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Utilitarian and Industrial Ceramics of Montana in the Late Nineteenth and Early Twentieth Centuries

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UTILITARIAN AND INDUSTRIAL CERAMICS OF MONTANA IN THE LATE NINETEENTH AND EARLY TWENTIETH CENTURIES

By

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Utilitarian and Industrial Ceramics of Montana in the Late Nineteenth and Early Twentieth Centuries

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This thesis answers the question: What type of utilitarian and industrial ceramics were being produced or brought into Montana in the late nineteenth and early twentieth centuries? This question came from correspondences with the Montana Historical Society where the main research took place. This research was conducted in the Montana Historical Society archives which consisted of files and other sources to find evidence of ceramic production within the state. Further research was done to get an understanding of clays and ceramic production for this period of time. This thesis presents the information by first addressing clays, and then moving into an overview of what types of ceramics were being produced during the late nineteenth century and early twentieth, and how they were produced. The results show that there was minimal utilitarian ceramic production, but prolific industrial production throughout Montana. The research also addresses the various amounts of ceramics being imported into the region. The conclusions of the project show: 1) that Montana had a need for ceramic products of both a utilitarian and industrial type; 2) that people coming to Montana knew opportunities for business when they saw them; 3) Montanans understood the need for sturdy fireproof building materials; 4) finally, that Montanans were willing to take on hard-work to procure items as needed whether it be for personal safety or for profit.

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CHAPTER 1 PROJECT DESCRIPTION

1.1 Introduction

When looking for a thesis topic I was at a loss, trying to focus on a topic, so I reached out and sent emails and made phone calls hoping someone would help me. George Oberst of the Montana Historical Society responded, informing me of a future display dedicated to the state's ceramic production that the Montana Historical Society was putting together with the Archie Bray Foundation, from Helena, for the foundation's upcoming anniversary. Oberst relayed that it would be helpful to the Montana Historical Society if I could put together information on utilitarian and industrial ceramics in Montana from the late nineteenth to the early twentieth centuries. I went to Helena and met with Oberst, who took me on a tour of the Montana Historical Society and introduced me to its many employees, all of whom became an invaluable source of information. This group quickly helped me find what I was looking for and guided me through the many files and boxes.

1.2 Research Focus and Objectives

The purpose of this thesis is to answer the questions: What types of ceramics were produced in Montana and where? What drove people to bring ceramics to Montana? What were the motivations of going into the ceramic business? What does this say about the people that helped form the state of Montana? To answer these questions it was important to understand that, during the late nineteenth century, many people migrated to

the new state of Montana for wealth, new beginnings, and adventure. With these people came the need to bring utilitarian ceramic products with them, such as kitchenware, and industrial ceramic products, such as bricks, and also the need to have them available once they arrived. Bricks may not be the first thing thought of when referring to ceramics, but since they are formed from hardened clay they are given the moniker of industrial ceramics. As towns and cities formed and grew, the need for things like bricks became apparent when fires ran rampant through quickly built buildings and so, kilns and brickyards were constructed.

The time period of the late nineteenth century and early twentieth century represented a starting point to address the above questions. Using this as a temporal scope to guide my research, I examined the various regions and cities of Montana to locate the geographical scope of ceramic production within the state itself.

The objectives of the project were to answer the above research questions by developing an understanding of ceramic production in Montana, and to portray this information in a manner that would lend itself to a museum display. Moreover, this project consolidated the information into one specific source rather than many scattered throughout the Montana Historical Society and other places.

1.3 Methods and Sources

The method employed in researching this paper was to go through books, local newspaper articles, and papers on ceramics in the late nineteenth and early twentieth centuries. This would help gain an understanding of what the ceramics were, while

slowly pinpointing what was produced in Montana that merited mention in the public record, either through significance in Montana or through being shipped elsewhere. At the Montana Historical Society archives I examined files that consisted of newspaper clippings from various time periods in hopes that ceramic production of the industrial or utilitarian type would be mentioned. In addition to the news clippings, these files contained ledgers from businesses and companies that produced the wares I was researching.

At this point I went through the indexes of files to find any information on the various cities and towns that existed in the latter half of the nineteenth century and beginning of the twentieth century. Once I had those files, I read through their contents to see if there was any mention of ceramic production. If such production was noted, then I would look to see if there were files on those businesses to further narrow the focus on what was being made and to determine when it might have been produced.

Once the available information had been compiled I had to organize it into something that would lend itself to a reader's eye and that would make sense at the same time. The organization process also identified any details or areas that needed more information, which in turn led to looking for more books or articles that would fill voids in the data set.

The organization of information was something that had to be closely examined, as there is much that goes into ceramic production, and various places within Montana that produced them. Once organized, this information could then be put into a series of chapters that present the information in steps that are comparable to those involved in ceramic production itself.

1.4 Chapter Summaries

The ultimate aim of this thesis is to answer the question of what type of ceramics were produced in and also brought into Montana, but also seeks to show the amount of work needed to produce ceramics. To do this, the knowledge of the steps involved in production of ceramics needs to be established so that the reader will understand the amount of work involved in producing one single object, whether it is a flower pot or a brick. Once these steps are established, then the actual production within Montana is addressed. Chapter 2 provides an overview of clay that is used for ceramic production, looking at specific types of clay and their coloring properties. Ceramic production and decoration are addressed to give an understanding of what it took to get from a pliable substance to a hardened and practical object.

Chapter 3 addresses utilitarian ceramics specifically with industrial ceramics being discussed in a later chapter. This chapter goes into detail on the production of these products and defining what they are. After this information has been presented, the various types of utilitarian ceramics that were produced during the late nineteenth and early twentieth centuries are discussed so that knowledge of what was coming into the state can be ascertained.

Chapter 4 discusses the production of industrial ceramics, specifically bricks, the basic steps, the work involved in each step, and how the brick-maker arrives at the final product. This chapter further expands the topic by looking at brick categories and classification types and what decides these things. Finally the chapter looks at color variations within the categories and classifications of bricks themselves.

Chapter 5 presents the production of utilitarian and industrial ceramics in and importation to Montana. The need for these products is introduced, as well as the difficulty of transporting such a product to a remote region like Montana. The production of utilitarian ceramics, such as flower pots, in Montana was done on a small scale compared to the production of industrial ceramics, such as bricks. Utilitarian ceramics are discussed first and the industrial ceramic production discussed in alphabetical order second.

Finally, chapter 6 presents the summary of the thesis and the conclusions reached by the research and writing done on this project. The questions asked at the beginning of the thesis will be answered throughout the paper, but more concisely so in this chapter. The findings of the project will be presented and conclusions drawn from those findings.

CHAPTER 2 CLAYS

2.1 Introduction

To understand ceramics, both utilitarian and industrial, it is first important to know what is needed to produce them, namely, clay. This chapter will look at the various types of clay that are used in ceramic production, giving a brief understanding of the material that is so important to the craft itself. The crafter of the ceramic needs this understanding so that the end product will hold to its intended purpose. There are various types of clays used in ceramics, and within these types there are differing grades as well. "The term 'clay' as used today carries with it three implications: (1) a natural material with plastic properties, (2) an essential composition of particles of very fine size grades, and (3) an essential composition of crystalline fragments of minerals that are essentially hydrous aluminum silicates or occasionally hydrous magnesium silicates" (Grim 1942:226-7). The chief types of clays that are utilized in ceramics are kaolin, montmorillonite, and the illites, and these will be discussed below. These names refer to the minerals that comprise the clay, and these minerals affect the absorption of water and the plasticity of the clay itself.

2.2 Types of Clay

Kaolin is a part of the higher-grade clays, which is something that producers seek since better clays result in better products. “Kaolinite is the chief member of the kaolin

group and also the chief constituent of most high grade clays. Chemically it is a hydrated aluminum silicate…" (Shepard 1956:8).

A second clay, montmorillonite, is named after the minerals that comprise it. "Montmorillonite, the chief mineral of the group that bears its name, is the constituent of bentonite, which often is formed from the decomposition of volcanic ash. Montmorillonite, [is] also a hydrous aluminum silicate in which part of the aluminum is replaced by another ion, generally magnesium" (Shepard 1956:8-10). This information can seem daunting, but the references to aluminum silicates are merely showing the make-up of the clay and where water is absorbed. It is through these molecules that the clay gains its plasticity, which is vital in the shaping of ceramics themselves.

The third group, the illites, does not take its name from a mineral like the others and is described as follows. "The name 'illite' was suggested by Grim, Bray, and Bradley as a group name rather than as a specific mineral name for the constituents of clay materials that are similar to, but not identical to, the white micas. Illites contain less potash and more water than the white micas and also differ from them in certain physical properties" (Grim 1942:231).

Material found in the clay deposits is something that can affect the final product. "The color of raw clays is due primarily to two classes of impurities, organic matter and iron compounds. Clays that are relatively free from impurities are white" (Shepard 1956:16). The color of raw clay will influence the uses of the clay for the ceramic producer. The material in the clay affects the color of the raw form, but it also affects the fired forms coloring. The impurities within the clay color it in the following manner. "Organic matter makes a clay gray to blackish depending on its amount and condition.

Hematite and the hydrated forms of ferric oxide, apethite and limonite, produce reds, browns, buffs, and yellows" (Shepard 1956:16).

2.3 Ceramic Production

To produce a ceramic requires exposure to heat through a process known as firing. Firing techniques will be discussed more specifically in the utilitarian and industrial ceramic sections as different kinds are required for each. "Discussion of the effects of heat on clay is simplified by reference to the major changes that take place. There are three: dehydration, oxidation, and vitirification" (Shepard 1956:20). These three effects of heat on clay are simple in their statement, but specific in what they do. These effects will be discussed in greater detail below, but the nature of each effect will be discussed now. The dehydration of the clay allows for the ceramic to lose plasticity and can occur when exposed to weather, or to heat. Oxidation effects material within the clay and occurs when the ceramic is placed within great heat. Finally, the vitrification of a ceramic is when the body of the piece solidifies unto itself; this is also the time when a glaze would form a glass around the ceramic as well.

