

Pine Grove Furnace

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Pine Grove Furnace and the Charcoal Iron Industry

Pine Grove Furnace was a typical “cold blast charcoal iron” industrial site and community in the South Mountains of southwestern Cumberland County.¹ Using local ingredients – iron ore, limestone, and hardwood charcoal – plus water power off the hillsides, this facility produced crude pig iron and cast iron products such as pots, stoves and railroad wheels from circa 1770 to 1895. At Laurel Forge, a finery forge built nearby in 1830 as an integral part of the business, pig iron from the furnace was converted to wrought iron which could be sold at higher prices. The furnace and forge were collectively called an iron works.

A steady supply of iron ore for the furnace was mined from open-air quarries or “pits” including “Pine Grove Number 1” (today filled with water as Fuller Lake), the still-dry “Old Pit” to the south of Fuller Lake, and late in the 19th century two quarries near Laurel Lake, among other sources.² Limestone came from two small quarries on the hill south of the Old Pit near the iron community’s cemetery.³ The other key raw material, wood such as chestnut and oak, was converted into charcoal by “wood choppers” and skilled “colliers” working on the thousands of acres of forest owned by the iron company.⁴

Key to the success of Pine Grove Furnace and similar iron works in the South Mountains was the felicitous economics of nearby abundant raw materials. It is sometimes erroneously claimed that iron works were remotely situated to hide from British officials enforcing mercantile regulations such as the Iron Act of 1750 (resented by American businessmen and a contributing cause of Revolutionary fervor). However, these regulations did not block the production of pig iron and plain wrought iron bars.⁵ Furnaces and forges were built in the mountains simply because that’s where the raw ingredients and waterpower were to be found. Comparing the cost of transporting a heavy finished product – iron – from production site to market, *versus* the cost of hauling voluminous raw materials which were also heavy on poor road networks; it often made economic sense to build early furnaces close to the raw materials.⁶

The nucleus of the entire iron works was the furnace stack, a 33-foot-tall masonry structure constructed with local stone such as quartzite and metarhyolite. A hollow columnar space lined with firebrick ran vertically up the center.⁷ When “in blast” (making iron), the furnace would typically run nonstop for 8-10 months or longer. Workers called “fillers” dumped layers of ore, limestone and charcoal into the top of the stack several times an hour around the clock. Furnaces of this type are almost always built next to a steep “furnace bank” to facilitate dumping the raw ingredients into the top; the hillside at Pine Grove Furnace is still visibly stained from a century’s worth of spilled charcoal. A large waterwheel next to the furnace turned constantly to power “blast machinery” forcing air into the bottom at an opening called a “tuyere.”⁸ Without a steady flow of air, the furnace interior (at the widest part or “bosh,” and at the “crucible” at the bottom where liquid iron collected) could not reach the very high temperatures needed for the chemical and physical process of producing iron from iron ore. Twice a day, workers under the direction of the “founder” or “keeper” broke open a clay plug to allow molten iron at almost 3,000°F to flow from the crucible into the casting house. Floating atop the iron in the crucible was a molten waste product of the smelting process which flowed out separately and cooled into a colorful glassy material called slag. Pieces of slag can still be seen today as road fill or along trails throughout the State Park and State Forest.

When freezing temperatures eventually interfered with the waterwheel, the furnace would go “out of blast” (shut down) for a few months. This allowed maintenance including replacement of the interior

firebricks. The operation was also shut down when external economics made the business unprofitable. Most notably, Pine Grove Furnace was “out of blast” 1874-1878, and again 1893-1894.⁹

In late 1877-1878, the waterwheel and associated blast machinery were replaced with a steam engine by John Birkinbine, an engineer hired to modernize the facility in the face of growing competition from much larger iron and steel works elsewhere.¹⁰ Other late improvements made at that time and in 1883 included an iron and brick shell atop the furnace stack, raising its height to 53 feet; a steam-driven hoist to fill the taller stack; and converting to efficient “hot blast” (preheated air blown into the bottom of the furnace).¹¹ These changes allowed prolonged and more efficient iron production during the final years of operation. In the Revolutionary era, a furnace like Pine Grove might have produced around 500 tons of iron annually until winter forced a seasonal shutdown.¹² In 1872, the furnace produced a weekly average of 50 tons of pig iron, and a maximum of 62 tons.¹³ After the industrial improvements in 1877, Pine Grove’s annual output dramatically increased, with an annual peak capacity of 6000 tons: this was roughly ten times the amount of pig iron the furnace could produce a century earlier.¹⁴

The iron company eventually owned more than twenty thousand acres of surrounding forests to supply charcoal fuel for the furnace and forge, and to supply the community with firewood and building materials.¹⁵ As a thriving and largely self-sufficient community or “iron plantation” in a remote location, the property included five farms to feed workers, horses and mules, and a water-powered grist mill to grind the grain. Pine Grove also included workers’ houses, a company-run store, a large “Ironmaster’s Mansion” for the owner and his family, a paymaster’s office and residence, a water-powered saw mill just west of the furnace stack, a carpenter shop, a blacksmith shop, and barns and various other outbuildings. Large buildings and apparatus adjoined the furnace including “blast machinery” to force air into the stack, and a casting house. At the top of the furnace bank a “charcoal house” (storage barn) kept the fuel dry until loaded into the top of the furnace.¹⁶ The Laurel Forge area also had many structures including a dam to create a “forge pond” to supply power via two water-wheels, workers’ houses and a forge superintendent’s house sometimes called a “Mansion.”¹⁷

Many of these buildings are gone today, either sold for scrap after the furnace ended operation in 1895, destroyed by fire,¹⁸ or torn down due to poor condition after the Commonwealth of Pennsylvania bought the property.¹⁹ We can only imagine the noise, heat, dirt and round-the-clock activity of the long-vanished industry. Fortunately visitors to Pine Grove Furnace State Park can still see some surviving structures including the repaired furnace stack; the paymaster’s office, today a park rental cabin; the large Ironmaster’s Mansion, built 1827-1829 from bricks made on-site²⁰; a mule stable today housing the State Park store; the grist mill today housing the Appalachian Trail Museum; and a 19th century boarding house today serving as the State Park office and museum.

Laurel Forge

Laurel Forge was built by Peter Ege in 1830 two miles east of the furnace. This “finery forge” converted pig iron from the furnace into wrought iron. Wrought iron could be subsequently rolled, pressed or welded into useful shapes, whereas brittle pig iron would shatter. A blacksmith could only use wrought iron, usually in the form of “merchant bars.” The forge process at Laurel involved heating pig iron to burn out carbon, then hitting it repeatedly with a very large “helve hammer” – essentially a length of tree trunk attached to a hinge at one end with a stone and iron head weighing 500 pounds or more at the other end. Laurel had two forge hammers,²¹ one of which was said to be the 2nd largest in all of Pennsylvania when the forge shut down around 1896.

In operation, forge hammers pounded the hot metal about once a second – an extremely loud process. To rapidly lift and drop these massive hammers, water wheels were attached to wooden shafts with a cog mechanism. Water power was the key reason that a large dam was built across Mountain Creek to create Laurel Forge Pond (today called Laurel Lake). In addition, water power lifted bellows to push

air into the fires that heated the pig iron. The dam at Laurel Forge was located 60 feet upstream from today's State Park dam. The original 1830 "timber crib" dam, constructed from logs and stones with a dirt layer on the upstream side, failed at least three times (October 1847, June 1889 from the same rains that caused the famous Johnstown Flood, and July 1919).²² It was rebuilt with logs each time to allow continued forge operations, and to support an ice industry beginning in the 1880s. After many partial repairs and threats of additional dam failures, a new modern concrete structure was finally built in 1968 by the Commonwealth of Pennsylvania for the sake of recreation at Laurel Lake.²³

All the forge buildings are now gone; they were located in the vicinity of the gravel parking lot adjoining the modern dam along Pine Grove Road east of the beach. In the early 20th century, a series of massive forest fires – most notably in 1900 and 1915 – destroyed what remained of the old forge and nearby workers' houses, as well as storage barns for the ice industry.²⁴

