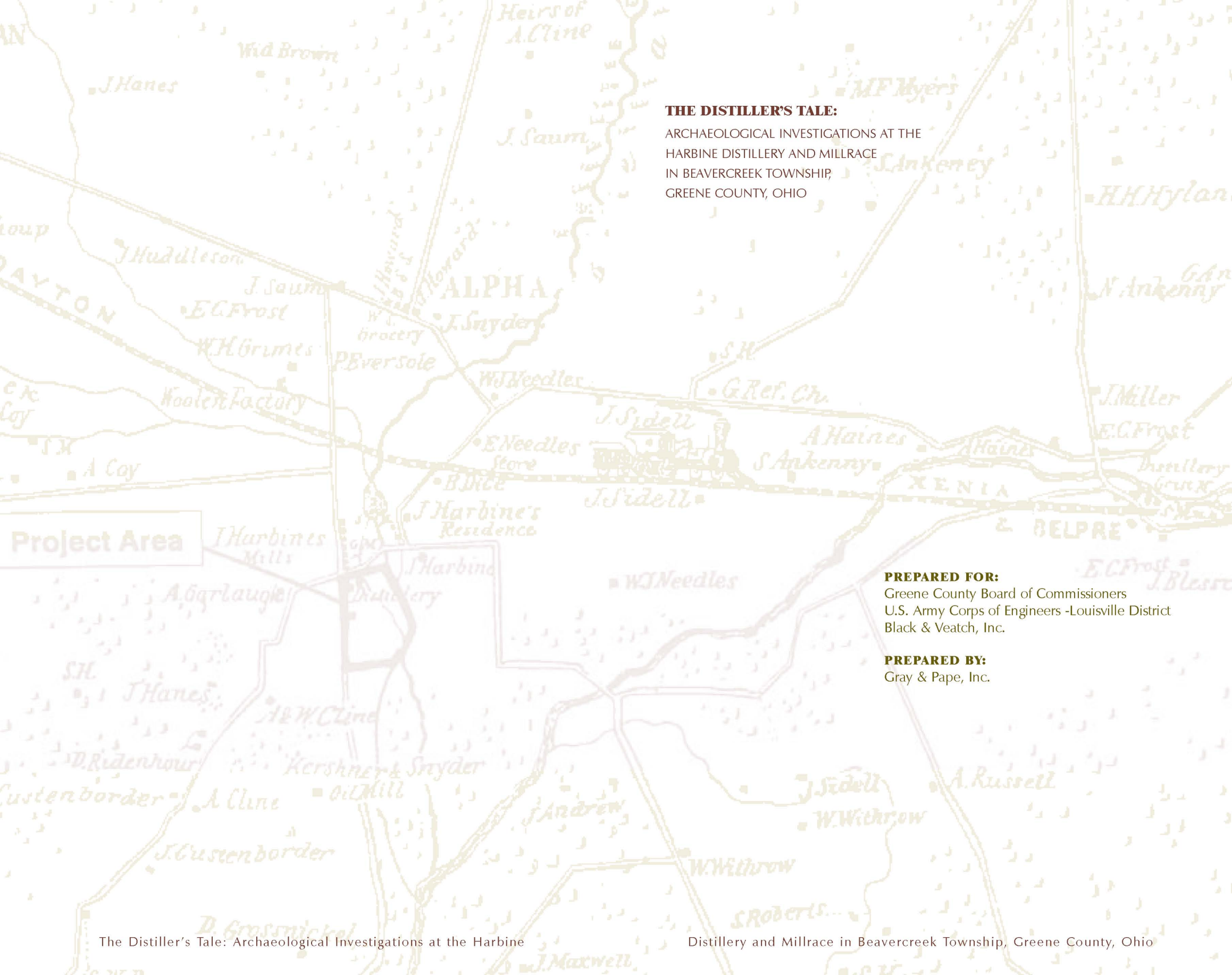
THE DISTILLER'S TALE

GRAY & PAPE
INC
CULTURAL RESOURCES CONSULTANTS

Archaeological Investigations at the Harbine Distillery and Millrace in Beavercreek Township, Greene County, Ohio



THE DISTILLER'S TALE:

ARCHAEOLOGICAL INVESTIGATIONS AT THE
HARBINE DISTILLERY AND MILLRACE
IN BEAVERCREEK TOWNSHIP,
GREENE COUNTY, OHIO

PREPARED FOR:
Greene County Board of Commissioners
U.S. Army Corps of Engineers -Louisville District
Black & Veatch, Inc.

PREPARED BY:
Gray & Pape, Inc.

INTRODUCTION

Between 1995 and 1996, a series of archaeological investigations were conducted at Sites 33Gr914 (the Harbine Distillery) and 33Gr916 (the Harbine millrace), located within the parcel set aside by Greene County for the new Beavercreek Wastewater Treatment Plant. Black & Veatch, Inc., as the design engineer for the project, hired Gray & Pape, Inc., of Cincinnati, Ohio, to conduct the archaeological investigations of the parcel. The investigations were necessary to ensure that the project would not have a negative impact, or adverse effect, on any historic properties. In 1995, Gray & Pape identified all archaeological sites located within the parcel. Two of these sites had additional archaeological testing investigations conducted at them in early 1996, resulting in a recommendation that they be placed on the National Register of Historic Places, as they were deemed to possess information important to Greene County's early development (**Figure 1**). The National Historic Preservation Act is a Federal law that states that if the destruction of a site or structure that is eligible for the National Register cannot be avoided, then mitigation of the adverse effects of the project on the site or structure must be conducted. Mitigation efforts may include data recovery excavations and archival research. At the Beavercreek Wastewater Treatment Plant project, the desirable alternatives of avoidance or preservation of the historic properties were not possible options.

