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THE WESTERN CLAY MANUFACTURING COMPANY:

An Historical Analysis of the Plant  
and Its Development

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## INTRODUCTION

The Western Clay Manufacturing Company was founded in 1905 by Nicholas Kessler and Jacob Switzer with Charles Bray as general manager. Western Clay went on to become Montana's largest clay products manufacturing company. In the process, Charles Bray's son Archie, who became the manager of Western Clay upon his father's death in 1931, went on to become one of Helena's major patrons of the arts and in 1951 founded the Archie Bray Foundation, a ceramic arts educational institution of national reputation.

The Western Clay Manufacturing Company went out of business in 1960. The brickyard was sold to a Canadian firm, while the Archie Bray Foundation became an entity independent of Western Clay. The brickyard was mothballed rather than being demolished and, consequently, is in surprisingly good condition considering the fact that it has been abandoned for 25 years. In 1984, the Archie Bray Foundation purchased the brickyard from the Canadian firm and is currently studying possible futures for the brickyard and its buildings.

This historical narrative is part of that study. This narrative has been prepared by Fredric L. Quivik, Architectural Historian for Renewable Technologies, Inc. of Butte, Montana, as part of an architectural and historical inventory of the grounds of the Western Clay Manufacturing Company and the Archie Bray Foundation. The inventory has led to a nomination to the National Register of Historic Places for the Western Clay Manufacturing Company Historic District which includes the brickyard, Foundation buildings and other related structures.

This historical narrative describes the historical background to the Western Clay Manufacturing Company, the history of the company itself, the equipment and processes employed at the brickyard, the history of the Archie

Bray Foundation, and the contribution both the brickyard and the Foundation have made to Montana's development.

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#### BACKGROUND TO WESTERN CLAY'S BRICKYARD

##### History of Brickmaking

Making masonry units from mud or clay is a practice which goes back at least 10,000 years. The earliest bricks were hand-formed and dried and baked in the sun by artisans in the Middle East. About 5,000 years ago, molds were used to shape bricks at Jericho and in Peru. Bricks which are only sun-baked are not very strong.

Certain types of materials, generally known as clays, vitrify when fired to higher temperatures and, therefore, become much stronger in compression. Firing bricks to make them stronger seems to have been discovered about 4,000 years ago in places like India, China and the Middle East. Brick was a popular building material throughout the Roman Empire, but its use during the Dark Ages was restricted to Italy. By the 13th century, the use of brick was

re-established in England and Holland, the two countries most responsible for importing the use of brick to North America.

In the American colonies, Dutch settlers employed brick widely in an effort to replicate the buildings they left in Holland. Brick was less commonly used in England, but its use was a symbol of prestige. Consequently, grander homes of the English colonists were often of brick. However, the ample supply of timber in the colonies made wood the predominant building material. Nevertheless, brick was often used in the colonies for chimneys and foundations. The use of brick spread across the continent and, depending on the availability of materials, enjoyed widespread use in some regions.<sup>1</sup>

#### Early Montana Brickmaking

The first European settlements in Montana were trading posts and missions. Their temporary nature was reflected in their log construction. The gold rush of the 1860's brought the first more permanent settlements. The first structures in these mining camps were still of wood construction, since modes of transportation to the gold fields from sources of supply were too crude to allow for construction from anything but local materials. 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. One of Montana's first brickmakers was Helena brewery owner Nicholas Kessler.

Early Montana brickyards, such as Kessler's, were relatively primitive affairs. Horses or 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 under crude shelters from the sun and rain. Once dried, the bricks were stacked in such a fashion that they became their own kiln,

called a clamp or scove 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.<sup>2</sup>

There were several reasons which motivated settlers to use brick for the construction of their businesses and residences as soon as it looked like their community would be permanent. One was the age-old threat of fire and the fact that brick construction is much more fire resistant than wood construction. During the 1880's, for example, large fires destroyed many of the commercial buildings in Dillon, Glasgow and Glendive. In each case, the commercial buildings which burned had been built of wood and were replaced by brick commercial structures.<sup>3</sup>

Another reason to build in brick had to do with the boosterism that was prevalent in an age when many small towns were competing with their neighbors to attract residents and investments. As in the English colonies, brick was seen as a material of prestige as well as permanence and progress. Butte, for example, had been a gold boom town in the 1860's, but by 1870 had declined to a population of less than 200 and all of its buildings were of wood. In the mid-1870's, however, Butte re-emerged as a major mining center with the advent of underground mining and Butte's population and prosperity grew fantastically during the rest of the 19th century. The introduction of this "era of true progress" was symbolized in the eyes of many by the beginning of the use of brick for construction in 1878.<sup>4</sup>

By 1894, there were at least 27 brickyards in Montana located in the following counties:<sup>5</sup>

Beaverhead (2)	Granite
Carbon	Lewis and Clark (2)
Cascade	Madison
Choteau	Meagher
Custer (2)	Missoula
Dawson	Ravalli
Deer Lodge (3)	Silver Bow (2)
Fergus	Teton
Flathead	Yellowstone (2)

By 1913-14, Montana had a larger population, yet fewer brickyards (20). This was due to a couple of factors: several of the above brickyards had grown and had either merged or forced competitors out of business; transportation infrastructure had improved so that larger brickyards in larger communities could supply the demand for brick in smaller communities, thus obviating the need for many local brickyards. In 1913-14, there were brickyards in the following Montana communities:<sup>6</sup>

Anaconda	Helena
Billings (2)	Kalispel
Bozeman	Lewistown
Butte	Livingston
Deer Lodge	Miles City
Fromberg	Missoula (2)
Great Falls	Musselshell
Hamilton	Polson
Hardin	Whitefish

#### The Industrialization of Brickmaking

As already described, early brickmaking was a very labor intensive process and it remained relatively unchanged for thousands of years. This all began to change during the Industrial Revolution as other forms of power were applied to tasks previously done by human or animal power and as innovators tried to develop machinery and processes which eliminated as much as possible

the need for laborers to handle each individual brick. Many new developments began to appear in the mid-19th century and England was often their source.<sup>7</sup>

