Landmark Nomination Report Jefferson County Historic Landmarks Commission

Potomac Mills/Boteler's Cement Mill

Physical Description:

The site of the Potomac Mills, also known as Boteler's Cement Mill, is located in eastern Jefferson County, West Virginia, a half mile below Shepherdstown. The property, owned by the Jefferson County Historic Landmarks Commission, is bisected by River Road and adjoins the Potomac River.

Historic Description:

The Potomac Mills, or Boteler's Cement Mill, was one of a handful of mills that produced hydraulic cement for the construction of the C&O canal. This mill was in operation for approximately seventy years. Constructed in 1826 as a gristmill, it was converted to cement production in 1829.

The first decades of the 19th century saw road improvements by turnpike companies, spurred by construction of the National Road west from Cumberland, Maryland. However, the Blue Ridge Mountains still stood between the farms of western Maryland and Virginia and their markets to the east. Dreams of water transport persisted and in 1828 the first shovel of dirt was turned on the construction of a still-water canal to run from the Ohio River to the tidal Potomac at Georgetown, Maryland. The Chesapeake & Ohio (C&O) Canal was planned to follow the northeast bank of the Potomac River through Maryland. Construction was slow, requiring the excavation of the canal prism as well as construction of stone-lined locks, culverts, aqueducts and dams. Hydraulic or natural cement, designed to harden in a water environment, was essential to C&O Canal construction. Thus, hydraulic cement mills catering to canal needs were established at locations along the route, including "Tuscarora, Maryland, above the Monocacy Aqueduct; at Shepherdstown, (West) Virginia; at Hooks Mill, (West) Virginia, across the river from Hancock, Maryland; at Round Top, Maryland; at Leopards Mill, Maryland, below Dam No. 6; and at Cumberland, Maryland." The Shepherdstown (Potomac Mills), Round Top, and Cumberland cement mills were the largest, "providing the C&O Canal and the Potomac Valley with natural cement for many decades

Canal construction, beginning with the Erie Canal in New York, was the primary catalyst for the production of natural or hydraulic cement in the United States. Industrial historians, Thomas Hahn and Emory Kemp observed in their monograph *Cement Mills Along the Potomac River*: "It is clear from a study of the history of the natural cement industry that the canal of the United States depended on the manufacture of natural cement." At its peak in 1899, there were 76 natural cement manufactories, most located in New York, Indiana, and Kentucky, while four were in Maryland and one (Potomac Mills) in West Virginia. Natural cement's salient property was its ability to harden and remain hard under water – a necessity for the construction of dams, locks, and bridges. Hahn and Kemp describe the manufacturing process:

Natural cement...is made from naturally occurring limestone with a suitable argillaceous component usually 13 percent to 35 percent, of which 10 percent to 22 percent is silica... The cement rock (argillaceous limestone) is calcined [oxidized by heating] at a slightly higher temperature than that used to produce quicklime...

The burned limestone is ground into a fine powder which, when combined with water, produces a hydraulic paste with the main cementitious materials being calcium silicates. This paste does not slake [chemically change to calcium hydroxide], will set under water, and is waterproof.

The kiln type used most commonly to burn (heat or calcine) the limestone was "usually a truncated pyramid with a cone shaped opening inside, which, in later days, was lined with firebrick," and for convenience "often built in batteries against a hillside so that they could be more easily charged [filled] from the top." "Continuous vertical kilns" could be continually recharged with stone and coal, as described by Kenneth Reis in 1901: In burning natural cement rock, the fire is first started in the bottom of the kiln, and on this are spread alternating layers of coal and rock. The coal is of pea or chestnut size commonly. As the burned stone is drawn from the bottom, fresh stone and fuel are added at the top...The yield of these kilns is large, being 50-120 barrels of cement per ton of coal.

The limestone rocks loaded from the top rested within in the cone or kiln throat above the arched draw pit and heated to 1300 to 1500 degrees. The calcined rock was then transported to the mill to grind it to powder, using often nothing more than "ordinary grist mill buhr-stones" through much of the 19th century. Thus the process required the appropriate limestone quarry, vertical kilns in which to burn (calcine) the limestone, and a mill to grind the powder.

In January of 1828, six months before canal construction began, Henry Boteler wrote a letter to the president of the C&O Canal Company, Charles Fenton Mercer, in which he identified what he believed to be proper limestone for natural cement production: This stone is found in great abundance on my premises, below this place [Shepherdstown]. It is found on the surface and under the ground to a considerable depth. The hill, which appears to be entirely of this stone, is 200 feet high, and nearly half a mile around its base.

