Local Iron Furnaces

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Historical Archaeology is the analysis of items of material culture in order to gain insight into the culture being studied. This process consists of drawing up questions about the subject, excavating the site, and finally interpreting the results in order to piece together the cultural, historical, and archaeological puzzle. Understanding the influence that the past has had on an area is extremely important in determining its identity. Simply observing the names of streets, towns, and historical sites in the southwest Virginia area immediately indicates the strong influence of the iron industry. Virginia’s iron history dates back as far as the colonial days when New World iron-producing communities were just getting started. Like every modern civilization, they had a vital need for iron products. The Early Exploration Period (1740-1830), the first era of iron manufacturing in Virginia, began even before the Revolutionary War. Historical documents suggest that 1760 was the first year of iron smelting west of the Blue Ridge Mountains, in Rockbridge County. By 1779, Daniel Dougherty had opened a forge near the mouth of Irish Creek, also in Rockbridge County. Iron cannon balls, a main product of early smelting in southwest Virginia, were fired at the British in Yorktown in 1781 (Industrial Interests: 1). Gradually, other furnaces and forges were built in the region as Allegheny and Rockbridge Counties grew,
quickly becoming the leading iron manufacturers in Virginia. During the Iron Plantation Period (1830-50), “iron smelting was the most technologically intensive enterprise undertaken by American business” (Dimensions, 1866: 1). The Civil War Rebirth Period (1861-65) increased the need for iron from Virginia, as the furnaces in Rockbridge and Allegheny counties were almost solely responsible for providing the Confederacy with all of their iron products, including ammunition and weapon parts. The Railroad Period (1865-1900) brought yet another boom in the iron industry as railroads expanded in Virginia and across the country. Finally, the Emigrant Labor Period (1900-20) carried the iron industry into the twentieth century. Iron furnaces wrote a major portion of southwest Virginia's history and have had an overwhelming impact on the region's identity.

When studying the history of Virginia's iron industry, it is important to understand how the production process works. There are three parts to iron manufacturing: mining, smelting, and forging. Oriskany sandstone was the main source of iron mined in southwest Virginia. From the mines, the sandstone was taken to a furnace, where it was smelted down into pig iron and taken to a chafery forge. There, the iron was reheated and hammered into bars, which were much easier to sell and transport. Because the furnace was obviously the central feature in iron manufacturing, it was constantly being refined to meet the demands of the rapidly expanding industry, as well as to produce a purer form of iron, and to conserve energy. The largest iron producing companies in Virginia in the early days, such as the Jordan & Irvine Company, used a charcoal burning,
“cold blast” furnace. A cold blast furnace was essentially a large, four-sided structure enclosed around an open vertical shaft that tapered out as the furnace structure got closer to the ground. It was dubbed “cold blast” because the air that facilitated the intense heat was pumped in from large bellows.

Then, in 1835, a young British immigrant named William Firmstone arrived in southwest Virginia and began developing his idea for a “hot blast” furnace. He believed that more efficient combustion would be achieved by using hot air as opposed to the cold air that was being used up to that point in furnaces like the Lucy-Selina. To generate this heat, Firmstone took out the waterwheels that were the force behind the bellows, and installed steam engines in their place (Anthropology 377, 1999: 10). Furnaces such as the Australia and Longdale used these new coke-fueled engines to heat the air prior to entering the furnace structure.
These furnaces were the catalysts behind Virginia's huge iron industry. It is important to analyze the iron manufacturing communities as a whole to completely grasp the impact of iron on Virginia's past. An in-depth archaeological study at Structure B in Community IV of the Longdale Mining Complex revealed that iron production was the center of life for the nineteenth century Virginians that lived there. The remnants of material culture left behind by these people included such vital iron products as ammunition, nails, tools, horseshoes, and railroad ties. The location of this structure and the artifacts found indicate its reliance on the main furnaces nearby. The leading local furnaces at the time were the Longdale, California, Mount Hope, Dolly Ann, and Low Moor. These furnaces and their surrounding communities helped make the area the capital of iron industry in Virginia.