Therefore, in June and July of 1996, Gray & Pape conducted archaeological data recovery investigations at Site 33Gr914, the Harbine Distillery, and Site 33Gr916, a portion of the millrace associated with the Harbine Mill Complex. Archaeological investigations included backhoe removal of the disturbed topsoil from about half of the Harbine Distillery. This was followed by archaeological hand-excavation of a number of exposed features (wall foundations, post remnants, or pits) to document construction techniques, construction episodes, and evidence for association between structural features. In addition, several large backhoe trenches were excavated to explore cross sections of the millrace.

The archaeological investigations were guided by information obtained from a review of historic documents. The archival work was designed to determine the historical context of the sites and the length of time they were in use. The chain of ownership for tracts of land within the project area was reconstructed from records on file at the Greene County Courthouse. In addition to histories of the Harbines and their community, the investigations included a review of 19th century distilling practices.

The results of the investigation produced a reconstruction of the history of the distillery and the millrace. These sites were once part of a rural industrial complex owned by John Harbine, one of the founders of the community of Alpha. Mr. Harbine and his sons were among the leading industrialists in Greene County during the 19th century. The family's history is tied to their personal holdings as well as to the development of the surrounding community. The following document summarizes the results of the archaeological and archival research at the Harbine Distillery and the millrace portion of the Harbine Mill. Other sources of information used in the preparation of this document can be found in the "Further Reading" section.

ACKNOWLEDGEMENTS

The investigations described in this document were conducted by Gray & Pape, Inc., of Cincinnati, Ohio, on behalf of their client, Black & Veatch, Inc. The parcel on which the Beavercreek Wastewater Treatment Plant will be constructed is owned by Greene County and administered by the Greene County Board of Commissioners. The U.S. Army Corps of Engineers - Louisville District served as the lead federal agency overseeing the project.

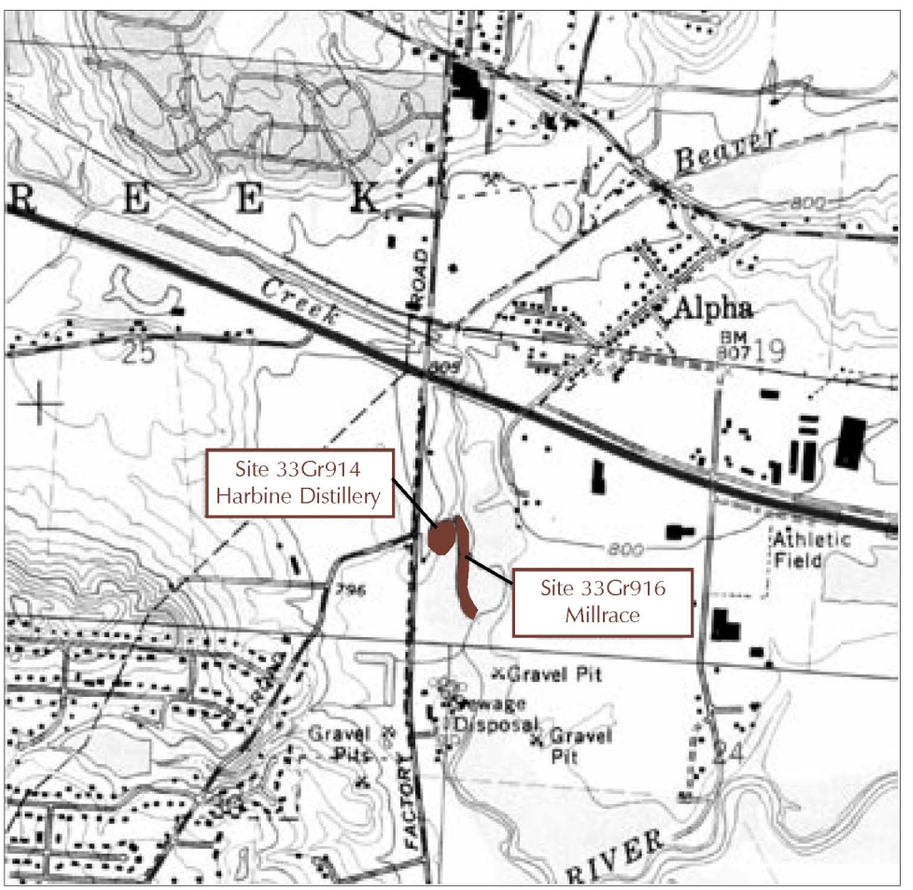


Figure 1. Location of The Harbine Distillery (Site 33Gr914) and Millrace (Site 33Gr916) in Beavercreek Township, Greene County, Ohio

THE HARBINES OF GREENE COUNTY, OHIO

John Harbine (1804-1873) and his wife Hettie Herr Harbine were natives of Maryland and Pennsylvania, respectively, and settled in Beavercreek Township, Greene County, around 1827 or 1828. Mr. Harbine purchased a 180-acre tract in 1827, which contained a gristmill built in about 1799. By 1832, the Harbine property included a gristmill, a sawmill, and a distillery. Harbine's brick home was built in 1833 and is the only standing structure on the property today. Harbine founded other enterprises in the vicinity including a flour mill, a linseed oil mill, a woolen mill (which burned in 1871), and another sawmill with associated lumberyards. He also operated his own pork packing business in association with the distillery.