The company sent John H. Cocke, Jr., who was already tasked with finding local supplies of building and cement limestone, to test the stone at Boteler and Reynolds' mill site. Cocke tested the stone in a small kiln in September 1828 and confirmed that it was good natural cement. Immediately Boteler and Reynolds made a proposal to the canal company, "...that they could burn, grind, and deliver cement at the mill for 18.75 cents per bushel." The proposal noted additional costs for delivering the powdered cement by river boat to Georgetown, Maryland where the construction of the canal had begun just two months earlier.

C&O Canal construction was slow due to a shortage of laborers, land disputes, lack of adequate funding, and an ongoing dispute with the Baltimore & Ohio Railroad over the narrow strip of right-of-way below Maryland Heights. While the railroad lost the right-of-way battle and was forced to cross the Potomac River into Virginia at Harpers Ferry

(now West Virginia), still railroad construction greatly out-paced construction of the canal. Ironically, Boteler and Reynolds provided the C&O Canal Company with natural cement calcined in kilns fired with coal that was transported by the B&O Railroad.

Boteler and Reynolds' Potomac Mill grew with the natural cement business. The original stone and brick grist mill building had two sets of buhrs turned by water power drawn from the Potomac River by a stone and log crib dam. Beginning in 1829, the grist mill performed double duty during the harvest season, alternating between grinding grain and cement stone. New buhr-stones made specifically for grinding calcined limestone arrived later in 1829, along with a smaller cement mill addition to the original building. The first limekiln (still standing) was constructed on the hillside near the mill early in 1829. An additional bank of three kilns was constructed below the river road closer to the mill in July 1829 and another three were added by April 1830.

The Potomac Mills complex ground wheat into flour, and ground lime for architectural plaster and fertilizer (also known as "plaster") as well as for natural cement. Their contracts with the C&O Canal Company were likely their most significant income producer. In 1829 Boteler and Reynolds were authorized by the canal company to erect a warehouse to accommodate storage of the 2,000 bushels of lime ground per week in their mill. Their August 7, 1829 to May 15, 1830 contract was for 80,000 bushels at 19 cents per bushel; a second contract extended from January 28, 1830 to September 1, 1830 for 60,000 bushels. Additional contracts with the canal extended through 1837, after which cement was primarily supplied from the Round Top Mill at Hancock, Maryland.

By 1834, C&O Canal construction had reached Lock 38 opposite Shepherdstown. Nearly all of the traffic on the canal to this point was agricultural produce, with flour topping the list. The Potomac Mills dam across the Potomac River, located just below Lock 38, allowed produce, fertilizer lime or plaster, bags of natural cement, and other products to be boated across the river:

The impoundment formed a slackwater pool that occasioned the construction of a river lock in 1833-1835 to provide access to the canal from the river. This made possible the tapping of an extensive Virginia trade, which was an important source of business for the canal. Barges were loaded on the Virginia (West Virginia) side, floated across the river, and entered the canal via the river lock.

The Potomac River ferry, still in operation under the ownership of John Blackford, also benefited from the slackwater. Blackford's journal from the year 1838 noted ferrying as much as "3 ton plaster in two trips" from "George Reynolds mill." A thriving wharf community grew at the ferry landing below Shepherdstown. In 1836, George Reynolds entered into an eleven-year lease of the ½-acre "Ferry Lot" with owners John Blackford and the Swearingen heirs. The terms required that Reynolds build a warehouse on the lot (no longer standing). Reynolds, in addition to the Potomac Mills business, owned and operated a canal packet boat called "The Henry Boteler." Shepherdstown merchant William Shortt also located his canal boating warehouse at the ferry landing. About 1849, Shortt replaced his building with a large stone warehouse (today commonly known as the Tobacco Warehouse).

In June of 1835, the partnership of Boteler and Reynolds was dissolved when Henry

Boteler sold his interest in the mill complex and their jointly acquired tracts of land, a total of nearly 400 acres, to George Reynolds for \$25,932. Though Reynolds fulfilled his mortgage obligation to Boteler for this purchase, by 1842 Reynolds was in debt to the tune of \$27,000. In his 1842 Deed of Trust to Henry Berry, George Reynolds mortgaged everything he owned as security: his home farm and mill, the Potomac Mills and ferry lot warehouse, 3,000 acres in Morgan County, 29 slaves, 30 horses, 20 mules, 40 cattle, several hundred sheep and hogs, nine wagons, three carts, a Threshing Machine, and his four canal boats. In 1846, Reynolds defaulted on this mortgage and was forced by Chancery Court to sell all of his property, including the Potomac Mills. A newspaper advertisement for the July 1846 public sale of the mill property described the "Very Extensive and Valuable Milling Establishment known as the 'Potomac Mills,' with 10 or 12 Acres of Land adjacent thereto":

