of this paper.

Step 3: Supplementary Data

Finally, during step three, supplementary data can be collected from archival, oral and published sources. During this step, Instrumental Nuclear Activation Analysis (explained further below) and inclusion analysis were conducted. Also during this step archival research began.

Comparative data and supplementary data steps were conducted at the same time since the site location and producers of the waster sherds were known.

3.2.2 The Conjectural Paradigm

In conjunction with the New Brunswick Model, this project was also directed by the writings of Carlo Ginzburg, his presentation of the Conjectural Paradigm and its concentration on the idiosyncrasies of the individual present in material objects. Ginzburg's discussion on ways of perceiving through use of clues, was helpful when examining the minute details of the ceramic vessels, particularly the rims. Ginzburg's investigation of Morellian connoisseurship of art led to a search for the individual potters' signatures in their most mundane daily production of utilitarian redware.

Carlo Ginzburg outlined his concept of the Conjectural Paradigm in an article called "Past and Present" which he published in 1976. His work was translated from Italian to English by Anna Davin, and published in *History Workshop* in 1980. Davin describes Ginzburg's focus as "historical epistemology—the history and theory of the construction of knowledge" (Ginzburg 1980: 5). Ginzburg's theoretical approach is a frenetic journey through 'high and low', formal and informal, conjectural and scientific ways of knowing (Ginzburg 1980: 5-6). He addresses the fields of medicine, art connoisseurship, hunting, detective stories, handwriting, psychoanalysis, oral literature and the concept of individuality—all to provide evidence that, although given little credence by the ruling classes, knowledge gained from clues, is a powerful concept that is used daily in many fields (Ginzburg 1980).

One of Ginzburg's most prominent examples for the use of the Conjectural Paradigm was Giovanni Morelli. Morelli was a famous (and controversial) art connoisseur who designed a system for identifying unsigned (or wrongly attributed) works of master artists by "concentrate[ing] on minor details, especially those least significant, in the style typical of the painters own school: earlobes, fingernails, shapes of fingers and toes" (Ginzburg 1980: 7).

Morelli is also believed to have influenced Freud's introduction of psychoanalysis. Morelli's influence on Freud, Ginzburg maintains, was a strong one. Freud himself reports, "the proposal of an interpretative method [is] based on taking marginal and irrelevant details and revealing clues" (Ginzburg 1980: 11).

Ginzburg's second example of the use of conjectural knowledge (or the use of clues to make conclusions) is Arthur Conan Doyle's character Sherlock Holmes (Ginzburg 1980: 8). He believes that Doyle's training as a physician taught him to see small, seemingly insignificant clues others are unaware of (Ginzburg 1980: 8). Ginzburg attributes this way of knowing to Doyle's training in the area of symptomatology. He believes that Hippocratic medicine, "which based its methods on the central concept of the symptom" (Ginzburg 1980: 15) is one of the few acceptable uses of conjectural knowledge left in a world of science and math.

Ginzburg maintains that, in medicine, as well as connoisseurship of art, hunting, handwriting analysis and a number of other pursuits "tiny details provide the key to a deeper reality, inaccessible by other methods. These details may be symptoms for Freud, or clues for Holmes, or features in paintings for Morelli" (Ginzburg 1980: 11). He points out that Galilean science leads "towards study of the typical rather than the exceptional, towards a general understanding of the workings of nature rather than particularistic, conjectural notice" (Ginzburg 1980: 20). This, he maintains, leads away from the study of the individual.

Ginzburg believes that the reason medicine has continued to address symptoms and the individual patient is because, "descriptions of particular diseases which were adequate for their theoretical classification were not necessarily adequate in practice, since a disease could present itself differently in each patient. . .knowledge of a disease always remained indirect and conjectural. .

." (Ginzburg 1980:21) He points out that it is this very individuality of a patient that defies the Galilean model because, "(t)he more central were features to do with the individual, the more impossible it became to construct a body of rigorously scientific knowledge" (Ginzburg 1980: 19).

Finally, Ginzburg asks the question, "is rigour compatible with the conjectural paradigm?" (Ginzburg 1980: 28). He suggests in matters such as art and the health of a horse,

> "elastic rigour. . .of the conjectural paradigm seems impossible to eliminate. Its a matter of kinds of knowledge which tend to be unspoken, whose rules, as we have said, do not easily lend themselves to being formally articulated or even spoken aloud. Nobody learns how to be a connoisseur or a diagnostician simply by applying the rules" (Ginzburg 1980: 28).

As it turns out, it is this type of knowledge that can be obtained through close inspection of redware sherds. The knowledge is there for the astute, but it is not in the repeatedly drawn profiles, nor is it even well expressed in photographs. It comes from weeks of touching, exploring, drawing, measuring and comparing hundreds of pottery rim sherds, lids, and handles. Only then does the individual become subtly visible. Because redware is utilitarian in design, little time is spent producing it—therefore, little artistic energy is invested. Nevertheless, this research proposes that evidence of individual artistic style is there. Nineteenth century potters were creative people who unconsciously put their individual stamps on their work—particularly in their rim finishes.

3.2.3 Instrumental Neutron Activation Analysis

During step three of the New Brunswick Model called Supplementary Data, Instrumental Neutron Activation Analysis (INAA) was conducted on sherds from the Champoeg flowerpots and from each of the four potteries. Since the researcher has no background in archaeometry, two references were used to understand the process on a novice level. The first, an article by Dr. Lea Minc (professor of archaeometry at Oregon State University) on INAA, was recently published in the *Encyclopedia of Archaeology* (Pearsall 2007). This article provided simply stated educational material. A glossary of terms was included. A history section and one on the basic principles of how the analysis works were also helpful. Of particular interest was the discussion on the complexity of distinguishing provenance for ceramics.

An article by Michael D. Glascock was also informative. According to Glascock, "during the bombardment of a sample with neutrons, a small fraction of the nuclei for each of the [trace] constituent elements will be transformed into unstable radioactive isotopes that decay with characteristic halflives" (Neff 1992: 12). Trace elements, with concentrations below 1,000 parts per million, "whose presence in the clay is effectively 'accidental'. . .provide the primary basis for provenience analysis" (Neff 1992: 11). In 1992, when this article was written, over 50,000 INAA analyses on ceramics materials had already been conducted, giving the process considerable credibility in the field of archaeology.

Instrumental Neutron Activation Analysis has been used successfully by archaeologists for over fifty years (Speakman, Glascock 2007: 181). Although fewer and fewer nuclear facilities are available to the archaeological community for obtaining information in this manner, Oregon State University is fortunate to have gained Dr. Lea Minc as director of the archaeometry laboratory at the O.S.U. Radiation Center. Due to closing of the reactor at the University of Michigan, Dr. Minc transferred her research to Oregon (Speakman, Glascock 2007: 181). This made archaeometry accessible for this research project. Of particular interest was the excellent intercalibration of INAA data, making information from other facilities, as well as any future analyses by researchers on Oregon pottery, compatible (Speakman, Glascock 2007: 181).

Instrumental Neutron Activation Analysis of ceramics, “seeks to identify those characteristics of the composition that can be used to distinguish between materials from different sources” (Orton et al. 2004: 144). According to Dr Minc, INAA is a “quantitative method of chemical analysis based on the nuclear properties of constituent elements” (Pearsall, 2007: 1670). Since the goal of this project was identifying properties that would prove to be unique for each pottery, and to strengthen or disprove tentative conclusions reached in the Comparative Data step, INAA was an appropriate choice for supplementary data.

Instrumental Neutron Activation Analysis was chosen over other similar methods because of the availability, its sensitivity, (element concentrations are measured in the parts per million) its ease of sample preparation and the scope of elements it can detect—all advantages pointed out by Dr. Minc in her article. INAA can detect and measure over fifty different geochemical elements that may be present. As Dr. Minc points out, however, there are also disadvantages such as the radioactive waste generated through irradiation of samples, the lack of availability, and a slow turn-around time (Pearsall, 2007: 1670).

Glascock maintains that the advantages of proveniencing ceramics, using this method, are its "high sensitivity, precision and acuracy for many trace element. . .small sample size. . .the fact that it is a fully instrumental technique capable of measuring 30-35 elements, simultaneously. . .and the fact that it is easily adapted to automation" (Neff 1992: 12). Also contained in the Glascock article are details of sample preparation, the use of reference and control standards, and methods of statistical analyses used by various researchers. At Oregon State University, bivariate plots and cluster analysis were used for this project.

According to Speakman and Glascock, INAA offers the most efficient and complete picture of the elemental makeup of ceramic sherds (as well as many other types of artifacts) available to the archaeologist at this time (Speakman, Glascock 2007: 180). The advantages of this technique over other chemical characterization methods include: "(1) ease of sample and standard preparation; (2) determination of the concentrations of multiple elements in a bulk sample; (3)

many elemental determinations with high analytical precision; and (4) good inter-laboratory comparability" (Speakman, Glascock, 2007: 180).

The method has continued to be used successfully in such projects as the Utah Pottery Project. The Utah Project began in 1999 (Scarlett et al. 2007: 72) and the findings were recently published in *Historical Archaeology*. The Utah Project tested a total of eighty-seven samples chosen from eight different pottery sites. Results from INAA yielded "statistically viable groups" for each pottery site (Scarlett et al. 2007: 89). This information will be useful in future research on ceramic distribution and trade patterns and when analyzing ceramics from unknown potteries (Scarlett et al. 2007: 90). Of particular importance in this study was that despite wide variation in color and texture of the selected samples, each pottery "produced highly homogeneous fabric chemistry" (Scarlett et al. 2007: 90).

3.2.4 Inclusion Analysis

Inclusion evaluation was conducted when it became necessary to discern visual differences in the make-up of the paste mixes. By viewing the remaining sherd samples from each of the Champoeg vessels and from each pottery under the microscope inclusions could be seen and tentatively identified. This process aided the evaluating the results of the INAA investigation. The inclusion evaluation process also indicated that inclusions might be of some value in determining the source of Northwest redware sherds--whether INAA or not will be used.

3.3 Soils Sourcing

There was no physical attempt to locate and test clay sources in this research. It was enough to understand that there are excellent clay deposits near each of the pottery sites. An article by Arnold, Neff and Bishop, along with advice from Dr. Minc, helped with the decision not to pursue sources. According to Arnold, Neff and Bishop, "the concept of 'source' is. . . problematic because 'source' can be thought of as a single mine, a single widespread clay stratum, all clays in a single drainage, a single community of potters, or perhaps even a group of such communities" (Arnold, et al. 1993: 70). Since potters, according to Arnold, Neff and Bishop, do not perceive their clay in terms of its chemical content, many different factors go into their choice of paste recipes. "Any substance that the potter mixes with clay may cause the trace element composition of the pottery to diverge from the composition of the 'source' clay" (Arnold et al. 1993: 71). This can include water (which contains soluble salts), temper, the levigation process (if used), the type of fuel used for firing, and even post-depositional processes (Arnold et al. 1993: 71). Taking these factors into account, the Neutron Activation Analysis became a search for like groupings of ceramics—regardless of the source of the clays, or even, for that matter, who produced them.

At Dr. Minc's suggestion, soils maps were consulted during the inclusion evaluation. This was done for several reasons. Dr. Minc is new to the area and needed references to help her understand Willamette Valley soil types, their location and their proximity to each pottery site. In her capacity as a teacher, she expects the researcher to know how to conduct this type of research. Finally, there were some oddities and anomalies found in the inclusion samples. Visualizing slope grade and local water sources was adventageous for hypothesizing the cause of these anomolies.

Through integration of theoretical concepts and analysis methods, it is hoped, that a dynamic picture has emerged from each artifact, or group of artifacts. The theory of the individual, Conjectural Model, New Brunswick Model and INAA all strive to illuminate the past by providing more information about individual potters. Archival research, inclusion analysis and soils sourcing provide further knowledge about the potters, their clay mixes and their clay sources. Armed with this information, it is hoped that future researchers will continue the work that was begun here.

Chapter 4: ARTIFACT ANALYSIS CHAMPOEG SITE

As analysis of the Champoeg redware was begun, every effort was made to follow the New Brunswick Model as closely as possible. All of the steps found in the observable data step are discussed--for each of the Champoeg vessels. Rim sherds were given particular attention. A detailed description was documented and profiles of all rim types were drawn.

The redware fragments from ORMA27 were cleaned, cataloged and cross-mended. There appear to be at least seven identifiable partial vessels. The vessels, now identified as probable flowerpots, were assigned the letters A through G. These letter assignments are used throughout this paper and as identification during archaeometric analysis.

4.1 Vessel A

Vessel A (Figure 9) consists of ten cross-mended redware sherds, a rim fragment that matches the configuration of the cross-mended rims, and eight pieces that match the vessel in fabric color, texture and appearance. The vessel's color is HUE 5YR 6/6 reddish yellow (Munsell 1975). The base (with attached body) of Vessel A cannot be attached to the rim (also with attached body) due to missing pieces. The two are, however, similar enough to each other (and different enough from the other six artifacts) to allow a probable link to be made. The shape appears to have been a simple unrestricted contour when the vessel was intact.

Figure 9: Vessel A.

4.1.1 Material

The material used to produce this artifact is earthenware clay typical of clays used to produce redware. It is not apparent from observation what was used for temper. The choice of clay as the raw material for producing this artifact influenced the final form of the vessel. Clay, when fired, produces ceramic—which is a hard, non-plastic, material, excellent for vessels. All vessels are constructed from the same raw material and this step is omitted for the rest of the Champoeg vessels.

The source of the clay and firing technique is not evident, although redware is typically a low fire ceramic. The cleaning process indicated great porosity, which would strengthen that impression. Sources of clay for all sherds examined are unknown and are not discussed in this section. Inclusions will be discussed in a separate section as well.

No evidence of trade patterns was apparent at the time of evaluation. It is hoped that trade patterns may be revealed through this research.

4.1.2 Construction

The base and attached body is 118 mm in diameter and 108 mm at its highest point. It is approximately 8 mm thick, (there is variation) and has an uneven 16 mm diameter hole through the center of the base. This was not evident until the piece was cross-mended. There are horizontal striations on the bottom side of the base. There is also a 3 mm wide concave ridge 2 mm from the bottom of the exterior sides. This mark runs around the entire circumference of the existing body.

The rim and attached body consists of two cross-mended pieces and one similar piece that is not attached. The unattached piece is 122 mm at its highest point. Maximum rim thickness is 20 mm at the rolled rim. The lip flutes outward and curves down to form a modified flattened roll. Twenty-seven mm below the top of the rim, the body forms a pinched convex ridge, which is more pronounced than those on other vessels. This ridge appears to be purely decorative, giving aesthetically pleasing lines to an otherwise utilitarian piece of redware.

The exterior has been smoothed, for the most part. A number of finger smudges are present in the lower half of the vessel, as well as an almost complete fingerprint.

The interior body of the vessel has the characteristic rilling of hand thrown pots. This is further evidenced on the exterior—particularly with the presence of the fingerprint imbedded in fragment ORMA27-B-354. Various pre-depositional bulges and imperfections on the interior may indicate speed in production.

The construction method appears to be hand turning on a potter's wheel. The simple unrestricted contour shape of the vessel is typical of vessels produced using this method of construction. The potter's wheel influenced the appearance of all Champoeg vessels. Turning lines are visible in all pieces. Wheel turning allowed the pieces to be very round in circumference and very uniformly shaped. There are no markings or inscriptions on the vessel. Dark splotches appear to be post-depositional and caused by absorption of chemicals from the soil.

4.1.3 Function

The artifact was produced for a utilitarian function. This vessel appears to be a flowerpot, as evidenced by the simple unrestricted shape and the hole in the base. Since flowerpots are often made of redware and are a utilitarian vessel, it is possible that this vessel was once used for some type of horticulture. A caveat to this hypothesis of artifact function must be acknowledged. It is a French-Canadian and Metis tradition to use flowerpots for bread baking (Author's personal experience). It is possible, though not provable, that flowerpots were used for this purpose since Champoeg had a large French-Canadian and Metis population. Two gardeners and a baker are listed on the 1860 Champoeg census (Speulda 1983: 22)

Production of similar products for today's gardening market indicate this is a successful and useful product. The hole in the base of the flowerpot assists drainage, as does the porosity of the artifact, therefore the functional performance was affected by the potter's choice of materials.

The minimally decorative finish on the lip of the vessel may reveal the maker's artistic craftsmanship even in a utilitarian piece, and be a clue to where the vessel came from.

4.1.4 Provenience

Provenience is unknown. An attempt to find the maker and place of production are the direction of research for this paper. The original owner is also unknown. This artifact was apparently used by someone living in a cabin on the East side of Champoeg Creek. Subsequent owners or uses are unknown. There is no known history of the owners at this time.

The provenience section is the same for each vessel. Discussion is not repeated in sections for Vessels B--G.

4.2 Vessel B

Vessel B (Figure 10) consists of nine cross-mended redware sherds, and a rim fragment that matches the shape of the cross-mended rim. There is a small amount of body, which accompanies the rim fragments, but the rest of the vessel is absent. The color is HUE 5YR 6/8 reddish yellow (Munsell 1975). It is not possible to determine the shape of the intact vessel, other than that the orifice was round.

Figure 10: Vessel B.

4.2.1 Construction

The piece is 61 mm at its highest point. Maximum rim thickness is 14 mm at the rim. The lip is a full rolled ogee rim. Seventeen mm below the top of the rim, the body forms an exterior convex ridge that is 4 to 6 mm wide. This ridge appears to be purely decorative, giving aesthetically pleasing lines to an otherwise utilitarian piece of redware. One of the cross-mended pieces (ORMA27-B515-A) has black stains from post-depositional contamination or burning. There is evidence of a stump fire at the site.

The interior body of the vessel has the characteristic rilling of hand thrown pots. Various pre-depositional bumps, bulges and imperfections on the interior may indicate speed in production.

4.2.2 Function

The artifact was produced for a utilitarian function. This vessel appears to be a flowerpot, similar to vessel A, but it is impossible to tell the exact shape and use without more pieces of the body and base. Since the identifiable redware artifacts appear to be flowerpots, it is assumed, in future writing that this was probably a flowerpot.

4.3 Vessel C

Vessel C (Figure 11) consists of 42 cross-mended redware sherds, and 4 pieces that match the vessel in color, texture and appearance. The color is HUE 5YR 5/4, reddish brown, HUE 5YR 4/3, and HUE 5YR dark reddish brown depending on where on the vessel the Munsell chart is used (Munsell 1975). The base is, for the most part missing, with the exception of two small fragments. Some of the body pieces have small sections of base attached. One center section of the base was re-attached. This piece has the remnants (approximately 30 percent) of a center hole in the base. The shape appears to have been a simple unrestricted contour when the vessel was intact. Approximately 75 percent of the vessel pieces were found and cross-mended.

Figure 11: Vessel C.

4.3.1 Material

The source of the clay and firing technique is not evident, although redware is typically a low fire ceramic. This vessel appears to have been over-fired or burned post-depositionally. In a profile analysis of the sherds, the interior fabric is the usual redware color. The exterior 2 to 3 mm however, is black in some places. (Later information indicates poor oxidation. Rice) The cleaning process indicated somewhat less porosity than the other vessels. However, the porosity is still sufficient to indicate redware.

4.3.2 Construction

It appears this vessel was produced on a potter's wheel. The interior exhibits the characteristic rilling of hand turned vessels. The open contour shape is the traditional shape used for flowerpots and is still used today. Experienced potters can quickly, and easily, produce this vessel shape.

The base is 102 mm in diameter. It is approximately 5 mm thick (there is variation). There are horizontal striations on the bottom side of the base. The rim is 150 mm in diameter. It is approximately 9 mm at maximum thickness (there is variation) of the rolled rim. The rim is simply finished, lacking any decorative flourishes, and is comparatively thin. The artifact is 122 mm at its highest point.

The exterior surface is porous and rough but has been smoothed, for the most part. Various pre-depositional bumps, bulges and imperfections on the interior may indicate speed in production.

4.3.3 Function

The artifact was produced for a utilitarian function. This vessel appears to be a flowerpot, as evidenced by the simple unrestricted shape and the hole in the base. See Vessel A for further discussion.

4.4 Vessel D

Vessel D (Figure 12) consists of three rim fragments. The pieces cannot be cross-mended but are the same form, thickness and color. The color of vessel D is HUE 5YR 7/6, reddish yellow. It is lighter in color than the other vessels.

Figure 12: Vessel D.

4.4.1 Construction

It is not possible to tell the shape or size of the vessel since there are only three fragments available to examine. ORMA27-B-67 is 34 mm wide and 22 mm long. ORMA27-B-6 is 24 mm wide and 23 mm long. ORMA27-B-216 is 14 mm wide and 22 mm long. Thickness ranges from 7 mm on the rolled rim to 5 mm at the thinnest part of the existing body. The rim is a simple rolled lip, with a 4 mm concave ridge approximately 11 mm below the top.

4.4.2 Function

The artifact was produced for a utilitarian function. It is not possible to determine the exact function since there are only three sherds to evaluate. It is unknown how well this artifact performed its function. The total design is unknown. It is not possible to ascertain whether design affected the function.

The rim finish is plain and utilitarian. There is nothing revealed about the maker or the owner through visual examination.

4.5 Vessel E

Vessel E (Figure 13) consists of a rim and attached body, a base with attached body, and 20 fragments that match the vessel in fabric color, texture and appearance but cannot be cross-mended. The base of Vessel E cannot be attached to the rim due to missing pieces. The two are, however, similar enough to each other (and different enough from the other six vessels) to allow a probable link to be made. The color is HUE 5YR 6/8 reddish yellow (Munsell 1975). The shape appears to have been a simple unrestricted contour when the vessel was intact.

Figure 13: Vessel E.

4.5.1 Construction

The base and attached body is 140 mm in diameter and 58 mm at its highest point. It is approximately 9 to 11 mm thick, (there is variation) and has an uneven 15 mm diameter hole through the center. This was not evident until the piece was cross-mended. There are horizontal striations on the bottom side of the base.

The rim and attached body consists of 14 cross-mended pieces. The artifact is 85 mm at its highest point. Maximum rim thickness is 15 mm at the rim. The rim is either rolled or applied. It is not possible to ascertain which method was used. It consists of a 25 mm band, which is 11 mm thick. The top of the rim was finished with a tool, which created striations and a 90-degree angle to the sides. It appears that fingers were used to smooth it, creating occasional concave indentations. There are no decorative flourishes on this vessel.

The exterior surface is porous and rough. It has a much rougher, sandpaper-like feel than any of the other pieces, and the heavy use of course temper (or poorly cleaned clay) is evident. The interior body of the vessel has the characteristic rilling of hand thrown pots. This is further evidenced on the exterior—particularly with the presence of a fingerprint imbedded in fragment ORMA27-B-354. Various pre-depositional bumps, bulges and imperfections on the interior may indicate speed in production. Dark splotches on the vessel appear to be post-depositional.

4.5.2 Function

The artifact was produced for a utilitarian function. This vessel appears to be a flowerpot, as evidenced by the simple unrestricted contour shape and the hole in the base. Further discussion of function can be found in the section on Vessel A.

This vessel, unlike some of the others, lacks decorative quality to the rim finish. It is plain, unadorned and lacking artistic flourishes. This quality may actually help identify the craftsman through research.

5.6 Vessel F

Vessel F (Figure 14) consists of 27 cross-mended redware sherds. There are no sherds similar to this vessel that were not cross-mended. The base is complete, with the center hole intact. The rim is approximately seventy percent complete. The shape of the existing cross-mended vessel is a simple unrestricted contour. It is 150 mm tall. The color is HUE 5YR 6/8 reddish yellow (Munsell 1975).

Figure 14: Vessel F.

