Capital's Utopia
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Experimentation is an essential element of industrial restructuring. Manufacturing firms invariably translate their decision to produce new items or to institute new production techniques into a search—for the most appropriate material inputs, equipment, work processes, and workforce configuration. Successful experimentation leads to greater competitiveness within the industry, a larger product market, and more profit. It may also spark greater investor interest in the region in which the industry sits, the spatial expansion of existing production sites, geographical extension of production into new locations, and the irrevocable alteration of local labor markets. Failure, however, may force firms to continue searching and experimenting—that is, as long as financial resources will allow. It may also require them to scale back on production, lay off workers, look desperately for new sources of investment capital, relocate, or go out of business altogether.

Experimentation characterized the economy of southwestern Pennsylvania’s Kiskiminetas Valley even before large-scale industrialization related to the rise of the steel industry. Prior to 1860, manufacturers tried repeatedly to exploit the region’s natural resources of salt, coal, and iron and its proximity to Pittsburgh’s
rapidly expanding urban market, only forty miles away. Most found it very difficult. Many closed their operations when natural resources and investment capital played out. Rugged topography and inadequate transportation infrastructure also thwarted attempts to routinize trade with Pittsburgh.1

For reasons explored later in this chapter, antebellum iron makers in the river town of Apollo had a particularly hard time making a go of it. On the eve of the Civil War, however, a handful of Pittsburgh-based entrepreneurs began injecting large sums of investment capital into Apollo’s iron-rolling mill. These same investors convinced experienced ironmasters to move to the town to institute technological and workforce changes. Together, they experimented with two product shifts—from making iron nails in the early 1860s to making tin plates in the 1870s, and to making steel sheets in the 1880s. In the 1890s, however, when they decided to create Vandergrift, the model industrial town, they reoriented the focus of their experimentation from product to people and place. Understanding these successive shifts allows us to build an interpretation of Vandergrift’s history and landscape that goes beyond simply paying homage to the Olmsted firm’s urban design and to George McMurtry’s supposed benevolent altruism in creating a model industrial town.

The Kiskiminetas Valley before Iron

Southwestern Pennsylvania’s Kiskiminetas River forms the main artery of the largest watershed in the Allegheny River basin. Rainwater and snowmelt-fed creeks run through the highland forest and down the rugged western slope of the upper Allegheny Plateau to meet and form a major waterway—the Conemaugh River (fig. 1.1).2 After the Conemaugh flows through the city of Johnstown and continues west through gaps in the Laurel Highlands and Chestnut Ridge, it joins Loyalhanna Creek near Saltsburg. Beyond this point the river is known as the Kiskiminetas. Its seasonally variable currents flow northwestward along a deep and winding twenty-mile gorge through the hilly Pittsburgh Plateau before emptying into the Allegheny River approximately twenty miles northeast of Pittsburgh.

Extremely narrow, flat strips of rich, alluvial soils dot the Kiskiminetas River’s banks. Frequent floods in the 1790s kept early Euro-American settlers away from these fertile spots and forced them up onto the plateau’s rocky and heavily leached soils. Kiskiminetas floodwaters had, however, greatly denuded the
earth’s surface over the millennia, bringing numerous underground pockets of salt brine and substrata of bituminous coal within easy reach of handheld drills and shovels.³

Given the Kiskiminetas Valley’s low population threshold and limited market range during the 1790s and 1800s, Euro-American settlers did not commercially exploit salt and coal resources. Residents reduced only enough brine into salt to

Fig. 1.1. Map of Southwestern Pennsylvania.
satisfy their personal household needs. Moreover, in the agricultural uplands, large stands of deciduous forest suitable for fuel (which needed to be cleared for fields and pastures anyway) made coal digging an unnecessary activity.

In the 1810s, the rapid growth of Pittsburgh—a town lying about fifty river-miles to the west of the Loyalhanna-Conemaugh confluence—presented Kiskiminetas Valley residents with a potential market for their salt. Pittsburghers demanded the substance in large quantities to preserve and enliven the taste of their food. Pioneers passing through Pittsburgh also stocked up on it before heading west to the Ohio Valley frontier. But until Kiskiminetas Valley production started in earnest, merchants imported salt to Pittsburgh at great expense from either the eastern seaboard or from Kentucky.