The Mill-House is of Brick and very well built. It has Six Pair of Burrs, and commands the entire water-power of the Potomac River. Besides the Merchant Mill, there is a sawmill, of the most approved construction, a Plaster Mill, and several large and wellconstructed permanent Lime Kilns, situated immediately on the River and near the Mill, with every convenience for manufacturing the Hydraulic Cement upon the most extensive scale.

Upon the premises are a large and well built Smoke House, Blacksmith's Shop, several Work Shops, with a convenient Dwelling-House.

The adjoining tracts of land were to be sold separately. Alexander R. Boteler, son of Dr. Henry Boteler, purchased the Potomac Mills complex for \$15,100 (Figure 8). Boteler continued the Potomac Mills name and operations through the 1850s, advertising both cement and grain products in the local newspaper.

Alexander R. Boteler was elected to Congress in 1859 as an Independent. Born in 1815 in the Shepherdstown area to the wealthy landowning and slave owning Boteler family, he was opposed the idea of dividing the Union. It was apparently an opinion shared by a majority of residents in Jefferson County. But as the Union began to dissolve in 1861, following South Carolina's secession and attack on Fort Sumter, the Commonwealth of Virginia's strong sentiment toward states rights became evident. At the first special convention held in April 1861 initial votes went against secession; that changed to a vote in favor of Virginia seceding from the Union in May 1861. The mill complex was burned by Union troops in August, 1861. Not surprisingly, Alexander Boteler's business collapsed with the destruction of the mill. In September 1865, the property was again for sale at auction:

On Saturday, the 7th of October, next, that very desirable Property upon the south bank of the Potomac, one mile below Shepherdstown, known as the

"Potomac Mills,"

including the Mill Lot of about Fifteen Acres and all its Valuable Appurtenances.

The Water Power

belonging to this Property is one of the most extensive in the Sate, comprising as it does the full force of the Potomac river by means of a dam some seven hundred feet in length, built against a ledge of rock, which extends at right angles across the bed of the River, constituting thereby an indestructible natural dam of itself and affording the best possible foundation for such a superstructure.

The

Hydraulic Cement Quarries

upon the premises are convenient to the kilns and capable of supplying an unlimited amount of that Mineral of the very best quality.

Although the buildings have nearly all been destroyed during the recent war – the Merchant Mill, Cement Factory, Saw Mill, &c., having been burnt by Massachusetts troops in the summer of 1861 – the walls of the principle part of them remain without material injury, being of the most substantial character, those for instance of the Merchant Mill being one hundred feet long by fifty wide, three stories high of brick, three feet thick at their base, and eighteen inches at top, resting upon a limestone foundation six feet thick, built upon arches sprung on solid rock.

By means of the Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad every facility is afforded for transportation to and from this Property, which from its situation in the fertile Valley of the Shenandoah, is admirably located in every respect for the establishment of a Manufacturing village and is well worthy the attention of enterprising capitalists.

Following its sale to a group of trustees for \$35,000, the money was to be used to reinvest in the mill complex. In 1867, the Potomac Mills Mining and Manufacturing Company was formed and rebuilt the mills. Cement production resumed by 1875, according to the editor of the <u>Shepherdstown Register</u>:

...the editor stated that a Major Hagan was running the mill to its "fullest capacity, and making an excellent quality of cement, all of which is shipped to Washington (presumably by canal) where there is a great demand for it. The Major puts things 'very likely'."

Major Harry Blunt, a Washington builder who also owned a Jefferson County horse farm, leased the Potomac Mills through the 1870s. In 1878, it was likely Blunt who purchased the complex under the name of new trustees, William Webb and L. E. Coyle.