Early brickmaking machinery simulated the hand actions of earlier brick-makers in that they forced clay into molds. Besides saving labor and speeding production, these machines had two other advantages: they could exert greater pressure and, therefore, could produce denser and more finely shaped brick; they could work stiffer or even dry clay, thus shortening or even eliminating the drying time before the brick could be fired. By the Centennial Exhibition of 1876 in Philadelphia, many brick-making machines had been invented and were on display from England, Canada, Germany, and France as well as the United States.<sup>8</sup>

Among those displayed was a machine which applied a very different concept to the forming of bricks. Rather than pressing clay into molds, this machine extruded clay through a die forming a continuous bar of clay in the size and shape of brick. This bar was then conveyed to a cutter comprised of wires appropriately spaced so that they could cut the bar into individual bricks. Early brick extruding machines were problematic in that laminations which weakened the brick were often produced as the clay passed through the die. These problems were resolved through selecting proper clays, mixing the clay to the proper consistency and lubricating the die with water or heat.<sup>9</sup>

The mechanization of brickmaking was also evident in the improved size and performance of crushers and pug mills for preparing clay. The advent of steam power allowed these machines to be driven by a single steam engine with power transmitted by means of overhead line shafts to crushers, pug mills and brick machines. Steam could also be piped to the machines to drive pistons which operated the brick presses. Finally, steam allowed for a more rapid

drying process by piping steam to drying tunnels built especially for that purpose.<sup>10</sup>

Firing or burning the bricks after they had dried initially took place in temporary kilns called scove kilns or clamps in which the bricks being fired created the kiln itself. The bricks were stacked in such a manner that periodic openings were left for the furnaces or fire boxes where the fuel (wood or coal) was burned. Hot combustion gasses passed up through the mass of brick, first driving off the rest of the water, then oxidizing some of the contents of the clay and finally vitrifying the brick. Brick near the furnaces vitrified sooner and were often deformed by the weight of the bricks above. Brick near the top of the clamp often did not receive enough heat and, therefore, were left underfired. Thus, the process of burning brick in these temporary kilns was relatively inefficient. However, their advantage was that they could be built wherever the clay was dug and formed into brick.<sup>11</sup>

During the 19th century, downdraft kilns were developed as an improvement over scove kilns. Downdraft kilns were either rectangular or circular in plan with fire box openings around the perimeter. Hot combustion gasses rose up the sides of the kiln and then were drawn down through the mass of brick and through grates in the floor by means of a draft induced by a nearby chimney which was connected to the kiln through a below-grade flue. The circular downdraft kilns had a domed ceiling and were called beehive kilns. Although these kilns were more efficient in the percentage of properly fired brick they produced, they were still inefficient in that setters had to hand-stack the brick in the kilns for each firing and then unload the kilns by hand after the brick had cooled.<sup>12</sup>

This last vestage of hand labor was eliminated in the 1890's when the tunnel kiln was perfected. Cars on tracks were loaded with brick at the brick machine, slowly moved through the drying tunnels, and then finally through the tunnel kiln in which, at various stages, the brick was subjected to the proper temperatures for the steps in the firing process.

#### ORIGINS OF WESTERN CLAY MANUFACTURING COMPANY

##### Kessler's Brick and Tile Works

Nicholas Kessler was born in Luxemburg in 1832 and emigrated to the United States in 1854. He worked in Chicago for a few years before heading west to the gold fields of Colorado and then Montana. In 1865, he bought a brewery in Helena which he operated until his death in 1901. Although best known as the owner of one of Montana's largest and longest operating breweries, the Kessler Brewery, Kessler was also well known as a brickmaker. He began producing brick in 1866 and continued to expand that business as well. In 1875, he entered into partnership of several years duration with Matthew Wormer, and in 1880 he purchased his first two brickmaking machines. Kessler's first brickyard was located near his brewery, not at the location of the Western Clay Manufacturing Company.<sup>13</sup>

Western Clay is located on the grounds of a brickyard founded by Charles C. Thurston. Thurston was born in New Hampshire in 1828. He apprenticed to be a brickmason in Boston where he worked until 1850 when he moved to New York and established himself as a contractor. In 1874, he went to work for the Utah and Northern, a railroad which would eventually connect the mines in Butte with the Union Pacific Railroad (the first transcontinental in the U.S.) in Utah. In 1876, he moved to Butte and established a brickyard there which he operated until 1883 when he moved to Helena to establish yet another

brickyard.<sup>14</sup> Thurston operated his Helena brickyard for only two years before selling it to Kessler<sup>15</sup> and moving to Anaconda where he established a giant brickyard to produce brick for Marcus Daly's new town and huge smelters which processed ore from the Anaconda Copper Mining Company mines in Butte.<sup>16</sup>

One of his employees was Chales Bray who was born in England in 1864 to a man employed in brick manufacturing. Before moving to the United States in 1880, young Bray was apprenticed in the business of making bricks. He worked for brickyards in Minnesota and North Dakota before arriving in the employ of Thurston in 1884. When Kessler bought Thurston's works in 1885, he placed Bray in charge of the operation. Bray was responsible for updating and enlarging the plant.<sup>17</sup> Having been thoroughly trained in the clay manufacturing business, he continued to keep abreast of the latest in technological innovations and business practices. For example, in 1898, Charles Bray traveled to Pittsburgh for the annual meeting of the National Clay Workers, a professional organization of which he was a member.<sup>18</sup> Bray also served in the third (1893) and eighth (1903) sessions of the Montana legislature.<sup>19</sup>

When Bray arrived, the plant was operated with horse and oxen power and the bricks were hand-molded from mud clay. In 1885, Bray introduced a 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.<sup>20</sup> The Kessler Brick and Tile Works, as it was then called, got an especially large boost when the U.S. government decided to build Fort Harrison in Helena (Kessler had been very active in efforts to bring the military post to Helena). The federal government acquired the land

in 1893 and the construction of several large brick structures as well as a sewer system began soon thereafter.<sup>21</sup>