The dehydration of ceramics is more than merely losing moisture within the clay; it also affects the makeup of the piece. "When the molded or cast piece is dried, shrinkage occurs, owing to the elimination of the thin water films between the clay particles" (Norton 1942:323).

> The principal constituents that are hydrated are the clay minerals themselves, and the discussion of water of crystallization covers the phase of firing. Plasticity is generally lost during dehydration and the porosity of the body is increased. Some impurities are also dehydrated (Shepard 1956:20-21).

This passage describes another important point and that being the porosity within the body of the ceramic. The increase in porosity is crucial to production because it allows moisture trapped within the ceramic to escape easily, but also for heat to penetrate further into the ceramic. It is only because of the changes brought forth by dehydration that oxidation and vitirification can occur.

Oxidation is a change that occurs within the ceramic at a chemical level, as it affects things within the clay rather than just the clay itself. "Oxidation, unlike dehydration, is a chemical change that affects the impurities of clay, chiefly, carbon and iron compounds. …The oxidation of these compounds does not take place simultaneously; carbon has a greater affinity for oxygen than does iron and therefore any iron that is not at its highest state of oxidation will remain unaffected until the carbon is burned out" (Shepard 1956:21). Since the oxidation affects impurities within the clay it can also affect the final color of the ceramic itself. This is why it is important for the producer to have an understanding of the clay they are using, as well as what exists within the clay, especially if a particular color is desired.

Vitirification is "The final stage in standard firing practice, during which constituents of the body soften and melt, so that particles first adhere to each other and are then cemented by the glass that is formed, causing the body to become increasingly dense and less pervious…" (Shepard 1956:83). Realizing that the ceramic softens and melts, and is cemented by a formed glass, gives an idea of how sturdy the final product is.

It is no wonder that ceramics have not changed much over the years. One of the only improvements in the field of ceramics in the last century has been with the machinery used in production. Most often these machines are simply the modernization of what was used in earlier production, but this technology does allow cheaper production on a mass scale.

2.4 Ceramic Decoration

Having discussed what occurs to a ceramic as it moves through the stages of firing, it is now important to briefly discuss decoration types. Decoration can be thought of as images placed upon a ceramic piece itself, but decoration is also applying color or a glaze to a piece. Industrial ceramics are not decorated, but some utilitarian ceramics do have a basic design element that merits a look at decoration. "A pigment must meet two conditions to be suitable for the decoration of unglazed pottery: it must retain a desirable color after firing and it must adhere to the vessel surface. These conditions limit stringently the number of available pigments" (Shepard 1956:31). Using a pigment that retains color and adheres to the ceramic is important to ensure that the decorating process is not a waste of time. A poor choice of pigment can also lead to a final product that is not appealing to the eye. "The pigments of modern wares are either painted on the body before glazing (underglaze), mixed with the glaze, or painted on it so that, in each case, the pigment fuses with the glaze, which solves the problem of permanence" (Shepard 1956:32). This leads to the question of what a glaze actually is. "Technically, a glaze is a gloss, which means that it lacks regular atomic arrangement" (Shepard 1956:44).

"…These treatments serve both as decoration and, in many instances, to reduce the permeability of the vessel to liquids" (Tite 1999:187). Knowing what a glaze is helps one to realize what it does; it forms a glass-like layer around the ceramic itself during firing. Glazes will also be further discussed within the utilitarian section.

Having a basic knowledge of how clay is used in the production of ceramics, and what that production entails, are important for understanding utilitarian and industrial ceramic production, and the language used to describe these specific types of ceramic production.

CHAPTER 3 CERAMICS

3.1 Introduction

Ceramics of a utilitarian purpose, those used in food storage, preparation, and presentation have been around for centuries. The way these ceramics have been produced has evolved over time from hand-made to machine-made, but little else has changed. The types of ceramics being produced at present are not at all dissimilar from those that were first produced during the Upper Paleolithic (e.g., Venus figurine from Dolni Vestonice) or by the Jomon in Japan around 12,000 years ago. The reason for this is that those early people working with clay knew what kinds of pieces would work best for their needs, and we have the same needs today.

The types of utilitarian ceramics that were being produced in the late nineteenth century were of wide variety and style. The main types that would have found their way into Montana were redware, stoneware, brownware and yellow ware, whiteware, and porcelain. Although only one type of ceramic, redware, was produced in Montana, all these types will be discussed to establish a context for this study.

3.2 Source Material and Preparation

Pottery has existed since humans discovered that clay would harden when exposed to great heat. "The Jomon culture of Japan, a hunter-gatherer society, was making pottery over 12,000 years ago, and pottery became a fundamental part of the first sedentary communities along the Middle Nile Valley some 9000 years ago" (Cooper

2000:8). Techniques were mastered over time, and as the art moved into the future these techniques evolved with the machines of the day. There are still artists who make pieces by hand, as they need great control over their work to produce the finished product, but utilitarian ceramics have seemingly always been mass-produced on some level. This statement, however, should not take away from the beginnings utilitarian ceramics share with all other ceramics. "Some items were made solely by hand. …The craftsman cut out slabs of clay appropriate to the vessel and joined them by hand, smoothing over the joints" (Ketchum 1971:5). "The primary techniques… include modeling from a lump of clay by pinching, drawing, or beating using a paddle and anvil; pressing or pounding into a mold; building up from coils or slabs…" (Tite 1999:185-6). These techniques would have been used for basic items, such as plates, which would be easier to form in this manner rather than from a large mound of clay. Those items would be made in the following manner. "For most of his work… the artisan employed the kick wheel, two horizontal discs joined by a vertical shaft. Turning the lower of the discs by foot caused the upper to revolve. A lump of clay placed thereon could, thus, be shaped as the potter desired" (Ketchum 1971:5). This means of production would not have been useful for companies wishing to mass produce and profit from ceramics, and for that reason, it is easy to see why ceramic production would have to evolve.

The means of ceramic production are basic in nature, but there is a lot of work that must take place to prepare the clay. The most important thing to a ceramic producer would be access to a supply of clay, which meant that they either had to set up ceramic works next to a supply or haul clay to the place of production. Building next to a supply can reduce labor and transportation costs, but it did not lessen the work needed to process

the clay. As processing techniques evolved “the pit was replaced by the pugmill, a semicircular tank in which a shaft set with heavy knives revolved” (Ketchum 1971:5). This statement refers to the means used to take the raw clay and break it up into a more manageable form. The pit was just that, a pit that clay was put into that had a turning device that was mule driven. This turning device then evolved into the shaft with heavy knives in the pugmill. What the pugmill did was break the clay into, “…a puttylike mass which was then 'screened' to remove foreign bodies. This involved forcing the earth through a wire screen at the base of a hand press called a jack, a vast improvement over the previous method of laboriously picking out the pebbles by hand” (Ketchum 1971:5). This statement further shows the amount of work that goes into preparing clay for the production of ceramics. This work also brought the clay to the final stage of preparation. “Cleaned and reduced to a relatively even consistency, the clay was then cut into cubes or cylinders judged by weight or eye to be sufficient for a particular object. The potter was then ready to create” (Ketchum 1971:5).

Once the clay had been processed the craftsman was then ready to produce a ceramic product. This process could stop with screening or it could include adding temper as well. "Therefore, as-received clays frequently either were refined to remove excessive quantities of nonplastic inclusions or had temper [e.g., sand, grog (i.e. crushed sherd), organic material (e.g., chaff), crushed flint, shell, or limestone] added to them" (Tite 1999:185). “American Archaeologists have used the word *temper* to designate nonplastic material; generally the term is limited to the substance added by the potter, but is sometimes extended to all nonplastic material in the paste. Temper is used…because it counteracts shrinkage and facilitates uniform drying, thus reducing strain and lessening

the risk of cracking" (Shepard 1956:24-25). It can seem a bit odd that someone would go through all that trouble to extract foreign bodies from the clay when processing, just to turn around and put some back in. The reason that temper was added is because the producer knew its effects on the ceramic. Often the temper was another fired ceramic that had broken, and because it was already fired it would not go through another shrinking process.

When different ceramics were being produced there were various tools that would be used to alter their physical appearance. These tools could be used to smooth the product, or to add a type of decoration to it. "The secondary techniques, which are subsequently used to modify the basic shape, include scraping, trimming, and, again, beating using a paddle and anvil" (Tite 1999:186). "A few rib sticks or 'smoothers' were kept about, thin pieces of wood with which to eradicate the 'ribs' or ridges left on a pots surface by the makers fingers" (Ketchum 1971:6). Other means of smoothing and decorating involved the following. "There was a sponge to give a final finish, and perhaps a punch or coggle wheel for decoration. The latter was a little disc that revolved at the end of a handle, leaving a series of decorative impressions. Far more common was decoration produced by holding an awl or even a piece of stick against the side of the pot or jug as it revolved on the wheel" (Ketchum 1971:6). Utilitarian ceramics may not be known for their decoration, but it is interesting to note what one might have found in the shops where these products were made.

3.3 Redware

Having addressed the basics of pottery, specific types of ceramic ware can be discussed, the first of which is redware. "Ceramic specialists may refer to the wares as 'redware'… because the clays used in their manufacture turn red… during firing" (Orser 2000:10). Redware is one of the most frequently occurring types of ceramic wares throughout the United States. This is because red clay is the most frequently found type of clay. "Redwares can be seen as the quintessential pioneer pottery and could be made with clean clay from virtually any local deposits, which was found to be perfect for firing to the low temperatures required" (Cooper 2000:214-215). "As dug, the earth was coarse in texture, filled with pebbles and sand. After having been exposed to the weather for a month or so to achieve maximum plasticity, it was refined" (Ketchum 1971:4). The processing of the clay involved breaking it up into a manageable product, as well as removing any extraneous materials the clay contained. Once processed the clay was then formed into various products, and put through the firing process.