4.6.1 Construction

The base is 104 mm in diameter and is attached to the body and rim. It consists of four cross-mended pieces, the largest of which has an uneven 14 mm hole in the center. There are no horizontal striations on the bottom side of the base as is the case with the other vessels with remaining base pieces. There is also a 4 mm wide convex ridge one mm from the base on the exterior body. This mark runs around the entire circumference of the existing body.

The rim consists of six cross-mended pieces. There is 350 mm of rim still in existence and 172 mm absent, making the circumference 522 mm. This indicates that 72 percent of the rim is present. Maximum rim thickness is 14 mm at the canted lip. The canted lip flutes outward and curves down to form a 45-degree angle from the top of the vessel. This lip finish is 15 mm wide. Beneath the lip, is a

12 mm concave ridge that ends in a 4 mm convex ridge then continues down into a smooth body with no further decoration.

The exterior surface is porous and rough. A number of finger smudges are present in the center of the vessel as well as partial fingerprints in three different pieces. There are post-depositional areas of darkening in several areas.

The interior body of the vessel has the characteristic rilling of hand thrown pots—these rills being much more distinctive and evenly spaced than the other vessels. There is further evidence of hand throwing on the exterior—particularly the presence of the fingerprint imbedded in fragments ORMA27-B-285, ORMA27-B-270 and ORMA27-B-447-A. Various pre-depositional bumps, bulges and imperfections on the interior may indicate speed in production. Dark splotches on the vessel appear to be post-depositional.

4.7 Vessel G

Vessel G (Figure 15) consists of eight cross-mended redware rim sherds. The shape appears to have been a simple unrestricted contour when the vessel was intact. The color is HUE 5YR 6/8 reddish yellow (Munsell 1975).

Figure 15: Vessel G.

4.7.1 Construction

The vessel consists of six cross-mended rim pieces with attached body and two cross-mended body pieces. The artifact is 128 mm at its highest point. Maximum rim thickness is 14 mm at the rolled lip. The rim has a decorative ogee finish. Twelve mm below the top of the rim, the body forms a pinched 5 mm convex ridge that angles downward. This ridge appears to be purely decorative, giving aesthetically pleasing lines to an otherwise utilitarian piece of redware.

The exterior surface is smooth with occasional porous and rough areas. The interior body of the vessel has the characteristic rilling of hand thrown pots. On the exterior there is further evidence of hand throwing—particularly the presence of fingerprints. Various pre-depositional bumps, bulges and imperfections on the interior may indicate speed in production.

The construction method appears to be hand turning on a potter's wheel. Dark splotches on the vessel appear to be post-depositional.

4.7.2 Function

It is not possible to determine what type of vessel this was. It is probable; however, that it was also a flowerpot. Further discussion of function of this vessel can be found in discussion on Vessel A.

4.8 Rim Profiles

Rim profiles (Figure 16) of the seven Champoeg redware vessels were drawn. The contour gauge was used in this project for acquiring the exact shape and contour of the vessels without damaging the artifacts. By pressing the device against the side of the vessel, both inside and out, the contour gauge takes the shape of the rim. The gauge was used to obtain all profile shapes and measurements.

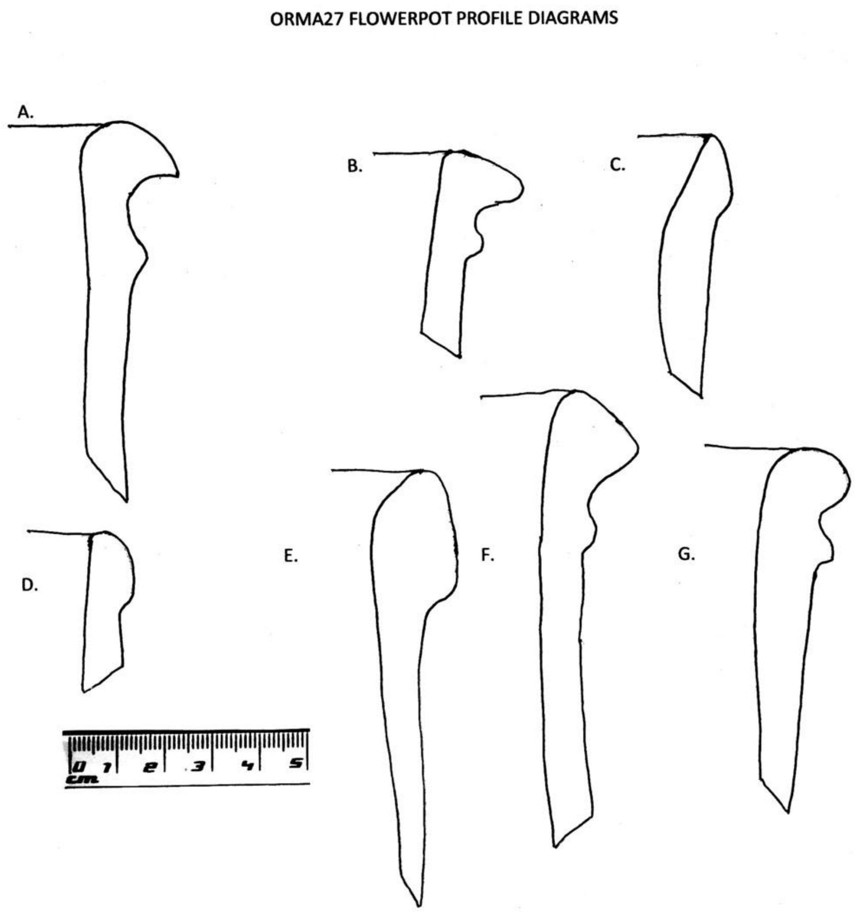


Figure 16: Champoeg rim profiles.

Chapter 5 Artifact Analysis: Potteries

5.1 Richardson/Grove Wasters, Damascus, Oregon

The redware fragments from the site excavation on the west side of Richardson Creek were cleaned and cross-mended. Sherds are grouped according to type. Due to the daunting size of the collection, discussion will be on groups, rather than individual fragments. Cataloging was not done, since the collection was borrowed. Eight hundred and seventy pieces were selected from the collection. These were selected because of identifiable parts such as rims, lids and handles or because the fragments could be cross-mended with others to become an identifiable vessel. The remaining pieces were unidentifiable body fragments.

5.1.1 Handles

Sixty-nine handles or partial handles from the collection were evaluated. Twenty-three of the handles are various sizes of strap handles. Twenty-seven are lug handles. Seventeen of the handles are integral ear handles. Two of the ear handles have decorative features and do not appear to have come from the same vessel.

Material:

The material used to produce these artifacts is earthenware clay, also known as redware. Inclusions will be discussed in a separate section. The choice of clay as the raw material for producing this artifact influenced the final form of the vessel. Clay, when fired, produces ceramic—which is a hard, inflexible material, excellent for vessels. This material is commonly used for similar artifacts. The source of the clay and firing technique is not evident, although redware is typically a low fire ceramic. The cleaning process indicated great porosity, which would strengthen that impression

Construction:

There are three types of handles, all of which were hand applied to each vessel. The vessels were produced by turning on a potter's wheel. While the wheel was still turning, the potter incised one or two parallel lines around the circumference of each vessel. These were used for placement of handles--to insure they were located in the same place on each side of the vessel. The handles were hand made with short pieces of clay coil that had been shaped, in the case of ear handles, or simply bent and attached to the vessels, in the case of lug handles. Strap handles were slightly flattened before attaching to jugs or pitchers. Lug and ear handles were applied on both sides of the vessels for ease in lifting.

Strap Handles: There are 23 complete or partial strap handles. (Figure 17) They vary in length from 102 to 132 mm. Widths vary from 28 to 40 mm at the top and 27 to 32 mm at the base.

Ear Handles: There are 17 partial or complete ear handles (Figure 18). They vary in width from 29 to 46 mm. All ear handles are integral to the vessel. One complete side of the handles were smoothed into the body of the vessel.

There are two decorative ear handles. (Figure 19) Only one handle is nearly complete, although it is damaged. Several fracture points are visible. The two pieces are intact enough however, to see the decorative element. Ear handle number one is 91 mm in width and 36 mm high. There is incised scalloping on the outermost edge of the handle. These scallops vary in size from 14 to 17 mm wide and appear to have been made with a sharp instrument. There are six scallops still intact. Ear handle number two is 72 mm in width but is incomplete. It is 32 mm high. This handle appears to be manufactured the same way as handle 1. There are three scallops present ranging from 18 mm to 22 mm wide.

Both decorative ear handles are red HUE 2.5YR 4/8 colored unglazed redware, spattered with HUE 2.5YR 2.5/2 very dusky red (Munsell) colored glaze. They are post-depositionally discolored, making the scalloping difficult to see.

Figure 17: Strap handles

Figure 18: Ear handles.

Figure 19: Decorative ear handles.

Lug Handles: There are 27 partial or complete lug handle (Figure 20). They vary in height from 49 to 64 mm. Widths vary from 69 to 82 mm.

Twenty lug handles samples are integral to the vessel. The lower part of the handles were smoothed, and flattened into the vessel.

Figure 20: Lug handles.

Eleven lug handles are affixed to the vessel at the base of the handle, but the upper parts are left free from the vessel body.

The potter's wheel influenced the appearance of all handles, since incised lines were used in placement. This method allowed the vessels to be round in circumference and uniformly shaped, with evenly placed handles. The shapes of the handles themselves however, were influenced by the rolled construction method. Lug handles appear to have been attached quickly, with minimal amounts of smoothing.

Two of the vessels that were cross-mended, had decorative elements to aid in the placement of the handles. One, which is red HUE 2.5YR 5/8 (Munsell) colored glaze with black flecks, is incised 32 mm below the top of the lug handle with two concave incised lines. Each line is 4 mm wide and is separated by a 4 mm wide convex ridge.

The second vessel with incised lines to aid in the placement of handles, appears to be a decorative urn. (Figure 20) It is unglazed and had warped in firing. This is probably why it was discarded. The vessel has a considerable amount of decoration. It will be discussed later. It also has two concave 4 mm rills, separated by a convex ridge that is approx. 3 mm wide. The lug handles are located 6 mm above the decorative rills. The handles are not decorative and are similar to other lug handles found at the site.

Figure 21: Richardson/Grove urn.

Value:

Both the decoratively shaped urn and the one with decorative ear handles are pleasing to the eye. These pieces indicate the potter spent extra time and effort to produce an attractive and aesthetically pleasing vessel. These handle samples come from simple redware vessels, predominantly produced for utilitarian use. At the time of production, they would not have been considered sophisticated. Potters were a part of the manufacturing world. They were highly skilled and produced a uniform product with a minimal amount of tools and equipment. Those skills required the degree of sophistication that any quality hand-made product does. Hand craftsmanship was the norm in the mid-1800s, rather than the exception, as it is today. Economic value for utilitarian redware vessels was probably on a par with plastic storage vessels of today. They were valued for their storage capacity but were expendable when broken or damaged.

Function:

Handles are applied to redware vessels today to facilitate lifting and carrying. This is probably true of redware vessels in the past, including the more decorative pieces. The two decorative ear handles, in fact are incised so that fingers fit more comfortably as they curve around the handle.

For the most part, the handles were designed to perform their function well. There are several fully affixed lug handles however, that would be difficult to use since they do not protrude far enough from the vessel, nor is the opening large enough for more than two fingers.

Construction method and design were probably geared to the functionality of the finished product. The vessels, even small ones, are heavy. Handles assist the function of the container markedly. The construction of the handles indicates a skilled artisan with arguably, an artistic bent, which is exhibited in the more decorative vessels—particularly in the two scalloped ear handles. Functionality and aesthetics were both in evidence in these artifacts.

The function of these artifacts today is to provide information about the maker that is not available through archival research. This is certainly not the function the potter, who once discarded the sherds in the waster dump, would have expected.

Value:

The potter valued the artifacts because they provided functional vessels for himself and his neighbors as well as a source of income—whether through barter or cash.

The ownership of a pottery production area reflects some social and economic status. The skill to produce pottery was valued, both at the time of production and today. It is assumed that these skills lent the individual who produced them some degree of status.

5.1.2 Lids

Nineteen lids or partial lids from the collection sample were evaluated. Sixteen of the lids are convex with handles on top that are integral to the piece. Additionally, a signature piece was photographed and measured but not taken to the Oregon State University laboratory. Three of the lids are convex. The handles are also integral to the pieces but are, for the most part missing.

Construction:

There are nineteen lid fragments. Although there are two types of lids, all were produced by turning on a potter's wheel. The two types of lids were produced in different ways however.

Convex Lids

The convex lids were all turned on the potter's wheel in, what appears to be two steps. The lids appears to have begun upside down, with the potter shaping a round convex cone. A flange for secure fitting inside of the vessel was attached to the base. The lids were then removed from the potter's wheel and, with two fingers and a thumb, turned over. Fingerprints in several of the lids led to this conclusion. Finally, the handle was shaped while the wheel was turning.

There are two types of handles on convex lids. Four of the handles are rounded on top. The remaining twelve are cone shaped, coming to a distinct point. Mr. Steele provided a nearly complete jar, including lid, for measuring and photographing. It is one of the signature pieces of the collection. This vessel (Figure 22) has the cone-shaped lid handle and is a good example of the distinctive shape this finish affords the piece.

The lidded jar is glazed. The glaze color is closest to Munsell HUE 2.5 YR 5/8 red, but is much more orange. The glaze also has black flecks. The vessel is 520 mm high, 152 mm in circumference at the base, and 230 mm at the top. The lid is also 230 mm in diameter and 87 mm high. The handle is 46 mm in diameter and protrudes 33 mm from the lid.

Figure 22: Richardson/Grove lidded jar.

Other convex lids with cone handles (only five of the twelve are complete enough to measure diameter) range in diameter from 128 to 162 mm. Height ranges from 42 to 76 mm.

Concave Lids

The three concave lids are all incomplete. No handles remain for analysis. These lids appear to have been turned on the potter's wheel using only one-step (Figure 23). The base was produced first. The lip/brim was then formed. The top of the lid was formed while the wheel was turning, by pressing a concave trench into the wet clay and then gradually forming a small convex center. A handle, which protrudes above the center, was then created. It is unknown what the handle shape was since there are none available to investigate. The piece was then removed from the wheel by pulling wire or string across the wheel and beneath the base while the wheel was turning. This action left tell tale drag marks across the bottom of the lids.

The convex lids appear to have been of better quality and more complex to create than the concave lids. They are also more attractive and more carefully finished.

Figure 23: One process hanging lid. (Greer 2005: 65)

There are no decorative elements such as lines, applied pieces, or decoration on any of the lids. The only decorative element is the small point at the top of the cone handles. The minimally decorative cone handles on the convex lids are pleasing to the eye, as are the gentle undulations in the surface produced by the potter as he worked inward, and upward, from the edge to the handle. There are no markings or inscriptions on any of the lids. Since all of the collection is from a waster dump, there are no use-wear markings.

Function:

Lids are produced to protect the contents of the vessel. The lids assisted the function of the vessels. The lids found in the waster were not suitable to perform that task. They were discarded and were of little value to the producer unless they were ground for grog. Handles all assisted the user when removing the lids. The material used produced a hard, relatively impermeable product. The form and construction method assisted the function. Both types of lids have elements that protrude into the interior of the vessel, producing a tighter seal and eliminating the possibility of the lid sliding off. The use of a potter's wheel assisted in the production of a nearly perfect round sealing device to fit into a round container.

Lid construction reveals that the potter may have considered some vessels more valuable than others due to the extra time and effort expended to produce the convex lids. It is also possible that certain vessels which were in demand with the potter's customer base, required certain types of lids to seal properly. The moderately decorative cone style handles indicate the possibility that the potter had an artistic inclination to add a distinctive ‘signature’ to the vessels.

5.1.3 Jug Rims

There are 25 complete and partial jug rims in the sample collection. Pictured below is part of the collection (Figure 24). There are four different styles—a rounded lip with double rim (ringed collar), a rounded lip with a single rim (simple roll), a flattened rim (flattened simple roll), and a rim that is concave on the upper surface. These styles may have been for various uses. The ringed collar protrudes more from the body of the vessel than the others do. The rings were probably used for fastening the stopper on--a sturdy place under which to tie a string.

Figure 24: Examples of jug rims.

Construction:

All partial and complete jug rims were well finished and smooth. Five of the flattened rim types are glazed with a HUE 10R 2.5/1 reddish black glaze (Munsell 1975). The rest of the vessels are unglazed.

Convex Double Lip or Ringed Collar (Figure 25)

There are five jug fragments with ringed collars—two complete and three partial rims. These rims appear to have been made by rolling the lip outward for a smooth finish with a protruding rim. A tool was used to incise a groove in the side, thus producing two convex ridges. The rim finish protrudes from the body of the vessel, creating a secure place for tying a stopper in place. The two complete rims are 39 mm and 44 mm in circumference. The circumference of the three incomplete fragments cannot be measured.

Flattened Simple Roll (Figure 25)

The majority of the rim fragments are rolled and flattened on the upper surface. There are fourteen flat topped lip fragments—five complete and nine partial rims. These rims appear to be made by rolling the lip outward for a smooth finish with a protruding rim. A tool was used to remove the convex upper surface and make it flat. The rim finish protrudes from the body of the vessel. The flattened simple rolled rims appear more flared from the body from other rim designs. The five complete flat-topped lips vary in circumference from 46 mm to

72 mm. The circumference of the nine incomplete fragments cannot be measured. Rims vary in depth from 11 mm to 16 mm.

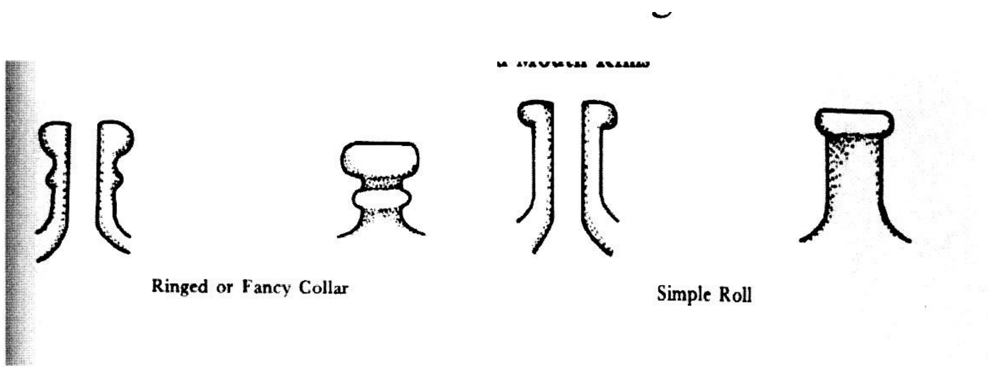


Figure 25: Jug rim forms. (Greer 2005: 65)

Single Rolled Lip, Convex

There are eight jug rims with simple rolled lips—two complete and six partial rims. These rims appear to have been created by rolling the lip outward for a smooth finish. The rim finish protrudes from the body of the vessel, creating a secure place for tying a stopper in place. The two complete simple rolled lips are 39 mm and 44 mm in circumference. The circumference of the six incomplete fragments cannot be measured. The rim finishes are from 12 mm to 16 mm in depth.

Concave Simple Roll

There are four jug rims with concave or inward angled lip finishes. All are complete. These rims appear to be made by rolling the lip outward for a smooth finish with a protruding rim. A tool was used to scoop a concave groove in the top of the rim as the wheel turned. Two are angled toward the interior of the vessel.

Two are more concave. The rim finish protrudes from the body of the vessel, (but much less so than rounded or flat-topped rolled rims) since a tool was used to create an angular finish. The four rims measure from 40 mm to 48 mm in circumference.

The potter's wheel is the most technologically sophisticated tool used in the manufacturing of jugs. Tools used to make the four types of jug rims were probably simple—ranging from fingers to simple flat objects and pointed objects. The construction method is responsible for the uniformly round jug rims as well as the smooth progression of the body into the finished lip. There is no ornamentations on any of the rims. One rim with attached body has a minimally ornamental convex ridge 35 mm below the top of the rim. The ornamentation interrupts the fluidity of the object and provides a pleasing visual affect.

Function:

Vessels with rims much narrower than the body of the piece are constructed to contain liquids. The small opening allows for a stopper to prevent spillage. The attached handles are for ease in pouring and carrying.

5.1.4 Flower Pot Fragments

Nine flowerpot bases are included in the sample collection. Four of the bases are complete. Two were cross-mended. The remaining bases have all or part of the drainage hole visible—allowing identification of their use. Unfortunately, no identifiable flowerpot rims were available for examination and comparison to the Champoeg vessels.

Construction:

The four complete flowerpot bases vary in size from 90 mm to 101 mm in diameter. One of the incomplete bases has enough remaining to measure the diameter, which is 112 mm. Circumference of the 4 complete bases vary from 315 mm to 355 mm. Center drainage holes of complete pot bases and those with intact holes, vary from 8 mm to 18 mm. One drainage hole was not finished on the inside. The a hole was gouged through the base with a tool or finger, and the excess clay was left in place.

All flowerpot bases are unglazed. Two of the pot bases have horizontal striations on the bottom from the tool that was used to remove them from the wheel—probably string or wire. The rest are smoothly finished.

There is no ornamentation or decoration present. There are no markings or inscriptions. All flowerpot bases are comparable to each other. No others had been evaluated at the time this collection was examined.

Function:

The flowerpot bases may have been intended for horticultural use. The hole in the base of the flowerpot assists drainage, as does the porosity of the artifact, therefore the functional performance was affected by the potter's choice of materials. Production of similar products for today's gardening market indicate this is a successful and useful product. A caveat to this hypothesis of artifact function must be acknowledged. It is a French-Canadian and Metis tradition to use flowerpots for bread baking (Author's personal experience).

5.1.5 Flower Pot Drip Trays

Thirty-two of the artifacts from the collection appear to be flowerpot drip trays similar to those used today. There are only four complete or cross-mended trays. One of these is in excellent condition and could be used today. It is unknown why it was in the waster dump. Twenty-three fragments have base still attached to the body, which assisted in identification. Only five rim pieces have no (or nearly no) body attached.

Construction:

The drip trays were wheel turned. They are relatively well finished for utilitarian pieces—mostly smooth with few drips or bulges left behind by the potter to indicate rapid production. Twenty-six of the sherds were finished with an angular rim, slightly flared and squared off on the top. This finish visually divides the rim from the body. Two rims have rolled convex finishes, and two are also rolled, with no visual division between the rim and body. Two are missing the lip part of the rim.

The four complete drip trays vary in diameter from 132 mm to 184 mm. The circumference varies from 427 mm to 591 mm. Standardization of tray height may have been attempted. There are three trays with a height of 26 mm. Four trays have a height of 28 mm, four with a height of 29 mm, four with a height of 30 mm, and four with a height of 32 mm. Seven trays have a height of 34 mm and only four have non-conforming heights of 18, 20, 38 and 43 mm.

There is no ornamentation on any of the objects. There are no markings or inscriptions on any of the drip pans.

Function:

Since the artifacts are unglazed, (like the flowerpots) and the proper size, investigators believe these are flowerpot drip pans. This is predicated on similarity of the artifacts to unglazed redware drip pans produced today.

5.1.6 Rims

One hundred and seventy nine rim sherds were evaluated. Some were cross-mended, others could not be. The evaluation only included a sample of the collection. Further examination might yield more rim fragments for cross-mending. Thirty-one different rim finishes were documented. Both glazed and unglazed rim samples were examined to evaluate the variety of rim forms from this waster site. It was understood that thorough evaluation of all rim sherds would provide as much comparative material as possible for the Champoeg vessels.

Construction:

All rim sherds exhibit the characteristic interior rilling of vessels that are hand turned using a potter's wheel. This rilling is caused from hand pressure to the interior walls when the vessel is being formed.