Origins of Pine Grove Furnace

The historical origins of the iron works are debatable. The first uses of the land that became Pine Grove Furnace were described in deeds implying the area was originally sought for its abundant trees and water power for running saw mills. After an initial land sale on July 22, 1762 by the heirs of William Penn to a carpenter named Samuel Pope, the land was soon sold in October of that year to George Stevenson (1718-1783). A deed at that time mentions that Finley McGrew (1736-1812), a Quaker from northern Adams County, had already built a saw mill on the land. Stevenson was a lawyer, businessman and land speculator connected to four of the first five iron furnaces located west of the Susquehanna River.²⁵ Most historians credit Stevenson's ownership for the earliest iron making at Pine Grove, with technical expertise by John Arthur and Robert Thornburgh, but this has been disputed.²⁶ Stevenson sold the property to Finley McGrew in 1772 who then resold it to carpenter Jacob Simeon in 1773. The earliest deed mentioning a furnace at Pine Grove is from 1782; however, no deeds clearly describe who first built the furnace. The year 1764, suggested as the furnace start in many modern summaries, seems to be too early. 19th century documents generally claimed "1770" or "around 1770" as the earliest year for the single furnace built at Pine Grove, though it may have been built as late as circa 1781.²⁷

Ege Ownership

Regardless of our confusion today as to when the furnace was built, Robert Thornburgh's sons Joseph and Thomas became part owners in December 1782 along with Michael Ege (1753-1815). John Arthur replaced Joseph Thornburgh as a part owner in 1788.²⁸ Another co-owner's name mentioned in various business records from 1785 to 1791 is William Lusk (for example, the title page of a 1785 Furnace Day Book reads simply "Thornburgh and Lusk") but little is known about him. Ege became full owner of Pine Grove in late 1803.²⁹ By the time of his death, Michael Ege owned four iron furnaces in the area including Pine Grove, plus all the associated forest land and farms for these furnaces totaling as much as 50,000 acres.³⁰ Michael Ege did not live at Pine Grove – he was based at Carlisle Furnace in what is now called Boiling Springs, and he built his personal mansion there.

Beginning in 1800, Michael's oldest son Peter (1776-1847) came to live at Pine Grove as manager of the furnace for his father. Peter Ege remained at Pine Grove for almost all the rest of his life. After Michael's death in 1815, Peter engaged in legal maneuvers with his siblings so that he became sole owner of Pine Grove Furnace in 1816. From 1827 through 1829 Peter Ege built the still-standing brick mansion in English Tudor architectural style – unusual for the area – specially for his wife Jane Arthur (1774-1841). In 1830 he built Laurel Forge. To avoid debts, Peter Ege retired as ironmaster in 1835 and sold Pine Grove to his sons Michael Peter Ege and Joseph Arthur Ege,³¹ though Peter continued to live there. When the iron works went into bankruptcy, probably related to the national economic downturn called the Panic of 1837, it was sold at Sheriff's sale in 1838 to Frederick Watts and Charles Penrose.

Watts Ownership and Departure of the Ege Family

Frederick Watts (1801-1889) was a prominent lawyer and judge in Carlisle. He was also an enthusiastic agrarian reformer known for introducing the McCormick reaper to Cumberland County in 1840 and for his leadership in creating the agricultural school that would eventually become Penn State University.³² His second wife was Henrietta Ege, daughter of Michael Ege's son Michael Ege III who had inherited the Carlisle Furnace at Boiling Springs. Hence, through Frederick Watts by marriage, Pine Grove Furnace still maintained a familial connection to the Ege family despite the sale to Frederick Watts.³³ Watts did not force his wife's uncle and aunt – Peter and Jane – to leave the Ironmaster's Mansion. Jane Arthur Ege died there in 1841. Peter Ege moved to his daughter's home in nearby Cumminstown on the north side of the mountain shortly before his death in January 1847.³⁴

Charles Bingham Penrose (1798-1857) was Frederick Watts' law partner and a politician.³⁵ Penrose sold his share of the furnace in 1843, leaving Watts as sole owner. However, Watts did not live there and did not function as a traditional ironmaster. The two sons of Peter Ege (Henrietta Ege Watts's cousins) who had lost the property in bankruptcy nonetheless remained at Pine Grove until at least 1844 as managers on behalf of Watts.³⁶

In 1844 or early 1845 Frederick Watts sold the entire iron works to his brother William Miles Watts (1809-1883) and Frederick's brother or uncle Edward Watts; later in 1845 ownership was fully transferred to William Watts alone. Watts moved to the iron plantation to become full-time ironmaster, despite his former training in law and medicine.³⁷ William Watts was Pine Grove Furnace's ironmaster for 20 years until he retired to Mechanicsburg in 1864. He sold the iron works to Jay Cooke's business interests at a time of elevated iron prices due to the Civil War.

Free and Unfree Labor at Pine Grove Furnace

Surprisingly few workers were needed to run the iron works. In its early years, only 12 to 25 workers were needed for the furnace and associated ore pits.³⁸ During the decade after the Civil War, the total number of employees was 65 not including farmers and colliers.³⁹ and by the last two decades of operation the total workforce was around 200. Many of the early workers at Pine Grove Furnace and other ironworkers in the region were probably of Scots-Irish descent.⁴⁰ In the mid-19th century, workers were often of English or less often Irish descent.⁴¹ German and Italian immigrant workers constructed railroads at Pine Grove Furnace later in the 19th century.⁴²

Among the early workers at Pine Grove Furnace were African-American slaves and English or Irish indentured servants, working side-by-side with free workers – both black and white – in similar jobs.⁴³ Slavery persisted in the local iron industry into the early 19th century despite Pennsylvania's 1780 "Act for the Gradual Abolition of Slavery" (the key word being *gradual*).⁴⁴ Several men associated with Pine Grove Furnace were slaveholders including George Stevenson, Joseph and Thomas Thornburgh and Michael Ege. In particular, many slaves worked at Pine Grove when Michael Ege was owner (with his son Peter as manager), reaching a peak in 1810 with 14 slaves out of a total of 30 workers. Many of these slaves may have been leased from other owners, rather than owned outright by Ege.⁴⁵ The use of slaves in the region's iron industry declined rapidly in subsequent years.

In contrast to its early history of slave labor, Pine Grove Furnace served as a "station" on the Underground Railroad during the decades before the Civil War.⁴⁶ The passage through the middle of the mountains near Pine Grove Furnace was one of many possible routes northward, and probably was used only when easier roads along the edges of the South Mountains were not available.⁴⁷ Despite claims today that escaping slaves stayed in the Pine Grove Furnace Ironmaster's Mansion, there is no evidence to support that particular building as a place of refuge. It is more likely they hid in less prominent places such as barns or among black workers (especially at Laurel Forge) while they waited for safe conduct toward Boiling Springs, York Springs or Carlisle and onward to Harrisburg where they were somewhat safer. Ironmaster William Watts' personal knowledge of and attitude regarding

Underground Railroad activity at Pine Grove is unknown, but his older brother Frederick as a judge and lawyer expressed opposition to slavery.⁴⁸

Cooke and Fuller Ownership

In April 1864, William Watts sold the furnace for \$225,000 to William Garroway Moorhead (1811-1895) on behalf of Jay Cooke & Company. In November of the same year, Moorhead sold it for \$1,500,000 to a newly formed company called the South Mountain Iron Company which was closely allied with Jay Cooke's business interests. Moorhead, who remained connected to the iron company, was a business partner and brother-in-law of Jay Cooke, the richest man in the country at the time. Cooke (1821-1905), a banker based in Philadelphia, was known as the "Financier of the Civil War" for selling bonds to fund the Union war effort. (For more, see following [article on Cooke Township](#).) In conjunction with the new iron works ownership, the South Mountain Railroad was chartered in 1865; tracks were built 1868-1869 to connect Pine Grove Furnace with Carlisle; and the new railroad began regular operation by early 1870.⁴⁹ This marked the first time passengers and freight could reach this mountain location other than on foot, horseback or animal-driven wagons across rough dirt roads.⁵⁰

In November 1872 at a time of distress in his financial businesses, Jay Cooke's company sold the iron works to a large conglomerate; however the Thomas Iron Company based in Lehigh County defaulted on the purchase mortgage, itself suffering from the growing crisis that came to be called the Panic of 1873 and which was largely blamed on Jay Cooke. Pine Grove Furnace went "out of blast" in July 1874. By 1877, Cooke regained some of his wealth. In July 1877 along with former iron works superintendent Jackson Fuller (1827-1904), Cooke repurchased Pine Grove Furnace and formed the South Mountain Mining and Iron Company. They brought in the well-known Berks County and Philadelphia hydraulic and mining engineer John Birkinbine (1844-1915) to upgrade the furnace in the winter of 1877. Birkinbine's work resulted in significant improvements in efficiency when the furnace restarted in 1878, after almost four years of inactivity. For the first time, the furnace could optionally burn anthracite coal or bituminous coke, in addition to wood charcoal, depending on which one was available and cheapest.⁵¹ Ephemera from 1883 (invoices on postcards) show that the iron company purchased various train-car loads of anthracite, coke and charcoal fuel from elsewhere in Pennsylvania within a period of only a few months, apparently seeking the least-costly fuel at any given time. Importing charcoal is notable, as the company owned thousands of acres of land adjoining the furnace.