Fired redware took a form that was "usually thick and heavy especially in utilitarian vessels" (Brown 1982:21). Although the vessel was thick and heavy, redware had problems as well. "Baked redware clay is relatively soft and porous. Liquids leak or 'sweat' out, rendering the unglazed ware impractical for most purposes" (Ketchum 1971:6). Because of this impracticality the redware clay was most often used as flowerpots, or terra cotta, or bricks. This impracticality could be taken care of by utilizing a glaze, which can be used for decorative means, but also as a means of sealing

the product. Glazes ranged from common items such as table salt, to other clays in a liquid form, but all served the same purposes. "The liquid glaze was applied to the dry, or 'green', ware either by dipping the vessel into a bowlful or by pouring a quantity into the object and stirring it around" (Ketchum 1971:7). Once the redware had been glazed then it was ready to be fired.

"The methods employed by the redware potter varied little between 1635 and 1850" (Ketchum 1971:4). The first redware kilns served their purpose, but could lead to problems such as uneven burning. "The earliest…was the so-called groundhog kiln. This was a low brick or stone structure with an arched roof and a chimney at one end. At the other was an opening through which green pottery might be inserted" (Ketchum 1971:7-8). The problems in firing forced the potters to change kiln technology.

> Accordingly, at a very early date the Eastern potters began to employ a more sophisticated model. The total structure was much larger and built on two levels. The lower contained several fireboxes; the upper was the kin proper, a substantial round or rectangular space in which the ware was placed (Ketchum 1971:8).

This new technology allowed for the potter to have more control over temperature to fire their product as well as easy access to the heat source. When these kilns were full

> …the wood-burning fireboxes underneath it were ignited and the baking began. The fire was gradually built up in order to avoid the always present danger that too much heat too early would cause the ware to collapse. Fires were maintained for thirty to thirty-six hours, reaching a temperature of 1700º F. in the later stages (Ketchum1971:8-9).

This shows how extensive a job it was to produce ceramics of any type on a large scale. It also shows how much care and energy must be put into the production if success was to be assured.

> At an appropriate time the fires were damped and the cooling period began. This usually took about a week, at the end of which the entrance was unbricked and the finished product removed. If all had gone well, the unglazed pieces such as flowerpots would be pinkish buff to red-brown in color (Ketchum 1971:9).

The glazed products that were produced in this same manner would come out of the kiln with a sheen on them.

The following passage not only tells of the dwindling redware industry, but it also tells of the movement away from handcrafted wares. "In the last decades of the nineteenth century the dwindling remnant of the redware potteries concentrated primarily on the manufacture of flowerpots, and these almost without exception were mold made. By then little remained of the early handcraft skill" (Ketchum 1971:13). Redware is the only ware on record that was produced in Montana, and this will be addressed in a later chapter.

3.4 Stoneware

Stoneware as its name implies, is an extremely strong and durable type of ceramic that was more popular than redware. This was due to "The very durability that has insured the survival of so much of this ware was also the motivating factor in causing potters to work in this medium rather than local red clay even when it was necessary to import the former from a distance" (Ketchum 1971:49). Although stoneware may have been more durable and more popular to work with than redware, their production techniques were very similar.

Stoneware clay is different than redware clay in more than just color as the following shows. “Stoneware clay is a more or less white fine-grained earth which 'reaches maturity', i.e., is properly hardened at around 2200ºF., a much higher temperature than employed in redware ovens” (Ketchum 1971:50). This is not to say that different ovens were used in stoneware firing, but simply that higher temperatures had to be reached. "The American stoneware was almost steel-hard; impermeable and durable when properly fired, it was much tougher and harder-wearing than redware" (Cooper 2000:218).

Two different types of glazing were used with stoneware: one involved table salt and the other involved clays. "By this time" [the middle of the nineteenth century] "most high-temperature wares were glazed by introducing salt into the kiln…" (Cooper 2000:219). "The salt would instantly vaporize, covering the crockery with a clear, thinly pitted glaze not unlike orange peel in texture…” (Ketchum 1971:50). A second type of glaze involving clays was used because the salt could not get inside ceramics. “Where not salt glazed, stoneware was coated with Albany, Michigan, or Texas slips, rare clays which, when mixed with water and applied as a finish, would fuse to a natural glaze at baking temperatures” (Ketchum 1971:50).

The high firing temperatures needed for stoneware led to problems with the decorating techniques that could be used. Not many minerals could stand up to the high levels of heat needed, which limited the colors that a manufacturer could use for decorating. “The typical stoneware decoration was achieved through application of cobalt, a dark blue pigment consisting primarily of cobalt aluminate” (Ketchum 1971:51). Decoration colors were not the only problems to arise with stoneware production. “First,

the clay was not available everywhere and…was generally more expensive. …Second, the higher firing temperature required more durable ovens. …All this meant [more] expense, and one man could seldom finance a manufactory" (Ketchum 1971:53). To take care of expenses stoneware had to be made in large factories rather than small shops, which limited the amount of companies that would undertake the production of such wares.

Unlike redware, stoneware was limited in use and function. This was because of the heavy nature of the product, as well as the scarcity of this clay compared to redware clay. "Where everything from dolls to coffins was made in redware, salt-glazed items rarely venture beyond jugs and a great variety of crocks" (Ketchum 1971:54). Although stoneware was such a durable type of ceramic, it was replaced over time with other products. "Like redware, stoneware suffered a decline after 1875, largely due to the introduction of glass and tin storage containers. The craft did not, however, come to an end" (Ketchum 1971:55). Knowing that stoneware products could be heavy and bulky, it is easy to see why people might have turned to glass and tin storage units. Even so, stoneware products did not disappear altogether.

3.5 Brown and Yellowware

The following excerpt provides a brief introduction to brown and yellow wares, and also shows how they differ from redware and stoneware. "While treated separately by some authorities, brownware and yellowware differ essentially only in degree of clay refinement and baking temperature, the lighter [in color] ware being, of course the more

highly fired. In each case the clay is of a particular [type,] finer textured than red earth, less dense and vitreous than the stoneware medium" (Ketchum 1971:93). The differences between the wares could be why a producer would choose one over the other, but it could also be the preference of the time. Another difference between brownware, yellowware and the previous wares is the firing temperature. "It [brownware and yellowware both] is fired at a temperature somewhat above 2000°F" (Ketchum 1971:93). This temperature is higher than redware, but lower than stoneware.

The processing of the clay used in brown and yellow wares is slightly more sophisticated than previous means.

> The raw clay was first placed in a large vessel called a blunger or churn, where it was reduced by mechanical means… to a creamy consistency. It was then passed through a series of sifters or bolters, which removed grit and foreign substances. The batch was then allowed to mature or age in large cisterns until needed. When suitable, the clay was run through hydraulic presses to remove liquid and then forced into a wedging machine, from which it emerged in blocks of suitable size and consistency (Ketchum 1971:94).

This statement reveals that the means of processing clay was evolving with the times, utilizing the machinery of the day where animal and human power had been required before.

The actual shaping, or molding, of pieces also evolved with the times, and two different means were used.

> The first, known as jigging, involved the stamping or pressing out of individual pieces. A "bat" or glob of clay was pressed into a plaster mold… which was then fixed on a rotating table. The clay-filled form was… placed on a drying rack, where it remained until sufficiently dry to allow removal (Ketchum 1971:94).

The second means of molding required the clay to be in a different physical state than the first. "…Liquid clay was poured into plaster molds and allowed to set until a suitable

volume had adhered to the mold wall. The excess was then drained off and the adherent clay was allowed to harden before removal" (Ketchum 1971:95). The two means of molding brownwares and yellowwares may have utilized dry and liquid clay, but they both ended with molded wares ready to be fired.

The process of firing these types was a two-fold one. "The complete vessel was baked twice, the first or bisque fire being intended simply to harden the ware, which was then glazed, usually with a clear lead or alkaline mix, and fired a second time" (Ketchum 1971:95).

Something that set brownware and yellowware apart from the redware and stoneware ceramics was the ability to take decoration. "Perhaps the most popular finish devised for the brown and yellow clays was Rockingham, a glaze employing manganese and/or various metallic salts to produce a surface which varied from dark brown to the sponged yellow effect known as tortoise shell" (Ketchum 1971:95). "This was later enhanced by sprinkling different-coloured oxides in blue, yellow, orange and green" (Cooper 2000:221). The Rockingham decoration was used for more decorative pieces, such as pitchers and vases, whereas another type --banded, or annular decorations were used for everyday pieces. "Much more common, however, particularly in kitchenware, was the use of white, yellow, brown, or blue slip, rings of which circled a bowl or pitcher and added a pleasant touch to otherwise mundane objects" (Ketchum 1971:95). "Decoration was minimal and typically consisted of embossing or bands of coloured slip, while a covering of transparent alkaline glaze gave a smooth, bright, practical finish" (Cooper 2000:220).

3.6 Whiteware

Whiteware ceramics were developed around the same time as yellowware, but soon overcame it in popularity as the following shows. "From 1825 on, roughly paralleling the rise of yellowwares, the various whitewares conquered the tableware trade. Today the most refined of these bodies, white earthenware, is found in every American home, primarily in the form of dishware and cooking utensils" (Ketchum 1971:119). This excerpt describes the popularity of whiteware pieces, but also alludes to the domestic or kitchen functions associated with whiteware.

The type of clay used in whiteware is described in the following excerpt. "…There are banks of highly plastic white-burning clay which, when properly prepared, may be fired at a high temperature to produce an opaque, non-vitreous, more or less porous body" (Ketchum 1971:120). This type of clay was used to create the various types of whiteware.

The first type of whiteware to be discussed is the cream colored type. "At the less sophisticated end of the spectrum is cream-colored ware, commonly advertised as C.C. ware and made by a large number of nineteenth-century factories as an improvement on the popular yellow earthenware. It possesses the same relatively coarse texture as the latter, being distinguished only by a somewhat lighter tint, after firing, hence the term 'cream colored'" (Ketchum 1971:120). The production of creamware occurred at two different times in the 1800s, which could be due to popularity spikes for this specific ware. "Creamware was made in this country on a limited basis prior to 1850, but it was in the last half of the century that it came to be widely used in decorative tableware"

(Ketchum 1971:121). The creamware form was one that was "Thin and light, deep foot on bowls" (Brown 1982:16).