An inventory of buildings at the Kessler brickyard dated January 1, 1897, showed a brick boiler house, two drying sheds, a dry pan shed, a kiln shed, an office, and a variety of ancillary buildings such as bunk houses, cook house, superintendent's residence, and a barn. The equipment inventory included two steam engines, two boilers, machine tools for the machine shop, a sewer pipe press complete with dies for sewer pipe and flue linings, a flower pot machine with dies, a dry pan, a wet pan, a dry press brick machine, and four wet-mud brick machines with pug mills. The Kessler works employed about 30 men.<sup>22</sup>

By the following year, the inventory of buildings had expanded to include three downdraft kilns and the associated stack among other new structures.<sup>23</sup> Around the turn of the 20th century, the Kessler Brick and Sewer Pipe Works was one of the leading clay manufacturers in Montana. Statewide production records show that the Kessler works consistently held ten percent of Montana's common brick production during those years. Brick manufacturers in Butte, Anaconda and Great Falls sometimes produced more brick than the Kessler works, but their production levels varied wildly from year to year depending on the demands of the mines and smelters.<sup>24</sup>

The Kessler works, on the other hand, was meeting a general commercial demand and, therefore, was able to maintain more consistent production levels. Furthermore, those same statewide production figures show that the Kessler works was the major consistent producer of sewer pipe, paving brick and other clay products such as flower pots. At the turn of the century, the only other consistent manufacturer of sewer pipe was the Butte Sewer Pipe and Tile Company. The only other brick manufacturer in Helena was Jacob Switzer.<sup>25</sup>

### Switzer's Blossburg Works

Another major Helena brickmaker was Jacob Switzer who owned and operated a manufacturing facility near his clay pits at Blossburg, just over Mullen Pass about 15 miles west of Helena. Switzer was born in Alsace on the Rhine in 1839. In 1857, he emigrated to the United States and first settled in Leavenworth, Kansas, where he spent most of his first twenty years in America. He moved to Helena in 1877 and by 1889 had his own wholesale liquor and cigar business. 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. To avail himself of the nearby Northern Pacific Railroad mainline, Switzer built a 1.5 mile spur to connect his plant to the Northern Pacific. His clay at Blossburg was of fine quality suitable for terra-cotta and tile fabrication.<sup>26</sup>

### Charles Bray and the Western Clay Manufacturing Company

In 1905, the Switzer and the Kessler works merged with the incorporation of the Western Clay Manufacturing Company. The two stockholders in the new company were Switzer and Nick Kessler's son Frederick.<sup>27</sup> Charles Bray was secretary and general manager. Switzer's extruding machinery was moved to Helena, and 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. Prior to that, the Kessler works had obtained its clay from an area on East Lawrence Street in Helena.<sup>28</sup>

Other improvements were made at the plant of the new Western Clay Manufacturing Company as well. Bray installed new drying spaces and built beehive kilns. Most of the buildings at the brickyard directly associated with the brickmaking process were probably built during this period immediately

following the creation of Western Clay, the exceptions being the boiler room, the engine room and the sewer pipe press shop. Some of the ancillary buildings which still survive, like the bunk house, the cook house and the barn were probably built prior to the creation of Western Clay.<sup>29</sup>

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. The inventory of equipment included a crusher, two dry pans, a wet pan, four pug mills, four soft-mud presses, two stiff mud extruders, and a sewer pipe press. The plant was powered by a 250 horsepower Corliss steam engine. Western Clay was known to have the most varied output of any plant in Montana with products including flue lining, clay tiles, fire brick, flower pots, lawn vases, culvert and sewer pipe, sidewalk and paving brick, white and red pressed brick, and ornamental brick in addition to common brick. Products were shipped throughout the state as well as to Wyoming, Idaho and eastern Washington.<sup>30</sup> The plant employed about 50 men, and it still accounted for about ten percent of Montana's production of common brick although its production was exceeded by the Butte plant and occasionally by the plants in Anaconda, Great Falls or Billings.<sup>31</sup>

Ten years later, Western Clay was clearly the largest producer of brick in Montana, producing more than twice as much common brick as its nearest competitor, Great Falls.<sup>32</sup> During these years and up to his death in 1931, Bray continued to upgrade the plant by converting wood frame structures enclosing the brick and tile shops to brick, adding space to the drying shop and improving the facilities in the clay shed. In 1920, Bray bought Switzer's stock in Western Clay and in 1928 became the sole owner by purchasing the Kessler interests.<sup>33</sup>

Archie Bray, Sr.

Charles Bray's two sons, Archie and Ray, both worked for him at Western Clay. To prepare him to take over the plant, Archie (the eldest) was sent by his father to Ohio State University, thought to have the best ceramics program in the country at the time, for a degree in ceramics engineering. Within two years of his graduation in 1911, Archie was made foreman of Western Clay. His younger brother, Ray, was the bookkeeper for the business.<sup>34</sup>

When Charles Bray died in 1931, Archie took over as president and general manager. Ray died two years later. One of the first improvements made under Archie's management was the conversion of the operations from coal to natural gas.<sup>33</sup> The boilers and the kilns were converted in 1931, the year the Montana Power Company completed its natural gas pipeline from Cut Bank to Butte and Anaconda with branch line service to Helena and Deer Lodge. Western Clay was one of the first businesses in Helena to convert to gas, along with the State Nursery and the East Helena smelter.<sup>36</sup>

During the thirties, Archie continued to improve the plant. In 1935, the brick extruding machine was replaced with a similar piece of equipment which had a de-airing chamber just before the die, enabling the plant to make a higher quality of brick. The machine was said to have been the first de-airing machine west of the Mississippi. About that same time, Bray added two more drying tunnels to the brick plant. Even during the height of the depression, Bray employed about 40 men and production remained high as Western Clay continued to be the state's largest producer. During World War II; employment dropped to four men plus Bray as a result of the war-induced labor shortage.<sup>37</sup>

After the war, Bray continued to improve the plant. For example, two new warehouses were built during that period. However, demand for brick was declining and Bray was turning his attention to his passion for the arts.<sup>38</sup>

Archie Bray, Jr.