Decline of the Charcoal Iron Industry

Despite various improvements, the iron works at Pine Grove Furnace and Laurel Forge could not compete with new technologies to make iron and steel in bigger volumes at large population centers with better transportation. Traditional small, remotely situated operations such as Pine Grove were doomed despite making a specialty product that was still sought by niche markets such as railroad wheels and boiler plate. After being "out of blast" for two years, the furnace briefly restarted in a final attempt to make a profit, then shut down for the last time in April 1895.⁵² It was truly the end of an era.

Other Uses of the Property and Sale to the Commonwealth of Pennsylvania

Fuller and Cooke sought other uses for the property even before the final economic failure of the iron operation. Their attempts to make money included a popular amusement park one mile east of the furnace, 1878-circa 1900; the Fuller Brick and Slate Company, in operation 1892-1907 using local raw materials including from a slate quarry reached by an extension of the railroad across Piney Mountain Ridge south of the furnace; and ice commercially harvested from Laurel Forge Pond beginning in the 1880s. In 1912-1913, the Commonwealth of Pennsylvania purchased 16,869 acres of former industrial works plus the iron company's farms and forest land. Initially the purchase was called the Pine Grove Division of the South Mountain Forest Reserve. In 1920 it was incorporated into the newly named Michaux State Forest spanning Cumberland, Franklin and Adams Counties. "Pine Grove Iron Works" was entered in the National Register of Historic Places in 1977.⁵³

NOTES

1. Lenore Embick Flower, *History of Pine Grove Furnace* (Carlisle PA: Cumberland County Historical Society, 4th edition, 2003; originally published 1933). Be aware that Flower does not generally cite her sources and not all details are necessarily correct. Despite its limitations, this 32-page booklet is the best place to start learning more about Pine Grove Furnace. For general background see Gerald G. Eggert, *The Iron Industry in Pennsylvania* (Middletown PA: Pennsylvania Historical Association, 1984) pp. 5-12. For more extensive technical information on how furnaces worked, see Robert B. Gordon, *American Iron 1607-1900* (Baltimore: Johns Hopkins University Press, 1996).
2. Randy Watts, *Railroads to Pine Grove Furnace: Book Two in a Series, Railroads of the Cumberland Valley* (Carlisle PA: Keystone Computer Services, 1991) pp. 21-23, 26-27.
3. Persifor Frazer, *Report of progress in the counties of York, Adams, Cumberland, and Franklin: illustrated by maps and cross-sections showing the magnetic and micaceous ore belt near the western edge of the Mesozoic sandstone and the two Azoic systems constituting the mass of the South mountains. with a preliminary discussion on the Dillsburg ore bed, and a catalogue of specimens collected in 1875* (Harrisburg: Pennsylvania 2nd Geological Survey, 1877) p. 247.
4. For details of this process, see Jackson Kemper, *American Charcoal Making in the Era of the Cold Blast Furnace* (Fort Washington, PA: Eastern National Park and Monument Association, 1987; originally published 1941).
5. Arthur Bining, *Pennsylvania Iron Manufacture in the Eighteenth Century* (Harrisburg PA: Pennsylvania Historical and Museum Commission, 2nd edition, 1979; originally published 1938) pp. 139-144.
6. Anne Kelly Knowles, *Mastering Iron: The Struggle to Modernize an American Industry, 1800-1868* (Chicago: University of Chicago Press, 2013) pp. 39-40. This logic did not apply later in the 19th century as transportation networks improved. See for example Richard Schallenberg and David Ault, "Raw Materials Supply and Technological Change in the American Charcoal Iron Industry" in *Technology and Culture* 1977 v. 18 n. 3 p. 450. This was one reason remote furnaces such as Pine Grove ultimately could not compete with iron works elsewhere. Despite finally having a railroad by 1870, Pine Grove shut down permanently in 1895.
7. In early years of iron making at Pine Grove Furnace, the refractory interior lining was talcose schist (locally called "soapstone") obtained from a still-visible quarry one mile north of the furnace: John H. Way, *Your Guide to the Geology of the Kings Gap Area, Cumberland County, Pennsylvania: Environmental Geology Report No. 8* (Harrisburg PA: Pennsylvania Geologic Survey, 1986) p. 13. Soapstone was also mined from a small quarry visible today along the Appalachian Trail just south of Old Railroad Bed Road. Blocks of this material were also occasionally used as a general construction material, and a few blocks are visible today in the rebuilt furnace stack exterior and in the foundation of the brick Ironmaster's Mansion. The interior of the Pine Grove Furnace stack is still lined with original firebrick from 1895; the bosh is today half-filled with a 15-foot layer of raw materials abandoned in place when operation ceased in April 1895 (direct examination by Andre Weltman and Pine Grove Furnace State Park director of maintenance Warren Baum on May 29, 2013). The exterior brick and the iron doors of the crucible, visible today at the bottom of the stack, were installed by the State Park as modern approximations of the original appearance during repairs in 1985-1986 (personal communication, former State Park manager William Rosevear, 2012).
8. This furnace presumably was first constructed with a single tuyere, but had two tuyeres by the end of 1849: *Documents Relating to Manufacture of Iron in Pennsylvania for the Convention of Ironmasters in Philadelphia, December 20, 1849* (Philadelphia: The General Committee, 1850) p. 123. It had three tuyeres in its later years of operation: John Birkinbine, "Experiments with Charcoal, Coke

and Anthracite in the Pine Grove Furnace, Pennsylvania” in *Papers of the Montreal Meeting, September 1879* (Philadelphia: Transactions of the American Institute of Mining Engineers, 1879) v. 8 p. 171.

9. John Birkinbine, “Notes Upon the Drainage of a Flooded Ore-Pit at Pine Grove Furnace, PA” in *Papers of the Philadelphia Meeting, February 1878* (Philadelphia: Transactions of the American Institute of Mining Engineers, 1878) v. 6, p.174; and Watts *op. cit.*, p. 27.

10. Pine Grove was among the last of the Pennsylvania furnaces to still use an outmoded waterwheel system to power its blast machinery – although not the very last as claimed by John B. Pearse, *History of Iron Manufacture in America* (Philadelphia: Allen Lane & Scott, 1876) p. 192. As one contrary example, a waterwheel system was in use (as a supplement to a steam engine) until 1883 at Hopewell Furnace in Berks County.