The evolution of whiteware ceramics went from the creamware to the "white earthenware, which being further refined, possessed a chalk-colored body of great strength and durability" (Ketchum 1971:121). This further refinement allowed the white earthenware to have "gradually pushed creamware out of the field, and this body is today the medium from which most standard tableware is made" (Ketchum 1971:122). Another type of whiteware that the white earthenware replaced in the late 19th century was pearlware which was "cream colored… early-thin like creamware, becoming thicker later" (Brown 1982:17).

Two final things making whiteware popular are its durability and the types of kilns used in its production. "Its extreme durability, exceeded only by that of stoneware, has found it a continuing place in chemical vessel manufactory and other areas where a shock-or acid-proof medium is required" (Ketchum 1971:122). If this type of durability can be trusted for these uses, then it is no wonder that whiteware is such popular tableware. The two types of kilns used for whitewares consisted of the bisque kiln and the gloss kiln. "…The bisque kiln, in which molded ware was burned for some seventy hours to achieve a fairly hard unglazed finish, and the floss kiln, in which the pieces were baked after receiving a glaze" (Ketchum 1971:124). The firing of ceramics in two separate kilns seems to be a style started with the whitewares that was continued, in a way, in porcelain production.

3.7 Porcelain

An interesting point about porcelain is that it would have found its way into Montana in two types, utilitarian and industrial. The utilitarian being small household items such as dolls, and the industrial being larger items such as toilets. Another interesting point about porcelain is the material that forms the ceramic itself. Porcelain "…differs greatly from other ceramics in being composed not of a clay or several clays but of an artificial mixture generally containing …kaolin, ground flint, and feldspar. Baked at an extremely high temperature, this blend becomes steel hard, vitreous, non-absorbent, and translucent" (Ketchum 1971:145-6). A second type of porcelain is commonly known as bone china, and it is interesting to note how this name came about. "Here powdered glass was added to the batch to secure vitrification at lower temperatures. It was later learned that phosphate (bone ash) would accomplish a similar result, the ware being known …as bone china. It is somewhat softer than hard china and slightly absorbent" (Ketchum 1971:146). It is understandable that manufacturers would have experimented with lowering temperatures for vitrification, as lower temperatures would have been easier to control and would have cut costs as well.

The actual baking of porcelain was a slightly more complicated process than described previously. "All porcelain was baked in a double oven the first stage or firing taking place in the cooler upper level, where the ware was brought to the biscuit stage. …The biscuit or bisque was then dipped in a tub of glaze consisting of its own body ingredients in different proportions, those which fuse first now predominating" (Ketchum 1971:146). One can imagine that this was a time consuming process as the

ceramics would have to be heated for a great deal of time to get to the bisque stage itself. The adding of the glaze was an important step for the porcelain, as it brought it to the final form. "The porous vessel absorbed the liquid in the glaze, leaving a fine, dry mineral coat on its surface. The pieces were then …fired in the main oven at maximum temperature. The glaze of softer composition melted into the body; the whole was then vitrified into a homogenous glass like form" (Ketchum 1971:146). The firing of the porcelain pieces in two parts of a kiln is similar to what was being done with whitewares, as stated earlier.

When talking about porcelain some things of note are the characteristics, the price of production, and the location of factories producing it. The characteristics of porcelain are quite different than anything that has come before. Porcelain was "Generally quite thin. Bone china is translucent. Industrial porcelain (sinks, toilets, etc.) quite thick & heavy" (Brown 1982:8). These characteristics are apparent when one thinks about the items being produced with porcelain, namely dolls, decorative china, and the previously mentioned sinks, and toilets. The porcelain itself was expensive to produce, due to the material used, and the people who could produce it. "Materials had often to be bought from a great distance. Special ovens and the services of particularly skilled artisans added to the overhead" (Ketchum 1971:146-7). The previous excerpt shows just how much a person had to invest if they were going to go about producing porcelain. The location of "the factories, however, were almost entirely in the East and in Ohio" (Ketchum 1971:145). It is also understandable that these factories would be in the Eastern portion of the United States, as at this time period in America that is where most of the money, clay, and material was.

The previous pages and paragraphs have shown the various types of ceramics that were being produced in the late nineteenth and early twentieth centuries. These varied ceramics would have found their way into what would be, and is, Montana through various means, and this will be discussed in further detail in a later chapter.

CHAPTER 4 BRICKS

4.1 Introduction

Bricks of all sorts have been around for thousands of years, whether it be adobe bricks of the ancient Middle East or the clay bricks that we use today. Bricks are industrial ceramics, a category that also includes cement sewer pipes. Bricks were the most abundant of all the industrial ceramics produced in Montana in the late nineteenth and early twentieth centuries, and the bulk of my investigation subsequently focuses on the brick industry.

4.2 Brick Production

"There are five basic steps in making a brick: 1. mining -frequently called 'winning'; 2. preparation; 3. molding -sometimes referred to as 'forming'; 4. drying; 5. firing -frequently referred to as 'burning'" (Gurcke 1987:4). "Bricks traditionally have been produced in a number of steps that have varied little since antiquity: finding and preparing the clay, forming or shaping the clay into blocks, drying, and finally burning the blocks to make bricks" (Broeksmit and Sullivan 2006:46). These very basic steps have been around for ages, but on paper they do not show the amount of work and time involved. "The first step in the manufacture of bricks, even the mechanized methods employed today, is the opening of the clay pit" (McGrath 1979:88). The mining of clay could be a simple task of shoveling clay into a bucket for later use, or may include heavy machinery digging into sides of mountains. No matter the size of the operation, once the

clay has been mined, then the manufacturer must move into the second step of brick making, preparation.

"Weathering is the first step in clay preparation" (Gurcke 1987:7). "This action is best affected by the freeze-thaw cycle, which diffuses the (clay) material prior to its [sic] moulding" (McGrath 1979:88). The weathering of clay usually involved allowing the clay to sit until the manufacturer was ready to utilize it, at which point they would move into the second stage of preparation, tempering.

> For the brick maker tempering consisted of two steps. First, water and other materials were added to make the clay plastic enough, give it the right color, or make it burn properly. Second, the mixture had to be distributed throughout the entire clay mass (Gurcke 1987:7).

Obviously you would have to make sure the clay mass was uniform so that any bricks being produced would burn in an expected and uniform manner.

Once the clay was prepared to the brick makers liking they could move to the third step, molding. "Molding consists of forming the clay mass into something that very closely resembles the shape of the final product" (Gurcke 1987:13). "This process could be undertaken by teams of either two or three persons; one person supplying the clays, 'the wheeler', one preparing the moulds, the 'moulder', and a third person, the 'off bearer' to carry off the moulded brick" (McGrath 1979: 89). For the early brick maker this would usually involve a kind of wooden form or tray to work the clay into the desired shape. "The mold box, often made of wood, was divided into brick-shaped sections…"(Broeksmit and Sullivan 2006:46). Later brick makers would have the luxury of machines to do forming for them. Once the clay was molded to the brick makers liking, then the fourth step could take place, drying.

"Drying means simply removing as much of the moisture from the green brick as is practical before they are burned" (Gurcke 1987:24). The drying of the clay relied on various factors as the next passage shows. "Handmade bricks required about two to three weeks of drying time, depending on the weather and the clay" (Gurcke 1987:26). As long as all the elements cooperated with the maker, then they could move into the fifth and final step, firing.

The firing of the bricks involves a kiln, and with kiln firing certain precautions must be taken. "Once the kiln is full it has to be sealed to prevent drafts penetrating the interior and affecting the burn" (Gurcke 1987:28). Obviously a nice uniform burn will allow for the most consistent of brick firings, so these precautions must be taken. Meanwhile, inside the kiln, the clay of the bricks is undergoing a metamorphosis as it shifts towards the final product. "As there is still a good percentage of water remaining in the brick, the temperature is raised slowly to around 250° to 350°F to prevent too rapid shrinkage" (Gurcke 1987:28). "The first stage of the firing process was the… smoking stage, during which any excess water was driven off before the kiln's temperature became high enough to burn the bricks. This process allowed for a gradual increase in temperature, which resulted in a better end product" (Broeksmit and Sullivan 2006:47-48). A lot of the care must be taken during the firing stage as there is no recovering as there is in the previous four stages. The temper can be adjusted, water can be added, but a brick cannot be un-burned.

> Vitrification is the last stage in the burning procedure. It requires temperatures ranging from around 1600° to 2200° F. When oxidation is complete, the strong drafts are cut down and the kiln is sealed. During this period the clay softens, the pore spaces filling up, and the larger grains begin to adhere or melt to each other (Gurcke 1987:35).

This is where a brick really starts to be a brick as we know them, much denser and tightly packed. "Once the kiln has settled to the proper degree…the fires are shut off and the bricks are allowed to cool gradually. This cooling process usually requires from 48 to 72 hours" (Gurcke 1987:35). After this cooling process has finished the manufacturer then has the final product, a brick.

4.3 Brick Categories and Classification

"In 1913 the American Society for Testing Material proposed a tentative standard that divided building bricks into four categories according to their absorption properties, compressive strength, and other categories. The categories were vitrified, hard, medium, and soft" (Gurcke 1987:35). These categories would then insure that the various bricks would be used in the proper manner to allow for safety and marketing measures.

Soft bricks were classified and described in the following manner. "Because they had not received enough heat, they were always soft on the inside and frequently on the outside as well. These bricks were intended for interior walls and other unexposed areas and were not to be subjected to the weather" (Gurcke 1987:36). From this description it is easy to see why the classification for bricks would be so important to people's safety, as the right brick for the right job would be truly important.