The potter(s), for the most part, used the method of rolling and rounding off the rim, then forming a protruding lip. The attached body often displays concave and convex ridges, of varying numbers, a short distance from the rim. Only five individual sherds have rims that are angular (or squared off) without rolling. One decorative vessel will be discussed in detail. Rim finishes have been assigned width and type designations to facilitate discussion.

Wide Rims

There are 25 sherds with wide rims. Of the 25, there are four different finishes. Lip thickness varies between 20 mm and 31 mm. (Figure 26)

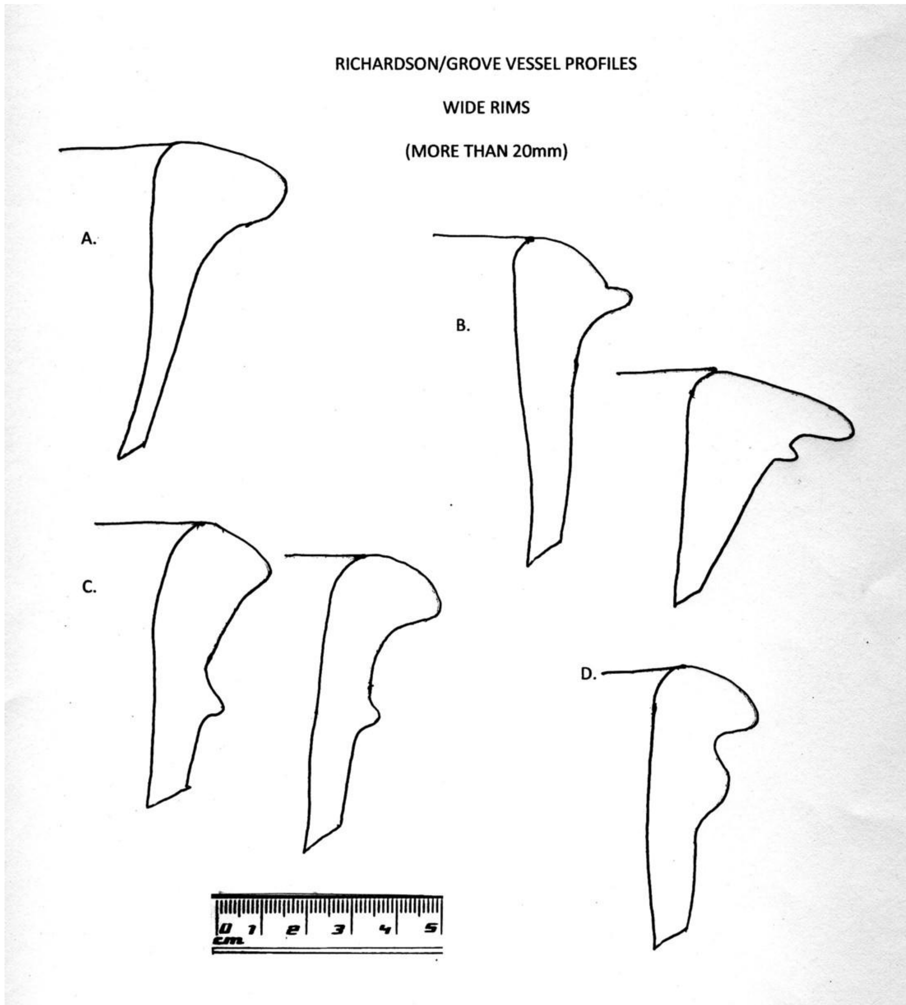


Figure 26: Wide rim profiles.

Rim Type A (Canted /Flattened Roll): Five sherds have no decorative ridges below the finish. They are slightly flattened on the upper surface. These sherds are cross-mended. The glaze is similar to Munsell HUE 2.5YR 5/8, but is much more orange. There are black specks in the glaze. This glaze is very similar to the cross-mended lidded jar described in convex lids. The thickness of this lip is 20 mm. This appears to have been a milk pan. Eighteen sherds have similar rolled lips but are angled downward (canted) toward the exterior body of the vessel.

Rim Type B (Ogee Variations): There are ten sherds of this type. All are unglazed. Five of the ten sherds have a distinctive rounded upper surface that was pinched to form an 8 mm ridge on the outside of a 25 mm lip. This appears to have been a milk pan. Four more of the sherds were cross-mended and are also probably a milk pan. The lip thickness is 31 mm. The upper surface of the lip is a simple convex curve (rolled), but there is a 4 mm convex ridge directly under the lip. One remaining sherd is very similar to the 31 mm piece but is 27 mm thick.

Rim Type C (Canted Ogee Curve Rim): Eight of the eighteen sherds were cross-mended and were probably an unlidded jar. The lip is very plain, almost squared off but still exhibits characteristics of the rolled ogee rim. It is 20 mm in width. There are two convex decorative ridges on the body of the vessel at 3 cm and again at 8.5 cm below the rim. The vessel is unglazed. A similar sherd, which is also 20 mm thick, has only one decorative ridge 16 mm below the lip.

Rim Finish D (Canted Ogee): Mr. Schmeer generously lent an important rim sample to Oregon State University. Like many of the others, its lip angles down toward the outer body of the vessel but much more so than the others do. It is 20 mm thick. Beginning five mm below the lip finish is an 11 mm wide convex ridge. Sixty-two mm below the base of the lip finish are two 5 mm convex ridges, separated by a 3 mm wide concave indentation. This piece is signed “S. Grove.” (Figure 27)

Medium Rims

Ninety-six rims from the collection are classified as medium (Figure 28). Their thickness ranges from 12 to 19 mm. For the most part, the attached bodies of these sherds are thinner than the wide rimmed sherds. There are seven different finish styles for this rim thickness category.

Figure 27: Signed Grover rim.

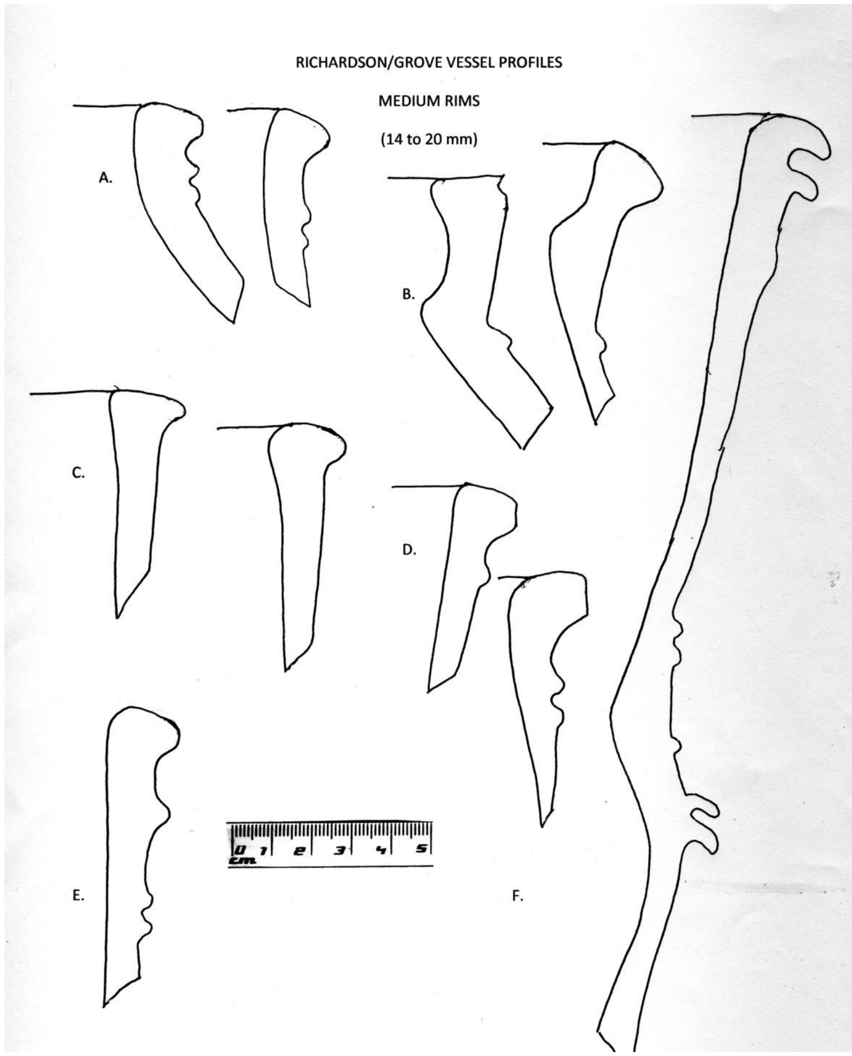


Figure 28: Medium rim profiles.

Rim Finish A (Ogee Roll Variation): The first rim finish is a simple rolled rim, slightly flattened with two convex ridges below. The artifacts appear to have been jars. Some have narrowed shoulders and some have vertical sides. Most rims of this style are 15 mm in thickness. Twenty-three fragments have markedly narrowed shoulders, creating an interior ledge. Nine were cross-mended to produce two partial vessels. The remaining fourteen appear to have been from at least four different vessels. This rim type has a slightly flattened rolled rim that angles slightly toward the body of the vessel (canting). There are two convex ridges 26 and 29 mm below the top of the rim finish. Each is 2 mm wide.

Five cross-mended fragments with ogee rolled rims have double convex ridges directly below the rim. Each is 5 mm wide and there is a 3 mm space between them. The partial vessel is glazed Munsell dark reddish brown, HUE 5YR 2.5/2.

A second partial vessel consists of four cross-mended pieces. It is unglazed. The rim is 17 mm in thickness. There are also two convex ridges 45 and 48 mm below the rim finish. These are 2 mm wide each.

A second variation on this rim style has a slightly constricted collar area. There are nineteen unglazed pieces of this type. None were cross-mended. They appear to be from several vessels. Ten fragments are 12 mm in thickness. There are double convex ridges 20 and 25 mm below the exterior rim finish of all 10 fragments. The ridges are all 3 mm in width, with a 2 mm convex ridge separating them.

The remaining nine fragments are less constricted at the collar than the first ten but are still finished with a slightly flattened rolled edge. These pieces are all unglazed. They appear to have been from several vessels. There is a single convex ridge 35 mm below the rim. Forming this ridge caused concave ridges on either side of it. The convex ridge is five mm wide. The two concave ridges are four mm wide.

Rim Finish B (Flattened Roll): The second rim type was also used for jars. It is less rounded than the first type. The top and side of the lip is markedly flattened, creating a more squared-off appearance. There are 18 fragments of this type.

Twelve of the flattened roll fragments have been cross-mended. The rim of this partial vessel is 15 mm in thickness and has a markedly constricted shoulder. There is a slightly convex ridge 28 mm below the rim finish. The ridge is 6 mm wide.

Five more of the fragments of this type were also cross-mended. This partial vessel is also unglazed. There is a number four incised on the exterior (Figure 29). The rim is 16 mm wide. There is also a marked constriction in the shoulder of this vessel. There is one convex ridge 40 mm below the rim finish. The ridge is 4 mm wide.

Figure 29: Example incised number 4.

The final fragment of this type has a 17 mm wide rim. It is flattened to create an angular appearance. The exterior of the lip proceeds vertically from the rim. It is only slightly rolled. Where the rim meets the shoulder of the jars, there is a 4 mm wide convex ridge. This vessel is also unglazed. It has an ear handle on the exterior.

Three cross-mended fragments, with flattened rolled rims, do not have a constriction at the top of the vessel. The sides appear to angle only slightly away from the base. The interior of this vessel was glazed Munsell dark reddish brown, HUE 5YR 2.5/2. It is 145 mm tall and may have been a mixing bowl or a milk pan.

A nearly complete mixing bowl from the Northwest Pottery Research Center is included in the collection. It also has a flattened roll rim finish. The vessel consists of 15 cross-mended fragments and 5 pieces that cannot be attached. It is also glazed with a color similar to Munsell HUE 2.5YR 5/8 red but with more orange.

Rim Finish C (Canted Rim): This type of rim finish is more angular than many of the fragments found in the collection. The sides of the vessels appear to have all been vertical. All are unglazed. All have a rim finish that angles away from the interior of the vessel and narrows significantly at the outer edge of the lip. The lip thickness varies between 12 and 18 mm.

There are four different sub-types of canted rims. Two have minor decoration. One cross-mended vessel, consisting of five fragments, exhibits a canted rim. It has a convex ridge 33 mm below the rim. The ridge is five mm wide and has two mm convex ridges on either side. The body is marked with a Roman numeral 2. A similar group of sherds have 18 mm wide lips and a four mm wide convex ridge 54 mm below the rim. One of these sherds also has the Roman numeral 2 incised into it. (Figure 30)

Figure 30: Examples of incised number two.

The largest three sherds with canted rims, have 18 mm thick rims and are probably from the same vessel. They are 114 mm tall and each has some of the base attached.

Eight more sherds of this type are a much more diminutive example, at 12 mm in thickness. There are eight fragments glazed in a color similar to Munsell HUE 2.5 YR 5/8 red only more orange. They are probably from the same vessel but could not be cross-mended.

Rim Finish D (Flattened Ogee Roll): There are only five fragments with flattened ogee rolled rims. Four have been cross-mended and have the Roman numeral two incised into one of them. These are very similar to rim finish C, but the exterior lip edge has been flattened with a tool and smoothed. The cross-mended vessel has a convex ridge 18 mm below the 15 mm thick rim. It is four mm wide. The remaining sherd is 18 mm thick at the rim and has two five mm ridges 14 and 31 mm below the rim edge.

Rim Finish E (Canted Ogee Roll Variation): This type is more decorative than the previously discussed types. It has a rolled rim that is convex on the upper surface. There is a large 10 mm wide convex ridge 17 mm below the rim edge. There are also double five mm wide convex ridges 42 mm below the rim. All are unglazed.

Rim Finish F (Rolled Rim Variation): This unglazed vessel, (Figure 18) and accompanying sherds, is the most decorative in the collection. It is the opinion of the researcher that this vessel is an example of the potter's most artistic endeavor. It is a good comparison piece for other collections and for archaeologists in the field. It is probable that it can safely be defined as Groves 'style'.

The vessel consists of sixteen fragments. Fourteen fragments were cross-mended. Two rim sherds could not be attached to any partially reconstructed vessel. Five rim sherds have been cross-mended to the body of the most complete vessel. There was one sherd with a lug handle 61 mm below the rim. The rim, with attached body, stands 226 mm high and is approximately 272 mm in diameter at the rim. The base is 178 mm in diameter and is nearly complete. It is 182 mm high.

The lip of this vessel consists of two rolled and elongated extensions that project outward and down toward the body. It is 18 mm wide at its widest point.

The double extensions are about 5 mm wide at mid-point, both narrowing to a downward curved point. Thirty-eight mm below the rim edge is a 7 mm wide convex decorative ridge. There are two concave decorative ridges 120 and 127 mm below the rim that create a convex ridge in the center. One hundred and sixty one mm below the rim is another double extended “rim” which also curves toward the lower body of the vessel. There are another two concave ridges 200 and 208 mm below the rim. These also create a four mm wide convex ridge at their center.

There are insufficient fragments to attach the base of this vessel to the upper part of the body. It is apparent, however, that two of the cross-mended fragments of the upper vessel and one of the fragments of the cross-mended base were once one. The base is 10 mm thick and the accompanying body varies in thickness from 9 to 15 mm. It would have provided a stable base should the pot have been used. There is a seven mm hole in the center of the base, indicating it was probably a decorative flowerpot.

The base projects out from the body of the vessel, probably to provide balance and stability for the heavy vessel. Thirty-eight mm from the base, a series of six wide convex ridges begin. The first ridge is approximately 28 mm wide from the center of the concave ridge below it to the center of the concave ridge above it. The second convex ridge is approximately 30 mm wide from the centers of the concave ridges above and below it. The third ridge is much less pronounced and is 26 mm wide. The fourth, which is also less pronounced, is also 26 mm wide. There is a fifth ridge 11 mm above this. This indicates that originally something was attached to the exterior of the vessel at this point. Directly above this broken area is a narrower, but very pronounced ridge that is 26 mm wide. The fragmented base ends 12 mm above this pronounced ridge.

This vessel appears to have been difficult to produce. Many of the rim fragments are distorted. It is likely that there were several similar vessels attempted since there are two partial rims as well as six rim, four body and six base fragments, that are visually incompatible with the nearly complete vessel.

Narrow Rims

There are seven types of narrow-rimmed sherds. These are grouped in three general categories (Figure 31). They vary in size from 5 mm to 11 mm in thickness.

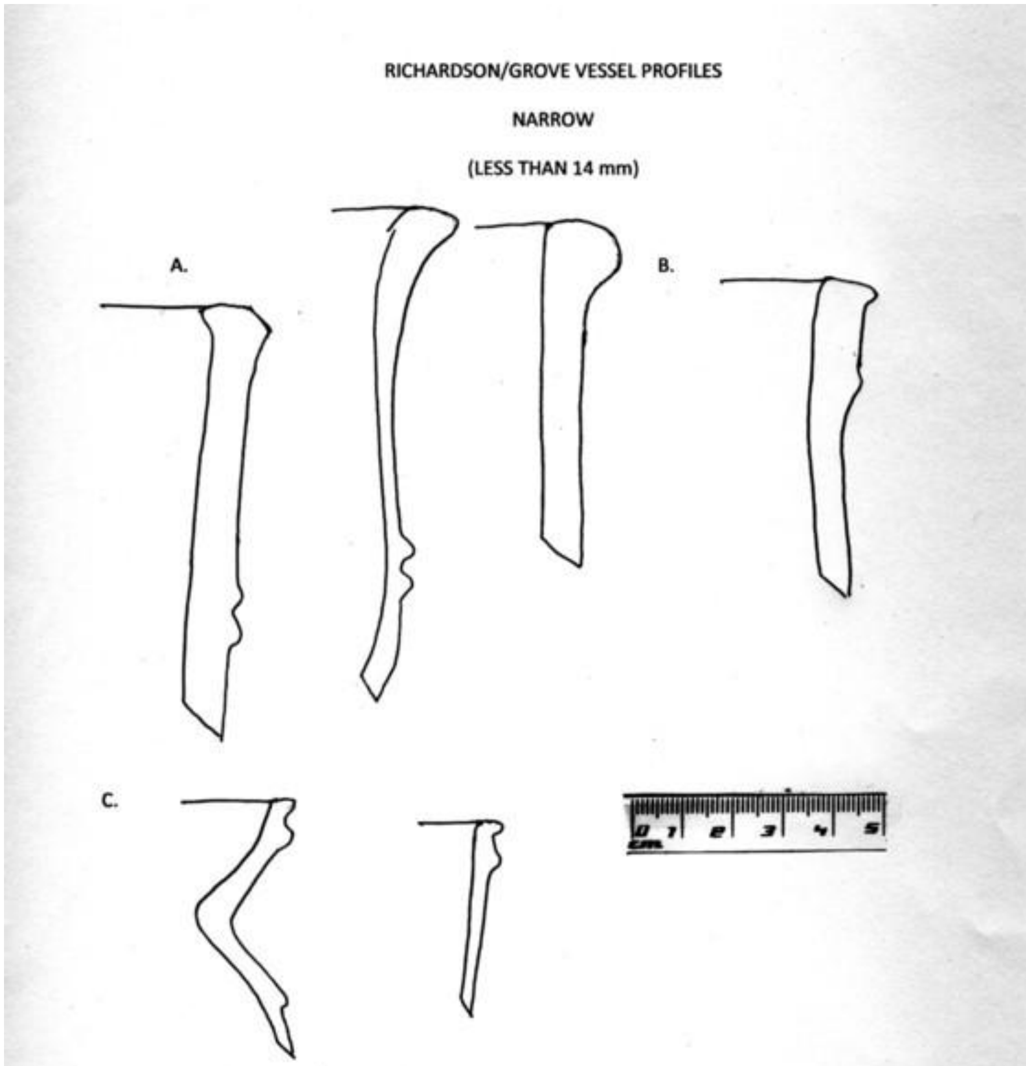


Figure 31: Narrow rim profiles.

Rim Type A (Flattened Roll): Three types of narrow-rimmed vessels are very similar. A group of four have been cross-mended. Another group of seven have also been cross-mended. There is one fragment of another type. The four cross-mended fragments have 9 mm thick rolled rims that are flattened on top. This partial vessel has a lip that angles slightly away from the body of the vessel and is trimmed flat on the edge. Fifty mm below the rim edge are three convex ridges divided by two concave ridges. The convex ridges are approximately 5 mm wide. The concave ridges are about 3 mm wide. This vessel was glazed a color similar to Munsell HUE 2.5 YR 5/8 only more orange.

The second group of flattened rolled rim fragments are 11 mm in thickness. The rims also angle slightly away from the body and are flattened to create an angular appearance. These sherds have no decoration and no glaze. Four of these sherds are marked with a number "3," probably to signify three-gallon containers (Figure 32). Two cross-mended pieces also share a number "3" marking. One piece is unmarked.

Figure 32: Example of number three.

Two rim sherds are glazed Munsell dark reddish brown, HUE 5YR 2.5/2. The lip thickness is 10 mm. The two sherds have been cross-mended with four body sherds. The rim area is constricted, creating a convex bulge toward the bottom of the fragment. On this bulge, approximately 60 mm below the top of the rim, are two decorative convex ridges. They are both five mm wide and are separated by a three mm wide concave ridge.

The last fragment of this type is very thin, measuring 8 mm. It rim is also flattened on top and side. This sherd lip protrudes very little from the body of the vessel. There are two convex ridges 55 mm below the lip. A concave ridge runs between the two. The convex ridges are five mm and the concave ones three mm wide. This sherd is glazed Munsell dark reddish brown, HUE 5YR 2.5/2 a dark reddish brown glaze, similar to the two discussed above. The rim and attached body are cross-mended with three body sherds. The piece has a slightly misshapen lug handle attached 38 mm below the rim. The handle is described in the Handle section.

Rim Type B (Flattened Canted Variation): Another group of rim sherds exhibiting a different lip finish are cross-mended into one complete vessel rim. There are twelve sherds. Very little of the body is present. The lip thickness is 10 mm, and the vessel opening is 285 mm in diameter. The rolled is flattened dramatically with. Eight mm below the rim is a convex ridge, 5 mm wide. The piece is unglazed.

Rim Type C (Ogee Curve): The two thinnest rim finish types are five and six mm thick. All thirty-two pieces are glazed with Munsell dark reddish brown, HUE 5YR 2.5/2. One sherd appears to be part of a pitcher spout. The rim is flared out from the body of the piece for 18 mm before reaching the shoulder. The lip is rolled with a convex ridge of approximately 7 mm in width two mm below.

The remaining thirty-one rim sherds are five mm in thickness. They also have rolled rims. Directly below the rims are concave ridges of approximately 2 mm in width, followed by a 3 mm convex ridge. None of these pieces could be cross-mended.

Other than a potters wheel, some unknown object was used to flatten some of the rolled rims and another was used to create decorative ridges.

5.2 Pedigo Waster, Damascus, Oregon

The redware fragments from the Edward Pedigo pottery were cleaned and cross-mended. No cataloging was done, since the collection was borrowed. Two boxes were randomly selected from the Northwest Pottery Research Center collection. There are seven hundred ninety two pieces in the sample. Nearly all of the samples are less than 50 mm square and none could be cross-mended. Six hundred and fifty four sherds are from the body or are unidentifiable. Identifiable parts such as rims, lids and handles were evaluated.

5.2.1 Lids

Thirty-eight sherds were probable lid fragments. Nine sherds were partial lids with partial handles present.