The California Furnace thrived in southwest Virginia for twenty-five years during the nineteenth century. Located fifteen miles northwest of Lexington and two miles southeast of Rockbridge Alum Springs, the California Furnace lies on Bratton's Run in very close proximity to the Longdale Furnace and mining community. It was a gigantic structure of roughly edged, rectangular-shaped chunks of limestone. Functionally, the California Furnace was a steam and water hot-blast furnace powered by charcoal. The vastly scattered pieces of dark green and blue limestone that remain today verify that the California Furnace was indeed an impressive structure during its existence. The California Furnace is estimated to have stood thirty-six feet high and have a bosh—the widest part in the vertical shaft—nine feet wide. Virginia iron mogul John W. Jordan, head of
the massive Jordan & Irvine Iron Company, also owned and operated the California Furnace. In just four and a half months of production time during 1855, the California Furnace produced almost 1,080 tons of cold short metal that was ready to be shipped to nearby forges. Perhaps a major reason for this huge success was the furnace's strategic location. Only a little over two miles away to the southwest of the furnace, a large brown hematite quarry provided massive amounts of ore to be smelted, and condensed the whole process. Several old railroad beds in the area leading to the Longdale mines (near present-day route 60) also add to the convenience and therefore success of the furnace. A narrow-gauge railroad that used to connect Rockbridge Alum Springs and Goshen actually passed by the furnace and made direct shipping to local forges much easier. The area near the furnace was also rich in streams and waterways that helped transport the iron, and a dam was even located close-by, possibly contributing an early form of hydroelectric power. The California Furnace, a massive structure that helped distinguish the region as an epicenter for iron production, was only one of a number of successful furnaces in the area.

Obviously, the conveniences enjoyed by the California Furnace fueled its remarkable success from 1850 through 1875. For the same reasons, another local furnace—the Mount Hope Furnace—also flourished during the middle part of the nineteenth century. Only a quarter of a mile north of the California Furnace along Bratton's Run, the Mount Hope Furnace had access to all of the same waterways and railroad systems as the California. The furnaces are so close in proximity that researchers believe they shared the same property. The
two also had architectural, as they were basically identical structures physically, and were both charcoal-powered furnaces. The Mount Hope Furnace was built by John Doyle in 1849, a year before the completion of the California. However, the California Furnace saw twenty-five years of success while the Mount Hope only enjoyed four before being abandoned in 1853. When the bigger and more efficient California Furnace went into operation in 1850, its larger production numbers overshadowed the success of the Mount Hope and eventually made it expendable. Nonetheless, its few years in blast were very impressive. The furnace stood dormant and unharmed for a decade after it was abandoned before being destroyed in the 1860s, leaving nothing more than a dark soil discoloration today. The furnace's brief history, though not well-documented, indicates that its four years of successful operation identify it as another important piece in Virginia's iron producing past.

Another small furnace that was eventually abandoned in favor of its nearby and larger counterparts was the Dolly Ann Furnace. It was a steam and water hot-blast charcoal furnace, like the California, and was often referred to as the "Rough and Ready Furnace" (Iron Manufacturers Guide: 71). B.J. Jordan & Co. owned the Dolly Ann Furnace, but W.H. Jordan managed its daily operations. Built originally in 1848 and then refined and enlarged to almost the exact dimensions of the California Furnace in 1854, the Dolly Ann produced 500 tons of metal in four months. This was only about half the production of the California for a similar amount of time, but all the hematite ore used was found on site instead of mined and shipped in, making for a cheaper and more efficient
overall production than the California. The Dolly Ann Furnace was located on Pounding Mill Run, just three and a half miles east of Covington, Virginia in Allegheny County. Like the California and Mount Hope Furnaces, the Dolly Ann had the conveniences of nearby waterways, the James River and Kanawha Canal, and immediate access to the Virginia Central Railroad line. Just like the smaller Mount Hope Furnace had the California to eventually overshadow it, the Dolly Ann had its own larger counterpart—the Low Moor Furnaces located nearby—that would finally lead to the abandonment of the Dolly Ann. The histories of these two groups of furnaces almost directly parallel each other.