11. John Birkinbine, “Progress as Illustrated by Blast Furnace Operation” in *The Manufacture of Pig Iron in Pennsylvania, Prepared at the request of the Bureau by Mr. John Birkinbine, Philadelphia: Official documents, comprising the department and other reports made to the Governor, Senate and House of Representatives of Pennsylvania.* (Harrisburg PA: Commonwealth of Pennsylvania Bureau of Statistics of Labor and Agriculture, 1894) v. 4 no. 10 pp. 84-85. A “hot blast stove” making use of the exhaust coming from the top of the furnace was apparently installed in 1837 or 1838 (*Carlisle Herald and Expositor* Jun 5, 1838, p. 3), but some early air-heating systems were known to be inefficient – indeed, a table of Pennsylvania furnaces in late 1849 described Pine Grove as having “warm” blast instead of “cold” or “hot”: *Documents Relating to Manufacture of Iron op. cit.*, p. 123. Birkinbine reported that when he renovated the Pine Grove stack 1877-1878, he found a “small 18-pipe hot-blast stove” already installed which he left unchanged: Birkinbine, “Experiments with Charcoal, Coke and Anthracite” *op. cit.* p. 168. Birkinbine does not clarify whether that stove was mounted atop the stack to directly capture exhaust heat (similar for example to the stove visible today at the ruins of Eliza Furnace near Johnstown PA). The heating mechanism Birkinbine found in 1877 was perhaps not the same as the one from 1838, because in his 1894 report Birkinbine said the stove he found in 1877 was installed “about 1870”: “Progress as Illustrated by Blast Furnace Operation” *op. cit.*, p. 84. In any event, at some point, perhaps 1883, an efficient Player-type stove was built and is shown in contemporary photographs; its ruins are still visible today just to the west of the stack. Player stoves are described by Gordon *op.cit.*, pp. 112-113.

12. James M. Swank, *Introduction To A History Of Ironmaking and Coal Mining in Pennsylvania: Contributed to the Final Report of the Pennsylvania Board Of Centennial Managers* (Philadelphia: James Swank, 1878) p. 35.

13. Birkinbine, “Progress as Illustrated by Blast Furnace Operation” *op. cit.* p. 84.

14. *Directory of the Iron and Steel Works of the United States Embracing the Blast Furnaces, Rolling Mills, Steel Works, Catalan Forges and Bloomeries in Every State and Territory*, (Philadelphia: American Iron and Steel Association, 1878) p. 37.

15. *Report of the Pennsylvania Department of Forestry for the Years 1912-1913* (Harrisburg PA: Commonwealth of Pennsylvania, William Stanley Ray, State Printer, 1914) pp. 9-10. In a series of four sales in 1912-1913, the Commonwealth purchased 16,869 acres, representing most of the historic Pine Grove Furnace acreage. Reverend Thompson Ege reported that Michael Ege’s “entire land holding” at Pine Grove Furnace was “27,000 acres mountain, farm and ore lands” but does not give a source for this number: Thompson P. Ege, *History and Genealogy of the Ege Family in the United States 1738-1911* (Harrisburg PA: Star Printing Co., 1911) p. 91.

16. The foundations of the charcoal house are visible today along the northern edge of the State Park general store’s parking lot. Also visible today are the remnants of storage sheds for coal at the base of

the furnace bank directly behind the stack (starting in 1878 the furnace sometimes imported anthracite and bituminous coke: Birkinbine “Experiments with Charcoal, Coke and Anthracite” *op. cit.*).

17. Andre Weltman, “The Mystery of the Unburned Mansion: The Loss of the Ege ‘Big House’ and Other Fires at Pine Grove Furnace and Laurel Forge” in *Cumberland County History* 2012 v. 29 p. 64.

18. Weltman *ibid.*

19. *Report of the Pennsylvania Department of Forestry for the Years 1914-1915* (Harrisburg PA: Commonwealth of Pennsylvania, William Stanley Ray, State Printer, 1916) p. 17.

20. Berman, David. *National Register of Historic Places Inventory – Nomination Form*, 1976. Typewritten document prepared by the Office of Historic Preservation, Pennsylvania Historical and Museum Commission on a National Park Service generic form.

21. J. Peter Lesley, *The Iron Manufacturer's Guide to the Furnaces, Forges and Rolling Mills of the United States*, (New York: John Wiley 1859) p. 169.

22. *Herald & Expositor* (Carlisle, PA) October 13, 1847; Fletcher Johnson, *History of the Johnstown Flood* (Philadelphia: Edgewood Publishing Co., 1889); “Country Flooded When Dam Broke,” *Gettysburg Times*, July 23, 1919.

23. Bureau of Dam Safety, Commonwealth of Pennsylvania Department of Environmental Protection “Shelf 21-025” archived materials, reviewed by Andre Weltman on June 22, 2012 (Rachel Carson Building, Harrisburg PA).

24. Weltman *op.cit.*, p. 66.

25. Roland Baumann, *George Stevenson (1718-1783), Conservative as Revolutionary: A paper presented in substance to the Cumberland County Historical Society, November 17, 1976* (Carlisle PA: Cumberland County Historical Society Bicentennial Series Booklet no. 3, 1978.).

26. Flower *op. cit.*, p. 8.

27. There seems to be no physical nor documentary evidence of an early furnace built in 1764 and replaced by another one around 1770, as is sometimes claimed.

One basis to define an earliest possible start date for Pine Grove is a 1769 advertisement to sell the Carlisle Iron works, claiming “There are no other iron works in the county, and the country to the west and north settling very fast, affords a greater, and perhaps a more advantageous sale for bar iron and castings, than almost any other situation.”: *The Pennsylvania Gazette*, September 7, 1769, cited in Randy Watts, “The Iron Works at Boiling Springs” in Richard Tritt and Randy Watts, eds., *At a Place Called the Boiling Springs*, (Boiling Springs, PA: H. Robert Davis and the Bubbler Foundation, 1995) p. 40. This advertisement implies Pine Grove had not yet started operations by early September 1769. George Stevenson was involved with Carlisle Furnace as well as Pine Grove Furnace; it is hard to see why an advertisement would attempt to deny the existence of another furnace operating only a few miles further into the South Mountains.

As a different piece of evidence to support a start some time in the 1760s, Mercer shows a photograph (Plate 178) with a fireback engraved with the text “Pine Grove” and “176__” – unfortunately the last digit of the year was worn off: Henry Chapman Mercer, *The Bible in Iron* (Doylestown PA: Bucks County Historical Society, 1914) p. 107. However, the image reproduced in Mercer’s book is quite indistinct, and the original artifact is apparently no longer available for closer examination.

The modern claim for 1764 appears in Bining *op. cit.* p. 50, but the deed cited does not actually clarify the year of first construction.

It is possible that some claims regarding 1764 represent confusion with a furnace in Sussex County, Delaware with the exact same name and which began operation in 1763 or 1764. This furnace in Delaware is described in: James M. Swank, *History of the Manufacture of Iron in All Ages* (Philadelphia: American Iron and Steel Association, 1884) p. 233; and *Bulletin of the American Iron and Steel Association* Nov 2-9, 1887 v. 21, n. 39, p. 1.

To add to the confusion, Ege *op. cit.* p. 91 suggested a “forge” may have been built by Robert Thornburgh on 1200 acres of land in the 1760s, implied by a Carlisle tax list in 1767: “An early forge was built in the vicinity, before any legal grant of land, thought to be on the site of the later forges built and rebuilt there and known as Laurel Forge, some distance below the furnace site on the Mountain Creek.” It is not clear whether it was a finery forge or a bloomery forge, two very different types of iron operation and each distinct from a furnace (the words furnace and forge and related terms can have different meanings depending on the context, year of writing, and technical sophistication of the writer). Note that Ege’s massive 1911 genealogy contains some typographical errors, and his data for Pine Grove Furnace should always be checked against the original material. Also supporting the existence of a finery forge before Peter Ege’s 1830 construction, as early as 1787 the Furnace Day Books repeatedly mention bar iron in addition to pig iron and castware (Weltman, personal observation), though this is not definitive proof.

Birkinbine, the engineer brought in to modernize Pine Grove in 1877, specifically reported the furnace first went into operation in 1771 but does not give a source for this information: Birkinbine, “Progress as Illustrated by Blast Furnace Operation” *op. cit.*, p. 84.

Flower claims a later start during the ownership of Jacob Simeon, after Stevenson sold the property to him in 1772 and before his sale to Ege and the Thornburgh sons in 1782: Flower *op. cit.*, p. 8. Although Jacob Simeon sold the property with a furnace upon it, the deed Flower references does not actually say that Simeon himself built the furnace.