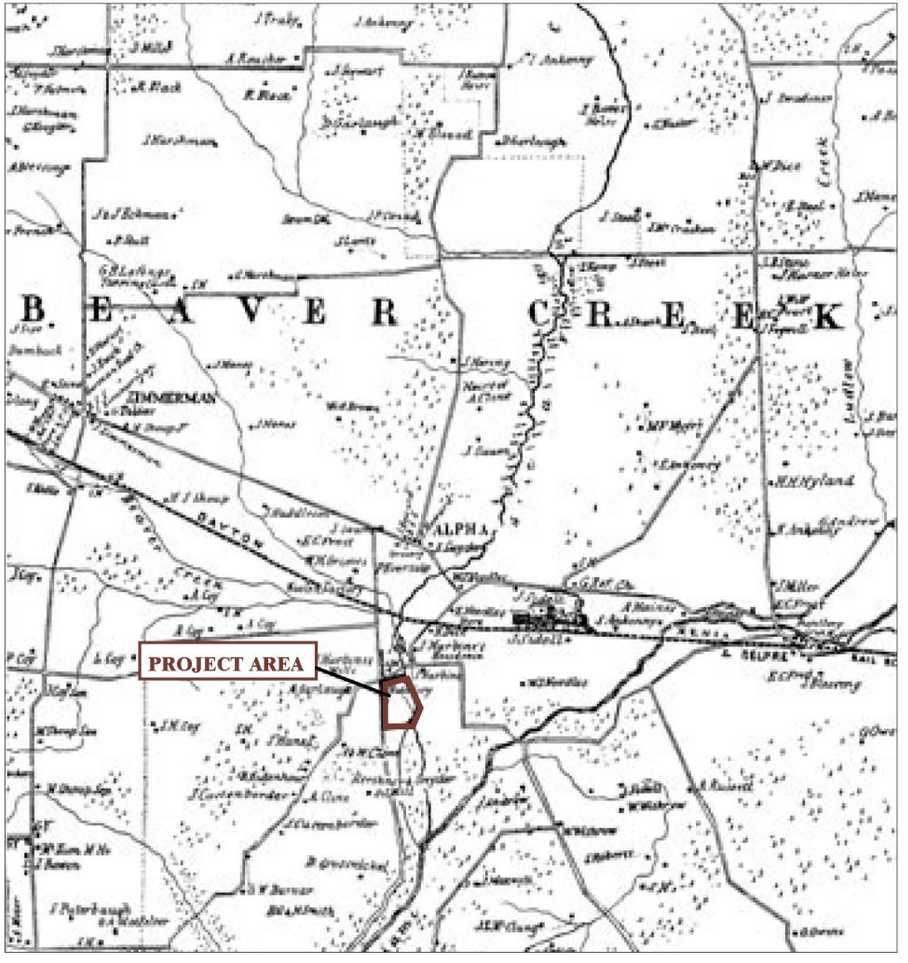


Figure 2. An 1855 Map of Beavercreek Township Showing the Location of The Harbine Distillery and Millrace

According to the United States Census, John Harbine was listed as a miller in 1850, though that year the distillery was the most valuable of all of his industries. An important boost to Harbine's enterprises occurred in 1853 with the opening of the Dayton, Xenia and Belpre Railroad through the township (**Figure 2**). John Harbine and William Needles laid out the town of Alpha adjacent to the railroad in 1854 to be used as a shipping point for the goods produced by the Harbine industries. Improvements were made to the distillery during the 1850s, and by 1860, Harbine was listed in the census as a distiller, as were his sons, Daniel and Jacob.

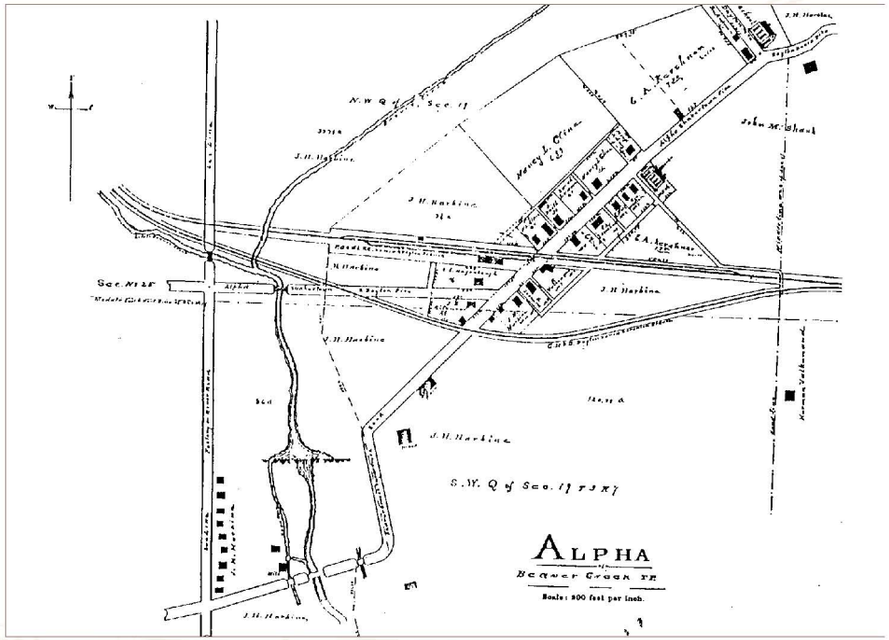


Figure 3a. An 1896 Map of Alpha and the Harbines' Property (Reddill and Reddill 1896)

The earliest known indication of the physical layout of Harbine's enterprises is seen on the 1855 map of the county (**Figure 2**). It shows two buildings associated with the distillery south of the Bellbrook Road (also known as Alpha-Shakertown Pike): one directly west of the race for the sawmill and gristmill and one further west, closer to Factory Road.

John Harbine retired in 1863 and his sons took over his concerns. John Harbine died at the age of 69 in 1873. The last historical mention of the distillery was in 1888, when a large fire destroyed it, the flouring mill, and several other nearby buildings. The flouring mill was the only loss mourned as the distillery was a vacant structure by this time. An 1896 map shows the Harbine house and barn, Beaver Creek, the millrace, the gristmill, and a row of workers' houses (**Figure 3a and 3b**).

After John Harbine's death, the majority of the 170 acres he owned went to his son, Jacob. By 1878, the Xenia City Directory noted that Jacob "...can be found at 100 and 102 west Main Street. He manufactures and deals in raw and boiled linseed oil, oil cake and meal. Mr. Harbine also pays cash for flax seed..." (Xenia City Directory 1878). By this time, Jacob's Xenia business was more valuable than any other in town, which suggests that his father's business savvy had been passed on.