Another way that bricks were classified dealt with a more aesthetic point of view. "Face bricks are those bricks intended for the front or face of a building and as a consequence are better made or at least better burned bricks" (Gurcke 1987:36). This type of description may be based on an aesthetic description, but it would also affect the

manufacturer on a selling standpoint as well. ""Shippers"…are hard burned and sound, though not quite perfect in form. They received their name because they were often exported" (Gurcke 1987:37). This is not a description as much as it is a nickname, but that nickname then became its classification.

"Firebricks are made from special clays, called fire clays, that have a greater resistance to heat. Although specifications vary, the minimum temperature firebricks should be able to withstand is 1,100°F and better grades must often meet or exceed 3,000°F" (Gurcke 1987:99). This type of brick would give someone a sense of sturdiness that would be especially welcome if they were building a house, or even a fireplace.

"Paving bricks are used primarily in street paving. They are made from clays that vitrify thoroughly and at low temperatures" (Gurcke 1987:99). The advantages given by clay that vitrifies thoroughly and at low temperatures is that a quality product would be obtainable in a quick manner. As many streets would require large amounts of bricks to pave the streets it is easy to see how this is advantageous.

"Sanitary bricks are made in the same manner as the other types of bricks; they are unusual, however, in that they have an enamel or glazed surface over one or more sides but usually not the whole brick" (Gurcke 1987:100). Thus enamel or glazed surfaces would give a smooth and oftentimes, white, side that would be easily cleaned and more along the lines of what one expects in a bathroom or kitchen.

4.4 Brick Color Variation

Another way that bricks distinguish themselves from one another is through color. "Color…reflects the temperature at which bricks were fired, the firing conditions within the kiln, and the composition of the product" (Gurcke 1987:125). Color is something that will play more into a customer's preference than need, i.e. the color does not have any effect on quality.

As many types of clay burn and vitrify at a color that is related to the clay it is formed with, something must be added to counteract this factor. "Chalk…turns a red burning clay yellow to white or nearly so" (Gurcke 1987:126). "Iron compounds are principally responsible for the red color in bricks. …Depending on the quantity of iron present, bricks can take on tints ranging from light yellow to dark red" (Gurcke 1987:126). "The color could be affected by a high iron content, which produced red, yellow, or buff products, or by a high level of organic material, which resulted in a black, brown, or gray product" (Broeksmit and Sullivan 2006:46). Another element that affects color is Magnesium. "Magnesium causes bricks to burn a light brown or tan, and in combination with iron, it produces buff to yellow tones" (Gurcke 1987:126). Knowledge of this type would be extremely important to the brick manufacturer as a demand for various colors can go against the types of clays present or readily available to said manufacturer.

Due to the fact that bricks are such a versatile and stable building product, brick manufacturers have been around for thousands of years, "the production of baked-clay units for construction extends nearly as far back as human civilization" (Broeksmit and

Sullivan 2006:45), that is as far back as the origin of complex societies in the ancient Near East approximately 5,000 years ago. Bricks are easily mass produced and have a fairly easy means of production. Given this, along with their diverse applications and structural importance, bricks and brick-making continue to be an integral part of human society around the globe.

CHAPTER 5 UTILITARIAN AND INDUSTRIAL CERAMICS IN MONTANA

5.1 Introduction

People came to Montana to strike it rich with gold, to start a new life homesteading, or even to escape an old life. "Just as precious metals first attracted a sizable population to western Montana in the 1860s, the more abundant resource of free grass first lured a permanent white population to the eastern plains during the 1870s" (Malone et al. 1995:145). As people arrived, towns and cities sprung up and began to take hold on the landscape. While the settlements grew, the needs of the people within them grew as well. Some of these needs could be taken care of with ceramics, as this would give the people objects for food preparation and consumption, as well as materials for building construction in the young U.S. Territory.

Some of Montana's first settlers came in pursuit of wealth that was provided with the finding of gold. "The first recorded discovery occurred in the spring of 1858, when brothers James and Granville Stuart and Reece Anderson found placer gold deposits at Gold Creek east of present day Drummond" (Malone et al. 1995:64). This discovery of gold would lead to large influxes of people coming to Montana and in turn some of its first cities being founded. Within these communities amenities required for daily life arrived with the settlers. This led to utilitarian ceramics and industrial ceramics being imported to, and sometimes produced in, the state of Montana.

Evidence shows that industrial ceramics were something produced more often and in more regions of Montana than were the utilitarian types. These products are ones that

were needed for the production and safety of the burgeoning settlements. As towns quickly came into existence the hastily assembled buildings became fire hazards because of their density in the settlements and because of their wood construction. This danger rendered bricks an important commodity, and this need spawned several brick-making businesses across the state.

Bricks served the need of and symbolized permanence. "Just as most residents showed little concern for the development of long-term institutions and services, so the buildings themselves, virtually all of them wood and most of them cheaply constructed, implied a lack of commitment to the future" (West 1996:36). New arrivals to the burgeoning town might be put off by the cheaply constructed buildings, but if well constructed permanent buildings met them, then their first impression might be quite different. "Prosperity attracted men, often with families, who were committed to remaining in the town and promoting stability and sustained growth" (West 1996:36). This prosperity was reflected in the choice of building materials used in construction, and it was at this time that bricks took on a kind of status symbol in the houses and businesses. "For material builders might choose California redwood or high quality pine, but more often they used brick or native stone, not only for their imposing appearance but also as a defense against fire" (West 1996:39).

Another reason for industrial ceramic production is the remoteness of an area such as Montana; the cost effectiveness of shipping them into the state was sometimes outweighed by the ability to produce them locally. Of course this did not do away with importation, as the supply was not enough to keep up with the demand in the Territory's burgeoning cities. However, once transcontinental railroads were constructed, shipping

became more efficient and oftentimes cheaper by the latter portion of the nineteenth century.

Some brick companies in Montana were short lived, which was due to varying levels of quality and the transient nature of the mining settlements. Production played into this as well: larger companies had the supplies, work force, and equipment to produce quality wares much more easily than the small companies, and this insured their success while the smaller companies often struggled and eventually succumbed.

This chapter will look at the production of utilitarian ceramics and establishment of brickyards in Montana. First I will provide a history of early companies, and then I provide an overview of brick production in alphabetical order by city. The Western Clay company from its early beginnings to final days will be addressed by itself, as it was the largest company to undergo this type of ceramic production, and ultimately became the Archie Bray Foundation which inspired this project in the first place.

5.2 Importing Ceramics

Ceramic production in the United States is something that occurred mainly in the Eastern portion of the country, which is due to the majority of country's population being predominantly in that region; with those people came the need and want for these types of products. "The mountain states had few potteries, a fact explained by lack of population than absence of suitable raw material" (Ketchum 1971:42). The climate of Montana effected where and how people lived. Such a large area has various means of survival that involve intensive amounts of labor and very hard work. These means did

not always put much importance on the manufacture of ceramics such as pottery. "Clay suitable for the making of fine earthenware was not common beyond the Mississippi, nor, until the twentieth century, did the population justify such an industry. The few manufactories which did develop were confined to California and Colorado" (Ketchum 1971:141). Areas like Montana, being remote and sporadically populated, do not necessarily require large ceramic production, but that did not mean that ceramic materials were not desired there.

"West of the Mississippi the little fine dishware owned by the pioneers was imported, not locally made. …Apparently there was little market for such a luxury" (Ketchum 1971:157). The importing of these products into the region could also have been because of the difficulty people undertook to get into the region itself. "Montana's homesteaders were the last wave of the agricultural frontier, and they found in Montana a hard way of life. Most came by rail, but others arrived in Studebaker wagons and lurching Model T Fords" (Malone et. al. 1995:243). While railroads made travel easier for new residents, as well as allowing for fragile ceramic objects (e.g., fine china) to be safely moved into the region, space was nevertheless limited among travelers baggage; thus importing ceramics remained important.

5.3 Utilitarian Ceramic Production

There was only a limited amount of utilitarian ceramic produced in Montana, but it did exist. "Only one Montana pottery is known, the Busack kiln at Deer Lodge near Helena, which was in business from 1871 until sometime after 1875" (Ketchum 1971:43).

This kiln may have been the only one of its kind in production at the time, but the sporadic nature of towns and the quick to leave ideology of their inhabitants make this hard to pin down. The Busack kiln did seem to make an impact in its brief existence though.

> The *Helena World Herald* of December 11, 1873, noted that: The pottery and redware works of Jack Busack, near the summit on the Mullin Pass, are being worked with good success. Mr. B. thoroughly understands all branches of the business, and experience has taught him how to manipulate the various clays with satisfaction. Busack made pitchers, jars, jugs, platters and flower pots; including the large ornamental kind (Ketchum 1971:43).

Apparently Mr. Busack was quite the prolific potter while he was in business, and the fact that we know about his business and not others may have to do with this. On the other hand it may be due to the fact that he was near a city with a newspaper. It is hard to tell.

5.4 Reasons for Establishing Brickyards

Early Montana brickyards were primitive in their means of manufacturing, and though they had room for improvement, this made sense for the beginning towns and cities.

> Early Montana brickyards…were relatively primitive affairs. Horses and oxen hauled and mixed the clay. Men hand-formed the bricks near the clay pits by throwing clay into sanded molds and then stacking the bricks to dry (Quivik 1985:3-4).

The production was crude, but at the same time it was one that relied on cooperation of weather and the seasons.

> Once dried, the bricks were stacked in such a fashion that they became their own kiln, called a clamp or scone kiln. Finished bricks were then hauled by horse drawn wagon to construction sites in the community.

> This kind of early brick-making took place only during summer months (Quivik 1985: 3-4).

Thus it is easy to see why production like this would have to occur when the timing was right. Heat and sun were essential to dry the bricks, and then cooperating weather was necessary to fire the bricks.