In the late 1940's, Archie Bray's health began to decline and his wife, Effie, asked their son, Archie, Jr., then an airline pilot, to return to Helena to help his father run Western Clay. When Archie, Sr. died in 1953, Archie, Jr. had been on hand for several years and was in a good position to take over the business. He too worked to improve the operations. One of his first improvements was the replacement of the steam engine with an electric motor which drove the overhead line shafts.<sup>39</sup>

The bottleneck in the manufacture of brick at Western Clay had typically been the firing process, it being a labor-intensive and time-consuming job to hand-load the beehive kilns, fire the brick, let the brick cool, and unload the kilns by hand. In 1957, Archie, Jr. secured a loan from the Small Business Administration 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. Western Clay employed about 14 men at the time of closure. A few years later, the SBA auctioned off the plant. The entire operation was bought by Medicine Hat Brick and Tile Company of Alberta and mothballed to ensure that the plant was not re-opened, thus eliminating competition in the region.<sup>40</sup>

A similar fate awaited the few other surviving brickyards in Montana. The 1950's also saw the closure of plants in Great Falls, Missoula and Butte.

At the time Western Clay closed, Montana's only two surviving brickyards were in Billings and Lewistown.<sup>41</sup>

#### DESCRIPTION OF BUILDINGS AND EQUIPMENT

##### Digging Clay

In the early years of Western Clay, some clay for soft-mud brick was dug on the grounds of Western Clay, but the higher quality clay came from Blossburg. Each year in the early summer, a crew was sent to Blossburg to dig the clay. The crew was housed in a bunk house, ate in a cook house, and consisted of a cook, a man who ran the steam engine which pulled loaded cars out of the pits to be dumped into waiting railroad gondolas, and three men to operate the steam shovel. The clay was inspected ahead of time by the plant manager who instructed the men as to which of the varieties of clay on the site to dig and into which cars to put it. Different clays were used for different purposes. The clay was hauled by the Northern Pacific to Helena.<sup>42</sup>

##### Preparing Clay

At Helena, the Northern Pacific delivered clay to the clay shed at Western Clay. There it was dumped to form piles of the various kinds of clay for the various uses (common brick, decorative brick, hollow clay tile, sewer pipe, etc.).

All that remains of the clay shed are the brick piers of the railroad trestle which ran through the clay shed, the concrete foundations of the clay shed, and the ruins of the primary crusher at the east end of the clay shed. The clay shed was a simple gable shelter over the trestle which protected dry clay from the weather. Gondolas filled with dry clay were pushed onto the

trestle by a locomotive to be unloaded onto the ground until needed. At that time, clay was shoveled onto a conveyor belt which moved the clay to the primary crusher at the east end of the clay shed. From there, it was conveyed to dry pans for the tile and brick shops. Originally, the coal shed's east end was a bit west of the brick shop. The coal shed was extended to the east during the 1930's. Originally, the trestle was supported by wood pile bents. These were replaced by the existing brick piers which were built one by one during the 1920's and 30's. The coal shed was demolished sometime after the Western Clay Manufacturing Company closed in 1960.

Clay was conveyed to the dry pans, one in the tile shop and one in the brick shop, from the primary crusher. The dry pans are still in place and are large grates onto which dry clay was poured and pulverized by two large iron wheels until it was small enough to fall through the grates. After falling through the grates, clay landed in a hopper where it was scooped up by a bucket elevator.

The tile shop and the brick shop each have a bucket elevator which is housed in the tall tower which extends above each shop. Clay was elevated to the top of the tower and dumped onto a piano wire screen. Clay which passed through the screen dropped into the clay bin from which it was fed to the wet pan or the pug mills. Clay which would not pass through the screen was conveyed back to the dry pan for further crushing.

Each of these dry pans and elevators date at least to the beginnings of the Western Clay Manufacturing Company, if not before.

#### Molding and Shaping

Most dry, fine clay from the clay bins was fed to a pug mill adjoining either the tile machine or the brick machine. Some of the clay, however,

was fed to the wet pan which prepared it for the sewer pipe press or other specialty applications.

The wet pan is beneath the clay bin for the tile shop and is similar in configuration to the dry pan. However, the wet pan mixed water with the dry clay and worked the wet mixture until it was ready for use. Wet clay was shoveled from the wet pan and conveyed by belt to the second floor of the sewer pipe press room where it was fed into the steam-powered hydraulic press. The press was controlled from the first floor. The press would extrude clay through a die suspended from above. A movable platform below the die would support the sewer pipe as it was being formed. From the platform, pipe would be transferred to specially shaped carts and transported to the drying floor. The wet pan and the pipe press may date from the 1890's.

The tile room is adjacent to and east of the clay bin and contains the pug mill which sits atop the tile machine. The pug mill is a horizontal cylinder with a central shaft and cutting blades which mixed clay and water and worked it until it reached the proper consistency for making tile. Prepared clay dropped into the tile machine which extruded clay out through various shaped dies in a horizontal direction. The extruded bar of clay would pass through a cutter which used piano wire to cut the extrusion into desired lengths (the cutting machine for the tile room is presently in the nearby brick room). Shaped and cut tile then passed onto carts and transported the tile to the drying floors. The tile room houses over a dozen dies of various shapes for both sewer tile and hollow clay structural tile. The tile room also houses a flower pot machine. The flower pot machine was housed in the flower pot shop, adjacent to the wet pan, until the electric motor was installed there in about 1953.

Both the pipe press and the tile room are adjacent to the two-story drying shop. Two-wheeled hand carts carrying pipe and tile could be elevated to the second floor on a belt driven freight elevator. Beneath the floors surrounding the elevator are numerous plaster molds for shaping vases and other decorative clay products.

The clay bin over the brick shop also fed clay into a pug mill over the brick machine where it was mixed with water and prepared for making brick. All of this equipment appears to date to the beginnings of Western Clay. The brick extruding machine, into which clay was fed from the pug mill, was installed in 1935. It has its own short pug mill and, more significantly, a vacuum chamber for de-airing the clay just prior to its being extruded through the die. This de-airing brick machine was a significant improvement over the previous machine for making a higher quality brick. Clay extrusions then passed through the cutting machine, comprised of piano wires which cut the extrusion into desired lengths, and onto cars for transport in the adjoining drying tunnels.