Operations at the plant through the rest of the 19th century followed the seasonal schedule of the C&O Canal, April through December, closing in the winter months. The canal closed due to ice but the cement plant's primary clients, builders in Washington, D.C., also suspended operations in the winter months. In 1879, the Shepherdstown Register gave a detailed account of the Potomac Cement Mills operations: The Potomac Cement Mills below town, are now running regularly, regularly [sic], though not to their full capacity. The daily average is a about seventy-five barrels. Some twenty or twenty-five hands are kept in constant employment under the management of Mr. J.E. Lucas, the efficient Superintendent. There has recently been put up in the mills a set of new and improved buhr for grinding the cement, which are said to be superior to the old style of buhr. We noticed the other day, about one thousand barrels of cement ready for market; about seven hundred of that number has been shipped on the boat of Mr. J.W. Osbourn via the Chesapeake and Ohio Canal to Washington. The cement is now considered the best in the country and the demand for it is rapidly increasing. The five kilns are constantly burning, and the business of the mill has necessitated the building of a new packing machine, which is now being made by that expert old

millwright, Mr. Davy Karns, of Williamsport, Md.

An 1883 description of the works published in *A Practical Treatise of Limes, Hydraulic Cements, and Mortars*, detailed the quarrying, burning, and milling process at Potomac Mills, called "The Shepherdstown Works":

The Shepherdstown Works comprise two run of four and a half French buhrstones and the necessary crackers, driven by water power, and three perpetual kilns...Cumberland coal is used for burning. The stone is derived from deposits which crop out in several places on the banks of the Potomac, near the mill. Though considerably tortuous and irregular, their general position is nearly vertical. The stone is quarried from the top of the hill, is then passed into the kilns, situated on the slope below, and subsequently to flat-boats in the mill-race. These are then floated into the mill, and the burnt stone is discharged through the hatchways up to the crackers. The deposit is in two principal layers, one of which furnished a quick, and the other a slow setting cement. The two are mixed together in nearly equal proportions, a combination which is believed to yield a better cement than either of the beds would if used alone.

Hahn and Kemp observed that while this is the first description of the mill to include a mention of "crackers," they were always a part of the process. A cracker literally cracked the burned limestone, "to break the stone down into pieces small enough to be put into the grinding stones."

Like all Potomac River valley occupants, the Potomac Mills owners and workers had to deal repeatedly with both flood conditions and drought. In 1884, the mill was closed in August due to low water in the river. Low water affected not only the plant's ability to produce power to turn the mill stones, but also to transport the burned stone to the mill by flat boat down the head race, and to deliver the cement across the river to the canal. The C&O Canal, which also drew its water from the Potomac River, was negatively impacted by low water with reduced traffic. Major Blunt responded to the drought by installing a steam engine to power a "turbine wheel" at the mill.

More destructive to both canal and mills, floods or "freshets" were more common along the Potomac during the 19th century as woodland along the watershed was cleared for building material, heating, charcoal production, and farming. The June 1, 1889 Potomac River flood was the worst ever recorded at the time, with a crest of 44 1/3 feet at Williamsport and 34 feet at Harpers Ferry. The water level at Harpers Ferry was 21 feet above the canal towpath. It was disastrous for the C&O Canal with numerous locks, gates, warehouses, and lockhouses washed away, and hundreds of feet of canal breeches. The necessary repairs closed the canal for three years, forcing it into receivership. The Potomac Mills main building was flooded to the second floor, according to a newspaper report, and the railway just recently installed to transport the limestone from the kilns to the mill was "swept away." The cement mill was back on line by the following week but the canal did not fully reopen until 1892, and then without the river lock opposite the Shepherdstown landing. It was not until 1896 that cement could be delivered by boat, a much less expensive proposition than hauling it to the railroad depot. But by then the mill dam had fallen into disrepair which severely limited boating across the river.

The Potomac Mills operated only sporadically through the remaining years of the

1890s. In addition to problems created by the river and transportation issues, competing production of Portland cement in the U.S., "an artificial mixture of lime, silica, and alumina" first produced in 1872 in Pennsylvania, had grown from 335,000 barrels in 1890 to 8,482,000 in 1900, and to over 92,000,000 by 1913. In the summer of 1900, Major Blunt prepared to reopen the mill, rebuilding the log crib dam and repairing machinery, reportedly with plans to eventually replace dam with a concrete construction. With everything repaired by the close of the season, the plant was ready to begin production in the spring. On January 12, 1901, Major Blunt died, and though his son Harry W. Blunt, Jr. took up the reins of ownership, the Potomac Mills went out of business after nearly 75 years of operation. By 1904, the property was again for sale, reported the <u>Shepherdstown Register</u>, noting that cement from the Potomac Mills was used to build the "Boundary Sewer in Washington" as well as the District's "Army and Navy buildings."