During the late 1810s and 1820s, Kiskiminetas salt producers experimented at drilling deep wells, building elaborate wooden sluices, grading numerous evaporation ponds, and setting up boiling kettles. To heat the kettles, manufacturers burned coal taken from “drift mines” dug into the river’s steep bluffs. They also provisioned their workers with produce from Kiskiminetas Valley farms. Gambling on the local salt industry’s success, land speculators even established two permanent trading towns along the Kiskiminetas—Warren (founded in 1816 and later known as Apollo) and Saltsburg (1817) (fig. 1.2). Inadequate transportation links kept Kiskiminetas salt makers and Pittsburgh merchants from efficiently trading with each other, however. Unlike the Allegheny River into which it drains, the Kiskiminetas’s swift currents and irregular channel made the waterway impassable to significantly sized craft for any more than a short distance. Although the river had once provided an easy canoe route for the Indian tribes who previously inhabited the area, it now presented major problems for anyone who sought to trade in bulk. The state-maintained road that led over the plateau from Warren to Pittsburgh was not much better, either. Snow and ice made it impassable during the winter, and after heavy rainstorms it was reduced to a quagmire twenty-five miles long. Pittsburgh and the Kiskiminetas Valley did not easily interact.

In an attempt to solve transportation problems like these across the entire Appalachian region, in 1826 the Commonwealth of Pennsylvania authorized the construction of the Main Line Canal System. The Pennsylvania Canal Commission’s plan called for the construction of a series of canals and an incline railroad to connect the Susquehanna River to the Ohio River and help Philadelphia compete with Baltimore and New York City for business in the trans-Appalachian West. The commission chose the Conemaugh-Kiskiminetas-
Allegheny Rivers to link Johnstown and Pittsburgh because they formed the most direct natural route through southwestern Pennsylvania and required the least amount of grading, digging, and construction. By 1829, work crews had dug a canal trench parallel to the Kiskiminetas River through the towns of Saltsburg and Warren. In a few spots, such as the six-mile winding and relatively tranquil stretch of river below Warren, workers did not dig a trench because, there, canal boats could be put into the river.\textsuperscript{8}

\textbf{Fig. 1.2.} Map of the Kiskiminetas Valley.
The canal proved to be a boon for Kiskiminetas Valley residents. When the state finished the Main Line’s Western Division in 1829, travel times between the valley and Pittsburgh were halved and bulk-item transportation costs decreased by two-thirds. After that, Saltsburg residents became even more focused on making salt for the Pittsburgh market. The people of Warren (who were at the northern edge of the salt-producing area where the brine was somewhat less saline and more difficult to exploit) took greater advantage of their town’s proximity to forest resources, establishing a sawmill and several boat-building works.

A third town also emerged. In 1827, the canal commission hired David Leech, of Sharpsburg, Pennsylvania, to build a slackwater dam across the Kiskiminetas about six miles downstream from Warren. Boats exited the Kiskiminetas River through a lock located immediately above the dam and entered a masonry-walled canal that ran beside the river all the way to the Kiskiminetas-Allegheny confluence. Next to this dam and lock, Leech established the town of Leechburg, soon to become an important canal-craft boat-building center that served as home base for Leech’s canal packet line through the 1830s and 1840s.

The canal sparked a great deal of activity along this section of its route and filled a real transportation need, but the entire scheme quickly ran into problems statewide. Rugged terrain and severe winters translated into high maintenance costs and seasonal operation. Moreover, given the extent to which fledgling railroads were cutting into the canal’s business, the commonwealth had spent far more money on building the thing than it could ever hope to make in tolls. In 1841, a mere twelve years after it had been completed, the commonwealth abandoned the system, and to recoup some of the loss sold portions of the canal’s route to the privately owned (and recently established) Pennsylvania Railroad (PRR). The railroad company filled in parts of the canal for use as a railroad bed and right-of-way.