A BRIEF HISTORY OF DISTILLING

The tale of the Harbine Distillery mirrors the history of an industry which was once common on the rural landscape of America. There were literally thousands of small distilleries scattered across the eastern United States in the early 19th century. Changes in taxation and transportation spurred interest in whiskey distilling as a means of income in the late 18th century. These same two factors, in addition to the temperance movement and the development of large distilling conglomerates, effected the decline of the rural distiller following the Civil War.

Whiskey's Origins

The origins of beer, wine, and spirituous liquors can be traced back to various Old and New World civilizations. The art of distillation was not introduced into Europe until at least A.D. 1100. Fittingly, the Irish and Scots were the first to distill malted grain for the purpose of creating intoxicating liquors, though some contend that they obtained this knowledge from the Chinese. The knowledge, technology, and range of distilled products has continued to expand in continental Europe and the British Isles ever since.

The first English settlers in the New World brought with them a taste for spirits, as well as the means to produce it. The first commercial distillery manufacturing whiskey from corn and rye was built somewhere on either Staten Island or on Wall Street in about 1640.

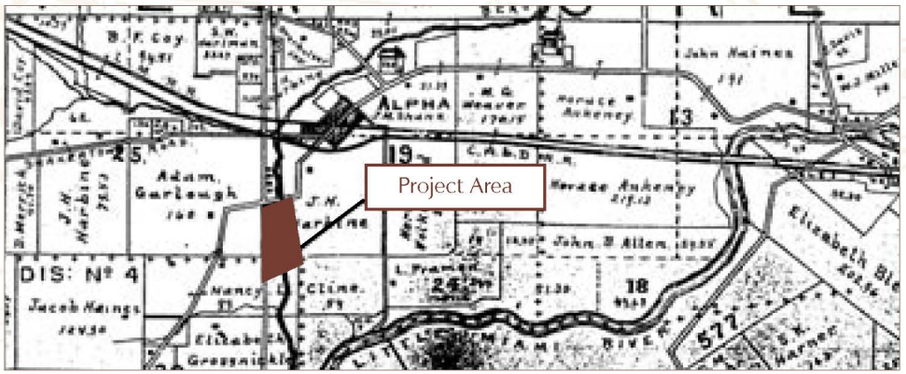


Figure 3b. An 1896 Map of Beavercreek Township

After the Revolutionary War, Americans moved away from producing rum and moved toward grain alcohols such as rye and corn whiskey. The decline in the availability of molasses added impetus to the rural whiskey distilling already taking root in western Maryland, Pennsylvania, Virginia, and North Carolina. The abundance of rye in these areas, coupled with the mid-18th century influx of Scotch-Irish, resulted in the beginnings of widely distributed rye whiskey production. In Kentucky, corn was the main ingredient, and the abundance of limestone waters combined with the concept of aging liquor in charred white oak casks, led to the development of bourbon sometime in the late 1780s. By about 1810, as many as 15,000 commercial distilleries were in operation throughout Kentucky, Pennsylvania, Indiana, and Illinois and continued to grow throughout the 19th century.

Distilling in the 19th Century

The methods by which whiskey and other grain alcohols are manufactured have changed because of advances in technology and increasingly strict governmental control. However, the process by which a potable (and preferably palatable) drink is produced has not changed to a great degree. Then as now, the process of distilling drinkable liquors involved four steps: (1) mashing, (2) cooling, (3) fermenting, and (4) distilling.

Mashing consists of grinding the grain (corn, barley, or rye) to the consistency of meal. The *mash* is soaked in warm water for several hours and then the hazy upper third of the mixture is drawn off as wort. The leftover grain (stillage or slop) is then sold as animal feed or redirected to ponds where it ultimately becomes fertilizer. Slop was a valuable byproduct of distilling and could be used to maintain a herd of livestock.

In America, the most common method of cooling wort was by running it through a coil of copper tubing, or worm, which was suspended in a cold water bath (**Figure 4**).

The source of the cold water was a very important consideration in the placement of a distillery, because a spring, active well, or large cistern was a virtual necessity. The next step in the process was fermentation, where yeast was added to the cooled wort to cause a conversion of the sugars from the grain into alcohol and carbonic acid. Once the wort was put into the fermenters, it was called beer or wash.

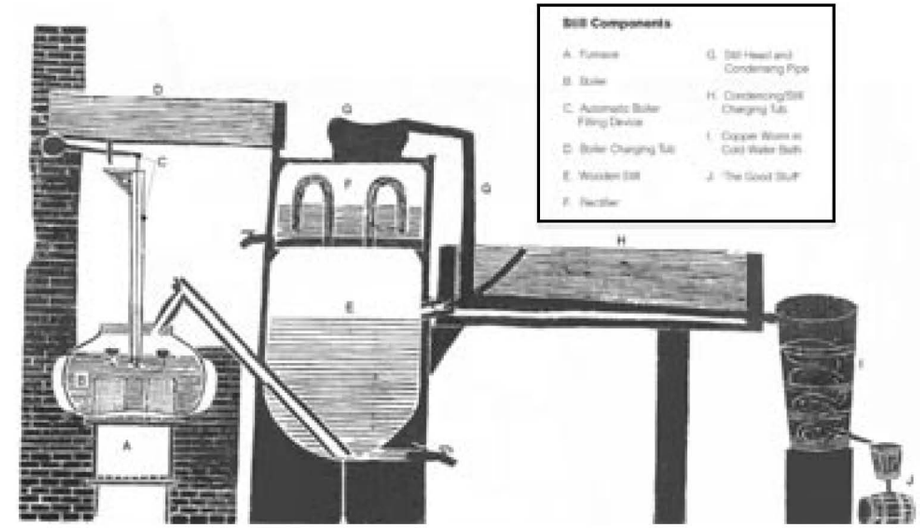


Figure 4. Gillespie's Improved Steam Still

The last step in the process, and the one in which the distiller would have invested the largest percentage of capital, was distillation. The difference between good liquor and bad liquor hinged entirely on how distillation was accomplished. The process varied depending on the type of apparatus employed and the quality and amount of product desired. The fermented beer was placed into the still and heated. The vapors which came from the beer as it boiled were piped through a copper worm and cooled before being collected in barrels wher the liquor aged.