People were drawn to regions like Montana for various reasons, and one of these was wealth from resources. "The goldrush of the 1860's brought the first more permanent settlements. …However, since clay deposits suitable for brick production are relatively common throughout Montana, local brickmakers soon established themselves if it looked as if a camp might become permanent" (Quivik 1985: 3).

These early brick makers could see opportunity in the new towns, but there was more to it as well. "Another reason to build in brick had to do with the boosterism that was prevalent in an age when small towns were competing with their neighbor's to attract residents and investments. As in the English colonies, brick was seen as a material of prestige as well as permanence and progress" (Quivik 1985:4). Ideally, this increased the population of the town, which could increase the demand for products such as bricks

Once a community had well-constructed, permanent establishments, it could advertise itself as being more prestigious than neighboring ones. .

5.5 Brick Production by City

There were many brick companies that existed throughout Montana and that lasted for various amounts of time (Figure 1). Some companies underwent large scale

production and thrived; some shot up to fit a local need and went away just as quickly as they arrived. "By 1894, there were at least 27 brickyards in Montana… By 1913-14, Montana had a larger population, yet fewer brickyards (20)" (Quivik 1985:5). All of the companies made an impact in one form or another, some of which is still felt in cities across Montana.

Anaconda, one of the earliest cities in Montana, established three brick companies as it grew. Evidence of the "Union Fire Brick Company (Lessees of the Denver Fire Brick works) 'Sole Manufacturers of the Celebrated Apex Fire Brick'" (Montana Historical Society [MHS] 1890; Anaconda Copper Mining Co. Records [ACMCR]; Collection 169 Box 3) appears in the historic record. Reports of operations and costs show that the Standard Fire Brick Co. was in business in 1895 in Anaconda (MHS 1895; ACMCR; Collection MC317 Box 62 Folder 7). Later "Interoffice Correspondences" of "Anaconda Bricks" (MHS Jan 21, 1907; ACMCR; Collection 169 Box 19 Folder 8) reveal that a third company existed as well. Having more than one brick company show up within a city in the span of a few years indicates the demand for such a product…and, arguably, the anticipated permanence of the community.

Billings is currently the largest city in Montana, and a little over a hundred years ago it was an up and coming cow town. "Herman Clark arrived in April [1881] and stated that he planned to erect a brick foundry to take care of building materials for the machine shops, round house, a 'mammoth' hotel and other buildings" (Kliewer 1940:259). Later in "[1882] Another brickyard was added to take care of the demand for building material" (Kliewer 1940:263). This shows how quickly demand can get out of reach for

one company, and in turn shows how the people were savvy enough to deal with that demand.

Fort Benton is a town that dealt with its needs locally. "Grand Union Hotel opened in 1882. Made of red and yellow bricks produced in local kilns" (Stiff 1972:15). Diversity in color, such as this, is evidence of the varying resources that a state like Montana has available to the manufacturer.

Glendive built buildings out of brick as it grew, many of which are still in use today. "The railroad company has selected Glendive as the site of the repair shops, and has made a contract for a million and a quarter of brick, to be furnished by H.L. Douglas this fall, for their erection" (MHS 1885; Dawson County Montana Vertical File). "Henry Douglas, a former Northern Pacific commissary agent, built a local brick-yard in the winter of 1881-82 for railroad -related buildings. The passenger depot and stockyards were completed soon after" (Babcock and Jacobson 1998:5) (Figures 2 and 3). Mr. Douglas must have seen quite the business opportunity in leaving the railroad and in stead, building its buildings. There was demand for more than just the railroad buildings, "The scarcity of building materials hampered development as did the fact the first bricks were earmarked for the railroad delaying masonry construction of commercial buildings until 1886" (Babcock and Jacobson 1998:5-6). This scarcity of material was dealt with much in the same way that it was throughout the state. "Henry Dion, who lost a saloon and mercantile to the first 1886 fire, finally constructed his own brick kiln so that he and his neighbors could build more fire-resistant buildings" (Babcock and Jacobson 1995:18).

Great Falls, too, had a brickyard, amongst many other businesses. "In the summer of 1884, new businesses included a boarding house, meat market, saloon, hardware-

grocery, sawmill, stationery-confectionery store, blacksmith shop and brickyard" (MHS August 22, 1993; *Great Falls Tribune*)

In the Bitterroot, Hamilton got into the business as well, with a rather productive operation making bricks. "Clay for brick was found locally and Patrick Cone established a kiln for firing brick at a good clay source on the west side of the river. The *Bitterroot Bugle*… noted Sept. 4, 1890, "S.F. Cone was up from the new town Tuesday and reports a kiln of 250,000 brick already burned and reports 500,000 being made across the river" (Michels 1987:31). These basic bricks were phased out over time. "The use of low fire local brick declined in the early 1900s being replaced by a more sophisticated precision brick with extremely crisp lines laid with perfect, thin joints" (Michels 1987:34). The local brick might have been phased out, but it served its purpose for a time.

Hardin established a brickyard sometime after it was founded in 1906, when exactly is unclear. "There was a brickyard located on the east side of the Big Horn River operated by Mr. Rousseau; his son Floyd is now with Bud's grocery" (Snyder 1976:6). Apparently Floyd did not have success carrying on in the family business.

[Helena will be addressed in the section devoted to the Western Clay/Archie Bray Company.]

Lewistown not only built a brickyard, but one that was renowned. "Industrially, Lewistown boasts a brickyard among the finest and most modern in the country manufacturing some of the finest brick and tile in the West, much in demand for public buildings, industrial units, and homes from Portland to St. Paul" (MHS 1961;Lewistown, Mont.-History Vertical File). This shows the quality work that was being done at this time with the natural reserves of clay that can be found throughout the state.

Miles City established another eastern Montana brickyard that helped in the building of structures in that community. "The Olive Hotel rests on a concrete foundation. A locally produced, soft red brick was used in the construction of the 1890's, three-story portion of the building" (Bick and Goff 1998:2).

Missoula is a city that, at the turn of the twentieth century, when it was growing, needed a lot of building material. There were two stages of brick production that coincided with the growth of the city itself. "During the building boom, Hollenbeck Brick Works, located three miles west of Missoula, produced common and façade brick at a rate of about four to five million bricks a year. After the Depression of 1893, brick production in the Missoula area collapsed" (Babcock 1989:24). In the early 1900s the brick production picked up again. "In 1909 Missoula had 26 manufacturing enterprises which produced bricks…" (Babcock 1989:11); this is quite a few, especially considering that the brick production had collapsed a few years earlier. "The second stage of brick production in Missoula occurred between 1909 and the 1920s when façade brick was once again produced in the area. Firms producing brick at the time included the revived Hollenbeck Brick Company and Missoula Brick and Tile, the latter located in East Missoula" (Babcock 1989:25). The businesses may have been rejuvenated in Missoula, but the brick producers in Helena had something to say about that. "By 1920, the Western Clay Manufacturing Company…in Helena drove the Missoula area façade brick producers out of business" (Babcock 1989:25). The Western Clay Manufacturing Company will be discussed more thoroughly in the next section of this chapter.

Whitefish entered the brick business by a fortunate accident. "One day [P.J. Hoffman, Pete's father] was raking through charcoal when he noticed that reddish

Whitefish clay in the fire had been baked into something resembling brick. This observation led him to open a brickyard, Hoffman and Sons, in 1903" (Schafer 1971; Whitefish, MT-History Vertical File). This accident kept the Hoffman family in the brick business for many years after as well. "Pete Hoffman began to operate his father's brick business in 1912, after he had spent a couple of years working in Spokane, and he expanded it considerably" (Schafer 1971; Whitefish, MT-History Vertical File). This expansion allowed for Pete to undergo a strategic re-location of his business. "In 1923 he moved the business to Kalispell, buying out the brickyard there so that there would be one not two brickyards in the valley. He still used red-streaked clay from Whitefish for his best brick" (Schafer 1971; Whitefish, MT-History Vertical File).

There were many brick yards that went into business in Montana during the late nineteenth and early twentieth centuries, and this speaks volumes about the growth that the new state was experiencing. The state was growing and attracting new citizens as it did so, citizens that needed quality building materials to insure that they would be safe and have a quality place to stay, and that is what these brickyards provided.

5.6 Western Clay and Archie Bray

Helena had a long lasting brick industry with one company taking on various incarnations throughout the almost 100 years that it lasted. One man, Nicholas Kessler, got the Helena brick industry started and saw it blossom into something special as time passed on. "He [Nicholas Kessler] began producing brick in 1866 and continued to expand that business…. In 1875, he entered into partnership of several years duration

with Matthew Wormer, and in 1880 he purchased his first two brickmaking machines" (Quivik 1985:8). "The Western Clay Manufacturing company…was started in 1869…by Nick Kessler…, without any building and with one 6,000 brick capacity hand mould, one man and a wheelbarrow" (*Billings Times* July 17, 1919). Thus began Western Clay, a company that grew, and bought out competition as time progressed.

Not only did Mr. Kessler know how to run his business, but he also knew how to go about dealing with competition as well. "In 1876, he [Charles C. Thurston] moved to Butte and established a brickyard there which he operated until 1883 when he moved to Helena to establish yet another brickyard. Thurston operated his Helena brickyard for only two years before selling it to Kessler and moving to Anaconda where he established a giant brickyard to produce brick for Marcus Daly's new town…" (Quivik 1985:8-9). Personal communications show the sale in detail, "that on this day I have sold to Nick Kessler all the Currency, all the brick, all the timber on the brickyard and Eight brick…for the sum of two hundred and ninety dollars" (George Thurston pers. comm. September 5,1885). This sale, worth roughly $357,000 in today's market according to Measuringworth.com, shows the value of the brickyard itself as well as the desire of Kessler to control Helena's brick business.