28. Cumberland County Deed Book H, v. 1, p. 602.

29. Cumberland County Deed Book YY, v. 1, p. 416

30. Ege *op. cit.*, p. 94. The four furnaces owned by Michael Ege when he died were Pine Grove; Carlisle at Boiling Springs; Cumberland near what is today the Huntsdale Fish Hatchery; and Mount Holly along Mountain Creek just south of the Holly Gap.

31. Cumberland County Deed Book QQ, v. 1, p. 91.

32. Mark W. Podvia, "The Honorable Frederick Watts: Carlisle's Agricultural Reformer" in *Penn State Environmental Law Review*, Spring 2009 v. 17 n. 3 pp. 298-317. A roadside marker along Route 11 on the west side of Carlisle marks Watts’ model farm: explorepahistory.com/hmarker.php?markerId=1-A-39 (accessed September 5, 2014).

33. Frederick Watts also became involved with two other economically distressed Ege furnaces (Mount Holly and Cumberland) around this time.

34. Jane Arthur Ege was buried in the Pine Grove Furnace cemetery adjoining the limestone quarries; her gravestone has been preserved, but the actual site of her burial is not known today. Although Flower *op.cit.* p. 21 says Jane died in 1811, she actually died February 1, 1841, aged 66: *American Volunteer* (Carlisle), March 11, 1841. Peter Ege was buried in the Dickinson Presbyterian Church graveyard, less than one mile east of the intersection of Route 233 with Walnut Bottom Road; his gravestone still stands.

35. John W. Jordan, *Colonial And Revolutionary Families Of Pennsylvania* (Baltimore: Genealogical Publishing Co. 2004, originally published 1911) p. 611.

36. "Notice" in *Gettysburg Adams Sentinel*, April 29, 1844, p. 5. A legal advertisement by Frederick Watts said "The public are cautioned against dealing in any way with" Peter Ege's two sons "in regard to any business or property whatever pertaining to the 'Pine Grove Iron Works Estate,' as they have no authority to dispose of any property or transact business there."
37. Bennett Bellman, "Hon. William Miles Watts" in *History of Cumberland and Adams Counties, Pennsylvania: Containing History of the Counties, Their Townships, Towns, Villages, Schools, Churches, Industries, Etc.; Portraits of Early Settlers and Prominent Men; Biographies; History of Pennsylvania; Statistical and Miscellaneous Matter, Etc., Etc. Illustrated* (Chicago: Warner, Beers & Co. 1886) p. 439. Note that Lenore Flower *op. cit.* p. 12 says that Frederick Watts sold the furnace in 1844, but Ege's 1911 *Genealogy op.cit.* p. 93 reports it was sold on February 5, 1845. "Edward Watts" who was briefly a co-owner of this iron works is hard to identify, but may have been Judge Frederick Watt's brother or uncle. It is unlikely that this Edward was Judge Watts' son as is sometimes claimed. Judge Watts did have two sons with first name Edward (plus both had middle name Biddle). However the first son was very young at the time of the sale; the second son was born in 1851, after the sale, and was given the same name. As with the Ege family, researchers must struggle to track multiple generations of the Watts family reusing names repeatedly. For example, Judge Frederick Watts had an uncle, brother, and son all named "William Miles"!
38. John Alosi, *Shadow of Freedom: Slavery in Post-Revolutionary Cumberland County, 1780-1810* (Shippensburg PA: Shippensburg University Press 2001) p. 71.
39. *Annual Report of the Secretary of Internal Affairs of the Commonwealth of Pennsylvania for 1874-1875, Part III — Industrial Statistics*. (Harrisburg PA: BF Meyers, State Printer, 1876) v. 3 p. 303.
40. John Bezis-Selfa, *Forging America: Ironworkers, Adventurers, and the Industrious Revolution* (Cornell NY: Cornell University Press 2004) p. 124.
41. Sarah R. Watts Rose, "Pine Grove Furnace" in *Forges and Furnaces in the Province of Pennsylvania*, (Philadelphia PA: Pennsylvania Society of the Colonial Dames of America 1914) p. 182. Rose was the daughter of ironmaster William Watts and grew up at Pine Grove Furnace; her chapter includes a lengthy description of community life there.
42. German immigrants as workers on the main line of the South Mountain Railroad 1868-1869: William H. Burkhart, "The Murder of Henry Stahm" in *Yesterday's Shippensburg and Surrounding Communities* (Shippensburg PA: Shippensburg Historical Society 1992). Italian laborers on the Hunter's Run & Slate Belt Railroad extension from Pine Grove Furnace into northern Adams County 1891: Watts *op. cit.* p. 19.
43. Slaves at Pine Grove Furnace: Alosi *op. cit.* pp. 71-73. One piece of evidence for indentured servants is "Eight Dollars Reward" advertisement by "Thornburgh & Lusk" for a runaway "indentured English servant": *The Freeman's Journal or, The North-American Intelligencer* (Philadelphia), June 29, 1785.
44. Alosi *op. cit.* p. 10.
45. Alosi *op. cit.* p. 80. "In the 1810 census schedule, three free blacks are listed as living on the iron plantation along with 14 slaves, the largest holding of slaves in the county. The Ege family had 8 more slaves working at their other iron works in the county, making them the largest slaveholders in the county with 22."
46. Hiram E. Wertz, "The Underground Railroad Along South Mountain" in G. Craig Caba, ed., *Episodes of Gettysburg and the Underground Railroad* (Gettysburg PA: G. Craig Caba Antiques 1998, originally written 1911) pp. 100-101. Also see David G. Smith, *On the Edge of Freedom: The Fugitive*

Slave Issue in South Central Pennsylvania, 1820-1870 (New York: Fordham University Press 2013) pp. 30-36.

47. William J. Switala, *Underground Railroad in Pennsylvania* (Mechanicsburg PA: Stackpole Books, 2nd ed., 2008) pp. 113-119.

48. As one example of Judge Watts' legalistic perspective on slavery: Paul Finkleman, *An Imperfect Union: Slavery, Federalism, and Comity* (Chapel Hill NC: University of North Carolina Press 1981) pp. 138-139.

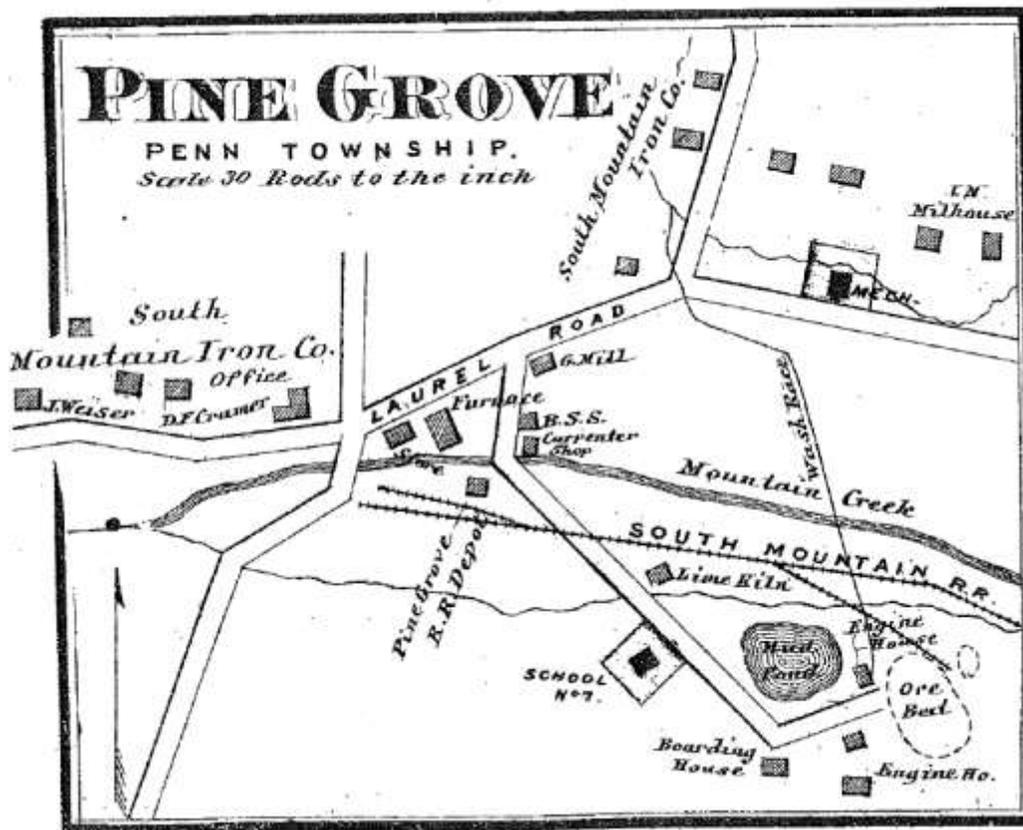
49. Watts *op. cit.* p. 4.