The advances in distilling technology which took place during the early part of the 19th century mirror the acceptance which Americans had of both the liquor and the profession. Enterprising distillers invented numerous contraptions to try and wring the greatest amount of liquor from the smallest amount of grain. The earliest documented American distillers in Virginia used a three part *alembic* still, which was adapted for use by pharmacists more so than distillers. A more productive and common type of still used for making whiskey was the simple pear-shaped copper *pot still*. This type of still became the favorite of illicit distillers, due to its ease of construction and portability.

A seminal improvement in distilling came in 1805, when Henry Witmer developed the *patent still*, which was based on ideas formulated by Colonel Alexander Anderson in 1801. The numerous variations on the patent still which came about following Witmer's improvement served to speed up the

Pot still thought to have belonged to George Washington. On display-Oscar Getz Museum of Whiskey History, Bardstown, Kentucky.

process of distillation and reduce operating costs. Aside from the fact that patent stills were less labor intensive and more fuel efficient than the larger pot stills, a 100-gallon patent still could be run 9 times per day, while a pot still of 220 gallons could only manage 3 runs per day. Another key advance (ca. 1795 to 1815) was the incorporation of steam as a heat source into the distilling process. The process of steam distilling involved using a boiler to evaporate water, which was then directed into the actual still.

By the mid-19th century, the efficient steam and patent stills had supplanted pot still technology in most distilleries. However, these were soon replaced by the ultra-efficient *column stills*, which incorporated numerous advances in technology into a single package. In fact, column still technology had completely replaced pot stills at the commercial level in America by 1900.

Distilling in Ohio

Illicit pot still and "thumping barrel". On display-Oscar Getz Museum of Whiskey History, Bardstown, Kentucky.

While there was a respectable number of distilleries in Ohio, most of them were devoted to simply turning corn into a more marketable and transportable commodity. Some rural distillers did not age their products, opting to either sell it straight off the still at local gatherings or ship it to one of the big distilling centers (Cincinnati, Louisville, and Maysville, Kentucky) where it was rectified, blended, and bottled for sale. Early on, whiskey was usually transported via canal; later, it was moved by railroad. The effect of this system was that agriculturally productive areas (most of Ohio) supported a large number of "cottage industry" distillers.

Figure 5. Archival Photo of the Staley Distillery.

This was the climate in which small production distilleries operated in the 19th century. Operations such as the Harbine's had to contend with a myriad of social issues and government interests, over and above the sorts of supply and demand problems faced by industrialists in any field. Despite this, Harbine's distillery operated for about 40 years.

Distilling in Greene County

Distilling in early 19th century in Greene County developed because it was the most profitable alternative for local corn farmers. The Harbine Distillery was one of at least 14 which operated in the county during the 19th century. According to the census, there were 320 people making their living as distillers in the county in 1850. Unfortunately, the operational spans of these facilities are poorly documented; some were probably small operations which were only active for a few years. Others, like the Harbine Distillery, enjoyed decades of uninterrupted production.

Harbine's distillery produced about 7.7 barrels of whiskey per day in 1850. In contrast, the Staley Distillery, in nearby Miami County, was capable of producing 30 to 35 barrels of whiskey per day between 1831 and 1839. The distillery at the Staley Farm was far more productive, despite the fact that they remained loyal to somewhat traditional distilling techniques. Today, the Staley Farm and Distillery is listed in the National Register of Historic Places and is arguably the most well-preserved rural milling and distilling complex in the country (**Figure 5**).

It is clear that a great deal of variation existed between distilleries, though some factors were common. Both the Staley and Harbine distilleries were built in tandem with a large gristmill, though Krafft (1804) and Boucherie (1819), both of whom were writers of distilling manuals at the time, recommend erecting a small mill next to the distillery solely for the purpose of grinding grain on site. Krafft also stresses the importance of locating a distillery near a reliable source of clean water; Hall (1813), another author of distilling manuals, specifies that a spring is the best possible water source.

Swine were probably raised at most of the distilleries extant during the 19th century in Greene County, taking advantage of the distilling by-product for use as feed, though the pork packing industry in the county did not become established until after 1855. Some distillers, like Harbine, went so far as doing some of their own packing.

The Fate of the Rural Distiller

The history of whiskey and liquors in the United States cannot be accurately understood without a look at the impact which taxation had on the industry, particularly at the level of the small-scale rural producer. Excise taxes were abolished in 1818, and were not reestablished until funding for the Civil War became an issue in 1862. These taxes raised significant amounts of cash for the federal government during the war, but caused vast numbers of distillers to either give up the trade or start producing and selling illegally.

As early as the 1830s, the whiskey industry also began to do battle with fledgling temperance societies. The effects of such societies were numerous and included the closure of 1000 to 1500 distilleries every year during the middle of the 19th century. In addition, the long sacred liquor ration for U.S. Army troops was abolished in 1830; the U.S. Navy followed suit, but not until 1862.

Post-Civil War America was witness to a much changed liquor industry. Taxation and temperance had taken their toll on the rural producer. In 1802, there were 22,000 distilleries in the United States; by 1909, there were only 613.

Improvements in transportation associated with canal systems in the 1820s and 1830s and railroads in the 1850s also played a role in the decline of rural distilling. Farmers once made whiskey as a method of reducing a bulky crop to a profitable and easily transported commodity. With the advent of an efficient means to transport the raw materials, the need to reduce them into spirits no longer existed. Ironically, while these improvements spurred the growth of rural swine enterprises, they at the same time handicapped the country distilling industry.

The above catalysts notwithstanding, the crippling blows to rural distilling did not occur until the Civil War, when taxes leapt from 20 cents to $2.00 per gallon. The distillers of Greene County suffered along with everyone else. Broadstone (1918), writing about the history of Greene County, states that "The [Civil] War with its attendant high tax on whisky [sic] put nearly all the distilleries in the county out of business."