When Kessler purchased Thurston's business he brought a man into the mix that would wind up being his successor and also furtherer of the industry in Helena. "When Kessler bought Thurston's works in 1885, he placed [Charles] Bray in charge of the operation. Bray was responsible for uploading and enlarging the plant" (Quivik 1985:9). Bray took his job seriously and went about improving Western Clay. "In 1885, Bray introduced 15 horsepower steam engine to power new equipment for producing bricks

including wet-mud brick presses and a dry-clay press, improved the kilns for firing clay products and added equipment for producing sewer pipe and tile, flower pots and decorative brick. These improvements allowed Kessler to increase production and drop the price" (Quivik 1985:9). As Kessler's business was growing and making improvements, other companies continued to form in the area as well, something that Mr. Kessler must have watched.

Jacob Switzer formed a company a few miles outside of Helena near the Mullan Pass, and the clay he utilized was highly praised. "In 1890, Switzer purchased the land near Blossburg and by 1892 established the Switzer Brick and Terra-Cotta Company and installed up-to-date equipment including brick and tile extruding machinery" (Quivik 1985:11). "The characteristics of the clay was such that it was thought it might be desirable for pressed brick, tile pipe or even fire brick, as much as it had been used in furnaces with satisfactory results and it is practically inexhaustible in quantity" (MHS 1890;Brickmaking Vertical File:2). This clay played a large role when Switzer's company and Western Clay merged, as it became the major supply for the company.

> In 1905, the Switzer and the Kessler works merged with the incorporation of the Western Clay Manufacturing Company… All brick, tile and pipe making activity was centered at the old Kessler works. The Switzer clay pits at Blossburg became the major clay supply for the new company (Quivik 1985:11).

After the merger of these two companies, Western Clay continued to improve and to progress forward, one way it did this was by expanding its means of delivery. "By 1908, the Western Clay Manufacturing Company was known as the most complete clay manufacturing plant in Montana. The plant was connected to both the Great Northern and the Northern Pacific railroads for convenient shipping of product statewide" (Quivik

1985:12). One can imagine how helpful it would be for the company to have direct access to trains for shipping, and the convenience would then reflect to their customers as well.

Charles Bray had been instrumental in updating Western Clay, and "In 1920, Bray bought Switzer's stock in Western Clay and in 1928 became the sole owner by purchasing the Kessler interests" (Quivik 1985:12). Once Bray had taken over the company it became more of a family affair. "Charles Bray's two sons, Archie and Ray, both worked for him at Western Clay…When Charles Bray died in 1931, Archie took over as president and general manager" (Quivik 1985:13). The family continued to run the company when Archie's son Archie Jr. joined the company and eventually took it over. "When Archie, Sr. died in 1953, Archie Jr. had been on hand for several years and was in good position to take over the business" (Quivik 1985:14). Unfortunately for Archie Jr., he took over a business in its twilight rather than its heyday.

> In 1957, Archie, Jr. secured a loan… to build a new tunnel kiln. Unfortunately because reinforced concrete and concrete block were replacing brick in many construction applications, the demand for clay products continued to decline and Western Clay was not able to repay the loan. Western Clay Manufacturing Company ceased operations in 1960 (Quivik 1985:14).

The closing of Western Clay was important not only to Helena but to the state as well. "At the time Western Clay closed, Montana's only two surviving brickyards were in Billings and Lewistown" (Quivik 1985:5).

Archie Jr. may have had to close Western Clay, but a love of clay remained within him that he had been nurturing prior to the closing of the company. "The combination of his love of clay and his love of the arts led to Bray's long-time dream of

creating a foundation which would support the ceramic arts. With artist friends, Peter Meloy and Branson Stevenson, he started an art center for potters in 1951" (Quivik 1985:25). At the time of the business's demise some convincing had to be made to differentiate the foundation from the manufacturing company. "By the time the Western Clay Manufacturing Company went out of business… the Archie Bray Foundation had enough stature that it was able to convince the Small Business Administration as two separate entities. And the Foundation had enough friends that it was able to raise the money needed to buy the buildings, which have since comprised the Foundation, at the auction in 1963" (Quivik 1985:26). This was important for the foundation as it made certain that it would be able to exist outside the business no matter what happened when it was sold, but hopes were held that everything would co-exist again. The "…dream was realized in 1984 when the old Western Clay Manufacturing Company structures were purchased from IXL Industries of Alberta, successors to Medicine Hat Brick and Tile" (Quivik 1985:26).

Western Clay had existed for almost a century before it closed down, and it had seen many changes in that time, the ultimate change being a movement from brick, tile, and pipe production, to the production of art. The Archie Bray Foundation is well recognized in the art community and attracts artisans from around the world, which represents a significant legacy. It is fascinating to see the various buildings that still exist from Western Clay's boom days, and to know that the site is still being utilized.

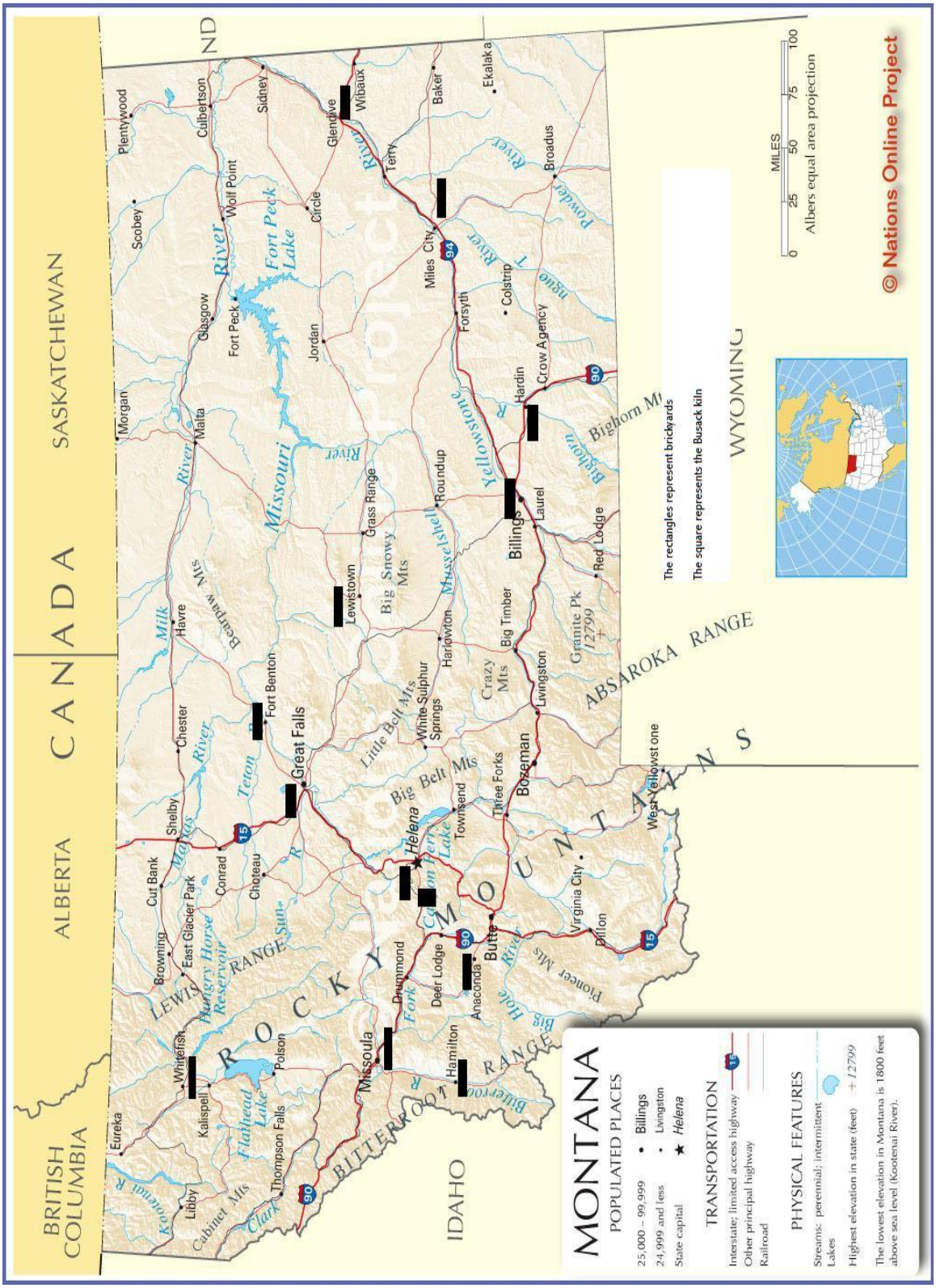

Figure 1 The black rectangles represent brickyards, and the square is the Busack kiln

CHAPTER 6 SUMMARY AND CONCLUSIONS

6.1 Introduction

As Europeans, European American, and Asians migrated into Montana during the late nineteenth and twentieth centuries, so, too did materials such as ceramic tableware for food consumption and bricks for construction of permanent communities. Although utilitarian and industrial ceramics were produced throughout the world for millennia, the previous chapters looked at the types being produced in Montana during the late nineteenth and early twentieth centuries. The durability, quality, and ease of shipping were integral to both market demands for such materials, as well as for local producers of these objects, especially because Territorial Montana--and the new state of Montana--included relatively remote settlements.

Within Montana there was a limited production of utilitarian ceramics which required people to bring these things with them as they came west, or to purchase them later from the local merchant. Industrial ceramics, such as those produced in brickyards, were more readily available in many cities across the newly formed state. Many of these brickyards were established by the westward moving railroads, and others established to fill a need for fireproof building material. An abundant supply of clay throughout the state provided these operations with enough material to make local ceramic production profitable and beneficial to the burgeoning settler communities.

The limited production of utilitarian ceramics, as well as the sporadic and oftentimes short-lived production of industrial ceramics is a reflection of the underdevelopment in Montana. Underdevelopment theory looks at situations like this

and one way it explains them is through internal colonialism. “In one instance, internal colonialism is seen as the ‘peculiar socialism without the peasant.’ A socialism in which an ‘urban-centered power elite’ in Russia transformed the whole peasantry into a legally and factually discriminated against class” (Hind 1984:543-4). To apply internal colonialism to Montana one must look at the companies that came into Montana as the colonizer, a "power elite" from the east. Companies came into the state with their own agenda and knowledge of how to make a profit through production, whether that involved mining or producing goods. This agenda allowed them to phase out businesses that already existed within the region, and it also separated them from the people living here. “Another interpretation maintaining that ‘ethnic solidarity among any objectively-defined set of individuals is principally due to the existence of a *hierarchical* cultural division of labor that promotes reactive group formation” (Hind 1984:544). This "reactive group formation" often takes shape in an us versus them mentality, one that still exists today.