50. Records from the early days of Pine Grove Furnace show that iron products were carried by wagons or even on horseback to Baltimore: John Birkinbine, "The Charcoal Era" in *The Manufacture of Pig Iron in Pennsylvania, Prepared at the request of the Bureau by Mr. John Birkinbine, Philadelphia: Official documents, comprising the department and other reports made to the Governor, Senate and House of Representatives of Pennsylvania.* (Harrisburg PA: Commonwealth of Pennsylvania Bureau of Statistics of Labor and Agriculture, 1894) v. 4 no. 10 p. 30.

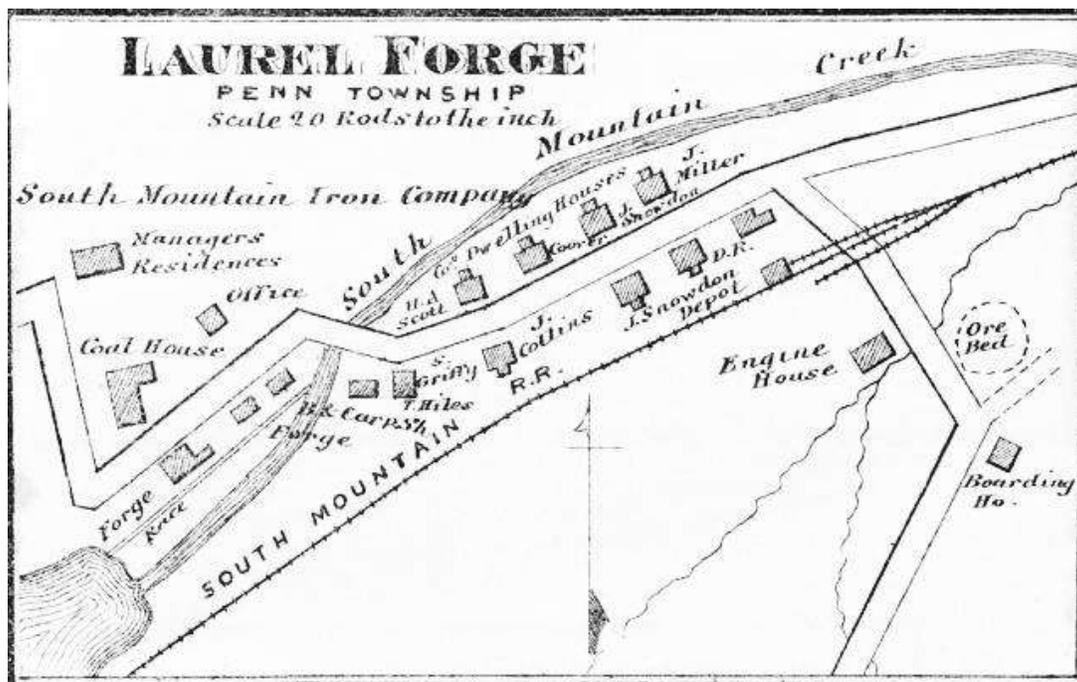
51. Birkinbine "Experiments with Charcoal, Coke and Anthracite" *op. cit.* pp. 170-172.

52. Watts *op. cit.* p. 27

53. "National Register of Historic Places" citation 77001158 at www.nationalregisterofhistoricplaces.com/pa/cumberland/state.html (accessed January 27, 2015).



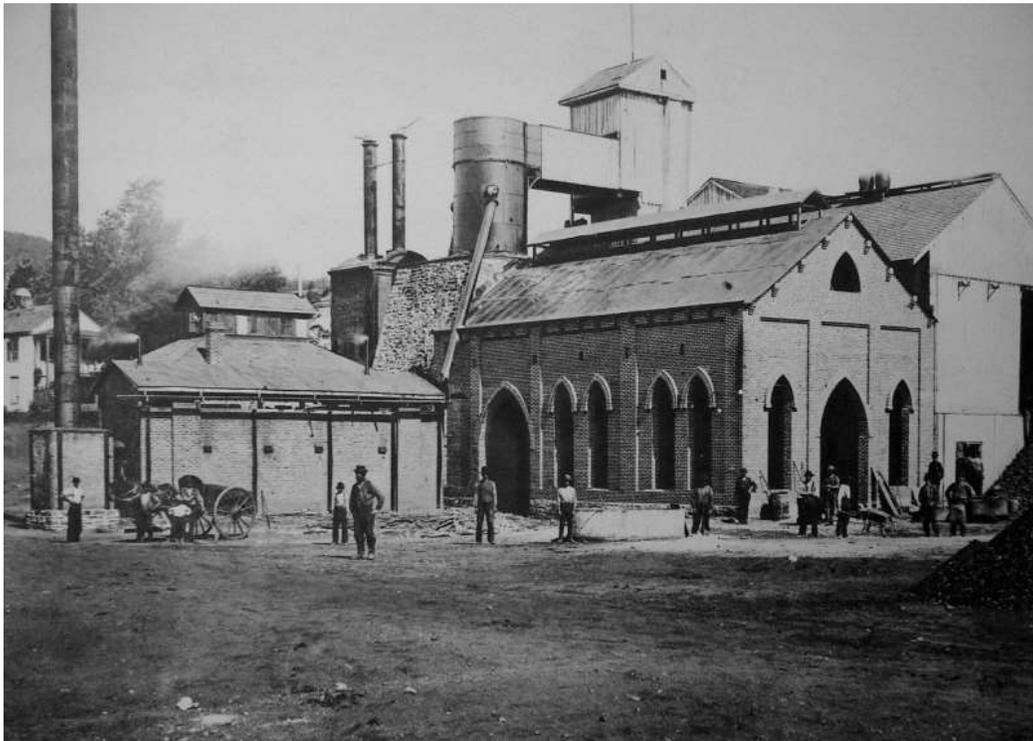
Map of Pine Grove in F.W. Beer's 1872 *Atlas of Cumberland County*. The field work for this map was performed in 1871, before Cooke Township was created, hence the map says "Penn Township."



Map of Laurel Forge in F.W. Beer's 1872 *Atlas of Cumberland County*. The field work for this map was performed in 1871, before Cooke Township was created, hence the map says "Penn Township."

30 To John W. Dermot for 9 mo & 10 days } 37
 work @ £48 p. ann. }
 78 To George Mullen for 2 mo & 1 day work @ 45/... }
 79 To Manasseh Mullen for 2 mo & 5 days }
 work @ 45/... }
 11 To Thomas Thornburgh for
 4 mo work of Negro Peter ^{filler} @ 60/... 12
 6 mo & 1 1/2 days work of d^o @ 40/... 12. 2. 3/2
 10 mo & 11 days work of J. Cully @ 25/... 13. 0. 7
 2 To Samuel Filson for 6 mo & 9 days }
 Blowing the Furnace, Moulding flues &c }
 11. 10. 0

Pine Grove Furnace ledger entries for December 29, 1787. Thomas Thornburgh, a co-owner of Pine Grove Furnace, is listed as receiving payment from the iron company for that year's labor by "Negro Peter" who worked 4 months as a furnace filler, and 6 additional months in an unspecified job at a lower pay rate. Thornburgh is also shown here as being paid for 10 months labor done by someone named "J. Cully" — probably an English or Irish indentured servant (other sources indicate his first name was "James" but we have no further information about him.) Peter was apparently freed within two years after this ledger entry but continued to work at Pine Grove Furnace.