In building its main line between Philadelphia and Pittsburgh in 1852, the PRR chose to take a direct overland route south of the Kiskiminetas Valley. This choice sounded the death knell for the already troubled salt industry. Decreases in brine salinity had forced salt makers near Saltsburg to dig deeper wells during the 1830s. As supplies dwindled, some manufacturers ceased operation altogether or relocated to more easily exploited deposits in the Allegheny River valley closer to Pittsburgh. A few—such as Thomas Kier, the father of future Pennsylvania oilman Samuel M. Kier—relocated to an area one county to the north to apply their salt-drilling expertise to experimentation with oil production in the forest near present-day Titusville.9 Many former salt workers never-
theless stayed in the Kiskiminetas Valley after the industry’s (and the canal’s) demise. For example, William McAdoo, who arrived in the Kiskiminetas Valley from County Donegal, Ireland, in 1830 to work as a salt boiler, purchased, cleared, and improved 130 acres of Kiskiminetas Township farmland. James McAwley, a native of Huntingdon County, Pennsylvania, who in the same year came to work at Gamble’s saltworks in Kiskiminetas Township, persevered in the salt business until the 1850s, but then began farming nearby with 111 acres.10

Even with salt’s decline and the state’s abandonment of the Pennsylvania Canal, the Kiskiminetas Valley population grew steadily through natural increase and in-migration, especially in the townships surrounding Leechburg and Warren. Newly arrived farm families from eastern Pennsylvania, Germany, Ireland, and Scotland occupied the arable Pittsburgh Plateau upland, and miners headed down into the Kiskiminetas’s gorge and tributary hollows to work the coal deposits. Leechburg, Warren, and Saltsburg served these farmers and miners as central market places. In each town, local entrepreneurs ran general stores and saw and grist mills. There were blacksmiths, tanners, saddlemakers, shoemakers, and wagonmakers, as well as doctor’s and lawyer’s offices, post offices, and schools. Professional teamsters and the short-haul packets that remained in operation on the remnant canal carried surplus flour, corn, oats, barley, salt, and coal north to Allegheny River steamboat landings and south to the PRR at Blairsville. They returned to the valley with manufactured items and mail.

During the early 1850s, when the PRR’s surveyors and engineers began searching for the best route for the railroad’s main line through southwestern Pennsylvania, the town of Warren decided to change its name. The two events may be connected. The original name came either from an eighteenth-century resident who maintained an Indian trading post near the townsite or from a Lenni-Lenape (Delaware) Indian chief named Warren who supposedly died in the area during the colonial era. No matter whether it was the trader or the chief, in the middle of the nineteenth century Robert McKisson—Warren’s leading physician, merchant grocer, druggist, town burgess, poet laureate, and postmaster—suggested that to keep up with the toponymic fashion of the day, residents should draw upon Greco-Roman mythology and change the town’s name to Apollo.11

The name change was an attempt at urban boosterism. During the nineteenth century, in much the same way as today, many U.S. towns and cities aggressively competed with each other for population, business, and an improved position within a rapidly changing transportation network. They sought to boost the re-
utation of their business communities, enhance their relative geographical situations, and propel themselves up the urban hierarchy through population increase. To meet these goals, their business communities created elaborate sets of place-related images. Newspaper editors wrote glowing descriptions of the superior sites and situations that their towns and cities occupied compared with other places. Civic organizations placed ads in distant newspapers, produced pamphlets, atlases, and bird’s-eye-view maps that made their towns look like veritable utopias. Town names also became part of this booster arsenal of place imagery. The choice of Apollo, the name of the god of music, poetry, medicine, and prophecy, reflected a hope that the town would become the cultural and social center of the Kiskiminetas Valley.¹²

For Warren, the canal system’s failure and the possibility of the railroad’s arrival compounded the importance of creating such an image.¹³ Warren’s residents no doubt wanted the PRR to do as it had done in other parts of central and southwestern Pennsylvania—fill in the canal bed and put main-line tracks through their town. But for this to happen, the railroad needed to foresee profits greater than construction costs there; a northwesterly route along the Kiskiminetas gorge and southwest along the Allegheny River toward Pittsburgh would add twenty miles to the overland route between Blairsville and Pittsburgh.