It is this, us versus them attitude, that can keep underdevelopment from becoming development. This attitude is instilled in people at an early age and with it comes the idea that the outsider needs to stay where they are. “In an early manifestation of the internal colonial theory, Lenin depicts the ‘migration of small industrialists and handicraftsmen from the central, long-settled and economically advanced’ regions of Tsarist Russia to the steppes as a ‘manifestation of the colonization of other regions’” (Hind 1984:544). This did occur in Montana as well, these "industrialists and handicraftsmen" did migrate to Montana, and in turn helped the burgeoning towns and cities take hold of the landscape. Unfortunately this also meant that now the Territory could be more appealing to the powerful, the businesses that could come in and make

people dependent upon them for employment and necessities. "This dependency relationship between the colonizer and comprador consequently leads to a political economy of internal colonialism" (Anders 1980:685).

The colonizer and the colonized learn early on who is in charge and how that will affect their day to day existence. "[C]olonialism is economically motivated and that it is facilitated politically by the disparity of power between the colonizers and the colonized. This power disparity often is reflected in the technological superiority of the colonizers or the use of force to adapt the existing institutions of the colonized to their needs" (Anders 1980:682). In Montana technological superiority did affect the business landscape, it was through this superiority that businesses were forced to cease production or not even begin. With technology comes the ability to do a job more cheaply and much easier, so a brickyard that couldn't keep up would naturally wind up closing their doors to customers. Only Helena had a brickyard that showed the level of productivity needed to combat this, and that is because Western Clay did what it had to do to survive and thrive through most of its existence. Western Clay invested in technology, bought out rivals, sought out the best sources of clay, and tied themselves into the rail lines. These steps allowed the business to exist far longer than any others, and also to be profitable.

It is the dependency relationship that allows the colonizer to take even stronger hold of the colonized, as they are able to then put themselves in positions of power, such as elected officials. "The dependency model further suggests that in many instances an internal colonial mechanism operating among elite tribal officers who control the political and economic decision-making power of tribal governments is now the main barrier preventing Indian people from realizing their true development potential" (Anders

1980:693). Much like the Indian people in this passage, the people in Montana did not realize their true potential either. The producers of utilitarian and industrial ceramics in Montana were able to be phased out over time because the initial need for them was soon circumnavigated by bringing in these wares from outside the state. The railroad was one of the big reasons that companies were able to get the products they needed from outside the region as it was soon that much easier to bring them in, and also much more plausible to do so.

The colonizers are able to keep the colonized from realizing their potential by evolving the economic landscape in a much faster manner than what they might have expected. "Furthermore, in these interpretations, underdevelopment is unlikely to be transitory because the societies and economies which manifest its characteristics have had their evolution so distorted by more advanced economies that the prospects of overcoming established structural imbalances are remote" (Hind 1984:55). The colonized soon find that they would not be able to compete with the colonizers and so they have to succumb to the way of life that is given to them. In Montana that has manifested in companies coming into the state to do a job, and they are able to do this job more efficiently and cheaper than a local business would be able to.

Another effect that colonization has on a region is that it can create different sectors within it. "A consequence of this pattern has been to polarize the economy of many countries into two sectors of growth: Those linked to the old export economy… and the rest of the economy, which stagnated because the economic surplus was constantly being removed" (Anders 1980:685). This pattern is evident in Montana when looking at the two halves of the state. Western Montana was where the mining took

place, and eastern Montana was where homesteaders and ranchers settled down. Today the western half of the state has higher populations and larger cities than what the eastern half does. Western Montana was thoroughly linked to the export economy, and the eastern portion was not able to experience this "economic surplus". It is unfortunate that the effects of this can still be seen today, but this could also be a result of the differing mindsets that go into the two ways of life.

There is a level of exploitation in the relationship between the colonizer and the colonized, usually because the colonizer has a motive for being there, which is often profit. Unfortunately for the colonized, underdevelopment can continue to exist long after the colonizer has left. "A principal criticism of colonial rule is that it entails economic 'exploitation.' hinders and distorts the advancement of indigenous peoples, and sets in motion a process of underdevelopment that political independence does not necessarily terminate" (Hind 1984:556). Underdevelopment does exist in Montana, and this is obvious when looking at the amount of resources that we have here. Underdevelopment exists due to fear of change, not wanting outside business to come in to do a job. It also comes in the form of comfort with the current state of affairs, and wanting to leave well enough alone. Of course in today's society there are more laws and regulations to overcome, but this does not mean that they cannot be. One of the big reasons that underdevelopment exists in Montana today is because at one time its people were exploited, and because of that a mindset has been passed down from one generation to the next, and that is what fuels underdevelopment today.

6.2 Conclusions

The question of what was being produced in Montana and where it was being produced was answered in Chapter 5 (see also figure 1). This answer was the specific location of the businesses that existed during the late nineteenth and early twentieth centuries. The second question, what drove people to bring ceramics to Montana is discussed below.

It is a common occurrence in today's society to receive a set of china (i.e. ceramic tableware), often as a wedding present, but ceramic tableware was also often passed down from one generation to the next. "Your first American ironstone platter or Rockingham doorstop usually comes as a surprise: a gift or, perhaps, an unexpected find in Grandmother's cellar" (Ketchum 1971:xiii). These types of actions give plates and dishware an importance to families, the individual, and within our society itself.

The importance of ceramics, to the family or individual, oftentimes means that these pieces do not find their way to museums or other easily cataloged collections, as many things from our past do. Another thing that keeps answers from the researcher, is knowing that items like ceramics are fragile in nature. This fragility led them to often be discarded when broken, and this discarding means that we will not be able to know what was brought into the state. Finally, some of these pieces are actually still in use, as the following shows. "Much turn-of-the century ironstone and porcelain is still in use, particularly in rural areas. A lot more is tucked away in closets and attics" (Ketchum 1971:xix). These three factors show that further research will be needed to decipher what was brought into the state of a utilitarian nature. A project could be undertaken that

makes the public aware of the need for answers to these questions. This could be done through newspaper ads asking for any information regarding personal items being shared with the proper people. In addition to this, questionnaires could be written and distributed throughout the state. This would allow for a sampling of various regions which would give an overlapping idea of what was brought where, and what was popular at the time. Of course either of these methods would require the cooperation of the public, but I think that many people are proud of the ceramics they have, and would be willing to share this information with the researcher.

The third question asked, what motivated people to go into the ceramic business, is answered by looking at brick production within the state. It is easier to answer this question by looking at brick production because there is such a wealth of evidence of these businesses.

Industrial ceramics were produced in large quantities throughout the state which allows for the researcher to find information on them much more easily than one does utilitarian ceramics. One of the main reasons so much information still exists about industrial ceramics is because they were meant to last for very long periods of time. No matter what the type of industrial ceramic being produced, if they were well made there is an excellent chance they are still around. A person traveling the state is often confronted with this information when looking at old buildings in various cities.

We are able to see what kinds of bricks were being made by looking at buildings throughout the state, but information on the manufacturers is harder to find. Many of the people who decided to make bricks were doing so to make a profit off of the railroad, or booming cities, but the companies these people formed were not meant to last. A few

companies in Montana lasted for years; some even for decades, but all too often these businesses were short-lived. This short life could be due to lack of quality wares offered to the public which would make it difficult for anyone to stay in business, but other times it was due to being bought out by another company. There are also companies, like Western Clay, that form a good relationship with their city, but also find quality clay to use, and make improvements to their companies to make production easier and cheaper.

Though many brickyards no longer exist, their wares still do. One can trace a company through a mere mention in an old newspaper, even if the researcher can't find the physical remains of the company they often can trace the bricks that came from it. One way to trace the bricks to a source would be through neutron activation analysis to source the clay used in its production. This is done by bombarding the items with neutrons, which allows the researcher to then measure the radioactive decay of various elements within them. This would be an interesting way to pinpoint a clay source for any of the companies that were producing bricks during this time period. A company that thrived might also mark the bricks they produced which makes them more easily traced. The smaller producers were quickly making bricks for use, but these are usually easily traced as well, since a historic record of the building exists to show who produced the bricks if not where as well.

There is an ironic twist to brick production in Montana, which is that most companies were established to produce bricks for the railroad buildings being built, but when the railroad took hold in the region, their bricks were brought in on the rails. The railroads brought these bricks in because they could transport them easily and they were produced more cheaply elsewhere. There are companies like Western Clay that were

able to tie themselves into the railroad, but many other companies in Montana disappeared when the large demand went away, and when local producers were pushed out of business by less expensive products brought in along the railroad. The modern day equivalent to this could be a big box store like Wal-Mart coming into a city and pushing out the local mom and pop store. This also ties into the theory of underdevelopment discussed above.

The final question, what does this say about the people that helped form Montana, can be answered by looking at what kinds of things they went through on their journey west, and the hardships they encountered once here.

The story of ceramic production in Montana is emblematic of settler migration to the region over the past century and a half. Nineteenth-century Montana was full of hardships for settlers, and for the ever-changing business front as well. The emigrants who moved to Montana were a hearty group that did not always know what lay ahead of them, but they adapted and made the best of it. They did this by finding ways to produce what was needed, or establishing the means to have it brought to them. They used local resources--clay--and found the means to erect buildings that exist to this day.

Figure 2

The roundhouse in Glendive Montana, modification has changed the look over time but original bricks still exist in the structure.

Figure 3

Another view of the roundhouse in Glendive shows the original brickwork in the arches, filled in over time with new brick.

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