The cars have steel wheels and rode on steel tracks which are still in place. Apparatus for negotiating the cars into the tunnels include a small floor-mounted turntable and a car which moved perpendicular to the tunnels and transorted the brick cars to the desired tunnel. North of the brick machine and adjacent to the drying tunnels is a large open room in which a brick re-pressing machine is housed. The brick re-press was used to stamp the name of the Western Clay Manufacturing Company or decorative figures onto individual bricks.

All of the above described equipment is in place and near working order, unless otherwise indicated.

## Drying Products

The drying shop appears to be part of a larger assemblage of spaces including the clay crusher, the tile room, the boiler room, the engine room, and the machine shop. The drying shop is a rectangular one- and two-story brick structure with gable roofs. The south end of the building appears to have been the original section. It was originally one story. The north end is a two-story addition with stepped parapets extending above the north gable end which was built prior to 1916. Shortly after 1930, the east half of the south end was raised to a two-story height. The shop is connected to the kiln areas by means of wood frame enclosed ramps, one at the north end and one on the east side.

The second floor of the interior is supported by a wood post and beam system and is comprised of 2 x 6's with one-inch spaces between them which allowed air to freely circulate throughout the shop. The shop is equipped with steam pipes beneath both floors which heated the space and facilitated the drying process. The shop is adjacent to the freight elevator, the tile shop and the sewer pipe press for the easy transport of clay products from fabrication to drying. At the southwest corner of the drying shop is the old flower pot shop where clay flower pots were fabricated.

The brick drying tunnels are adjacent to the brick shop and are of brick construction (the walls separating each tunnel are built of brick) with a single gable roof covering all the tunnels. The tunnels are a little over 100 feet long, with the south end directly adjacent to the brick shop and the north end opening to an extension of the gable roof which sheltered the brick cars before they were moved to the kilns. Originally there were seven tunnels; during the 1930's, two more tunnels were added along the east side of the structure along with a roof extension to the east for sheltering additional

brick cars. The roof of the drying tunnels is punctuated by several rows of vertical wood vent stacks which helped induce a draft to carry moist air out of the tunnels.

There is a wood door at each end of each tunnel. Each tunnel has a set of tracks on the ground. Beneath the tracks are steam pipes for heating the tunnels. Brick cars were loaded with newly made brick at the brick machine and moved into a tunnel for drying. Each car held about 400 bricks, each tunnel held 14 cars, it took about a day to dry the brick in the tunnels, and it took about eight tunnels full of brick to fill the beehive kiln. Under the roof at the north end of the tunnels is a car which was used to transport brick cars from the drying tunnels to the kilns.

#### Firing Products

Scove kilns were the typical type of kiln used to fire brick before the advent of more sophisticated kilns such as beehive kilns. The most elementary scove kilns were comprised entirely of unfired brick. More sophisticated scove kilns, such as those surviving at Western Clay, had permanent sidewalls. It is not known exactly when these scove kilns were built, although they probably predated the first beehive kilns which appear to have been built about 1905. In 1916, there were four of these scove kilns on the site. Only two survive. They were last fired in about 1924. They were converted to warehouses with the addition of gable roofs in about 1935.

The two surviving scove kilns are rectangular brick structures with a gable roof. Originally, the brick sidewalls were the only permanent parts of the structure and were used to contain a batch of brick as it was being fired. Bricks were stacked in the scove kiln in such a way that they were vaulted over the fire boxes and they had spaces between each brick so that hot gasses

could pass between the bricks and fire them. The sidewalls each have several arched openings at grade which allowed firemen to tend the fires in the kiln. The sidewalls also have brick vertical projections which look like buttresses spaced between the firebox openings. Straps installed over the vault of each batch of brick and attached to these buttresses resisted the outward thrust of the brick.

Beehive or downdraft kilns were developed to improve firing efficiency by drawing hot gasses from the firebox down through the mass of brick and out through a nearby stack. Coal or wood (and later natural gas) was burned in the fire boxes behind the "bag walls." Hot combustion gasses rose up the sides of the kiln and along the dome and then were drawn down through the mass of brick and the brick floor grate by the draft induced by the stack. This process more evenly fired the brick and was an improvement over the earlier scove kilns in which many bricks were either under- or over-fired. The first three downdraft kilns at the Kessler brickyard were built in 1897. It is not known whether any of the surviving beehive kilns are those initial downdraft kilns or if they were built in 1905 at the creation of Western Clay. It is known that at least six beehive kilns were eventually built at Western Clay before 1916.

These beehive kilns are brick structures about 30 feet in diameter in their outside dimension. At the base of each is a brick wall about eight feet tall with steel bands wrapped around it at various heights to restrain the outward thrust of the dome and with various arched openings to the inside. Two of these openings, one on each side of the kiln, are approximately six feet high and were used to load and unload the kiln. The other ten openings are evenly spaced around the perimeter of the kiln and allowed access to the fireboxes.

A brick dome rests on this perimeter wall and reaches a height of about 20 feet. At the center of the top of each dome is a small circular hole which allowed air into the kiln during firing and allowed the brick to be inspected during firing. ~~Inside each kiln is a series of rectangular fire brick compartments, one adjacent to each firebox opening. These were called bag walls and served to shield the brick being fired from direct exposure to the fire.~~ The floor of each kiln is comprised of a grate of large bricks which allowed the hot gasses in the kiln to be drawn down through the floor to the underground flue which connected the kiln to the adjacent stack. ~~Two of these stacks survive. The perimeter of the kilns are surrounded by a wood frame shed roof shelter which covers the ground between all the kilns except #6 which has its own surrounding shelter.~~

The tunnel kiln is housed in a metal frame building (manufactured by Butler) with corrugated steel siding, a slab-on-grade foundation and a gable roof. Within the building are two tunnel kilns, a drying kiln and a firing kiln, designed and built by Harrop (a kiln manufacturing company). This building is connected to the brick shop by a small metal passage within which is a conveyor belt which transported brick from the brick shop to the kiln. Brick were loaded onto cars in this building and moved first through the drying kiln and then through the firing kiln in a continuous operation.

#### Support Functions

There are numerous buildings on the grounds of the Western Clay Manufacturing Company which supported the operations of the plant including a blacksmith shop, various storage facilities, accommodations for room and board, and agricultural structures. The most central of these support structures, however, are the boiler room/engine room/machine shop.