Construction:

There were two methods of construction, similar to the Richardson Grove site. The nine lid sherds with handles still present are convex with the handles situated at the apex of the curve (two-process hanging lid), Widths for these lid handles varies from 24 mm to 33. Height varies from 13 to 18 mm.

The other type of lid construction has a rim with a wide lip and high convex center which appears to have stair-stepped at least once (and possibly more times to the handle at the apex). Four lid fragments have remnants of a flange on the lower side for securing them to the vessel, (two process hanging lid) but do not have handle fragments. There are 29 sherds of this type. None could be cross-mended. No handles for this type of lid are present in the collection. None is complete enough to discern circumference or other details concerning convex lids from this site. Twenty-five are glazed with Munsell color, HUE 5YR 2.5/2 dark reddish brown.

Enough remains of all but one convex lid handle to see that it is very similar to those from the Richardson/Grove site. Since Grove actually worked this site for a number of years, it is probable that these are his work.

5.2.2 Bases

There are thirty-one base sherds present. Twenty-six are glazed Munsell color, HUE 5YR 2.5/2 dark reddish brown. The remaining sherds are unglazed. No cross mending was possible. No center holes are present.

5.2.3 Rims

There are thirty-one rim sherds in this collection. Six rim types can be distinguished (Figure 33). In addition to a Munsell HUE 5YR 2.5/2 dark reddish brown glaze, (also found at the Richardson/Grove site), two other glazes are present. They are colored Munsell HUE 2.5YR 3/4 dark reddish brown and Munsell HUE 10YR 4/4 dark yellowish brown with dark brown speckles.

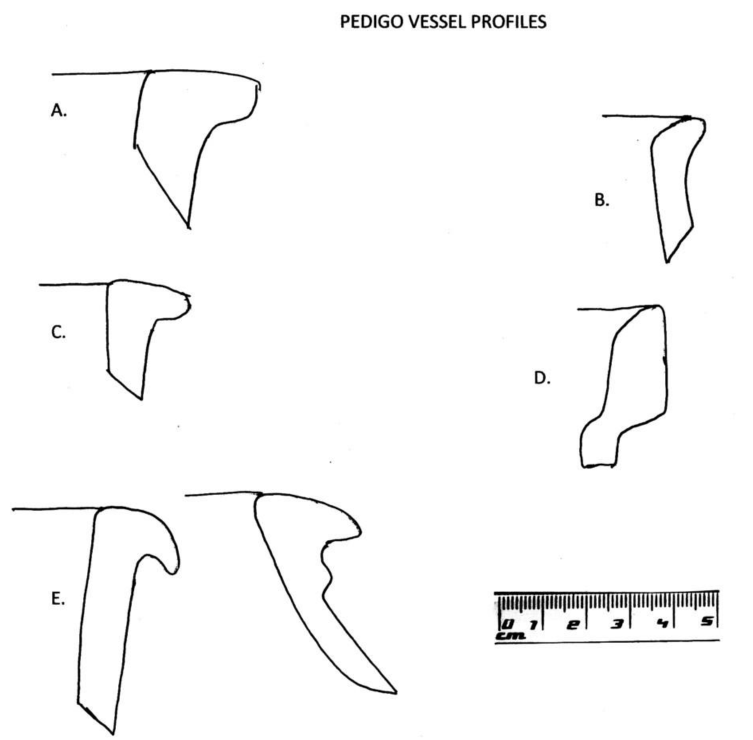


Figure 33: Pedigo rim profiles.

Construction:

Rim Type A (Flat Rim): Two rims have a flat, squared-off finish. The lip was rolled. The top and side were then cut, making the lip somewhat rectangular in shape. There are two pieces of this type. The first is 22 mm in width and is glazed Munsell HUE 10YR 4/4 dark yellowish brown, with dark brown speckles. The second is glazed Munsell color, HUE 5YR 2.5/2 dark reddish brown and is 19 mm in width. This vessel appears to be a jar or storage container and has a rim finish in which the collar angles out from the body to make a shoulder, creating a ledge on the interior.

Rim Type B (Reverse Canting): There are two types of upwardly angling rims. The angle is less pronounced in the first than in the second. There are eight fragments of this type. They vary in width from 13 to 20 mm. One is glazed Munsell HUE 2.5YR 3/4 dark reddish brown. Four are glazed Munsell HUE 5YR 2.5/2 dark reddish brown. Three are unglazed.

These rims are rolled. A tool was used to cut the roll at an angle to the body of the vessel. The tool was held slanted toward the interior of the vessel. The rim is, therefore, canted inward.

Rim Type C (Canted Flattened Roll): There are nine fragments of this rim type. Five are unglazed. One is glazed Munsell HUE 2.5YR 3/4 dark reddish brown. Three are glazed HUE 10YR 4/4 dark yellowish brown. Widths vary from 14 to 20 mm. These vessels differ from the inward canted rim type only in the manner in which the potter used the finishing tool. Instead of angling it toward the interior of the vessel, the tool was angled toward the exterior of the vessel—creating a rim finish that angles downward from the interior to the exterior edge of the lip.

Rim Type D (Wide Banded): There are four rims of this type. Three are unglazed. One is glazed Munsell HUE 5YR 2.5/2 dark reddish brown. These vary in thickness from six to 14 mm.

The long narrow vertical rim was made by leaving the rim thicker than the body of the vessel. The lip was smoothed, as was the base of the thickened portion, (possibly with a tool) which creates an indentation at that point. Length for this rim finish varies from nine to 21 mm.

Rim Type E: There are only three fragments of this rim type. They are 19, 22 and 24 mm in thickness. One is unglazed. The other is glazed Munsell HUE 5YR 2.5/2 dark reddish brown. These appear to have been finished by rolling the rim and then elongating the lip and allowing it to curve down and inward toward the body of the vessel. The two have convex ridges three mm below the base of the lip.

Two fragments appear to be similar to some of the rolled and elongated lip finishes found in the Richardson/Grove collection. The third may not be a lip fragment. It is more elongated and curved than the other two. (Figure 34) The upper surface of this rim is broken, and appears to have had something attached at one time—giving the impression that it was once a part of the body. This piece is remarkably similar to the decorative urn found in the Richardson/Grove collection (Medium Rim F).

Figure 34: Pedigo rim type E.

5.3 Harris Brothers Waster, Canemah, Oregon

The redware fragments from site excavation of the Harris brothers, burned kiln and waster dump were cleaned and cross-mended. Cataloging of the borrowed collection was not done. The evaluation only included a small sample of the collection. Rim sherds were selected to explore the hypothesis that they provide a unique signature for each pottery. Lids were not in evidence in the six storage boxes examined. One cross-mended flowerpot base, a cross-mended jug rim and handle, and all available fragments for a glazed jar were also examined as well as one rim fragment with a handle attached.

Construction:

Thirty-five rim sherds were randomly selected. These grouped into nine types. Finish size and shapes were remarkably similar for each group.

5.3.1 Rims

There are ten different rim types represented in the Harris Brothers sample collection. Profiles of the rim types are shown below. (Figure 35)

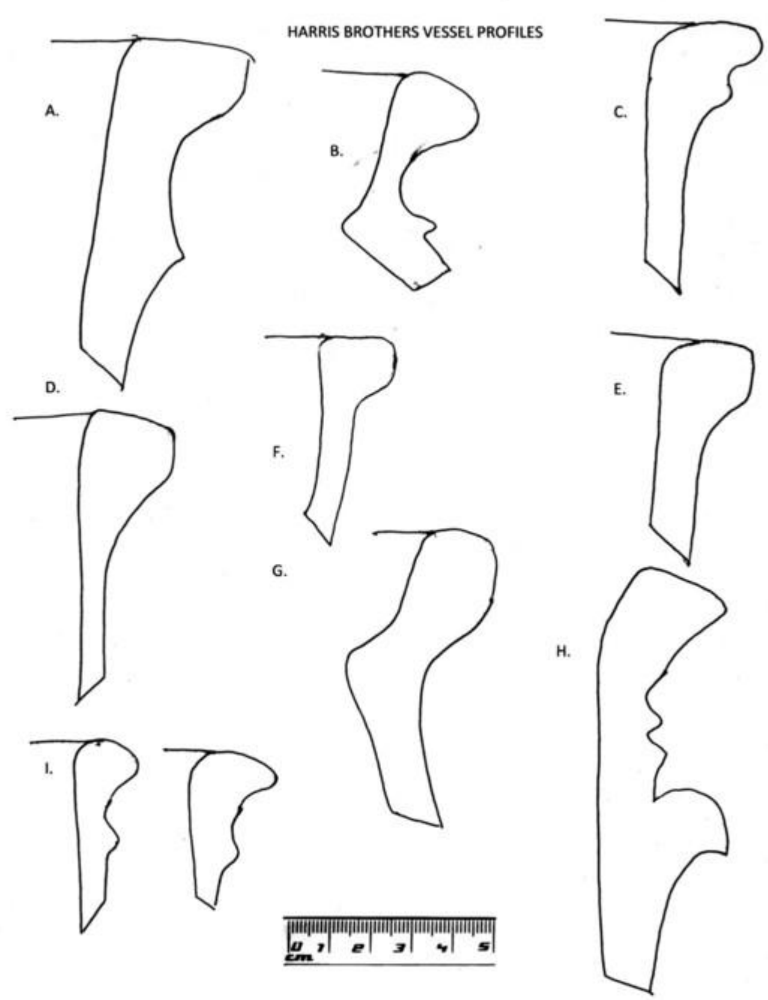


Figure 35: Harris rim profiles.

Rim Type A (Flattened Roll): There are two large sherds of this type in the collection. They are both substantial in thickness and were probably meant to be crocks or some other type of storage container. One sherd shows evidence of a handle, probably the lug type, to facilitate lifting.

The rims are of the simple rolled type. They were shaped using a tool. The top and the underneath side of the lip are squared-off. The outside edge was left rounded. They are 26 and 28 mm in thickness at the widest edge of the lip. Twenty-six and 45 mm below the bottom edge of the rim are 12 mm wide decorative convex ridges. Both sherds are glazed Munsell HUE 7.5 YR 4/6 strong brown on the exterior and a matte Munsell HUE 10YR 3/1 very dark gray on the interior.

Rim Type B (Canted Full Roll): Five similar fragments fit into this category. These vary in thickness from 18 to 20 mm. All are jars of some type. Collars narrow markedly above the shoulder, and then flair at the lip, creating an interior ledge. This rim type has a thick rolled rim that is flattened on the upper surface and slanted downward toward the exterior of the vessel. Eighteen and twenty two mm below the base of the lip on two of the four sherds are 6 mm wide convex decorative ridges that have been pinched at the outside edges, making them more angular than convex.

Three of these sherds are cross-mended. This vessel is glazed both on the interior and exterior with Munsell HUE 10 YR 2/2 very dark brown.

The other sherd of this type has three incised lines, four mm in width just below the point where the collar begins to narrow. This sherd has been cross-mended with two body sherds. There is also a base consisting of 16 cross-mended pieces and 22 unattached body pieces. This vessel is distinct because its exterior surface is glazed a matte Munesll HUE 10YR 3/1 very dark gray exterior and a glossy Munsell HUE 10YR 3/2 very dark grayish brown glaze which crazed on the interior.

The final sherd is glazed Munsell HUE 10 YR 2/2 very dark brown on the interior and the exterior. The shape of the lip is the same as discussed above, but there is no convex ridge at the base of the collar. There are two light draglines 38 and 45 mm below the rim that create a slight concave ridge 4 mm in width.

Rim Type C (Flattened Ogee). The third rim type is an elongated version of the type B, discussed above. The rim sherds are 21 and 22 mm thick at the rim, with an 8 mm wide convex ridge directly below and a part of the rim. This is an unusual rim finish, not found in other collections.

The first vessel of this type is glazed Munsell HUE5YR 4/6, yellowish red flecked with dark brown on the exterior and a matte Munsell HUE10YR 3/1 dark reddish gray on the interior.

The glaze on the second vessel is different than the first vessel. The exterior is glazed Munsell 10R 3/1 dark reddish gray. The interior is glazed Munsell HUE10R 3/2 dusky red. The exterior glaze was damaged in firing and may be the same glaze that was used on the interior. This vessel, when complete stood 136 mm tall with sides that angled away from the base. It was probably a bowl.

Rim Type D (Flattened Roll): There are four sherds of this type. These sherds are similar to Rim Type A. They are, however, considerably shortened and have no decorative ridges or incised lines below the lip. Lip thickness varies between 19 and 22 mm. All are glazed with Munsell HUE10YR 3/1 dark reddish gray on both the interior and exterior.

Rim Type E (Flattened Roll): These vessels are nearly the same as D. This lip has a squared off outer edge, created by rolling the lip and using a tool to create a more angular edge. There are six sherds of this type. Two are unglazed and cross-mended. Three are glazed with Munsell HUE10YR3/1 dark reddish gray color on both the interior and exterior. The fourth is glazed Munsell HUE 7.5 YR 4/6 strong brown on the exterior and Munsell HUE10R 3/2 dusky red on the interior. One sherd has kiln furniture attached to the lip.

Rim Type F (Flattened Roll): This rim type is similar to D. These were probably much thinner, possibly smaller vessels, than D, however. Lip thickness varies between 15 and 20 mm. Two of the sherds are fused together with two pieces of kiln furniture. These have a decorative pinched convex ridge 22 mm below the rim. All are glazed with Munsell HUE10R 3/2 dusky red. The exteriors and interiors of three sherds are matte.

Rim Type G (Rolled Wide Banded): There are two examples of this rim type. It is unlike any other vessel in this collection. The lip barely protrudes from the body of the vessel. The thickness is only 18 mm but the length is 30 mm. The collar angles out from the body of the vessel at the shoulder, creating a shelf on the interior. There is a fragment of a lug handle attached to one fragment. The color is Munsell HUE10R 3/1 dark reddish gray. A second fragment of this rim type is unglazed and the lip is 14 mm thick and 18 mm long.

Rim Type H: There is only one example of this rim type. It is important because “MH & Bro is incised into the widest part of the body (Figure 36). Approximately one-third of the rim of this vessel is present. The rim is unusual. Rather than rolled, it has been cut along the finish of the lip. The exterior edge was smoothed, but the interior edge was not. The collar and lip are all one. This vessel has a collar that angles away from the body but has no interior shelf for a lid to rest on. There are two 2 mm convex ridges 20 and 27 mm below the top of the vessel. There are also three incised lines 78, 86 and 118 mm below the top of the vessel. These were probably used for positioning the handle.

Figure 36: Signed Harris rim sherd.

Approximately half of one handle is still present. This handle is not shaped like any of those examined before. It is somewhat a cross between an ear and a lug handle. It has a wide bale across the top which drops perpendicular to the upper part. The lower end is flattened in the process of smoothing the handle to the vessel. The entirety of the handle present is fully incorporated into the body of the vessel with no separation at the upper rim. Glaze used for this piece is Munsell HUE10R 3/2 dusky red in color. The interior is matte, the exterior gloss.

Rim Type I (Ogee Curve Variations): There are ten fragments in the collection. Lip thickness varies between 8 and 18 mm. One fragment from the waster is unglazed Munsell HUE 7.5YR 7/6 reddish yellow colored redware. Two examples are also unglazed but were apparently inside the burned kiln, resulting in a Munsell HUE 5YR 6/1 gray. Four fragments were apparently glazed but the high temperatures in the kiln fire caused them to become a matte Munsell HUE 5YR

3/1 very dark gray color. The final two sherds are cross-mended. Their color is the same as the previous four but glossy rather than matte.

This rim finish type is of particular importance since there are so many fragments of it. It appears to be a signature style of at least one of the Harris brothers. The rim is rolled, the outside edge canted somewhat down and toward the body of the vessel. The underside of the lip is angled upward to meet the upper part of the curve. From 11 to 20 mm below the lip finish, the vessels have a convex ridge created with hand pressure. The ridge is pinched to varying degrees, creating a point on the exterior surface.

5.3.2 Other Fragments

The three cross-mended fragments that form a partial flowerpot base are the same Munsell HUE 5YR 6/1 gray color as two of the rim sherds. These are unglazed as well. The diameter of the base is 78 mm, (a small flowerpot) with a 9 mm partial hole in the center. Sherd thickness varies from four to seven mm. It is possible, considering how thin all of the gray rim fragments are, that they are fragments from the same vessel as this flowerpot vase.

Seven sherds have been cross-mended into a partial jug with lug handle. The jug fragment is unglazed. The lip is 45 mm in diameter. It has been rolled and has a very indented four mm concave ridge, (possibly to accommodate a string tie) followed by a five mm convex ridge directly below the 10 mm lip (ringed collar).

The upper surface of the lip has been flattened. There are two handle sherds, one was still attached to the lip on the upper surface. Five body pieces were cross-mended to the lip.

5.4 Grove Waster, Farmington, Washington

The redware fragments from surface collection at the Eden Valley site in Farmington, Washington, were cleaned and cross-mended. Cataloging was not done since the collection was borrowed. One storage box of sherds was selected for examination. The box contained 42 rim sherds, one decorative lid, five lid handle fragments, and one complete flowerpot base with minimal attached body. Sherds were evaluated and compared with the Champoeg flowerpots, and sherds from the other three sites.

5.4.1 Lids

Surface collection at the site of Grove's Farmington pottery yielded more of the two step cone shaped lid handles, similar to those found in Grove's Damascus site. Five lid fragments with cone shaped handles were found. A partial teapot lid was also found (Figure 37).

Figure 37: Teapot lid.

The partial teapot lid found at the Farmington site is minimally glazed on the exterior in a Munsell HUE 2.5YR 4/2 weak red (red/gray) color. It is 68 mm high. At its widest diameter, it is 92 mm however, much of the rim of the lid is absent. The lid is an exaggerated cone shape with undulating sides reminiscent of the base of Grove's medium rim type F vessel. The top of the lid begins with an upper cone which is nearly complete. Only a small chip at the very top is present. The upper cone is approximately 36 mm in diameter at its widest point (18 mm below the uppermost point). Below the upper cone, the lid constricts before widening again to a diameter of approximately 56 mm. There is a slight constriction below this ridge before the lid continues outward to what would have been the rim. A six mm hole was made through the lid at the last constriction, probably to release steam indicates this was most likely a teapot lid.

There are only a few fragments of teapot's lid rim remaining. One area of the existing rim is 18 mm from the constricted area to the downward curving edge. This indicates the lid was probably approximately 116 mm wide when it was complete. This lid is of particular importance due to its similarity in style to the Damascus vessel base.

5.4.2 Flowerpot Base

The only probable flowerpot base in the sample is 88 mm in diameter. It has an 8 mm wide hole through the center. A minimal amount of the body is present. It is unglazed.

5.4.3 Rims

There are forty two rim sherds in the sample collection from Grove's Eden Valley pottery site. Nine different rim types were represented (Figure 38).

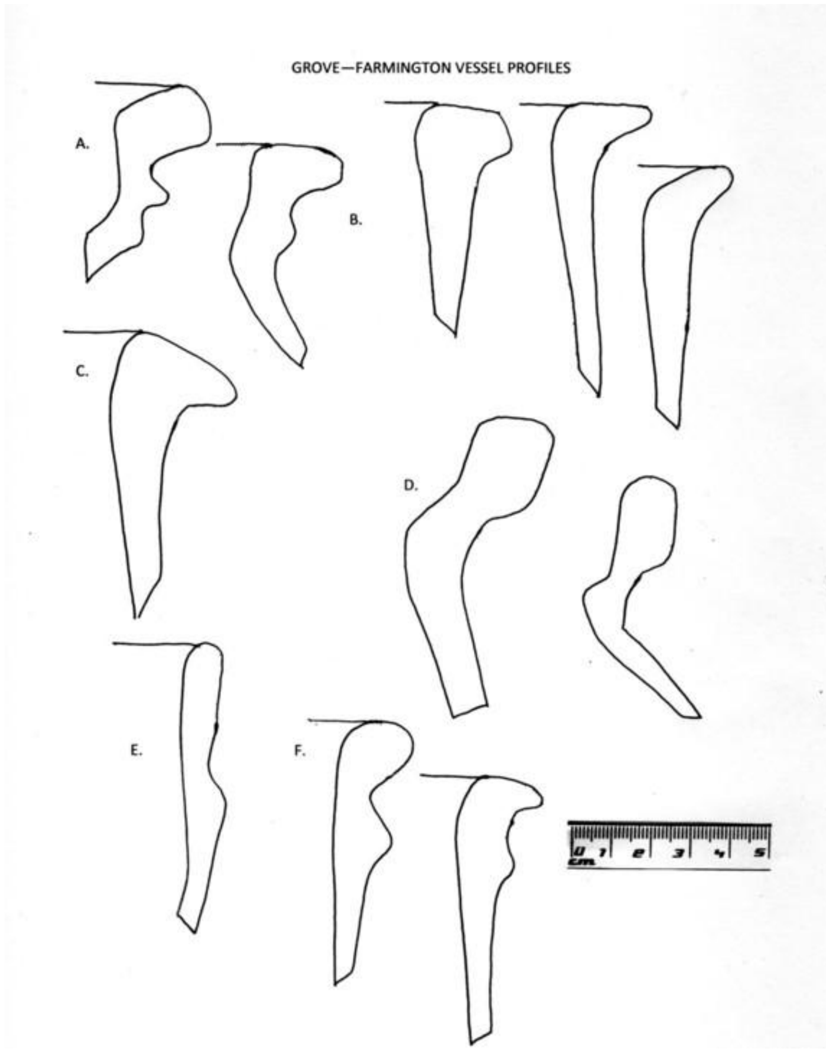


Figure 38: Farmington rim profiles

Rim Type A (Flattened Ogee): There are ten fragments of this rim type. Several appear to be from the same vessel but do not cross-mend. Two fragments are reverse canted. The fragments vary in thickness from 20 to 23 mm. All sherds are from jars of some type. They have collars that narrow and then flair at the shoulder, creating an interior ledge. This type also has a thick rolled rim that is flattened on the upper surface. Between 4 and 8 mm below the base of the lip, on all of the sherds, are convex ridges. These ridges are between three and nine mm wide. The sherds are glazed in four color types. One is unglazed. Two are Munsell HUE 2.5YR 3/4 dark reddish brown. Two are Munsell HUE 10R 3/1 dark reddish gray. Three are matte colored Munsell HUE 2.5YR 3/2 dusky red. One is HUE 10YR 3/4 dark yellowish brown. The last is HUE 10YR 6/6 brownish yellow.

The two reddish brown fragments have markings where lug handles were once attached. One of the dark reddish gray fragments has the upper corner of what appears to have been a 3. This indicates it was probably a three-gallon crock.

Rim Type B (Flattened Roll): There are eleven sherds of this type. They have no decorative ridges below the finish. All have slightly flattened upper surface. None could be cross-mended. The lip thickness varies between 20 and 23 mm.

Three unglazed sherds may have come from the same vessel. This appears to have been a mixing bowl or chamber pot. One other unglazed fragment of this type has a complete strap handle attached. The handle is 41 mm wide where it attaches directly to the lip and 32 mm wide where it attaches to the body. Its total length is 88 mm. This appears to have been a chamber pot.

There are two sherds glazed HUE 10R 4/4 dark yellowish brown. One is a large piece with considerable amount of body attached. It has a lug handle. The handle is well-made, and set neatly in place 16 mm below the base of the lip. This sherd also has a complete number three incised to the right of the handle. This indicates it was probably a three-gallon crock (Figure 39).

There is one sherd glazed Munsell HUE 10YR 3/4 dark yellowish brown. It also has the number three incised 19 mm below the rim.

The three of the remaining sherds are glazed Munsell HUE 10YR 6/6 brownish yellow. The last is glazed Munsell colored HUE 2.5YR 3/2 dusky red. This sherd has an unevenly attached lug handle. The flattened, rolled rim is canted toward the interior of the vessel.