While the Staley distillery managed to survive high taxation during the Civil War, John Harbine's could not. It is doubtful that the complex was very productive after 1863, the year in which Harbine retired. Harbine was evidently the family champion of this side of the business: he made significant improvements to the distillery during the 1850s. While his sons carried on some of the family's industrial concerns (flour milling, and linseed and flax oil sales) following the elder Harbine's retirement, none of them ever developed the nose for whiskey that their father had.

Archaeological Data Recovery Investigations at the Harbine Distillery and Millrace

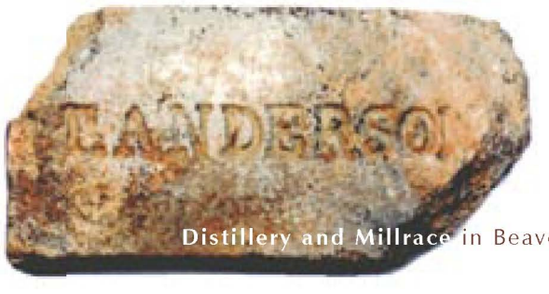
Archaeological data recovery investigations at the Harbine Distillery (Site 33GR914) and Millrace (Site 33Gr916) were formulated to concentrate on reconstructing the physical layout of the operations. The combined archival and archaeological investigations were aimed at: (1) determining how many structures were included in the distillery operation; (2) what types of structures (construction methods, size, function) were included; (3) whether there were any specific internal features such as fireplaces or basements within the buildings; (4) how the millrace was constructed; and (5) how the distillery and millrace functioned as a system, if at all.

Figure 6. Panoramic Overview of Site 33Gr914 During Excavation

The Distillery (Site 33Gr914)

The archaeological data recovery at Site 33GR914 included backhoe stripping of up to 20 inches of disturbed and recent soil from the site. A grid system was laid out across the site, the stripped surface was troweled, and all artifacts were collected from the cleared surface. Following the surface collection, 13 units measuring 3.3 x 6.6 feet were excavated by hand (**Figure 6**). A number of features such as postholes and building foundations were also investigated (**Figure 7**).

Unfortunately, the site had suffered numerous disturbances since it ceased operating in the late 1860s. The distillery buildings were destroyed in the Alpha Fire of 1888 which also consumed a large portion of the surrounding community. Despite this disturbance, the foundations of at least four structures were still somewhat intact, allowing a reconstruction of how the distillery may have appeared prior to the fire (**Figure 8**).



The most significant feature on the distillery was the stillhouse (Structure A), which included a series of brick footers, a limestone pavement, and a massive brick hearth and chimney. The stillhouse was located at the south end of the site on an artificially leveled building surface. While the building probably did not include a substantial superstructure, it may have had a shed or suspended gable roof designed to keep rain off the distilling equipment. In reality, the heat generated by the furnace and still would have made a well built wooden structure impractical.

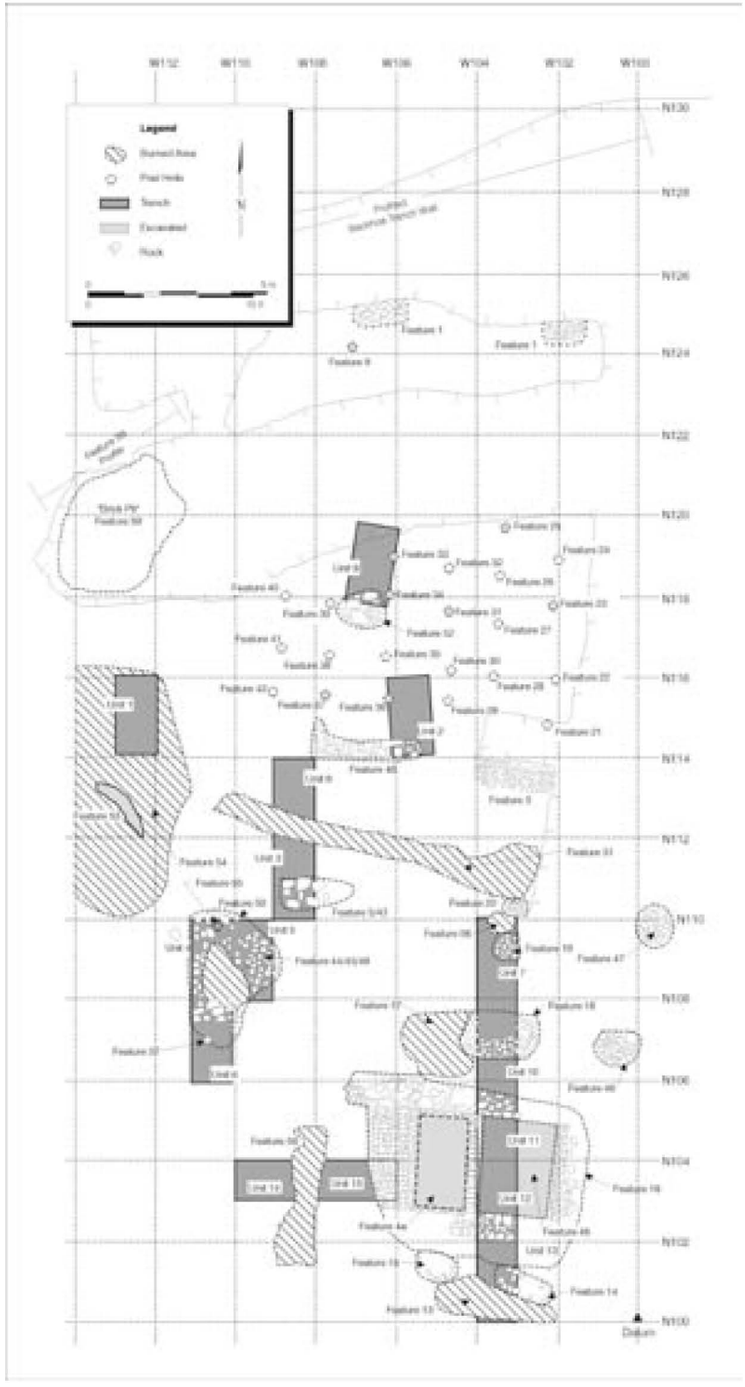
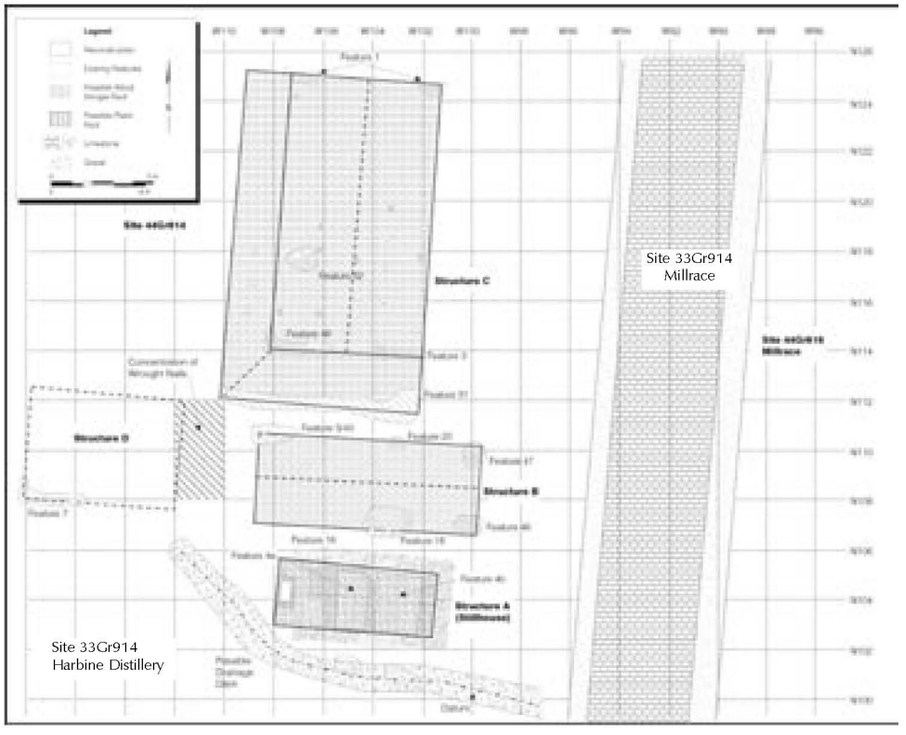