These three rooms appear to be part of a larger assemblage of spaces which include the tile shop and the drying shop which have already been described. These three rooms are all of brick bearing wall construction with a complex set of roofs. The main roof is a hipped roof over the engine room and part of the boiler room. There is a shed roof over the machine shop and a shed roof over the rest of the boiler room plus an extension above the boiler room which houses the base of the twin boiler stacks.

The boiler room houses two Atlas coal-fired boilers which were converted to gas in 1931. It also houses a large water tank, a shower room for employees which is said to have been one of the first showers installed in Helena, and various storage compartments and work benches for boiler maintenance.

The engine room is now largely vacant; the only remnants of its former use are a variety of gauges on the wall between it and the boiler room which were used to regulate the steam engine. The engine room housed a 250 horsepower Corliss steam engine, the fly wheel of which drove a belt which, in turn, drove line shafts which powered all of the equipment at the Western Clay Manufacturing Company. The steam engine was removed and replaced by an electric motor in about 1953.

The machine shop houses machine tools for maintaining equipment at the plant and for fabricating dies for the brick and tile machines. Almost all the equipment is still in place, including a lathe, a drill press, a planer, a steel cutting saw, grinding wheels, etc. All the equipment was driven by overhead line shafts which are still in place.

The advent of steam boilers, steam engine and steam-powered equipment necessitated forge and machine tool capabilities to maintain the equipment and to fabricate new parts. Thus, the blacksmith shop was built. Built by 1897, the blacksmith shop is a rectangular one-story wood frame structure

with board and batten siding and a gable roof with corrugated metal roofing. There are still many blacksmith and other tools on the inside.

The operation also required storage facilities for finished products. There are several warehouses on the grounds which date from the post World War II era. The oldest of the storage facilities is the pot and tile store house, north of the beehive kilns and probably built in the 1890's. It is a one-store rectangular wood frame structure with board and batten siding and a corrugated metal roof of wood shingles. It has a dirt floor and is badly deteriorated.

Around the turn of the century, most of the men who worked at the Kessler brickyard and later the Western Clay Manufacturing Company lived on the grounds due to the distance of the brickyard from Helena. Room and board was part of the employees' pay. The cook shed, south of the clay shed, was used to feed the men until about 1947 when the policy of room and board on the premises ceased. The cook shed is a rectangular one-story wood frame building with board and batten siding, a brick foundation, and a gable roof with wood shingles. This building housed the cook's quarters at the north end, the kitchen in the middle and the dining hall at the south end. A board and batten bunk house also survives north of the pot and tile store house.

In early years, the Western Clay Manufacturing Company used horses to move materials around the grounds of the plant. With the advent of the internal combustion engine, trucks slowly replaced horses and wagons. Nevertheless, Western Clay relied on horses for motive power until about 1934. The last of Western Clay's "retired" horses lived in the barn at the south end of the property until World War II. Prior to 1934, Western Clay also raised its own cows, pigs and chickens, produced its own dairy products and vegetables and grew crops to feed the livestock. Thus, in the early years this barn and the

nearby sheds were used in standard farm practice in support of the operations of the brickyard. The barn is a rectangular log structure with board and batten siding and a gable roof with wood shingles (most of the shingles are gone, exposing the roof decking). Centered on the roof is a louvered cupola. Extending to the north and south of the east end of the barn are wood frame shed roof wings. The log structure sits on a stone (rubble) foundation. Near the barn is a small stuccoed, wood frame house in which the "barn man" lived.

#### ARCHIE BRAY FOUNDATION

##### History

Archie Bray, Sr. was not only a skilled clay worker but a patron of the arts as well. He was known as a good piano player and traveled to New York City on occasion to take in the theatre and the opera. He was also one of the principle organizers and occasionally funders of Helena's Community Concert Association. Bray brought many nationally known theatrical and musical performers from Chicago and New York to town.<sup>43</sup>

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 his artist friends, Peter Meloy and Branson Stevenson, he started an art center for potters in 1951. Two young Montana potters, Rudy Autio and Peter Voulkos, were hired to work at the brickyard so they could establish a pottery shop. That first year, the pottery was housed in the drying shop adjacent to the old flower pot shop. Meanwhile, Bray, Autio, Voulkes, and some volunteers began laying brick for an actual building devoted to pottery. The new building, known as "The Pottery," opened with a ceremony in the fall of 1952.<sup>44</sup>

Almost immediately, the new Archie Bray Foundation began inviting celebrity potters to work and instruct at The Pottery. When Archie Bray died in 1953, Archie, Jr. took over the brickyard and continued to support The Pottery. By the time the Western Clay Manufacturing Company went out of business in 1960, the Archie Bray Foundation had enough stature that it was able to convince the Small Business Administration to sell the brickyard and the Foundation buildings 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.<sup>45</sup>

Since that time, the Archie Bray Foundation has continued to grow and expand, establishing a good local reputation because of its classes for the community, winning statewide awards for its artists and its programs, and earning national recognition for the impressive list of accomplished resident potters and reknowned visiting artists. Also, the Foundation has expanded its financial base by establishing a clay sales business. A long-time dream of the Archie Bray Foundation has been to purchase the buildings and grounds of the old neighboring brickyard from which the Foundation sprang. That 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.<sup>46</sup>

#### Buildings

The buildings of the Archie Bray Foundation include The Pottery and an annex, residences for the resident potter and the manager of the clay business, and a variety of garages and warehouses. Adjacent to the driveway to the Foundation is the Old Charles Bray residence, now under separate ownership from the Foundation. All of the Foundation buildings are of brick and tile construction.

More detail on these and other buildings at the Western Clay Manufacturing Company can be found on the individual inventory sheets for each building which accompany this report.

#### CONTRIBUTIONS TO MONTANA

##### Western Clay Manufacturing Company

The Kessler Brick and Tile Works was one of the two leading brick suppliers in Helena and one of the few suppliers of clay tile and pipe in the state. When Nicholas Kessler merged his clay manufacturing business with that of Jacob Switzer, their new Western Clay Manufacturing Company became one of the largest clay manufacturing concerns in the state and the only consistent producer of clay products other than brick. The businesses of the other leading brick manufacturers in Montana were more closely tied to fluctuations in demand from the state's most dominant industry, copper mining, smelting and refining. Western Clay, on the other hand, served a more general market with brick. Less than ten years after the formation of the Western Clay Manufacturing Company, it was clearly the leading brickmaker in Montana.