Rim Type C (Canted Roll): There are two sherds of this type. These sherds have a rolled lip (similar to type B) that is canted downward toward the exterior body of the vessel. Both are glazed a matte HUE 2.5YR 3/2 dusky red. One is incised with a small Roman numeral two 9 mm below the rim.

Figure 39: Examples of incised number 3, Farmington.

Rim Type D (Rolled Wide Band): This rim type is similar to Harris brothers' type G. There are sixteen rim sherds of this type. The lip barely protrudes from the body of the vessel. There are two thicknesses—12 and 18 mm. The collar angles out from the body of the vessel at the shoulder, creating a shelf on the interior. Two fragments are unglazed. Three fragments are glazed Munsell HUE 2.5YR 3/4 dark reddish brown. One has a partial lug handle attached. Two more are a closely related color, HUE 2.5 YR 4/4 reddish brown.

There are three rim sherds glazed Munsell HUE 2.5YR 3/2 dusky red. One has most of a well-made lug handle attached six mm below the rim. Another has an entire handle attached. One other sherd of this color appears to have had kiln furniture attached that broke off.

The final four sherds are glazed HUE 10YR 6/6 brownish yellow. Three appear to be large jars. One is the complete rim, with attached body of a small jar. The mouth is 77 mm in diameter.

Rim Type E: There is only one unglazed sherd of this type. The lip thickness is 9 mm. The rim is smoothed and rounded at the top. Twenty-nine mm below the top of the lip is a convex ridge 8 mm in width. This finish is similar to type F but lacks lip definition.

Rim Type F (Ogee Curve & Variations): There are two sherds of this type. The rim is rolled, the outside edge canting somewhat down and toward the body of the vessel. Both the upper surface and the exterior surface of the lip are convex.

Eight and 12 mm below the base of the lip, the vessels have a convex ridge which was made with hand pressure underneath the rim and on the body below the ridge. One sherd has a more flattened and canted lip finish. The other sherd is more of a classic ogee curve.

Chapter 6: Artifact Analysis: INAA and Inclusions

6.1 Instrumental Neutron Activation Analysis

Dr. Lea Minc conducted Instrumental Neutron Activation Analysis (INAA) on a selection of ceramic samples from each pottery site and the Champoeg vessels. Analysis was done at the Oregon State University Radiation Center. Dr. Minc directs the archaeometry program at the center. Although the researcher has no background in INAA research, after a brief orientation and considerable reading on the subject, she was allowed to prepare the project samples for irradiation. Graduate student Jessica Hale conducted a training session on how the samples should be prepared for the reactor. She also supervised the first sample preparations.

Forty-five samples were chosen. They were prepared in two batches. Three sherds from each of the seven Champoeg vessels were selected. Six sherd samples from each of the four pottery sites were also selected. When possible, pottery sherd samples without glaze were chosen from the pottery sites. This was done to most closely approximate the unglazed vessels from Champoeg.

All samples from the Champoeg flowerpots were removed from the body of cross-mended vessels. Sherds that were attributed to vessels but could not be cross-mended were not used. The twenty-four sample choices from pottery sites were assigned catalog numbers and labeled with ink to prevent confusion. Since the INAA process is destructive, forward and reverse photographs were taken of each sherd.

At the archaeometry lab in the Radiation Center, preparation was repeated for each sample. Latex gloves were worn during each step of the preparation. Gloves were changed before proceeding to the next step or the next sample. This precaution is to prevent the possibility of contamination from salts that might be present on the researcher's hands. Each sample was placed inside of a small isolation chamber. A portion of the exterior of each sample was ground clean using a silicon carbide burr. This process removed glaze (if present) and any post-depositional material that remained on the surface after the initial cleaning. The cleaned portion was then removed, using a tile cutter, and placed in a ceramic crucible. The samples were carefully washed with de-ionized water and placed on labeled filter papers. They were then put on an aluminum tray and placed in a 40˚ Celsius (135˚ Fahrenheit) oven to dry for twenty-four hours.

After the twenty-four hour drying period, the samples were removed from the oven and the grinding process began. Again, latex gloves were used at all times. Gloves were changed between sample preparations. Each of the small redware samples was removed from the drying tray, and placed (one at a time) in a ceramic mortar. A filter paper was placed on top of the piece to prevent flying ceramic sherds during crushing. A pestle was used to crush the piece into small (no larger than 5 mm) pieces. The filter paper was removed to prevent the possibility of contamination from small bits of paper in the sample. Using the pestle, the samples were reduced to powder. The crushed sample was placed in a small, lidded glass vial. Both lid and vial were marked with the sample's identifying number. The mortar and pestle were carefully washed with de-ionized water, and dried before proceeding to the next sample. The vials were placed on the tray and lids were removed. The tray was returned to the oven for another twenty-four hour drying period.

After the second drying process, the weighing and encapsulating procedure began. Using a small metal scoop, approximately 250 ml of each sample were placed into 400 µl polyvials, and weighed using an AG285 Mettler Toledo scale. Each vial was carefully sealed and wiped. The identification number for the individual sample was written on the outside of the vial before proceeding to the next sample. For controls, two hundred mg of five standards were also placed in vials. These were included in each batch. Dr. Minc uses NIST-1633a (coal fly ash) as a reference standard. Two hundred mg of two check-standards were included as well. They are, NIST-688 (basalt rock), and New Ohio Red Clay. Three samples of the coal fly ash were used in each batch. These are industry-trusted standards, made available to research laboratories by the National Institute of Standards and Technology (Bishop 2002: 605).

After closing the vials, they were heat-sealed to prevent accidental opening and contamination in the reactor. Each vial was placed into a slightly larger vial and heat-sealed again, for added protection. The vials were then bagged to await irradiation.

The two batches of samples were processed separately. Each was "subjected to a seven hour irradiation in the rotating rack at the O.S.U. TRIGA reactor, a location which experienced a nominal thermal neutron flux of 2 x 10^2 $n \cdot cm^{-2} \cdot s^{-1}$" (Minc). The batches were allowed to cool for five days and counted for 5000 seconds (live time). This process was used to detect elements with short half-lives. A high-resolution germanium detector was used to take half-life counts. The samples were then allowed to continue to cool for four weeks and, using the high-resolution germanium detector, a 10,000-second count was taken. This count indicates elements with long half-lives.

According to Dr. Minc, "(t)he ceramic samples were analyzed for a suite of 25 major, minor, and trace elements. . .The two counts provided data on As, La, Lu, K, Na, Sm, U, Yb, and Ba, Ce, Co, Cr, Cs, Eu, Fe, Hf, Nd, Rb, Sb, Ta, Tb, Th, Zn, and Zr, respectively" (Minc, personal communication, 2008).

The resulting data was initially somewhat inconclusive. Examination of the inclusions clarified which elements in the analysis should be given less importance, (because of the abundance of decomposed basalt found in the samples) and which should be evaluated more closely. Cluster analysis and bivariate plots were used to allocate individual specimens to statistically viable groups. This is a standard INAA procedure for ceramics (Pearsall 2008: 1681).

Initially, EVA-003 from Eden Valley grouped with the Harris samples during cluster analysis (Figure 40). This was confusing due to their geographic distance from each other. Dr. Minc determined this was an attempt, by the computer program, to put the sample into a group most similar to itself. Evaluation of the data indicates EVA-003 is significantly higher in rare earth elements than the other Eden Valley samples. Rare earth element quantities are most similar to the Harris brothers' sherds. After removing lanthanum, samarium, ytterbium, cerium and neodymium from the equation, this vessel grouped with the other Eden Valley samples, as expected (Figure 40). Since this sherd is a flowerpot base, it is possible that it was not produced at Eden Valley, but was simply a part of the household furnishings that were moved from Damascus, and was eventually tossed in the waster when it broke.

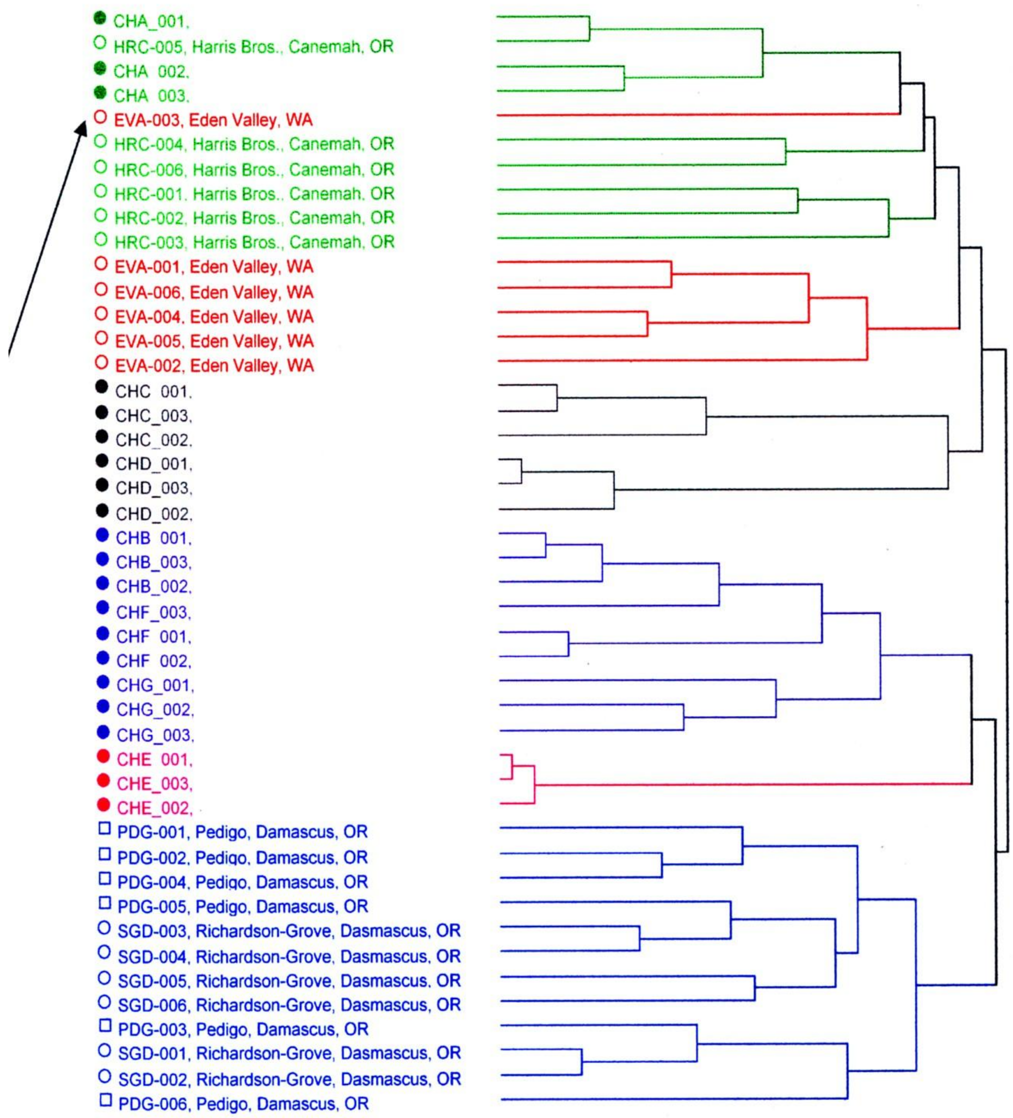


Figure 40: Cluster analysis based on all elements, using Euclidian distance, and minimum variance clustering algorithm.
Note that one outlier from Eden Valley joins with Canemah samples, due to influence of rare earth elements.

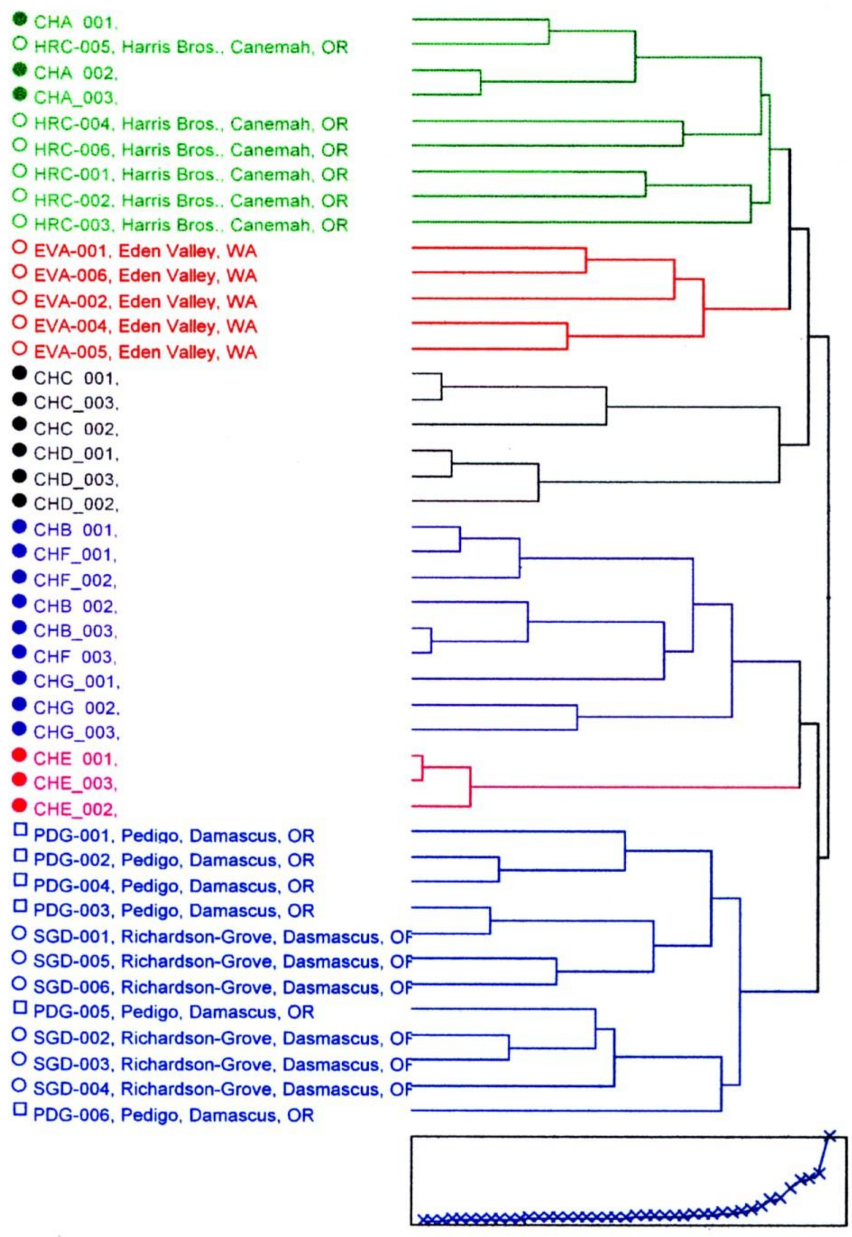


Figure 41: Cluster analysis excluding rare earth elements, using Euclidian distance, and minimum variance clustering algorithms.
Note that Canemah, OR and Eden Valley, WA (Farmington) reference groups separate.

Each group of pottery site samples separate statistically from each other. The exception is the Richardson/Grove group and the Pedigo group, which overlap. This is to be expected due to their proximity to each other. They successfully separate from the Harris and Eden Valley samples, however.

As expected, Vessel E separates from all other samples on most counts. All three samples taken from Vessel E indicate significantly lower amounts of samarium, ytterbium, barium, cerium, neodymium, scandium, thorium, and zinc than the other samples in the project. This vessel is also extremely high in chromium. This corroborates visual evaluation that found it unique in form and texture, and unlike all other vessels examined.

Vessels C and D consistently form a statistically viable group based on cluster analysis. This is due to similarly high quantities of lanthanum, lutetium, and samarium in comparison to the other samples. A bivariate plot of scandium and cesium, however, separates them from each other. Unfortunately, these two vessel samples do not form a statistical group with any of the pottery sites that were sampled. It is entirely possible that the identity of the potter who produced them can be found during future research. Their elemental content indicates that they are most likely from the Northern Willamette Valley.

In an exciting departure from the samples at hand, data from previous research on Willamette Valley bricks were compared to the project data (Figure

42). Vessels C and D consistently clustered with brick samples from the Catholic Church at St Paul. St. Paul, Oregon is located approximately twenty miles south-east of Portland and five miles east of Champoeg State Park. The St. Paul bricks were used to build St. Paul Catholic church and were produced very early in Oregon history. Nuns from the Notre Dame du Nam, who came from France, and the orphan children they supervised, produced the preponderance of the bricks in 1846. Local clay (just behind the present church) was used for the brick-making project. Brick samples from the church were obtained after renovations were required following a 1993 earthquake (David Brauner, personal communication). The correlation between Vessels C and D from the Champoeg archaeological site, indicates that a nearby potter may have produced these two vessels from similar clay.

Samples from Vessels C and D also grouped statistically with brick samples from the historic Hidden Brick Company in Vancouver, Washington (Groundspeak, Inc. 2008). They may have come from that area instead. Further research is needed to clarify elemental differences and similarities, locate other potteries, and compare Vessels C and D with other collections at the Northwest Pottery Research Center.

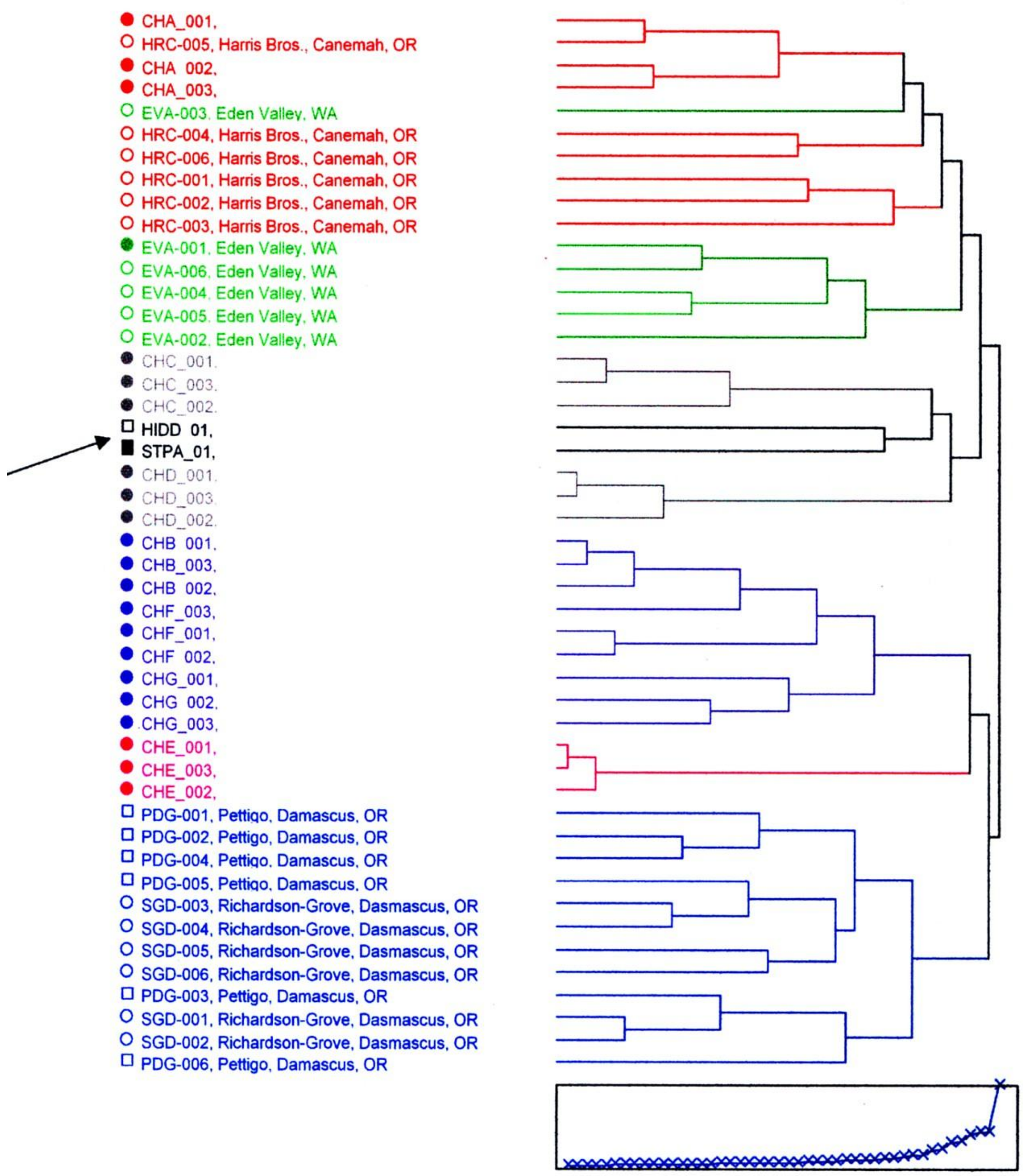


Figure 42: Cluster Analysis based on all elements, using Euclidean distance, and minimum variance clustering algorithms with bricks.
Note that the bricks from Hidden Brick Co. (Portland) and from St. Paul's Church join with vessels C and D.

The most exciting information gained from Instrumental Neutron Activation Analysis in this project, is that visual attribution of Vessel A to the Harris brothers appears to be statistically viable. Cluster analysis consistently places the three samples from Vessel A into a grouping with the six Harris site samples. This placement is due to comparatively high amounts of cesium, hafnium, and scandium. These are attributes shared by all nine samples.

Although previous Instrumental Neutron Activation Analysis research by the Northwest Pottery Research Center found a statistical separation between the Pedigo and Richardson/Grove sites, this study did not indicate that difference. Cluster analysis of the elements consistently created a statistical group containing the samples from both sites. The twelve samples are similar in quantities of every element evaluated. These twelve samples are also lower in Cesium than the other thirty-three samples. It is possible that a larger study would successfully define their differences.

Unfortunately, neither the Pedigo nor the Richardson/Grove samples formed viable groupings with Vessels B, F and G from Champoeg. Marked differences in quantities of Arsenic, cesium, chromium, cobalt, hafnium, rubidium, tantalum and zinc prevent the possibility of tying the three vessels to Grove. Only in the bivariate plot of scandium and cesium did they fall within the 90% confidence range of the Grove and Pedigo samples. The three Champoeg vessels do form a statistically viable group with each other. However, the original attribution to Grove was an incorrect hypothesis. The fact that Vessels B, F and G grouped together may indicate they are from the same potter. According to Dr. Minc, the three vessels are probably a product of one of the Willamette Valley potters. This is indicated by their elemental make-up. It is similar enough to all of the Willamette Valley samples that future evaluations could probably establish the potter who produced them.

The three bivariate plots (chosen from myriad possibilities) that most clearly illustrate sample groupings have been included (Figure 43, 44, and 45). The first, using lanthanum and lutetium, does group Vessels B, F and G with the Pedigo and Richardson/Grove sites. The Harris and Eden Valley sites overlap in two groupings—one in combination with Vessel C and D samples.

However, the second two bivariate plots (with ellipses drawn at the 90% confidence interval) show clear separation of pottery sites and Champoeg vessels, as well as clear groupings. The figures below show bivariate plots of scandium and cesium (Figure 44), and chromium and thorium (Figure 45).