Figure 7. The Harbine Distillery Excavations



It is difficult to say what type of distilling equipment was used at the distillery. It is doubtful that a traditional double pot still system (like the one which operated at Staley Farm) was used here, simply because the furnace would not have supported more than one still. In fact, the compact footprint of the Harbine stillhouse probably would have accommodated only a patent or steam still. Either one of these systems could be set upon a single flue furnace and engineered for use in a confined space. The floor plan of the Harbine stillhouse compares favorably with the plans for an 1816 distillery patent known as Gillespie's Improved Steam Still (**Figure 4**). Gillespie's plan consisted of a large square brick furnace, upon which a copper boiler was set. The wooden still was located adjacent to the boiler, though the Harbines may have used a copper still to greater effect. While Gillespie's plan used wooden supports for these auxiliaries, the Harbines could have used brick in the same manner.

A second, somewhat larger building (Structure B) was situated immediately north of the stillhouse; it was probably of frame construction.

The building probably measured about 9 x 23 feet, and could have had more than one story. The function of this building is unknown, though it could have been used as a malthouse and/or for barreling of finished whiskey.

The largest building on the site was of frame construction set upon limestone footers (Structure C). This building may have measured 15 x 28 feet and probably had an overhanging eave running along its southern and/or western sides. The building may have had a loading dock or similar platform running along its western side and probably stood one and a half to two stories high. This building was most likely used as a bondhouse where whiskey was aged in barrels, though mashing may have taken place here as well.

A scatter of wrought iron nails suggests that an earlier structure may have stood along the western edge of the site. In the absence of other structural evidence, it is impossible to say how large this structure was or what purpose it may have served. It is possible that a limestone footer was associated with what has been interpreted as an early frame building (Structure D).

The only other feature which may have existed at the site during its occupation was a ditch which served to drain the southern end of the site back into the millrace. This ditch consisted of a channel lined with gravel and cobbles. Such a feature would have been useful for carrying waste water from the stillhouse or other buildings to the nearby millrace.

Figure 9. Mudsills from the Harbine Millrace

The Millrace (Site 33GR916)

Archival research indicated that the millrace was constructed before John Harbine bought the property, sometime between 1798 and 1826. The race led from a mill dam located north of Alpha-Shakertown Road south to Beaver Creek and provided a controlled water source for Harbine's gristmill, sawmill, and distillery operations. The millrace may have been improved during the 1850s at the same time that the dam was rebuilt. The race appears on the 1896 map of Beavercreek Township (**Figure 4**) and, based on information regarding the construction and operation of a new gristmill on the Harbine property after the 1888 fire, may have continued in use until 1930. Abandonment of the race and its subsequent infilling with wetlands soils and construction fill occurred sometime after 1930.

Archaeological data recovery investigations at the millrace focused on determining the nature and extent of water control features connecting the race with the distillery and the course of the race in the southern portion of the project area. Unfortunately, the high water table in the area prevented close scrutiny of the millrace. When backhoe trenches were placed across the millrace, the trenches quickly filled with water, obscuring all portions of the millrace below the ground surface.

Additional investigations conducted at the millrace, included an interview with a worker who saw a portion of the buried millrace during the initial construction stages for the wastewater treatment plant. Also, a backhoe trench was excavated across a section of the race to the south of the distillery. These investigations allowed for a reconstruction of how the millrace may have looked when it was in use (**Figure 8**).