The California Furnace was tremendously successful during its twenty-five year life span. However, even the California's impressive production does not compare to the overwhelming success that the Low Moor Iron Company achieved from the use of all its resources and especially the furnaces that burned there. The State of Virginia granted New York businessman Abiel Abbot Low and his Low Moor Iron Company its charter on July 5, 1873. Originally, the company only held iron ore properties, but their total land holdings were over 4,100 acres in Allegheny County (Arritt, 1982: 111).
The company only mined the ore and sent it to local furnaces to be smelted in its early days. As the company's production and profits grew, so did its holdings. In 1880, the Low Moor Iron Company built its first blast furnace. But they did not stop there: by 1923, the company's assets included eleven iron ore mines, three furnace plants, several limestone quarries, and coke ovens throughout Virginia and West Virginia. Their total property covered 27,300 acres of land (Arritt, 1982: 111). Of all the Low Moor holdings, the most significant to the company's strong production were the three furnaces. Once they had their own furnaces to smelt all the ore they mined, they could condense costs and manufacture their product much more efficiently. The three furnaces were unofficially dubbed the "A," "B," and "C" blast furnaces. A and B were located at Low Moor, on the land that is now the Allegheny Regional Hospital, while C was in Covington. On October 11, 1880, A had its initial blast. When it was closed in 1923, the A furnace had produced over 862,000 tons of iron. Seven years after the A furnace was blown in, on July 26, 1887, the B furnace had its opening blast. It did not last as long as A did, but by 1919 it had produced nearly 900,000 tons of iron. The Low Moor Iron Company actually bought furnace C in 1893, but it did not have its initial blast until April 25, 1895. It too closed in 1923, having produced over 543,000 tons of iron (Arritt, 1982: 114). By the time the whole company shut down in 1926, the Low Moor furnaces were the last functioning in southwest Virginia, and among the last couple in the South. Modern researchers estimate that the furnaces had the potential to produce 600 tons of iron in a single day, if production went smoothly (Arritt, 1982: 111). These three massive furnaces
were all hand filled, meaning they used laborers to literally throw the chunks of ore into the furnace as opposed to using a mechanized dumper. By simply reading the above production statistics, it is obvious that such a huge company had to have an exorbitant amount of employees. During its times of full operation, the Low Moor Iron Company employed 1,200 people in its Virginia plants, along with 400 more in its West Virginia mines (Arritt, 1982: 111). While it would seem that such a huge company with a need for so many workers would be a positive thing for the people of southwest Virginia, Low Moor had the bad reputation of always hunting the cheapest labor, without regard to ethics or age. It has been rumored that Low Moor would hire illegal immigrants, desperate former slaves, and boys as young as eight-years-old to work arduous ten-hour days. Despite their dubious hiring practices and the pressures that come from running such an enormous company, the Low Moor Iron Company was the hub of iron manufacturing not only in Virginia, but also the entire South.

The Low Moor Iron Company built a furnace at Low Moor in 1873. The main line of the C&O is visible in the right of the photo. The buildings in the center stood where Alleghany Regional Hospital is today.

Historical Society Collection
The Low Moor Iron Company opened July 5, 1873 and closed in 1926. The main furnace occupied the site where Alleghany Regional Hospital is today.

Historical Society Collection

The local furnaces discussed above recorded astounding production numbers. But perhaps more importantly, the furnace communities lend insight into the way of life in Virginia's iron manufacturing days. During research, it became clear that a thorough history of any of the furnaces would never surface. Any in-depth analysis would be heavily reliant upon extrapolation. Therefore, in order to piece together the Virginia iron history as a whole, making comparisons
of similar regional furnaces is extremely beneficial. A wide variety of conclusions and theories can be made through these interpretation attempts, such as estimating feature dimensions, figuring out iron production, and determining ethnicity, socioeconomic status, and population in the mining communities. Archaeologists go into their excavations with hypotheses based on written sources and on information gleaned from their comparisons to similar sites. For instance, the information found from the California, Mount Hope, Dolly Ann, and Low Moor furnaces will help make conclusions at the Longdale site. One of these conclusions could come from comparing the size of the work force of the Low Moor furnace with that of California, and then relating it to Longdale. Low Moor's 1600 employees could potentially produce approximately 48,000 tons (based on the earlier stat of 600 tons per day) of iron in four months, whereas the California Furnace produced 1,080 tons in the same amount of time. Granted, technological advancements, proximity of mines, and abundant resources padded Low Moor's numbers. Nonetheless, the numbers still suggest that, proportionally, the California Furnace employed about 40 workers. The size of the overall community of Longdale estimated in its written history suggests that its furnace employed more workers than California. By using a formula similar to the one used above, given the appropriate statistics, conclusions can be drawn about Longdale and its production.