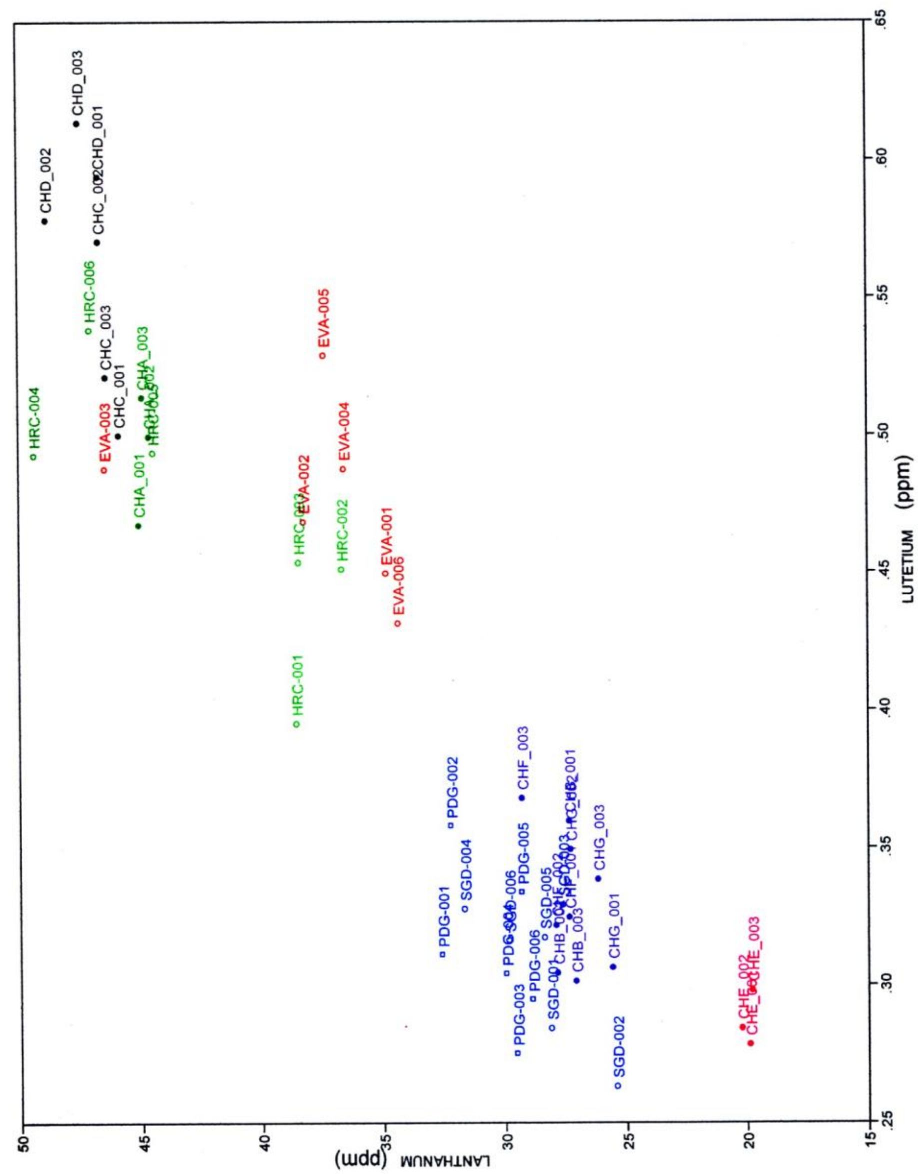


Figure 43: Bivariate plot for Lanthanum and Lutetium.

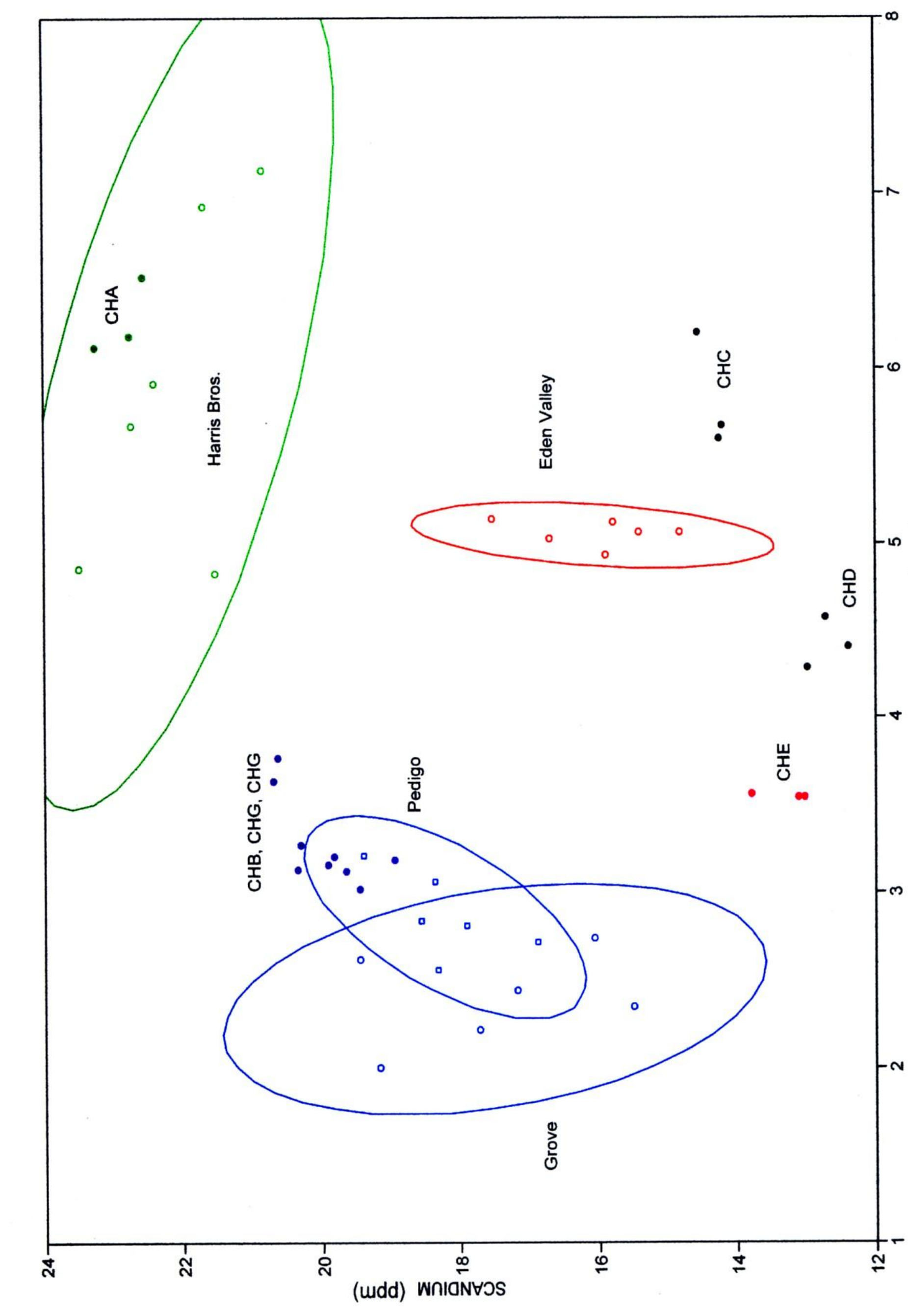


Figure 44: Bivariate plot for Scandium and Cesium.

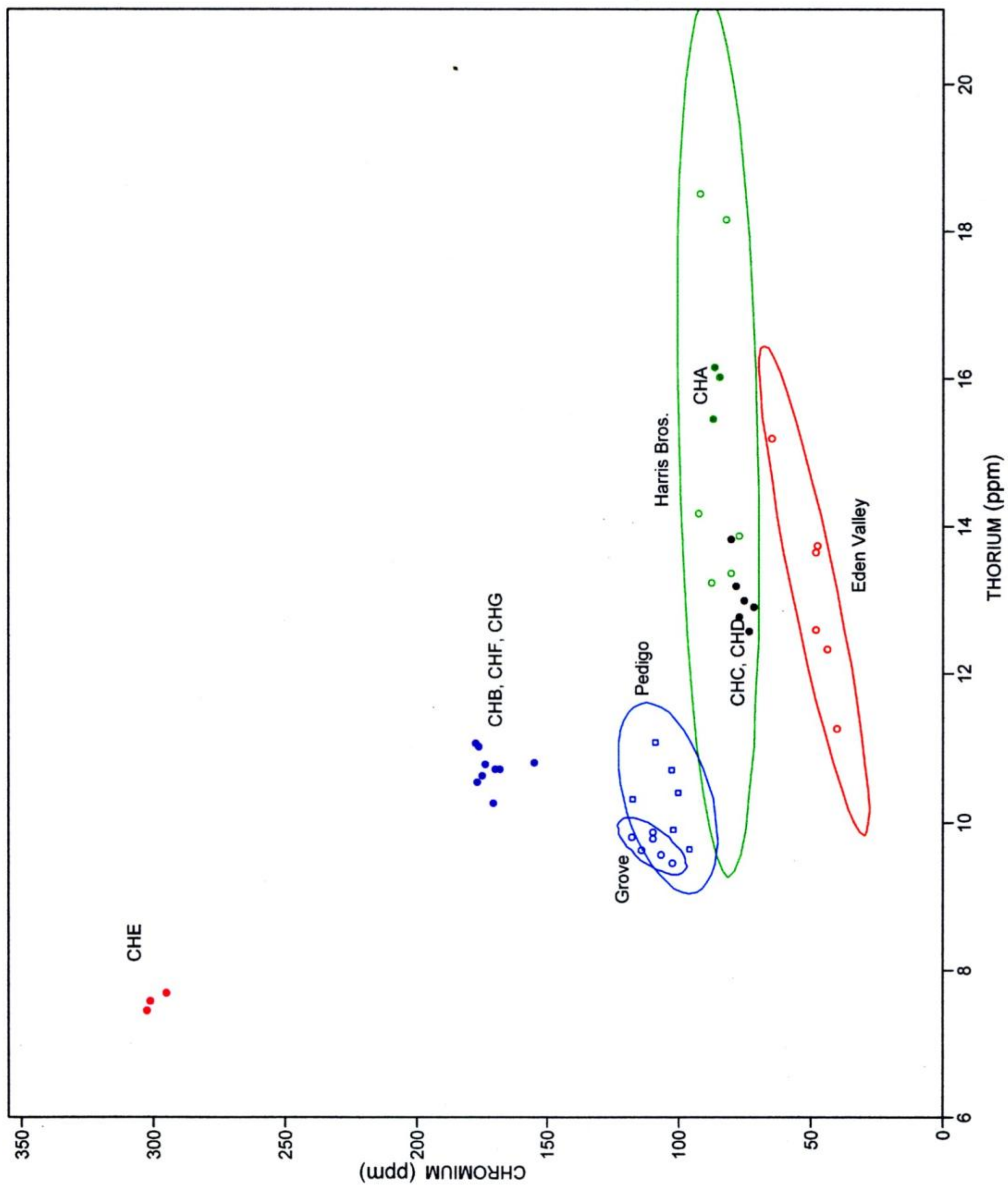


Figure 45: Bivariate plot for Chromium and Thorium.

The complete data results from this research is included in Appendix 1. It is hoped that this data will be useful to others researching Northwest redware.

6.2 Instrumental Neutron Activation Analysis References

An article entitled “Neutron Activation Analysis,” was recently published by Dr. Leah Minc in the *Encyclopedia of Archaeology*. In this article, Dr. Minc provided simply stated educational material. A glossary of terms that might not be known to the average archaeologist was included. A history section and one on a basic principles of how the analysis works were helpful. Of particular interest was the discussion on the complexity of distinguishing provenience for ceramics (Pearsall, 2007).

Once Instrumental Neutron Activation Analysis was established as the principle method for finding the source of the Champoeg flowerpots, other such studies were reviewed. Articles by Blaine Schmeer, Richard Pugh and Harvey Steele were consulted first. These were valuable for information The Northwest Pottery Research Center had already obtained through archival research, and archaeological work they had conducted with Dr. Dan Scheans. A careful check of their primary resources was conducted however, and several more were located in the process.

Unfortunately, articles written by Pugh on Instrumental Neutron Activation Analysis conducted by Scheans and The Northwest Pottery Research Center could not be used. They are valuable for a basic understanding of their results, but all primary data was lost when Dr. Scheans died. Neither was there information on what standards had been used, length of time the samples were irradiated or for that matter, number of samples in the study. This is unfortunate since the work would be very valuable for comparison with other ceramics projects in Oregon and Washington, if they could be successfully compared with the Pottery Center's data. Such data could not be used, however without standardization between studies.

Also useful was an article, recently published in *Historical Archaeology*. The article concerns a study conducted by the Utah Pottery Project. Scarlett, James, Speakman and Glasock provide a recent example of the use of Instrumental Neuclear Activation Analysis in historic pottery research. This group was fortunate enough to have obtained ledgers and church documents identifying vessel type, amounts produced, monthly and yearly production and location of the pottery sites. Excavations of many of the potteries had already been conducted. Funding was also available for Instrumental Neutron Activation Analysis on a large quantity of samples.

The Utah Pottery Project research "revealed some fabric, decorative, or glaze characteristics that may be unique to specific potters in specific locations" (Scarlett, et.al. 2007: 83). Sample preparation, similar to the Oregon State University pottery study, was conducted. Reference standards and control samples were similar (they were not from the National Institute of Standards and Technology, however). Irradiations were for different time lengths as were cooling periods. Bivariate plots were used to obtain groupings of like samples. The quality and quantity of the Utah research is enviable. Similar studies should be the goal for Oregon pioneer pottery sites and collections.

Other articles using Instrumental Neutron Activation Analysis for pottery sherds were also evaluated. These included, G. Harbottle's "Neutron Activation Analysis of Potsherds from Knossos and Mycenae," an early study published in 1970. In this older study samples were not pulverized but were cleaned and wrapped in aluminum foil. The standard was a piece of glass with known chemical content. Irradiation was for 5 hours and the cooling period was ten weeks. Shorter half-life elements were not counted. Groupings were based on evaluation of one chemical at a time not bivariate plots. Knossos and Mycenaean samples did separate from each other when ten elements were considered.

Two articles taken from *Chemical Characterization of Ceramic Pastes in Archaeology* edited by Neff, were used. "Characterization of Archaeological Ceramics at MURR by Neutron Activation Analysis and Multivariate Statistics" by Michael D. Glascock, was helpful for understanding the Instrumental Neutron Activation Analysis process. "Scale and Paste: Investigating the Production of Godin III Painted Buff Ware" by Hendrickson and Blackman served as another example of how INAA has been used in the past. This study was based on the hypothesis that relatively few potters produced Godin III Painted Buff Ware. The discovery of a number of vessels still located on the workshop floor led to INAA and petrographic thin sectioning. Instrumental Neutron Activation Analysis data successfully supported the research hypothesis. Also of interest for this study was Hendrickson and Blackman's discussion on potter's techniques which included a statement that,

> "products of individual potters tend to be slightly different in absolute size and proportions. . .Measurements are usually taken from the hand. . .such measurements become unconsciously incorporated onto the potters mental template. Consequently, if two potters with slightly different hand sizes are producing 'identical' forms, the dimensions. . .will vary proportionately to the relative size of their hands" (Neff 1992: 131-132).

6.3 Inclusion Evaluation

The pottery sherds chosen for Instrumental Neutron Activation Analysis samples had been previously broken to provide a quantity of material for processing. Fragments of all but one of the samples remained. It was a simple procedure to view the remaining sherds through a microscope. Some destruction of an artifact is usually necessary to examine inclusions. The fresh breaks from removing INAA samples provided a clear view of the inclusions without further destruction or interference from post-depositional debris.

Under the microscope, color, size, sphericity and roundness, as well as percentage of inclusions to clay ratios were recorded (See Appendix 2 for Charts). Comparisons to Willamette Valley clay samples were also made. The Wentworth scale was used to determine particle sizes. The samples were then photographed (Figure 46).

All of the samples contain inclusions derived from decomposed basalt. Inclusions include rust colored hematite, coral colored potassium feldspar, black intact basalt granules, white granules (either magnesium oxide or calcium oxide), and white to nearly clear quartz crystals of various sizes (Minc personal communication). Other inclusions are, small bits of granite, grog, (ground bits of pottery retrieved from the waster dump for a second use) and, in one of the Harris brothers' sample, a small bit of oxidized copper.

All Champoeg samples, with the exception of Vessel E, contain inclusions remarkably similar to the sample of Willamette Valley clay. Vessel A contains a

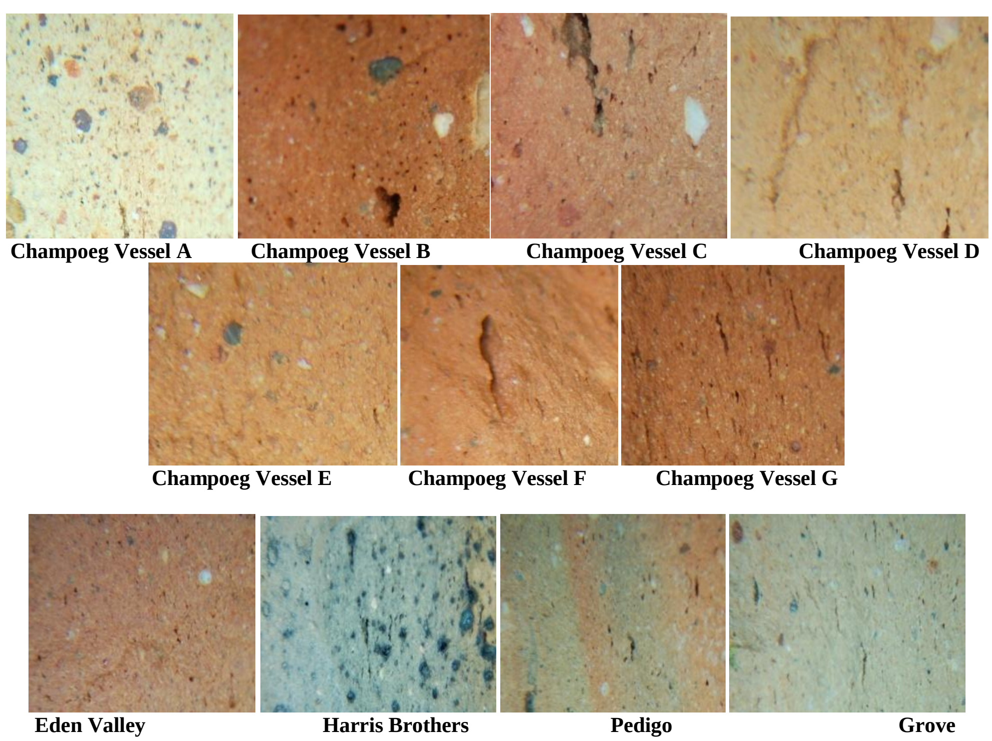


Figure 46: Inclusion photographs.

much greater quantity of very coarse inclusions of all colors than other Champoeg samples. Vessel A's inclusions are the same color and shape as the other samples, however. Samples from Vessels B, F and G contain quantities of inclusions comparable to each other and have high quantities of very fine quartz particles. The samples from Vessel B also have some very course inclusions, perhaps from lack of processing the raw clay. Vessel D has coarse granite inclusions in all samples examined. Vessel C has no coral or rust colored inclusions. Vessel E contains only large quantities of very fine quartz particles, and smaller quantities of fine black particles.

The inclusions in the samples from the pottery wasters are also very similar to each other--with the exception of the over-fired sherds from the Harris brothers' site, and the Eden Valley inclusions. Grove appears to have added small quantities of grog to his paste mix, which is visible in four of the seven samples. Two of the Harris brothers' samples, obtained from the burned kiln site, contain spherical particles of vitrified black inclusions. These two samples were glazed. Further research might reveal the events that occurred in the overheated kiln to cause the internal vitrification. Waster samples are not in any way similar to the Harris kiln pieces. They are a somewhat coarser mirror of the samples from the Richardson/Grove site. The Eden Valley quartz inclusions are very fine and more abundant than any contained in the Willamette Valley samples. Black and coral inclusions found in some of the Eden Valley samples are also fine to very fine.

A Willamette Valley clay sample, gathered just south of Corvallis in the mid-Willamette Valley, was used for comparison with the study samples. The sample is fired example of unrefined hillside clay with no temper added. Since the resemblance is so similar to the three sample sets from the Willamette Valley potters, it is unlikely that Richardson, Grove, Pedigo or the Harris brothers invested much labor in locating and adding temper from other sources. It appears that the "blue muck . . .found at a depth of a foot or two all over the lower valleys. . ." (Steele 2004: 1) Amos Ramsay's grandfather used at the Peoria Pottery had sufficient natural temper (and was readily available enough) that little processing was necessary to produce usable redware.

The conclusion drawn from the inclusion investigation was that the similarity of the clay, despite different sources would be necessary to factor into evaluation of INAA results.

6.4 Clay Sourcing

Although clay sourcing was not a necessary part of the Instrumental Neutron Activation Analysis, Dr. Minc recommended that some effort be made to locate general clay sources for each pottery site. Minc stated that the paste mix each potter uses might include more than one clay source, making INAA on clay sources incompatible with finished vessels. The temper each potter chooses will also distort the finished product from the source clay data (Minc 2008, personal communication). It is unlikely that the Willamette Valley potters gathered clay from several places since transportation was difficult and most of the clay in the area is very similar. The sourcing process did however, give a window into the type of elemental makeup of clay from each source and educate the researcher on the local terrain for each area.

Gathering information on where the potters obtained their clay (and temper) began with an archival search for eyewitness accounts, records kept by the potters, and other historic documents. The information obtained by Lottie Maybee (from Damascus area pioneers) was discussed in the history section. Since Edward Pedigo did not keep records, or those records have been lost, Maybee's account of the location where his clay was being collected was useful.

Information from Haskins' interview with Amos Ramsay on "the 'Blue Muck' that is found at a depth of a foot or two all over the lower [Willamette] valleys" (Milligan Vol 4. 1984: 61-62) gives credence to the idea that the potters did not transport their raw materials any great distance. Some may even have dug clay in the direct vicinity of their production site. Others, like Pedigo, used a wagon to travel a short distance for digging clay to their liking. This information was also helpful in discussions during the Instrumental Neutron Activation Analysis phase of the study. One can state, with reasonable certainty, that the clay used to produce the analyzed sherds, came from near the production site.

The Willamette Valley clay sample, used for comparison studies of the inclusions, further strengthens the idea that clay is readily available all over the Willamette Valley. The clay used to make the sample was removed from a ditch bank by Dr. Minc. It was minimally cleaned and fired. This sample is equal in quality and inclusion quantity to the samples from each of the potteries that were examined (with the exception of the Eden Valley samples).

Haskins, oral history documents were useful for reviewing USDA Soil Conservation Service soils maps. These maps could be examined with confidence, since it was likely that the clay used to produce pottery at the sites would have been excavated within a relatively short distance of the pottery sites.

The soils map indicates the Pedigo site is located in an area with 3 to 8 percent slopes and soils of Cascade silt loam. Nearby is an area of Delena silt loam with a 3 to 12 percent slope. This poorly drained soil, according to Gerig, is on rolling uplands. This area contains a thirty-five inch layer of grayish brown silty clay loam. The silty clay loam layer is located below only twelve inches of surface soil and a thirteen inch layer of subsoil (Gerig1985: 30-31).

The Richardson and Grove sites, located on the west and east sides of Richardson Creek, respectively, are in an area of Bornstedt silt loam. This area was formed from mixed old alluvium. The surface layer of very dark brown silt loam is about 8 inched deep. Below that is 20 inches of subsoil consisting of reddish brown silty clay loam. Below that layer is a 60 inch deep layer of brittle reddish brown and reddish gray clay (Gerig1985: 23). This would have been the clay used by both potters. Although there are places just above the banks of Richardson Creek, that would be similar to the areas mentioned in the Pedigo research, this would have been a deeper soil layer with more of the "blue muck" available.