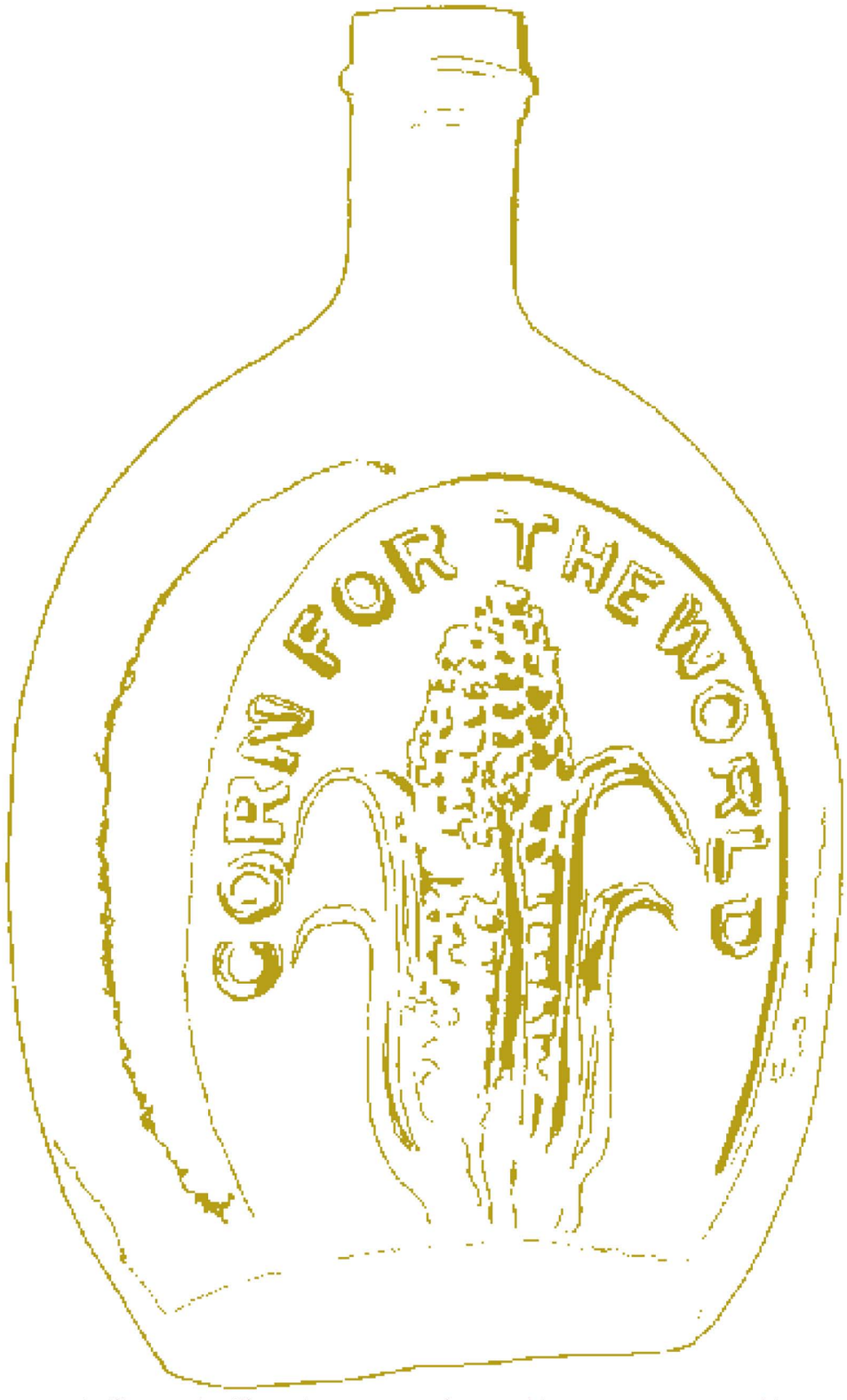
The Harbine millrace appears to have been at least 16 feet wide, as this was the width of the 6 x 11 3/4-inch oaken timbers which lined the base of the millrace channel (**Figure 9**). The timbers were placed perpendicu-

larly across the race at 10 to 12-foot intervals and gravel and cobbles were packed between them along the floor of the channel. Such timbers were known as mudsills to the millwrights of the day and served to anchor the floor of the race. The ends of the timbers were notched and bored, suggesting that the sides of the race were probably supported by a framework of wooden beams or boards. This wooden cribbing was anchored in place by large limestone slabs which functioned as rip rap. Curiously, this construction technique was not extended very far downstream from the distillery. Further downstream, the limestone slabs were replaced with angular limestone cobbles in a sandy soil and the oak timbers were omitted, though the race channel was still well defined.

CONCLUSION

The investigations conducted at the Harbine Distillery and Millrace have allowed for a reconstruction of the history of the use of the sites and has also revealed the extent to which Harbine and his sons were economically important to the growth and development of the region. Indeed, the community of Alpha was founded by the elder Harbine, and his son, Jacob, went on to be the most successful businessman in Xenia during the late 19th century. The Harbines built a small industrial empire around milling and distilling, which were two profitable and respected occupations during the 19th century. Remarkably, the family maintained their prominence in the region's business community even after distilling fell by the wayside. As a result, the Harbine name was one of the most prominent in Greene County for over half a century.

The Harbine Distillery was initially constructed during a time when distilling was an accepted and honored profession. The millrace may have been built before Harbine bought the land, but was probably improved by the Harbines. The lack of excessive federal excise taxes until the Civil War allowed the Harbines and other farmers to profit by turning bulky grain crops (corn, rye, and barley) into an easily transportable and much more salable commodity - whiskey. Grist and sawmilling, hog raising, and pork packing were industrial concerns commonly associated with rural distilling; the Harbine Complex included all of them. However, the Harbine Distillery was probably no longer producing whiskey by 1871 or 1872, and finally succumbed to fire in 1888.



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Project Area
ALPHA
XENIA
BELPRE
J.Harbines Mills
J.Harbine's Residence
Distillery
Woolen Factory
Kershner & Snyder Oil Mill