Before drawing conclusions about the Longdale excavations it is important to study the histories of other local furnaces and their communities. By drawing parallels to these other furnace communities, a more thorough interpretation and
analysis of Londale can be made. While a strictly operations-based comparison was made above involving work forces, other significant parallels can be made about anything from education, to population to the socioeconomic status of the people in their respective communities. These relationships can be taken one step further, beyond just individual community comparisons. Ultimately, archaeologists will be able to use in-depth parallels to extrapolate the size and success of Virginia’s iron mining industry as a whole. Historical Archaeology is the analysis of items of material culture in order to gain insight into the culture being studied. Insight gained from artifacts can be taken further by simply studying other similar sites. Drawing connections from one site to another can help bridge the gap between what is written to what is found at the sites.

"For the sparks really fly from the assumed dichotomy between 'as lived' and 'as written' with regard to history... Our effort will be to create a clearer, more helpful idea of what history is, what history means and what history does for people living their lives. And a clearer idea of history will give us a clearer understanding of archaeology."

--Parker B. Potter

Doug & Jack,

I know that it is hard to find sources on some of the old furnace, but both WIL and WIL have causes records that pertain to the iron industry. Even more info. of John W. Jordan and John Doyle would have been helpful. Documents should exist in the courthouse about this property. Because they were pre-Civil War did they employ slaves? There are too many unanswered questions here. What were their holdings? Did they share land with Londale?
California Furnace

Although these photographs were taken in the 1950's and the images are very grainy and faded, the general location of the furnace can be identified, marked by the scattered limestone remains.
More California Furnace

Although this picture was taken in the 1950's its image is very difficult to make out, the general location of the furnace can be identified by the scattered limestone pieces.

Mount Hope Furnace

The image below is of the site where the Mt. Hope Furnace once stood. All that remains is an obvious soil discoloration where the limestone stained the ground. This photo is also from the 1950's and is very faded.
Map of Rockbridge County's Iron Industry

- Panther Gap Furnace #1 (1811-1837)
- Victoria Furnace (1880's)
- Lydia Furnace (1820-1850)
- Bath Forge (1827-1850)
- Bath Iron Works
- Lebanon Valley Forge (1825-1885)
- Gibraltar Forge (1800-?)
- California Furnace (1850-1875)
- Mt. Hope Furnace (1849-1853)
- Goshen Pass
- Cedar Grove
- Henry River
- South River ("Iron Valley")
- Holbrook's Forge (c1800-c1850)
- Beechenbrook Iron Works (1820-1890)
- Lexington
- Catholic Grove
- Cotopaxi Furnace (1838-1854)
- CYPRESS FURNACE (1847-1884)

- Eckard Forge (by 1855-?)
- Buffalo Forge (1800-1865)
- Glasgow
- James River
- Glenwood Foundry (1849-1887)
- Glenwood Furnace (1849-1887)
- Buena Vista (1847-1864)
- Halbert & Moses McCuller's Furnace & Foundry (c1800-1818)
- Vesuvius Furnace (1828-1854)
- Vesuvius

- Grant's Furnace (1760-?)
- Dougherty Forge (by 1779-?)
- McCowan's Foundry (?-?)
- (Old) Buena Vista Furnace (1847-1864)
- McCuller's Forge (by 1789-1820)
- Moore's Furnace (by 1789-1829)
- Vesuvius Furnace (1828-1854)

A 42-inch long, 117-pound "pig" from Vesuvius Furnace, found in Richmond's canal basin.

The stone stack of Glenwood Furnace still stands beside Rt. 759

N

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Works Cited


Pledged in Full

[Signatures]