During those years in which Western Clay led the Montana brickmaking industry, there were not the building materials supply outlets which are common today. Brickyards sold their product directly to the contractor. For construction projects which were designed by an architect, the plans usually specified the kind of brick and the brickmaker. Toward this end, both Charles and Archie Bray, Sr. made it a practice to call on architects and large masonry contractors to encourage their use of Western Clay products.<sup>47</sup> The success of Western Clay during the first half of the 20th century attests to the good relationships maintained between the Brays and principals in the

construction industry as well as to the quality and price of product the company was able to offer.

As a consequence of the success of the Western Clay Manufacturing Company, there are many major buildings of Western Clay products throughout the state. These include the Federal Courthouses in Butte and Helena, the Civic Center and the First National Bank and Trust Company in Helena, the State Hospital at Galen, major buildings on the campuses of the State University System at Missoula, Bozeman, Butte, Havre, and Dillon, and the Veterans' Hospital at Fort Harrison.<sup>48</sup> Streets of Helena, Great Falls and Missoula were paved with paving brick from Western Clay.<sup>49</sup>

A final tribute to the success of Western Clay and the high regard toward its owners can be seen in the list of honorary pallbearers at the funeral of Charles Bray in 1931. It included such notable architects as Chandler Cohagen of Billings, Walter Arnold of Butte, Fred Willson of Bozeman, and A. B. McIver of Great Falls.<sup>50</sup>

#### Archie Bray Foundation

Montana has also benefited from the presence of the Archie Bray Foundation in Helena. For its contributions, the Foundation was awarded the "outstanding institution in the art field" in 1981 by Governor Ted Schwinden. The Foundation has also contributed many notable ceramicists to the state, principal among them: Rudy Autio, who has just retired after a distinguished career of reaching at the University of Montana; Dave Shaner, who has a successful pottery in Big Fork, and Kurt Weiser, current resident potter at the Archie Bray Foundation.<sup>51</sup>

## STATEMENT OF SIGNIFICANCE

The Western Clay Manufacturing Company is significant as a leader in Montana's clay manufacturing industry which played a major role in the development of Montana's built environment; for its associations with Nicholas Kessler, Charles Bray and Archie Bray, Sr., individuals prominent in Helena's history; because it embodies the distinctive characteristics of a turn-of-the-century clay manufacturing operation, both in terms of the surviving buildings and in terms of the equipment and the processes they house; and because the buildings, equipment and grounds may yield information important to the history of brickmaking in Montana.

The Western Clay Manufacturing Company, born of the merger of Helena's two principal brickmakers, the Kessler Works and the Switzer Works, was among the leading manufacturers of brick and other clay products in Montana at the turn of the century and soon became the industry leader. Besides producing a wide variety of common, face, fire, paving, and ornamental brick, Western Clay was Montana's only consistent producer of such other clay products as flue linings, sewer pipe and tile, hollow clay tile, and flower pots. Western Clay maintained its leading position in the industry until the decline in demand for clay products, due to increased use of concrete, forced it out of business in 1960. However, Western Clay is survived by its offspring, the Archie Bray Foundation, one of Montana's leading arts institutions.

Nicholas Kessler was Helena's first brickmaker and built his brickmaking business into one of the leaders in the state. However, he is more well known for his Kessler Brewery and as one of 19th century Helena's leading citizens. Charles Bray was a skilled clay worker trained in his native England. He was the single individual most responsible for the actual technological improvements at the Kessler brickworks and at the newly formed

Western Clay Manufacturing Company. He also served in two early sessions of the Montana State Legislature. He sent his son, Archie, to Ohio State University to study ceramic engineering so that technological advancement could continue at Western Clay. In addition to carrying forward his father's tradition of skilled and technically advanced clay manufacturing, Archie Bray was a leading patron of the arts in Helena and is perhaps best known as the founder of the Archie Bray Foundation.

Due to the fact that the Western Clay Manufacturing Company was mothballed by its new owner after the closure in 1960, the buildings and the equipment at the complex are in surprisingly good condition. The plant depicts all the processes employed in the production of clay products at the turn of the century with the exception of digging the clay. All of the equipment and buildings make it possible to clearly and visually understand the movement of clay from storage to preparation, fabrication, drying, and firing. Furthermore, there are varieties of these processes represented, such as both a wet pan and pug mills for preparation, brick extruder, tile extruder, sewer pipe press and flower pot machine for fabrication, drying shop and drying tunnels for drying, and scove kilns, beehive kilns and a continuous tunnel kiln for firing.

Because the facilities of the Western Clay Manufacturing Company are so intact, they present an excellent opportunity for artifactual analysis of various elements of the turn-of-the-century clay manufacturing process.

END NOTES

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3. Michael D. Peterson, "Montana's Brick Making and Clay Industry: A Historical Perspective," unpublished ms., 1975, p. 6, in which the author cites Frank Eliel, et al., "Southwestern Montana: Beaverhead Revisited," Finerock Publishing Co., and Vivian Paladin, "From Buffalo Boom to Sonic Boom," Glasgow Jubilee Committee, 1972.
4. M. A. Leeson, History of Montana: 1739-1885 (Chicago: Warner, Beers and Co., 1885), p. 923.
5. Third Annual Report of the Bureau of Agriculture, Labor and Industry of Montana, for the year ending November 30, 1894 (Helena: State Publishing Co., 1895), p. 120.
6. First Biennial Report of the Department of Labor and Industry, 1913-1914 (Helena: Independent Publishing Co., 1914), p. 132.
7. McKee, p. 44. J. Parker and B. Fiske, "The Elimination of Hand Labor in Brick Making," Engineering News, Vol. 44, No. 3, January 15, 1903, p. 63.
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10. Gurke, p. 47. Clemens Catesby Jones, "The Roller-Pallet System for the Manufacture of Bricks," Transactions of the American Institute of Mining Engineers, Vol. 30 (New York: American Institute of Mining Engineers, 1901), pp. 304-305.
11. Gurke, pp. 51-57. McKee, p. 43. Schumann, pp. 412-414.
12. Gurke, p. 57.
13. Leeson, pp. 269-270. Progressive Men of the State of Montana (Chicago: A. W. Bowan and Co., 1901), pp. 1380-1381. Helen Fitzgerald Sanders, History of Montana (Chicago: Lewis Publishing Co., 1913), p. 1227. Helena Weekly Herald, April 15, 1880, p. 8.