In 1916, the West Virginia Geologic Survey reported that the Potomac Mills (called by them the "Potomac Cement Company" or "Shepherdstown Cement Company") buildings had not been in use since 1900 and that they were still in good condition. In 1924, a devastating flood closed the C&O Canal for good and likely damaged the by then long-vacant mill buildings beyond repair. The 1936 Potomac River flood was "the heaviest flood in the recorded history of the Potomac Valley." That year Harry W. Blunt, Jr. conveyed the "Potomac Cement Mill Property," with "buildings, mills, machinery, water rights, fixtures," to Harry W. Blunt (III). The property, now approximately 18 acres, remained in the Blunt family ownership until the 2011 purchase by the Jefferson County Landmarks Commission.

Historic Resources:

The cut stone foundation and walls of the mill building or mill ruin stands between River road and the Potomac River on the 18 acre property. Also on this side of the road are the row of lime kilns, test kiln, riverside headrace wall, and dam remnant.

The ruins of the Potomac Mills building consists of the stone foundation/lower story walls of the large main building and smaller east addition. Historically the building was four stories including the stone lower story and brick three stories above with a hipped roof and clerestory. The addition was two brick stories over the stone lower story with a gable roof. None of the brick masonry remains intact today and no wood features (joists, floors, window frames, doors, rafters, etc.) remain. Stone segmental arches are located on the interior wall where the raceway passed through the building.

The Riverside Stone Wall is located along the south edge of the river. It is approximately 289 feet long and runs from the south end of the dam remnant to about 25 feet west of the mill ruin. It is likely a remnant wall of the headrace. Part of the wall shows cement repairs.

During periods of low water, the partial remains of the Potomac Mills dam can be seen as a ripple across the river. The remains are the stone foundation of the dam; none of the historic log cribbing remains intact. The Battery of Kilns is located on the river bank below the north edge of River Road approximately 350 feet west of the mill ruin. The kiln bank was constructed in three phases: the small stone test kiln on the west end (1828); the western bank of three stone vertical kilns (1828-29); and a later bank of three stone vertical kilns (ca.1870?) on the east end. The stone work and brick work of the eastern bank of kilns implies a later construction date. Civil War period descriptions also indicate there were only three kilns standing at that time. The test kiln) sits near the top of the bank on the south west corner of the Battery of Kilns. It is a small box-kiln constructed of stone with a brick-lined opening with a flat stone lintel. The six vertical kilns are all constructed of stone. All have brick arched draw pits; the western bank of three with keystones and eastern bank of three do not. Some of the face stones on the western bank of three kilns have fallen out. The tops of the kiln bank are nearly level with the River Road surface. All are filled in with debris and appear only as depressions in the ground.

On the western side of river road, the property contains the following historic structures: the large lime kiln and the office building ruin.

The Large Kiln is sited on the east side of a hill within a ravine, south/southwest of the mill ruin on the south side if River Road. It is a large, heavily built stone vertical kiln with a slightly pyramidal shape and a brick-arched draw pit on the east face. The interior kiln throat is stone and brick lined.

The brick ruins are located on the south side of River Road approximately 150 feet east of the mill ruin. The brick walls of this three story building are still largely intact though the roof is gone and the third story walls (probably mostly later additions) have begun to crumble. None of the wood features remain intact. The lower story has three bays with a central entrance. The brick bonding is common 5 rows of stretchers to one row of headers. All four walls show diamond patterned vents in the brickwork, most later infilled, indicating its possible earlier use as a warehouse. Interior walls of the lower two stories are plastered and whitewashed. It appears the third story was added by raising the front and back roof line, altering the gable end roof to a hipped roof. There is a brick interior chimney rising on the west gable end. There is an inscription in the plaster on the west interior wall "Boteler & Reynolds 1828". Newspaper advertisements from 1846 and 1865 describe a dwelling house associated with the mill, but no office building. It is likely this building was a warehouse converted to a dwelling house.

Nomination Criteria:

The JCHLC nominates this site under Criteria A for inclusion on the list of registered county landmarks. Criteria A states that a site may be nominated if, in the opinion of the Landmarks Commission, it is associated with events that have made a significant contribution to the broad patterns of our history. The property's owner, Jefferson County Historic Landmarks Commission, has voted to list the Potomac Mills site as a Jefferson County Historic Landmark.

Nomination Action:

The JCHLC voted unanimously to add Potomac Mill/ Boteler's Cement Mill site, under Criteria A, to the rolls of registered Jefferson County Historic Landmarks on September 19, 2012.



Mill Ruins



Race wall at Potomac River



Potomac Mills (Boteler's Mill) Office



Potomac Mills (Boteler's Mill) Throat of Large Lime Kiln