The village of Canemah was located next to the Willamette River. Gerig does not indicate a clay layer below the deep dark brown silt loam. This area backs up against very steep (20 to 60 percent) slopes of igneous rock (mostly basalt). No clay is available in this area. Less than a mile away, on the bluff above the river, there is a large area of Jory stony silt loam. The surface layer is about eight inches deep. Below that is a deep layer of reddish brown stony silty clay (Gerig1985: 64) that would have been ideal for stoneware. It is possible that the Harris brothers made some use of the clay in this area. This would not have produced redware, however.

To the south of the Jory stony silt loam area is a small deposit of Bornstedt silt loam with the excellent layer of reddish gray clay located approximately 28 inches below the surface layers (Gerig1985: 23). Since this area is less than one-half mile above Canemah, on the bluff, it is highly likely this is the place where the Harris brothers excavated their clay. The Oregon City/Canemah area was fairly well populated, even before the wagon trains began to roll west in 1842. The road to the top of the bluff was already in place at the time Canemah was founded. It would have been feasable to obtain clay on the bluff using a wagon for transportation.

The Eden Valley site, located in the small town of Farmington, Washington, sits within the fork of Pine Creek, in Whitman County. A seven to twenty-five percent sloping basalt outcropping lies to the north and east of the town. The majority of the shallow valley is Latah Silt Loam. According to Donaldson, the area consists predominantly of approximately 30 to 36 inches of various silty loams. Below that level, a silty clay loam begins to appear. The most common clay is a medium reddish yellow, (7.5YR 6/6) with light gray (2.5YR 7/2) mottles. Donaldson reports that this layer is sticky and plastic (Donaldson 1980: 40-41). The light gray modeled areas are the probable source of Grove's redware clay at his factory in Farmington.

Chapter 7 Discussion and Conclusions

7.1 Samuel Grove

Research conducted by the Northwest Pottery Research Center indicates that pottery making (including kiln firing and production) was, at some point, conducted on both the east and the west sides of Richardson Creek. It is hardly likely that one potter went to the trouble of building two kilns and two production centers. It was the decision of those involved in this research project, to tentatively attribute the pottery site on the east side of Richardson to Samuel Grove. The attribution decision was based on the Richardson/Grove wide rimmed sherd D, which is signed S. Grove, and the similarity of some of the rim styles to those found in Grove's later work at the Pedigo site and the Eden Valley site in Farmington, Washington. In the following discussion on style, attribution will be limited to Grove.

The signed wide rim sherd D (Figure 27) has a peculiar style that is somewhat tactile in nature and difficult to describe. It can most closely be labeled a canted ogee rim. The important nuances of the piece are the smoothly curving convex lip, (which is slightly elongated and canted downward and toward the vessel body) the wide convex ridge below the rim and the lack of any angularity. This sherd is very similar to Eden Valley rim sherd type F. None of these sherds were glazed, which may indicate they were intended to be flowerpots. This type is also very similar to Champoeg vessels B, F and possibly, G. During this phase of the project, these three Champoeg vessels were attributed to Grove—a bias that to a certain extent, drove the research and the literature review.

The medium rim sherds, type F, found on the East side of Richardson Creek (Figure 20) are the most decorative pieces in any of the collections. The multiple attempts to produce this relatively decorative vessel, (there are two partial rims as well as six rim, four body and six base fragment that are visually incompatible with the nearly complete vessel) indicates that it was of some importance to the maker. It is a tall, thin walled piece of ceramic with multiple thin appendages that would have been somewhat difficult to produce from redware

The base of Grove's wide rimmed vessel F is also unique. The undulating convex ridges are reminiscent of the partial teapot lid found at Eden Valley. Although they are not found on the same type of vessel, this form certainly is the sort of visual evidence or clue, one would expect to find when employing the Conjectural Paradigm to identify style characteristics.

Grove's wide rimmed vessel F appears to have taken considerable effort and time to produce. These vessels were probably not produced for daily consumption. They may have been the maker's ideal of a Victorian flowerpot. The value to the original producer, and possibly to the eventual owner, (should the vessel have been successfully completed) was probably considerable in the pioneer Willamette Valley in the eighteen-fifties. The social significance of such a decorative piece would have been considerably more than pickling crocks, flowerpots and milk pans.

7.1.1 Lids

One of the lid types found at the Richardson/Grove site on the east side of the creek may also be a Grove signature. The two-step production of the convex lid with cone shaped handle, (Figure 22) required more skill to produce than other lids found in the waster. Five lid fragments with this cone shaped handle were also found at the site of Grove's kiln in Farmington, Washington. The signature piece in the Damascus collection is the cross-mended vessel with unusual glaze (similar in color to Munsell HUE 2.5YR 5/8 red). This vessel exemplifies the usefulness of this lid with its basal flange for seating it on a jar. The cone shaped handle is clearly visible.

Arguably, although it is much more ornate, the teapot lid from Eden Valley could be compared to the convex lid with the cone handle. The tip of the handle is missing so it is not possible to tell if it had the distinctive tip, but it certainly echoes the shape of Grove's other convex lids.

7.1.2 Handles

For the most part, Grove's handles are the lug type used by all four of the Northwest potters. Of the sixty-seven examined however, seventeen are ear handles. Schmeer indicates this shape was not found in other sites (Schmeer, personal communication 2005). Very few examples of handles are present in the other collections so it is not possible to state definitively that this handle is unique to Grove. None were found at the Pedigo or Eden Valley site. As previously mentioned the Farmington site received only a surface collection and has yet to be excavated, so it is impossible to know what might be there. The shape is common in Euro/American forms of redware and stoneware pottery, but the scalloped decoration on two of the handles may be unusual. More research will be required to see if similar designs can be found in the Pacific northwest.

7.1.3 Glaze

One of the glazes mentioned in the Richardson/Grove section of Observable Data is described as Munsell HUE 2.5YR 5/8 red colored (Figure 22). As indicated, it is more orange than the Munsell color and has black flecks. There are no colors in the Munsell chart that exactly match this glaze. There is a large quantity of sherds with this glaze type from the site on the east side of Richardson Creek. No similar glaze was found in any of the other sample collection. According to Schmeer, there is no similar glaze in any of the excavated collections the Pottery Research Center houses (Schmeer, personal communication 2005). Schmeer indicates, however that some sherds of this color have recently been observed in preliminary surface reconnaissance on the west side of Richardson Creek (Schmeer, personal communication 2008)

This unusual glaze type leads to questions about who produced the Munsell HUE 2.5YR 5/8 color glaze and why it was found only at the Richardson/Grove sites. Grove may have taken his glaze recipes with him when he moved and began assisting his father-in-law at the Pedigo site. It is not clear why no examples were found in the Pedigo waster.

According to Prudence M. Rice, red or yellow glazes can be produced by employing iron in the mix. Red requires a reducing atmosphere while, yellow requires an oxidizing one. The red referred to by Rice is from the Munsell color system (Rice 1987: 339). These reds nearly always are more orange than red.

If reduction, (or lack of oxygen) is employed, an iron-based glaze can produce entirely different colors than when oxidization methods are used. Reducing the oxygen in the kiln can produce gray, blue and green as well as red colored glazes (Rice 1987: 337). Oxidizing a hot kiln can produce tan, brown, yellow, and green (if copper is incorporated) from an iron-based glaze. Chromium based glaze, if oxidized in the kiln, becomes green (Rice 1987: 337). Yellow can also be produced from Chromium in a reducing atmosphere (Rice 1987: 337).

The absence of glaze color Munsell HUE 2.5YR 5/8 at the Pedigo site could simply be due to events in the kiln or differences in how the kilns were constructed. The small quantity of sherds evaluated from the Pedigo site is not enough evidence for a definitive answer to this question. However, all glaze colors found there, according to Rice, "indicate incomplete oxidization: either an atmosphere with insufficient oxygen, or a short period and/or low temperatures of firing" (Rice 1987: 343). The orange Munsell HUE 2.5YR 4/8 glaze color is unusual enough that it might be used, along with other clues, to identify the possible source of ceramic artifacts found in archaeological sites. Grove, as well as Richardson may have had a specific method of maintaining proper oxygen levels in the kiln to produce the unusual color.

7.2 Edward Pedigo

As mentioned in the Observable Data section, most of the fragments from the Pedigo waster were small and unidentifiable. There were five partial lids, however, that were unlike those found at the Grove site. Since there were no handles attached to any of the lid fragments, it is impossible to know whether Pedigo or Grove produced them. It is possible that these were the type used by Pedigo for his well-made bean pots. All glaze colors at the Pedigo site were similar in color. This color could, possibly be used for identification of sherds at archaeological sites, although sherds found in the burned kiln area would not be useful.

7.3 Harris Brothers

The signed vessel fragment found in the waster at the Canemah site is an important indicator of the Harris brothers' style (Figure 35). Its rim finish is different from all other fragments examined. The handle is also unusual. Its value was evidently high enough that the maker felt comfortable signing it. It is also distinctive from other potter's work. It therefore, becomes an important reference should similar complete vessels, or sherds, of this type be found in archaeological sites.

The identifying characteristic found at the Harris site that was of most value to this research project was the distinctive pinch in many of the vessel sherds' exterior convex ridges. These are found on sherd type A and I (Figure 34). These immediately correlate with Vessel A (Figure 9) from Champoeg. It was evident at first glance that the styles are similar enough to safely, if tentatively, attribute Vessel A to the Harris brothers visually. This is an example of what was probably an unconscious production step becoming an important clue in style identification.

7.4 Champoeg Vessels

Vessel A (discussed directly above) was confidently, attributed to the Harris brothers early in the evaluation process. Later in the project, this style attribution became much more important in the process of combining visual evaluation of the potters' idiosyncratic behaviors with scientific methods.

Vessels B, F and G were also tentatively attributed to one maker very early in the evaluation process (with reservations for G). The attribution was never as comfortable for these vessels as for Vessel A. However, Samuel Grove was chosen as the tentative maker, because of similarities to the Richardson/Grove wide rim type D, as well as Eden Valley F (also made by Grove). It is evident from style evaluation that the same maker probably produced them. Bias must be acknowledged here. The effort to attribute these three vessels to Grove overshadowed much of the project. Much more archival research was done on Samuel Grove than other potters. More time was spent comparing Richardson/Grove sherds and Eden Valley sherds to these three vessels than in working with other collections. It will be important to eliminate similar biases on future projects.

Vessels C and D from Champoeg are somewhat similar to each other in style, as well as having thinner walls than the other Champoeg vessels. However, they were not grouped together in the visual comparative process. Bias on the part of the researcher must be acknowledged here as well. Due to the small quantity of sherds, Vessel D was not evaluated with the same intense scrutiny other vessels were afforded. Vessel C was not attributed to any potter but was scrutinized thoroughly. It is one of the most complete vessels in any of the collections and will, therefore be valuable to future research, particularly if it can be attributed to a maker.

From the beginning of the project, Champoeg Vessel E stood alone. It has considerably more temper than the others have. The clay was poorly worked and may have come from a different area than the any of the other vessels. There were no collections housed at the Northwest Pottery Research Center with similar rim finishes. It is much more angular and squared off than the cross section indicates. It acquired the name "The Outlier" in the Observable Data, the inclusion and the INAA evaluations. Future research may indicate who produced this vessel, making it a valuable example of that individual's work.

7.5 Inclusion Evaluation

Inclusion evaluation was conducted when it became necessary to discern visual differences in the make-up of the paste mixes. The inclusion evaluation clarified the results of the Instrumental Neutron Activation Analysis investigation. The inclusion investigation process indicates that inclusions might be of some value in determining the source of Northwest redware sherds, whether INAA will be used or not. Although the same inclusions were found in each sample group, size and amount of the inclusions differed for each pottery. Although Willamette Valley clay is similar all over the northern end of the Valley, grog (possibly in the form of river or creek sand) does differ, as do other forms of temper.

Grove appears to have added small quantities of grog to his paste mix, which is visible in four of the seven samples. Two of the Harris brothers' samples, obtained from the burned kiln site, contain spherical particles of vitrified black inclusions. These two samples were glazed. Further research might reveal the events that occurred in the overheated kiln to cause the internal vitrification. Inclusion samples from the Harris waster site are not in any way similar to the

Harris kiln pieces. They are a somewhat coarser mirror of the samples from the Richardson/Grove site. The Farmington/Eden Valley quartz inclusions are very fine and more abundant than any contained in the Willamette Valley samples. Black and coral inclusions found in some of the Eden Valley samples are also fine to very fine.

The Willamette Valley clay sample, used for comparison, was a fired example of unrefined hillside clay from the Corvallis area, with no temper added. Since the resemblance is so similar to the three sample sets from the Willamette Valley potters, it is unlikely that Richardson, Grove, Pedigo or the Harris brothers invested a great deal of labor locating and adding temper from other sources. It appears that the “blue muck . . .found at a depth of a foot or two all over the lower valleys. . .” (Steele 2004: 1) Amos Ramsay’s grandfather used, was sufficient in natural temper, (and readily available enough) that little processing was necessary and minimal temper was added to produce usable redware. Size and content of inclusion particles that were added as temper depend on whether the material is found, for example, on the banks of the Willamette River or Richardson Creek. This is due to various geological occurrences in each location. Photos and charts of inclusions in this study may assist identification of pottery sherds found in future site excavations.

The conclusion drawn from the inclusion investigation is, that the similarity of the clay, despite different sources is necessary to factor into evaluation of Instrumental Neutron Activation Analysis results.

7.6 Instrumental Neutron Activation Analysis

As previously stated, the resulting data from Instrumental Neutron Activation Analysis was initially somewhat inconclusive. Examination of the inclusions clarified which elements in the analysis should be given less importance, (because of the abundance of decomposed basalt found in all of the samples) and which should be evaluated more closely. Cluster analysis and bivariate plots were used to allocate individual specimens to statistically viable groups. This is a standard INAA procedure for ceramics (Pearsall 2008: 1681).

Although the previous research by the Northwest Pottery Research Center found a separation between the Pedigo and Richardson/Grove sites, this study did not indicated that difference. Cluster analysis of the elements consistently created a statistical group containing the samples from both sites. According to Dr. Minc, given the proximity to each other, it is unlikely the two sites could be separated using INAA. The twelve samples (six from each pottery site) are similar in quantities of every element evaluated. These twelve samples are also low in Cesium, compared with the other thirty-three samples.

Unfortunately, none of the pottery site samples formed viable groupings with Vessels B, F and G from Champoeg, as expected. Marked differences in quantities of arsenic, cesium, chromium, cobalt, hafnium, rubidium, tantalum and zinc prevent the possibility of tying the three vessels to Grove. Only in the bivariate plot of scandium and cesium did they fall within the 90% confidence range of the Pedigo samples. The three Champoeg vessels did group with each other. However, the original attribution to Grove was an incorrect hypothesis. The fact that the three vessel samples formed statistically viable groups probably indicates they are from the same potter. According to Dr. Minc, the three vessels are probably a product of a Willamette Valley potter (Minc, personal communication 2008). This is indicated by their elemental make-up. It is similar enough to all of the Willamette Valley samples that future evaluations could probably establish the potter who produced them.

Although it is disappointing that only one of the Champoeg vessels could be tentatively attributed to a known potter, it is gratifying to know all of them (with the possible exception of Vessel E) were most likely produced in the Willamette Valley. These results will prove valuable, when combined with future INAA research, for finding who produced the other six Champoeg vessels, and for providing data on the Pedigo, Richardson/Grove, Harris and Eden Valley potteries.

The stylistic evaluations, although not completely accurate, will also prove valuable for future research. It is true that Vessels B, F and G are not Grove's work. However, at some point, another potter's work will also be evaluated, and found to be similar to Grove's. At that point, INAA may finally indicate a match and the maker will have been found. This is also true of Vessels C and D as well as E. This research, and that of the Northwest Pottery Research Center, is only the beginning of the research needed to create both a stylistic and scientific reference for Northwest archaeologists.

7.7 Conclusions

7.7.1 Hypothesis 1: The idiosyncratic behaviors exhibited by potters, as evidenced by subtly detected differences in their pottery, can visually distinguish the work of nineteenth century Oregon potters from each other.

Although this hypothesis could not be fully supported, the researcher maintains this research provided enough evidence to partially support the idea of idiosyncratic behavior. Certain identifying attributes were found at each pottery. Visual attribution of the Champoeg vessels was only tentatively successful in one instance. However, the Champoeg vessels were visually separated into four, and possibly five, unknown potter groups. Later use of Instrumental Neutron Activation Analysis did provide a statistical likelihood that Vessels B, F and G were produced by the same maker as was originally hypothesized. Unfortunately, chemical analysis did not indicate Samuel Grove was that maker. More thorough study of all of the collections housed at the Northwest Pottery Research Center might eventually indicate who that maker was.

Samuel Grove

It has been comfortably established that the unusual cone shaped handles found on lid fragments at both Damascus sites and the Eden Valley site are probably a signature style attribute of Grove's. According to Schmeer, an antiquing trip through Palouse country will unearth numerous examples of this lid type. Local collectors attribute the lid to Grove (Schmeer, personal communication 2005).

The partial teapot lid found at the Farmington site is also tentatively identified as an example of Grove's signature style. The lid is an exaggerated cone shape with undulating sides reminiscent of the base of Grove's medium rim type F vessel.

The rolled rim variation of medium rim finish F at Damascus is also a probable Grove signature. The researcher argues that the multiple curving lip finishes, as well as the duplicate pseudo-lip in the body of the vessel, may be an example of Grove's best work. Certainly, a similarly shaped piece found in an archeological site or an antique shop could cautiously be attributed to Grove. A fragment similar to this, also unglazed was found at the Pedigo site, where Grove is known to have worked. That piece, Pedigo rim type E, also appears to have come from the body of a vessel rather than the rim. There is evidence that the body extended above this decorative "rim." Although there are only six, base fragments from the F type vessel, combined with the similar teapot lid found in Eden Valley, it is the opinion of the researcher that these constitute enough evidence to tentatively attribute them to Grove's artistic endeavor.

The orange glaze Color closest to Munsell HUE 2.5 YR 5/8 red (found on the tall lidded jar in Figures 22) is probably also unique to Grove (and possibly Richardson) among nineteenth century northwest potters. Despite years of effort, no other examples of glaze this color have been found in the Northwest by the Northwest Pottery Research Center.

The numerals three and four (Figure 29 and 32) found on rim sherds at the Richardson/Grove site are very similar to numerals found at the Eden Valley site. The two examples shown in Figures 29 and 32, indicate that this too may give subtle indication of Grove's work. The numeral shapes may be as unique to Grove as his handwriting would be. Future research may corroborate this hypothesis.

The canted ogee type rim finish discussed under wide rim finish type D (Figure 26) must be mentioned since it is signed. Although the ogee curve rim finish is a standard of American utilitarian ceramics, (Greer 2005) the canted version that Grove signed is reminiscent of canted ogee finishes found at the Pedigo site and the Eden Valley site. There is not enough obvious distinction between the two potters at the Pedigo site to definitively describe the style of each. It is the opinion of the researcher however, that a canted ogee curve rim (particularly if the lower ridge is not pinched) may point to Grove and should be investigated.

Harris Brothers

The researcher argues that the ogee curve variation, (identified as ogee curve variation rim type I, Figure 35) which is discussed in Chapter 5, points directly to the Harris brothers' Canemah pottery manufacturing site. As stated above, the ogee curve is relatively common among U.S. potters. However, the exagerated pinched lower ridge is not commonly found. This study indicates that this particular idiosyncratic behavior, if found in an Oregon site, is most likely a marker for the Harris pottery. The rim on Champoeg pot A, despite the elongated lip, was almost immediately attributed to the Harris pottery, due to the pinched ridge below the lip. This is an attribution supported by inclusion examination and Instrumental Nuclear Activation Analysis. The pinched ridge appears to be a much more definitive marker than the lip finishes for the Harris pottery. Since Instrumental Neutron Activation Analysis indicated that Champoeg Vessel A can be statistically attributed to the Harris' pottery, it is possible that the vessels found at Champoeg were shipped as freight up the Willamette River on stern-wheelers. It is equally possible that the occupants of the Champoeg Creek cabin brought flowerpots with them when they moved to Champoeg.

7.7.2 Hypothesis 2: Instrumental Neutron Activation Analysis of trace elements in sherd samples from four historic northwest production sites can distinguish the fabric make-up of each potter's paste recipe.

This hypothesis was statistically supported, with one notable exception. The Pedigo and Richardson/Grove sites could not be chemically separated. A larger number of samples might make this possible. However, since Grove worked both sites, it is possible that the clay came from the same place. It is also possible that the clay at both sites is simply from the same large vein, causing marked similarities in the chemical content.

Another caveat to the statistical support of this hypothesis is the possibility that Champoeg Vessel A was produced at the Harris brothers' Barlow Sawmill pottery site. Vessels produced at Barlow Sawmill would have a very similar, or identical, chemical makeup to Canemah vessels if the same clay source was being used.

Statistical grouping of the Champoeg vessels also provides possibilities for them to eventually be grouped with chemically similar samples from their pottery of origin. There appears to be four sites of origin for the Champoeg vessels. Future research may successfully locate the sources of the remaining six Champoeg vessels.

7.7.3 Hypothesis 3: The knowledge gained from visual and chemical comparisons between samples from pottery and archaeological sites can be used to expand knowledge about each site, provide evidence to assist in dating the site and contribute to our understanding of economic distribution patterns in the mid-nineteenth century Willamette Valley.

The researcher argues this hypothesis was supported when Champoeg Vessel A samples formed successfully statistical grouping with the Harris brother's Canemah samples during both visual and Instrumental Neutron Activation Analysis. Champoeg Vessel A is the first known example of extant material goods in which the distribution pattern can be tentatively traced from the Canemah producer to the Champoeg consumer. While there is no way to positively ascertain whether the flowerpot was carried down the Willamette River by an individual or as freight on the *Canemah* or the *Franklin*, it is certain that freight was being hauled from Canemah to Champoeg on steamboats by 1854 (Mills 1947: 54). It is probable this freight was made available at either Robert Newell and John Davis Crawford's or Edward Dupuis' general stores (Hussey 1967: 206). Since Dupuis' store was destroyed by fire in 1851 (Hussey 1967: 206) and the Harris brothers did not arrive in Oregon until approximately 1855, it is not possible that Vessel A was sold there.

The Harris Brothers moved into Canemah from their pottery site at the old Barlow sawmill site, a half mile south of the village of Canemah (Steele 1996: 5) in early 1858. It is probable that they were hoping to take advantage of steamboats to transport their freight. This is evidenced by their pottery site location on the banks of the Willamette just upriver from the Willamette falls, and very near the shipyard. The brothers may have been shipping stoneware and redware from their site further south as well. They built their first pottery sometime after 1855, by which time steamboats were already making the upriver (south) run two to three times per week (Mills 1854: 54). By 1854 freight was carried by the Citizen's Accommodation Line, from Canemah to Champoeg two to three times a week. The charge was ten dollars per ton (Mills 1854: 54).

While the date of manufacture for only one of the Champoeg vessels has been tentatively identified, this information can be combined with other dated artifacts found at the site to arrive at a general idea of the period the cabin was occupied. The Harris brothers were in business for less than a year during 1858, at the Canemah site before the kiln burned. Their previous pottery, south of Canemah, dates to post-eighteen-fifty five.

No post-1861 cultural material was found at ORMA27, and there is no evidence of occupation past that time (Brauner personal communication 2008). Dating of Vessel A, therefore, falls within a very tight time line. Manufacture of the transfer printed ceramic sherds found at the site date from 1834 to 1854. It is, therefore, safe to place the date of occupation as post-eighteen-fifty. The date of deposition however, is a much more difficult discussion. South's mean ceramic dating formula (Orser 2004: 131) was not used, due to the unpredictability of dating the time of discard. Ceramics can be retained for many years by their owner. They are often discarded only when broken. This does not lessen the value of the manufacturing dates for determining approximate occupancy dates. Taken as a unit, the ceramic assemblage points to a short occupation (due to the small quantity of artifacts) in the late eighteen-fifties or early eighteen-sixties.