14. Progressive Men, p. 893. Sanders, p. 1256.
15. Kessler bought Thurston's brickyard in 1885 but did not acquire the land on which the brickyard sits until 1888. Bill of Sale from Thurston to Kessler dated Sept. 5, 1885, in the Kessler Family Papers held at the Montana Historical Society Archives, MC 161, Box 44, Folder 15. Sheriff's sale deed to Kessler dated June 2, 1888, in Deed Book 14, p. 424, Clerk and Recorder's Office, Lewis and Clark County Courthouse, Helena.
16. Jess Monk, "Chronological History of the Old Reduction Works," unpublished ms., p. 4, in the Anaconda Copper Mining Company Records at the Montana Historical Society Archives, unnumbered subject files, Box 62A, Folder 17.
17. Progressive Men, pp. 1501-1502. Sanders, pp. 1272-1273. Bray first went to work for Kessler in May 1885. Payroll Book in the Kessler Family Papers, MC 161, Box 47, Folder 4.
18. William C. Campbell, From the Quarries of Last Chance Gulch, Vol. II (Helena: The Helena Independent Record Publishing Co., 1964), p. 167.
19. Sanders, p. 1272.
20. Campbell, From the Quarries of Last Chance Gulch, Vol. I (Helena: The Montana Record Publishing Co., 1951), p. 150. Jesse Perry Rowe, "Montana Clay Industry," in Some Economic Geology of Montana, University of Montana Bulletin No. 50, Geological Series No. 3 (Missoula: University of Montana, 1908), p. 56. The Townsend Star, July 14, 1919.
21. Helena Independent Record, July 22, 1945. United States Military Reservations, National Cemeteries and Military Parks (Washington, D.C.: Government Printing Office, 1916), p. 234. Notes on the history of Fort William Henry Harrison on file at the State Historic Preservation Office, Montana Historical Society, Helena.
22. Inventories in the Kessler Family Papers, MC 161, Box 49, Folder 2. Fourth Annual Report of the Bureau of Agriculture, Labor and Industry for the year ending November 30, 1896 (Helena: State Publishing Co., 1897), p. 70.
23. Inventories in the Kessler Family Papers, MC 161, Box 49, Folder 3.
24. Seventh Annual Report of the Bureau of Agriculture, Labor and Industry of Montana, for the year ending November 30, 1900 (Helena: Independent Publishing Co., 1900), pp. 330-331. Eighth Annual Report of the Bureau of Agriculture, Labor and Industry of Montana, for the year ending November 30, 1902 (Helena: Independent Publishing Co., 1902), pp. 392-393. Ninth Annual Report of the Bureau of Agriculture, Labor and Industry of Montana, for the year ending November 30, 1904 (no publisher or date given), pp. 246-247. Tenth Annual Report of the Bureau of Agriculture, Labor and Industry of Montana, for the year ending November 30, 1906 (Helena: Independent Publishing Co., 1906), pp. 284-285.
25. Ibid.

26. Progressive Men, pp. 452-453.
27. Frederick Kessler owned 450 shares and Jacob Switzer owned 150 shares, all valued at \$100 each. Trustees for the company were Charles Bray, A. L. Smith, cashier at the Montana National Bank in Helena, and C. S. Caird of Caird Engineering in Helena. Articles of Incorporation for the Western Clay Manufacturing Company dated December 6, 1905 and filed at the Office of the Secretary of State, Montana State Capitol, Helena.
28. Helena Independent Record, July 22, 1945.
29. These conclusions are drawn by analyzing extant structures and comparing observations with information in the Kessler inventories (Notes 22 and 23) and the Independent Record, July 22, 1945.
30. Rowe, pp. 55-56.
31. Tenth Annual Report of the Bureau of Agriculture, Labor and Industry of Montana, for the year ending November 30, 1906, pp. 284-285.
32. First Biennial Report of the Department of Labor and Industry, 1913-1914 (Helena: Independent Publishing Co., 1914), p. 132. Second Biennial Report of the Department of Labor and Industry, 1915-1916 (Helena: Independent Publishing Co., 1916), p. 135.
33. Helena Independent Record, July 22, 1945.
34. Helena Independent Record, July 22, 1945. Sanders, p. 1273. Interview with Archie Bray, Jr. on December 10, 1945, at the Western Clay/Archie Bray Foundation.
35. Interview with Archie Bray, Jr., December 10, 1984.
36. Telephone interview with Ed Dougherty of Helena (retired Montana Power Company employee who installed the gas service to Western Clay) on February 12, 1985. David Little, "50 Years of Natural Gas," in The Energizer, Vol. 33, No. 3, July 1981, p. 4.
37. Helena Independent Record, July 22, 1945. Interview with Archie Bray, Jr., December 10, 1984.
38. Interview with Archie Bray, Jr., December 10, 1984.
39. Ibid.
40. Ibid.
41. Peterson, p. 6.
42. Descriptions of buildings are based on field recordings by the author, the interview with Archie Bray, Jr., December 10, 1984, and Sanborn Fire Insurance Maps for the Western Clay Manufacturing Co. (1896 updated to 1916, 1930 and 1930 updated to 1953).

43. Helena Independent Record, February 17, 1953. Frances Senska, "Pottery in a Brickyard," American Craft, Vol. 42, No. 1, February/March 1982, p. 33.
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45. Senska, p. 34.
46. Interview with Kurt Weiser, resident potter at the Archie Bray Foundation, December 10, 1984.
47. Interview with Archie Bray, Jr., December 10, 1984.
48. Helena Independent Record, July 22, 1945.
49. Rowe, p. 56.
50. Helena Independent Record, January 20, 1931.
51. Senska, p. 34.