Pine Grove Furnace in the late 19th century. This view reflects industrial improvements made by engineer John Birkinbine. The top of the stone furnace stack is barely visible in the center. The large building with arched openings is the casting house. The smaller building at left housed a steam engine for forcing air “blast” into the bottom of the furnace.



Pine Grove Furnace circa 1914. This photograph was taken after the iron works was purchased by the Commonwealth of Pennsylvania. Note the dilapidated condition of the stone stack, and the removal of most adjoining structures. The Ironmaster's Mansion (far left) and Paymaster's Office (left) are barely visible in the rear of the image.

Cooke Township

*by Andre Weltman for the Gardner Digital Library, Cumberland County Historical Society
draft 2-28-2016 v7*

Cooke Township is an entirely rural township in southwestern Cumberland County. Founded June 18, 1872 from the southern portion of Penn Township (founded in 1860), the area that became Cooke was primarily industrial at that time while the remainder of Penn was primarily agricultural.¹ The township's past and present are closely intertwined with Pine Grove Furnace, the area's industrial hub starting circa 1770.

The township is named for Philadelphia banker Jay Cooke (1821-1905). Known as the "Financier of the Civil War," he became the wealthiest man in the United States by selling bonds to support the Union war effort. Seeking investments outside the banking sphere, he purchased two iron companies in New York and Pine Grove Furnace in Cumberland County. In 1864 Pine Grove was up for sale after two decades of operation under ironmaster William Watts (1809-1883). Watts sold to William Garroway Moorhead (1811-1895) on behalf of Jay Cooke & Company. Moorhead was Jay Cooke's brother-in-law and business partner, and soon resold the furnace, forge and surrounding land to the newly formed South Mountain Iron Company representing the business interests of Jay Cooke.

A key improvement was made to the business: the South Mountain Railroad was incorporated in 1865, constructed 1868-1869, and began regular service by 1870.² The line ran south from a junction with the Cumberland Valley Railroad on the east side of Carlisle and then turned southwest parallel to Mountain Creek, terminating at the furnace. The railroad carried freight and passengers all the way to the furnace stack area until 1936 (tracks closer to Carlisle were removed in the 1950s). To support a brick-making operation beginning in 1892, an extension of the rail line called the Hunter's Run and Slate Belt Railroad ran south from the furnace area and across Piney Mountain Ridge into northern Adams County.

Jay Cooke took a personal interest in Pine Grove Furnace and visited regularly.³ An avid outdoorsman, he fished for trout nearby despite local deforestation to supply charcoal fuel for the furnace. Cooke was a very religious man and in 1870 built the brick "Methodist Episcopal" chapel which is still used as a place of worship today (Cooke also built churches at other properties he owned).⁴ He annually brought pocket knives and scissors as July 4th gifts for workers' children at the Pine Grove Furnace school. Cooke entertained guests in the Ironmaster's Mansion including First Lady Julia Grant and her children (whether President Ulysses Grant, a close friend of Jay Cooke, himself visited the iron works is not clearly documented).

The specific reason for the creation of a new township after a century of iron making is unclear. Cooke's close relationship with Grant may be a partial explanation. In 1872, President Grant was fighting for a second term. By creating a new township named after himself, Jay Cooke also created a distinct voting district. After the election he proudly sent a note to Julia Grant asking her to tell her husband that all the workers at Pine Grove Furnace had voted for the president's reelection (whether workers would have felt free to vote against the owner's personal friend was not mentioned).⁵

With a political subdivision created in Cooke's name in June 1872, it is ironic that the area soon passed out of his hands. In November 1872, Pine Grove was sold to the Thomas Iron Company based near Allentown. Cooke had become financially over-extended in connection with bonds issued to build the Northern Pacific Railroad. Despite attempts to raise cash by selling various properties including Pine Grove, in September 1873 the Wall Street firm of Jay Cooke & Company collapsed. In conjunction with other systemic problems in the banking system, this bankruptcy precipitated the "Panic of 1873," a worldwide depression. The Thomas Iron Company was unable to maintain its own financial solvency as a result of the Panic, and defaulted on payments for Pine Grove Furnace. In July 1874 the iron

works went “out of blast” and remained shut down until repairs and improvements were made in 1877 and early 1878.⁶

Jay Cooke regained his wealth, although not to the same extent as before: it was said that he “built two fortunes but lost one of them.” In 1877 he repurchased the Pine Grove iron works – essentially all of Cooke Township – and formed the new “South Mountain Mining & Iron Company.” Jay Cooke and former iron works superintendent Jackson Fuller (1827-1904) were the primary owners.⁷

By the end of the 19th century, Pine Grove and other small iron producers in the region were struggling. New technologies and resources shifted the industry to large-scale steel production elsewhere. After a shutdown in 1893-1894 due to economic conditions (the “Panic of 1893”), the furnace was briefly restarted in early 1895 but failed economically. Pine Grove went “out of blast” for the last time in April 1895, ending more than a century of iron making at the property. The forge at Laurel may have continued operation for another year, but was dismantled and sold for scrap by 1898.⁸

Recognizing that the end of the charcoal iron era was approaching, Jackson Fuller sought profitable uses for Pine Grove’s non-iron resources. In 1878, Fuller built a free 30-acre amusement park one mile east of the furnace, hoping to profit from passenger traffic on the South Mountain Railroad. By 1880 “Pine Grove Park” had more than 21,000 annual visitors.⁹ After two decades of popularity, the park went into decline. Operation ceased around 1900, partly due to damage from forest fires.¹⁰ Commercial ice harvests at Laurel Forge Pond began in the 1880s and continued through the 1920s. The Fuller Brick & Slate Company, in operation 1892-1907, was successful but eventually succumbed around the time of yet another national economic downturn, the “Panic of 1907.”¹¹

After prolonged negotiations, the Pennsylvania Legislature in 1911 approved funds to purchase the former iron company lands. In a series of four sales in 1912-1913, 16,869 acres of industrial works and surrounding forests were sold to the Commonwealth of Pennsylvania for \$67,477.¹² Initially the purchase was called the Pine Grove Division of the South Mountain Forest Reserve, overseen by the Pennsylvania Department of Forestry (today the Department of Conservation and Natural Resources). In 1920 the whole region was given a new name as the Michaux District of the State Forest system, incorporating lands formerly owned by the various iron works operating along the South Mountains.¹³ Thus, the modern use of the area for public recreation arose directly from the industrial use of prior centuries.

Under the stewardship of the state government, the forests were revitalized after two centuries of charcoal production for the iron industry. Today, the Michaux State Forest remains a source of commercial lumber, but the hillsides are not completely denuded as had been the earlier practice.

As a consequence of this history, 92 percent of Cooke Township is part of Michaux State Forest, or, surrounding the former iron works, Pine Grove Furnace State Park. This high percentage of state-owned land makes Cooke unique among Cumberland County jurisdictions. Cooke Township taxable properties include 308 “seasonal cabins” on leased Commonwealth land, *versus* only 70 privately owned full-time houses (and 18 part-time structures on privately owned land).¹⁴ The township also has a very low population density, containing 19.9 square miles but a population of only 179 full-time residents.¹⁵

The Appalachian Trail passes through the township on its way “from Maine to Georgia.” The official midpoint of the trail is near Camp Michaux, three miles southbound from Pine Grove Furnace State Park. Through-hikers who reach the midpoint traditionally eat a half-gallon of ice cream at the park store located in a former stable. The park hosts the Appalachian Trail Museum, which opened in 2010 in a former iron company grist mill.