This approximate site date is a small sample of the information early northwest pottery sites have to offer. An in-depth study and creation of a chronological map, as well as chemical and inclusion charts could prove to be of assistance in dating northwest historical sites.

Further, the data provided by this study can be made available for use in the future, when redware sherds are unearthed in other sites. It is the hope of the researcher that this work is just the beginning of research on, and identification of, utilitarian redware in the Pacific Northwest. Despite the similarity of pottery styles and of the chemical makeup of Willamette Valley "blue muck," there are identifying characteristics that separate both.

Chapter 8 Future Research

Given endless amounts of funding, there are a vast selection of projects that could build upon this study. Even with a limited amount of funding, graduate student projects are abundant.

First, cleaning, cataloging and evaluating all of the Northwest Pottery Research Center's collection of artifacts would be adventageous. The Pottery Center houses collections from all known pottery sites in Oregon, and some in Washington. The information buried within these collections needs to be discovered.

Secondly, Instrumental Neutron Activation Analysis of samples from all known pottery production sites in Oregon and Washington would be adventageous. Using National Institute of Standards and Technology controls for standardization would give uniform results that could be entered into a data base.

If an easily accessable data base were created from the Pottery Center's catalogs and the Instrumental Neutron Activation Analysis results, along with pictures of signature vessels from each pottery site, archaeologists could expedite their research. Redware obtained from Oregon and Washington archaeological sites could be compared to the data system. INAA could be done on site artifacts and compared as well. This system would be one more tool archaeologists could use as a site dating tool.

A project like the one suggested above would, of course, be prohibitive without considerable funding. However, smaller projects available to graduate students could include evaluating a smaller quantity of artifacts, perhaps from two or three pottery sites. Since the sources of Vessels B, C, D, E, and F, from Champoeg were not found in this project, it is possible that further research would reveal their producers. Of particular importance would be searching for potters who had lived and worked near Champoeg, since the paste mix for Vessels C and D was similar to that of the St. Paul Church bricks.

Blaine Schmeer reported local rumors of a pottery once located in Newburg, which is near Champoeg on the opposite bank of the Willamette River. Archival research might reveal the location of that pottery. After excavation, Instrumental Nuclear Activation Analysis could be conducted on pottery sherds from Newburg and added to the data contained in this paper.

More research on social and monetary values of utilitarian ceramics from the eighteen hundreds could certainly be done. It is, however, beyond the scope of this project to pursue.

Utilitarian redware ceramics are a largely ignored part of extant Northwest material culture. This oversight is unfortunate because of the vast amount of information available through study of these artifacts. Undertaking a project as large as the Utah endeavor may be impossible, however smaller projects, particularly those conducted by graduate students, are possible. It is hoped that, at some point, someone will find Northwest redware as interesting and informative as the researcher and the members of The Northwest Pottery Research Center.

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Appendix 1

Complete Table of Instrumental Nuclear Activation Analysis

For Champoeg Vessels and the Four Sample Potteries

INAA ID	Batch	Vessel	Potter	Source
CHA_001	RC1825-1	A	Harris Bros., Canemah, OR #1	Oregon City, OR
CHA_002	RC1825-1	A	Harris Bros., Canemah, OR #1	Oregon City, OR
CHA_003	RC1825-1	A	Harris Bros., Canemah, OR #1	Oregon City, OR
CHB_001	RC1825-1	B	#2	ORMA27
CHB_002	RC1825-1	B	#2	ORMA27
CHB_003	RC1825-1	B	#2	ORMA27
CHC_001	RC1825-1	C	#3	ORMA27
CHC_002	RC1825-1	C	#3	ORMA27
CHC_003	RC1825-1	C	#3	ORMA27
CHD_001	RC1825-1	D	#3	ORMA27
CHD_002	RC1825-1	D	#3	ORMA27
CHD_003	RC1825-1	D	#3	ORMA27
CHE_001	RC1825-1	E	Outlier #4	ORMA27
CHE_002	RC1825-1	E	Outlier #4	ORMA27
CHE_003	RC1825-1	E	Outlier #4	ORMA27
CHF_001	RC1825-1	F	#2	ORMA27
CHF_002	RC1825-1	F	#2	ORMA27
CHF_003	RC1825-1	F	#2	ORMA27
CHG_001	RC1825-1	G	#2	ORMA27
CHG_002	RC1825-1	G	#2	ORMA27
CHG_003	RC1825-1	G	#2	ORMA27
EVA-001	RC1825-2	EVA	Eden Valley, WA	Eden Valley, WA
EVA-002	RC1825-2	EVA	Eden Valley, WA	Eden Valley, WA
EVA-003	RC1825-2	EVA	Eden Valley, WA	Eden Valley, WA
EVA-004	RC1825-2	EVA	Eden Valley, WA	Eden Valley, WA
EVA-005	RC1825-2	EVA	Eden Valley, WA	Eden Valley, WA
EVA-006	RC1825-2	EVA	Eden Valley, WA	Eden Valley, WA
HRC-001	RC1825-2	HRC	Harris Bros., Canemah, OR	Oregon City, OR
HRC-002	RC1825-2	HRC	Harris Bros., Canemah, OR	Oregon City, OR
HRC-003	RC1825-2	HRC	Harris Bros., Canemah, OR	Oregon City, OR
HRC-004	RC1825-2	HRC	Harris Bros., Canemah, OR	Oregon City, OR
HRC-005	RC1825-2	HRC	Harris Bros., Canemah, OR	Oregon City, OR
HRC-006	RC1825-2	HRC	Harris Bros., Canemah, OR	Oregon City, OR
PDG-001	RC1825-2	PDG	Pedigo, Damascus, OR	Dasmascus, OR
PDG-002	RC1825-2	PDG	Pedigo, Damascus, OR	Dasmascus, OR
PDG-003	RC1825-2	PDG	Pedigo, Damascus, OR	Dasmascus, OR
PDG-004	RC1825-2	PDG	Pedigo, Damascus, OR	Dasmascus, OR
PDG-005	RC1825-2	PDG	Pedigo, Damascus, OR	Dasmascus, OR
PDG-006	RC1825-2	PDG	Pedigo, Damascus, OR	Dasmascus, OR
SGD-001	RC1825-2	SGD	Richardson-Grove, Dasmascus, OR	Dasmascus, OR
SGD-002	RC1825-2	SGD	Richardson-Grove, Dasmascus, OR	Dasmascus, OR
SGD-003	RC1825-2	SGD	Richardson-Grove, Dasmascus, OR	Dasmascus, OR
SGD-004	RC1825-2	SGD	Richardson-Grove, Dasmascus, OR	Dasmascus, OR
SGD-005	RC1825-2	SGD	Richardson-Grove, Dasmascus, OR	Dasmascus, OR
SGD-006	RC1825-2	SGD	Richardson-Grove, Dasmascus, OR	Dasmascus, OR

ARSENIC	LANTHANUM	LUTETIUM	POTASSIUM	SAMARIUM	SODIUM	URANIUM	YTTERBIUM
2.27	45.03	0.468	12348	7.70	3716	4.52	3.34
2.99	44.59	0.500	11403	7.72	3620	4.17	3.65
3.67	44.87	0.514	13502	7.69	3805	4.75	3.57
10.24	27.36	0.360	16348	5.30	8359	2.20	2.01
11.59	27.85	0.305	15587	5.42	8793	2.32	2.08
11.36	27.10	0.302	16002	5.25	8596	2.39	1.92
3.79	45.84	0.500	26600	8.82	10770	3.28	3.89
3.63	46.64	0.570	27153	9.02	10928	4.07	3.67
4.40	46.36	0.521	28958	8.88	10855	4.00	3.85
6.02	46.68	0.594	17721	8.31	4914	3.88	4.52
4.91	48.82	0.578	18411	8.62	5083	4.47	4.29
4.88	47.45	0.614	18268	8.28	4820	3.87	4.25
5.68	19.89	0.279	20554	3.89	21537	2.27	1.84
6.99	20.23	0.284	16531	3.82	20457	2.17	1.79
5.67	19.78	0.298	19774	3.88	21420	1.73	1.87
10.33	27.37	0.325	13398	5.25	8396	2.37	2.25
11.35	27.90	0.322	16763	5.40	8578	2.42	2.17
10.76	29.27	0.368	12496	5.72	9053	2.73	2.44
10.40	25.54	0.307	19872	5.07	8758	1.74	2.12
11.80	27.31	0.350	18810	5.34	8737	1.90	2.46
11.67	26.17	0.338	15317	5.22	8659	2.48	1.89
1.00	34.84	0.450	13461	5.91	14548	3.60	3.21
1.77	38.23	0.468	13302	6.35	12163	4.00	3.09
4.84	46.45	0.488	15179	8.08	7893	5.40	3.52
1.26	36.56	0.488	10718	6.11	7447	4.21	3.18
1.40	37.36	0.529	11521	6.04	9000	4.63	3.32
2.54	34.36	0.432	12689	5.70	13937	4.08	3.06
5.39	38.56	0.395	11718	6.64	5599	3.88	2.70
6.97	36.66	0.451	11837	6.30	6173	3.71	3.14
8.40	38.47	0.454	12685	7.42	8052	4.04	2.85
0.56	49.35	0.493	11658	7.46	1387	5.48	3.13
1.70	44.46	0.493	12721	7.99	5986	4.01	3.44
0.61	47.01	0.538	10974	7.59	1626	5.43	3.60
4.51	32.56	0.311	9064	5.91	8748	2.69	2.30
4.75	32.22	0.358	8170	6.02	8725	3.34	2.26
4.41	29.51	0.275	10067	4.23	6827	3.26	1.76
5.23	29.96	0.304	8099	5.26	8923	2.78	2.05
4.63	29.27	0.334	8030	5.32	8902	3.20	2.12
6.20	28.84	0.295	11004	4.49	7633	3.08	2.21
4.17	28.11	0.285	9134	4.51	8288	3.33	1.82
4.38	25.42	0.263	8462	3.92	7518	2.94	1.51
4.12	27.62	0.329	8836	4.78	8093	2.77	2.06
2.43	31.69	0.328	9287	5.01	9804	2.94	1.88

4.20	28.38	0.318	6539	5.09	6793	3.04	1.94
4.59	29.85	0.317	7857	5.42	6743	2.58	2.00

BARIUM	CERIUM	CESIUM	CHROMIUM	COBALT	EUROPIUM	HAFNIUM	IRON
677.58	88.99	6.18	84.65	14.35	1.65	12.69	38668
522.49	89.66	6.12	86.80	14.43	1.70	12.83	42424
507.93	85.55	6.52	87.49	14.12	1.68	12.06	40503
700.32	61.39	3.28	175.08	21.44	1.21	4.83	55685
782.61	60.25	3.64	176.22	24.57	1.21	4.95	57484
679.32	59.54	3.17	173.87	24.71	1.16	5.51	55050
515.70	99.32	6.21	75.53	15.26	1.85	8.59	40925
403.29	95.30	5.60	73.33	15.24	1.75	8.11	40467
475.92	96.22	5.67	71.56	15.10	1.74	8.48	39932
434.24	93.48	4.41	77.01	9.11	1.62	15.01	27385
461.20	100.74	4.28	80.49	9.36	1.56	15.92	28297
392.68	98.42	4.57	78.51	9.20	1.59	15.74	27524
420.72	41.88	3.56	295.26	16.00	0.90	6.56	35327
414.47	41.88	3.54	302.53	15.23	0.96	6.24	33950
463.47	42.41	3.54	301.19	15.05	0.96	6.15	33768
627.83	55.50	3.13	170.47	20.14	1.20	5.43	51678
653.07	52.38	3.14	177.17	16.95	1.21	5.80	54077
674.76	64.13	3.77	177.58	24.74	1.35	5.59	53963
614.97	66.22	3.02	169.90	27.53	1.14	5.77	54501
462.39	62.63	3.21	167.92	21.98	1.22	5.52	55670
504.41	58.25	3.19	155.20	21.99	1.17	5.94	52250
547.48	67.36	4.93	47.97	14.32	1.24	10.01	23766
647.87	71.05	5.14	47.73	13.92	1.40	10.82	26038
615.03	108.10	5.12	65.04	17.28	1.59	10.32	30644
431.49	69.30	5.02	48.43	15.05	1.24	10.25	20615
542.50	65.30	5.06	43.92	14.41	1.24	9.91	19089
473.41	66.47	5.06	40.31	12.36	1.27	9.65	22634
564.50	80.60	5.67	88.03	17.21	1.61	11.16	45337
676.96	73.92	4.83	80.40	15.71	1.23	10.95	43882
725.96	79.99	4.86	77.29	16.45	1.58	10.28	48524
787.78	98.11	7.13	92.06	10.47	1.48	14.49	25168
623.56	83.53	5.91	92.47	15.83	1.59	11.14	44967
594.17	92.79	6.92	82.13	11.32	1.52	14.82	28448
441.25	71.94	3.06	95.92	15.02	1.32	8.22	49261
489.66	64.70	3.21	102.46	14.91	1.46	8.78	53262
413.05	58.17	2.83	108.63	15.26	0.96	9.26	52534
537.09	60.39	2.80	100.07	16.53	1.23	9.20	58393

637.75	60.42	2.55	101.75	12.92	1.21	8.81	48945
659.47	61.04	2.71	117.65	18.35	0.95	10.17	63105
485.82	56.82	2.21	110.37	15.53	1.00	9.43	45828
552.47	51.47	2.44	102.91	13.97	0.93	8.25	42309
550.16	60.13	2.74	106.69	12.06	1.09	9.82	42259
604.55	62.83	2.34	110.30	16.67	1.14	10.73	38007
394.37	63.42	2.00	114.16	14.21	1.16	9.36	40391
494.87	59.64	2.62	118.01	12.15	1.16	9.55	38512

NEODYMIUM	RUBIDIUM	SCANDIUM	TANTALUM	TERBIUM	THORIUM	ZINC
41.77	80.65	22.76	1.97	0.95	16.01	112.84
40.86	95.66	23.26	2.05	0.93	16.15	99.70
36.07	81.28	22.57	1.84	1.16	15.45	98.83
23.67	74.80	20.31	0.87	0.49	10.62	92.50
24.72	80.97	20.70	1.08	0.66	11.02	84.84
21.63	67.37	19.91	0.90	0.51	10.77	69.92
34.73	121.91	14.55	1.34	1.28	13.00	92.03
43.43	131.03	14.26	1.30	1.24	12.58	72.91
34.41	117.15	14.20	1.32	1.10	12.91	80.16
33.98	85.70	12.40	1.44	1.19	12.77	50.71
42.60	88.71	12.99	1.63	1.27	13.83	45.17
38.14	100.79	12.72	1.51	1.26	13.20	69.69
18.27	72.45	13.79	0.81	0.52	7.69	54.72
13.14	69.02	13.02	0.77	0.61	7.45	58.22
17.85	64.41	13.11	0.85	0.70	7.57	43.22
22.57	75.45	19.65	0.78	0.72	10.25	77.83
24.88	88.56	20.35	0.96	0.93	10.55	72.74
21.43	73.81	20.64	0.89	0.78	11.06	77.57
18.80	67.87	19.45	0.83	0.73	10.72	82.54
27.48	67.03	19.81	0.87	0.53	10.70	73.28
17.14	73.69	18.96	0.83	0.62	10.80	90.34
32.39	69.60	15.90	1.38	0.90	12.61	117.24
35.70	87.13	17.53	1.72	1.31	13.74	158.15
37.95	93.03	15.78	2.05	0.94	15.18	152.82
29.53	75.03	16.69	1.69	0.81	13.65	170.84
24.38	70.96	15.40	1.60	1.01	12.35	148.92
29.19	82.34	14.82	1.59	0.79	11.27	155.95
36.84	59.62	22.72	1.84	0.87	13.23	113.02
25.83	56.01	21.54	1.55	0.81	13.37	141.19
34.94	77.87	23.49	1.65	1.04	13.87	248.54
28.07	92.46	20.82	2.16	0.92	18.51	116.51
38.74	82.08	22.40	1.78	0.96	14.18	110.58

37.36	72.65	21.68	2.09	0.94	18.14	140.76
35.38	36.25	18.37	1.22	0.70	9.62	67.52
24.17	37.67	19.38	1.15	0.76	10.69	79.43
23.64	46.54	18.55	1.47	0.49	11.07	64.25
26.63	52.98	17.89	1.21	0.63	10.39	71.72
28.48	36.19	18.33	1.17	0.88	9.88	67.94
18.98	48.33	16.87	1.34	0.44	10.29	78.55
24.69	44.43	17.72	1.26	0.29	9.85	44.17
18.87	41.77	17.19	1.30	0.37	9.45	65.94
26.28	48.48	16.06	1.19	0.62	9.55	69.49
26.39	36.19	15.50	1.28	0.72	9.77	62.61
22.77	23.09	19.16	1.37	0.55	9.62	75.28
21.45	40.44	19.46	1.24	0.95	9.80	57.53

5_Cluster	**2_Cluster**
1.00	1.00
1.00	1.00
1.00	1.00
2.00	2.00
2.00	2.00
2.00	2.00
4.00	1.00
4.00	1.00
4.00	1.00
4.00	1.00
4.00	1.00
4.00	1.00
5.00	2.00
5.00	2.00
5.00	2.00
2.00	2.00
2.00	2.00
2.00	2.00
2.00	2.00
2.00	2.00
2.00	2.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00

1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
1.00	1.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00
3.00	2.00

Appendix 2

Inclusion Charts

Richardson/Grove Inclusion Chart

Sample	001	002	003	004	005	006
						Decorative Vessel
Inclusions:						
Percent	30% Sand <5% Other	30% Sand <5% Other	30% Sand <5% Other	30% Sand <5% Other	30% Sand <5% Other	30% Sand <5% Other
Color						
white	x	x	x	x	x	x
black	x	x	x	x	x	x
rust	x	x	x	x	x	x
red	x (1)	x	Higher %	x	x	x
other	Grog (3)		grog	grog	grog	
Sphericity						
white	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9
black	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9
rust	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5
red	0-9					
other	0-7 to 0-9		0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9
Roundness						
white	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7
black	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7
rust	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7	0-5 to 0-7
red	0-5					
other	0-3 to 0-5		0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	
Size	Fine White Sand Black, Rust, Red=Med.	Fine to Very Fine White Sand Black, Rust, Red, 1 mm or less	Fine White Sand Black, Rust, Red=Med.	Fine White Sand Black, Rust, Red=Med.	Fine White Sand Black, Rust, Red=Med.	Fine to Very Fine White Sand Black, Rust, Red, 1 mm or less

Pedigo Site Inclusion Chart

Sample	001	002	003	004	005	006
			Gray exterior layers/ Red interior			
Inclusions:						
Percent	30% Fine to Very Fine Sand <5% Other	30% Fine to Very Fine Sand <5% Other	30% Fine to Very Fine Sand <5% Other	30 % Fine to Medium Sand <5% Other	30% Fine to Very Fine Sand <5% Other	30 % Fine to Medium Sand <5% Other Predominantly Red
Color						
white	x	x	x	x	x	x
black	x	x	x	x	x	x
rust	x	x	x	x	x	x
red				x		x
other			4mm rust/black (1)			
Sphericity						
white	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-7 to 0-9	0-3 to 0-7	0-7 to 0-9
black	0-1 to 0-7	0-1 to 0-7	0-1 to 0-7	0-7 to 0-9	0-1 to 0-7	0-7 to 0-9
rust	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9
red				0-7 to 0-9		0-7 to 0-9
other						
Roundness						
white	0-5 to 0-9	0-5 to 0-9	0-5 to 0-9	0-5 to 0-7	0-5 to 0-9	0-5 to 0-7
black	0-1 to 0-5	0-1 to 0-5	0-1 to 0-5	0-1 to 0-3	0-1 to 0-5	0-1 to 0-3
rust	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-7	0-3 to 0-5	0-3 to 0-7
red				0-5 to 0-9		0-5 to 0-9
other						
Size	Fine to Very Fine	Fine to Very Fine	Fine to Very Fine	Medium to Fine	Fine to Very Fine	Medium to Fine

Harris Brothers Inclusion Chart

Sample	001	002	003	004	005	006
	From Waster Samples			From Kiln Fire Samples		
Inclusions:						
Percent	30% Very Fine Sand 10% Coarse	30% Very Fine Sand 10% Coarse	30% Very Fine Sand 10% Coarse	30%	30%	30%
Color						
white	x	x	x	x	x	x
black	x	x	x	x	x	x
rust	x	x	x	x		
red	x	x	x	x		
other		Yellow (quartz?)	Granite	Green		
Sphericity						
white	Sm 0-5 to 0-9 Lg 0-9	Sm 0-5 to 0-9 Lg 0-9	Sm 0-7 to 0-9 Lg 0-1 to 0-3	0-7 to 0-9	0-5 to 0-9	0-5 to 0-9
black	0-7 to 0-9	0-7 to 0-9	0-5 to 0-7	0-7 to 0-9	0-9	0-9
rust	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-3 to 0-9		
red	0-7 to 0-9	0-7 to 0-9	0-7 to 0-9	0-5 to 0-9		
other			0-7 to 0-9	Green deposits in voids		
Roundness						
white	Sm 0-3 to 0-5 Lg 0-7 to 0-9	Sm 0-3 to 0-5 Lg 0-7 to 0-9	Sm 0-7 to 0-9 Lg 0-1 to 0-3	0-7 to 0-9	0-3 to 0-7	0-3 to 0-7
black	0-3 to 0-5	0-3 to 0-5	0-1 to 0-3	0-3 to 0-9	0-9	0-9
rust	0-7 to 0-9	0-7 to 0-9	0-3 to 0-7	0-5 to 0-7		
red	0-3 to 0-7	0-3 to 0-7	0-1 to 0-5	0-5 to 0-7		
other			0-3 to 0-5			
Size	Fine white sand Coarse white, black & red	Fine white sand Coarse white, black & red	Very Fine White Sand Coarse white, black, rust red & granite	Medium to Fine poorly sorted	Medium white sand Black to 2 mm	Medium white sand Black to 2 mm
Comments	Looks like Or. Hill clay with Will. Valley coarse sand	Looks like Or. Hill clay with Will. Valley coarse sand	Looks like Or. Hill clay with Will. Valley coarse sand		HUE 10R 4/1 Dark Reddish Gray Glaze BLACK appears vitrified	HUE 10R 4/1 Dark Reddish Gray Glaze BLACK appears vitrified

Eden Valley Inclusion Chart

Sample	001	002	003	004	005	006
Inclusions:						
Percent	30% Very fine quartz sand <5% other	20% Very fine quartz sand <5% other	30% Very fine quartz sand <5% other High in black & red	30% Very fine quartz sand <5% other	30% Very fine quartz sand <5% other	30% Very fine quartz sand <5% other
Color						
white	x			x		x
black	x			x		x
rust						
red	x			x		x
other						
Sphericity						
white	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7
black	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5
rust						
red	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5
other						
Roundness						
white	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7	0-3 to 0-7
black	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5
rust						
red	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5	0-3 to 0-5
Size	Fine to very fine quartz sand Fine red & black	Fine to very fine quartz sand Fine red & black	Fine to very fine quartz sand Fine black Red to 0.5 to 1 mm	Fine to very fine quartz sand Fine red & black	Fine to very fine quartz sand Fine quarts, red & black	Fine to very fine quartz sand Fine red & black