NOTES

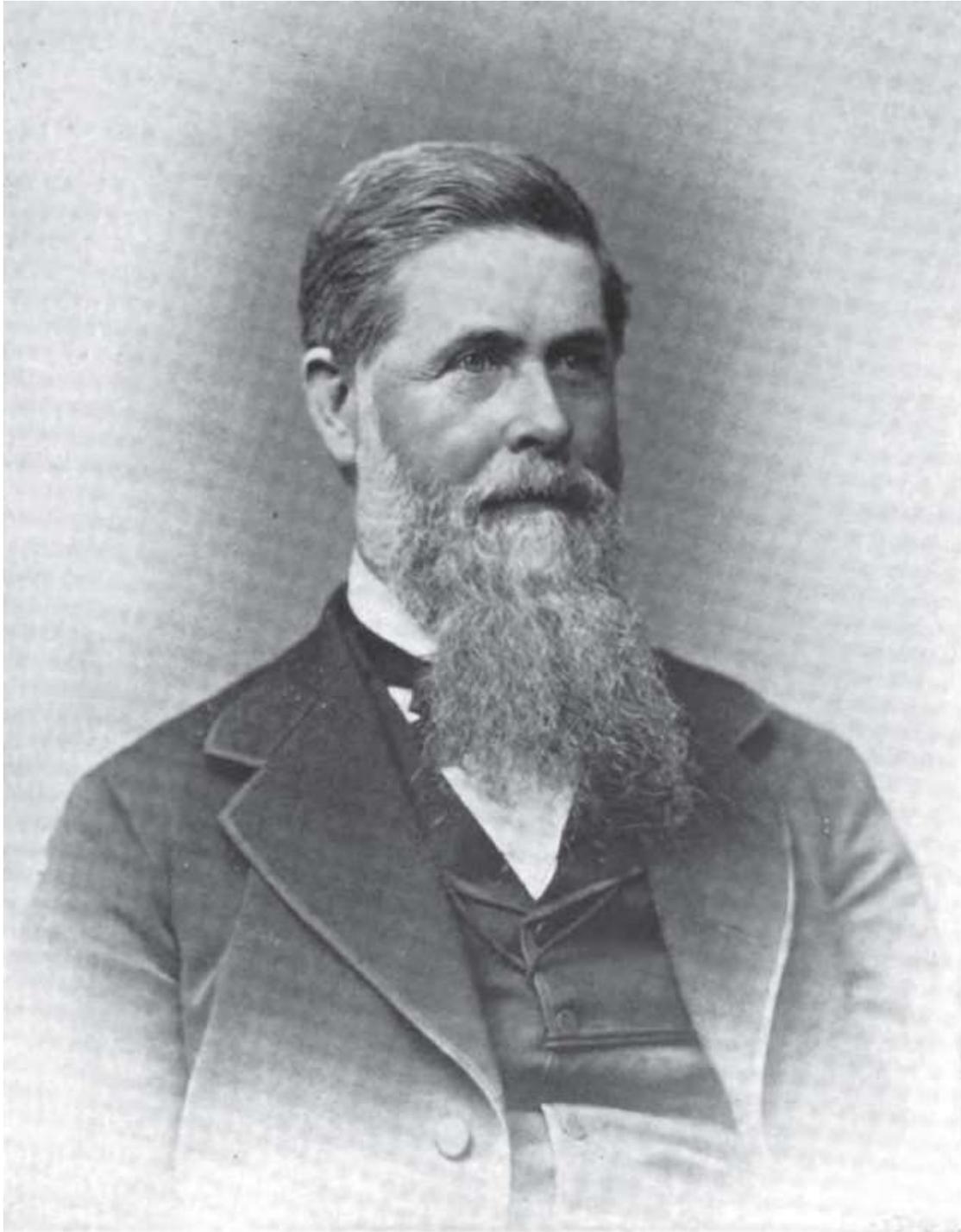
1. Original township boundaries in southwestern Cumberland County are difficult to interpret today due to often irreconcilable distance measurements and imprecise references to non-permanent waypoints such as trees stumps. The boundaries of Cooke Township delineated in 1872 legal documents were as much as 20% larger than the nearly rectangular shape accepted today. The original legal line between Penn and Cooke in 1872 contained three segments and started at least one-third of a mile north of the current northwest corner: “At or near the chimney rocks... Beginning at ap[proximately] the line which divides Newton Township fr[om] said Township south eighty nine degrees east 1293 perches to a Rock Oak on State road thence south 55½ degrees East 470 perches to pine st[ump] corner of Pine Grove Estate now the South Mountain Iron Co[mpany] thence south 82½ East 80 perches to a post on the line which [divides] Dickinson Township from said Township...” (Petition to Cumberland County, April 4, 1872). In such surveys a “perch” has many possible meanings going back to the 12th century, but in this instance probably equals 16.5 feet. The distance “1293 perches” is therefore 4.04 miles. By the end of the 19th century, the boundary lines for Cooke Township had been arbitrarily straightened and adjusted to the nearly rectangular shape shown on a 1919 U.S. Geologic Survey map and used by default ever since. See “Boundary questioned between Cooke and Penn townships,” Andrea Ciccocioppo, *Carlisle Sentinel*, December 4, 2008; and unpublished document submitted to the Cooke Township Board of Supervisors, “Thoughts on Township Boundaries” by Andre Weltman, Planning Commission Chairman, January 9, 2006.
2. Randy Watts, *Railroads to Pine Grove Furnace: Book Two in a Series, Railroads of the Cumberland Valley* (Keystone Computer Services, Carlisle PA, 1991).
3. Ellis Paxson Oberholtzer, *Jay Cooke: Financier of the Civil War* (George W. Jacobs & Co., Philadelphia, 1907). This two-volume work is the standard biography, prepared with his family’s cooperation after his death in 1905. It includes some personal details of his involvement with Pine Grove Furnace. Other biographies of Jay Cooke (by Larson in 1936, and Lubetkin in 2006) cover business matters but do not mention Pine Grove Furnace nor Cooke Township.
4. “Jay Cooke Man of Faith” on website of the Saint Paul’s Episcopal Church at Put-in-Bay, Ohio at www.stpaulpib.com/#/jay-cooke-man-of-faith/4544702096 (accessed August 7, 2012).
5. Oberholtzer *op. cit.* p. 456.
6. John Birkinbine, “Notes Upon the Drainage of a Flooded Ore-Pit at Pine Grove Furnace, PA” in “Papers of the Philadelphia Meeting, February 1878,” *Transactions of the American Institute of Mining Engineers*, vol. 6. Also see John Birkinbine, “Experiments with Charcoal, Coke and Anthracite in the Pine Grove Furnace, Pennsylvania” in “Papers of the Montreal Meeting, September 1879,” *Transactions of the American Institute of Mining Engineers*, vol. 8.
7. Lenore Embick Flower, *History of Pine Grove Furnace* (Cumberland County Historical Society, Carlisle PA, 4th edition, 2003). First written in 1933. Be aware that Flower does not cite all her sources and not all details are necessarily correct. She oddly skips over certain time periods and key figures, including Jay Cooke. Despite its limitations, this 32-page booklet is the best place to start learning more about Pine Grove Furnace.
8. Watts, *op. cit.*
9. “Pine Grove Park” in *Rural Resorts and Summer Retreats*, promotional brochure by the Cumberland Valley Railroad, 1881.
10. Andre Weltman, “The Mystery of the Unburned Mansion: The Loss of the Ege ‘Big House’ and Other Fires at Pine Grove Furnace and Laurel Forge,” *Cumberland County History*, vol. 29, 2012.

11. Randy Watts, *The Clay Brick and Sand Industries in the Mountain Creek Valley of Cumberland County 1890-2012* (Cumberland County Historical Society, Carlisle PA, 2012).
12. *Report of the Pennsylvania Department of Forestry For the Years 1912-1913* (Commonwealth of Pennsylvania, William Stanley Ray, State Printer, Harrisburg PA, 1914).
13. "Named After Scientist," *Gettysburg Times*, September 16, 1920.
14. Unpublished data from Cooke Township tax records, tallied April 2, 2008.
15. U.S. Census data via www.ccpa.net/DocumentCenter/Home/View/8406 (accessed January 3, 2015).



Topographic Map of Cooke Township

Excerpt of U.S. Geologic Survey map published in 1919 (field survey performed in 1916).



“Jay Cooke about 1875”

Photo in Ellis Paxson Oberholtzer, *Jay Cooke: Financier of the Civil War* (1907) vol. II, p. 100.



“Mansion at Pine Grove Pa. On Mr. Cooke’s South Mountain Estate”

Photo in Ellis Paxson Oberholtzer, *Jay Cooke: Financier of the Civil War* (1907) vol. II, p. 354.
This brick structure is the still-standing Ironmaster’s Mansion at Pine Grove Furnace State Park.