The PRR did not build a Kiskiminetas Valley line, indicating that a mere name change was not enough impetus to extend service to Apollo. Railroad construction did not occur there for another decade (1865), when the Western Pennsylvania Railroad (WPRR) company built a line along the Kiskiminetas’s west bank. The WPRR’s Kiskiminetas Valley line connected the Pennsylvania Railroad main line at Blairsville to the WPRR’s Allegheny Valley line at Freeport.¹⁴

Apollo, Leechburg, and Saltsburg grew rapidly after the railroad linked them to Pittsburgh and Johnstown. Between 1860 and 1880, population increased from 449 in Apollo and 359 in Leechburg to well over 1,000 in both towns. Saltsburg’s population grew from 592 to 855. All three towns thrived as market centers for their surrounding agricultural hinterlands. The iron industry also started to add population to Apollo and Leechburg; Pittsburgh-based entrepreneurs established iron-rolling mills at Apollo in 1855 and Leechburg in 1872. Although they had a difficult time participating in the Pittsburgh-focused economy until the WPRR arrived, soon afterward their experimentation with new products and production methods made the region into the first bona fide center of tinplate manufacture in the United States.¹⁵
Before the Civil War the Kiskiminetas Valley’s economic role in southwestern Pennsylvania thus waxed and waned with the fortunes of the salt industry, the canal, and the railroad. The canal in particular made it easier for residents to market their products outside the valley. Nevertheless, from a Pittsburgh perspective, the area remained something of an economic, social, and cultural backwater until the railroad came along.

Early Experimentation in Iron Making

The first experiments in iron making in the Kiskiminetas Valley occurred shortly before the canal arrived. According to historian Thomas J. Henry, a James Biddle established Rock Furnace near Warren in 1825, employing and housing fifty to seventy-five men at the Roaring Run—Kiskiminetas confluence. These men not only operated the furnace; they also mined iron ore from an adjacent hill and made charcoal fuel in the surrounding woods.16

Not much more is known about Rock Furnace. If any iron it produced was ever rolled into shapes, then that activity certainly did not occur in the Kiskiminetas Valley. Biddle abandoned Rock Furnace long before Pittsburgh residents Alex McClurg, John Kuhn, Washington McClintock, Alex Speer, James McFennemore, James Crane, and Theresa Crane established the Kiskiminetas Iron Company in 1855 and started the first rolling mill at the recently renamed town of Apollo.

Kiskiminetas Iron made iron nails and spikes. Capitalized at $25,000, its mill ran on water power derived from a Pennsylvania Canal-fed basin-and-sluice system. The products were so brittle, however, that in December 1859 all the original investors except McClintock bailed out of the venture. McClintock subsequently recruited two new partners, George and Ellen Cass, of Pittsburgh, who helped him assume Kiskiminetas Iron’s more than $40,000 debt (which included a mechanic’s lien of $5,400, a $2,000 mortgage held by the Western Theological Seminary, and three additional mortgages that amounted to more than $20,000).17

So began an important trend within Apollo’s iron- and steel-producing history. Despite membership changes in the firm that ran the Apollo mill between 1855 and 1902, there was never a complete purging of owners: investors drifted in and out of the company (table 1.1). Hence, few truly abrupt changes occurred in business practices over the years. Three men, however, stand out as particularly important figures in the Apollo mill’s ownership lineage: William Rogers
Sr. (1863–77), Philip H. Laufman (1876–86), and George G. McMurtry (1886–1901). Each experimented with the mill’s product line, production technology, work regime, and workforce. In other words, they oversaw the industrial restructuring processes that occurred at Apollo and that typified developments within the entire nineteenth-century U.S. iron and steel industries.

When Kiskiminetas Iron built the Apollo mill in 1855, iron making was still a “disintegrated” process. Throughout the northeastern United States, inde-
pendently owned and operated firms, situated at separate locations, performed one or two steps in a larger production process. The first step, smelting, required material inputs of iron ore, limestone, and charcoal.

To produce one ton of pig iron at a typical Pennsylvania antebellum smelting operation, a gang of twenty-five laborers loaded three tons of ore, more than three hundred pounds of limestone, and nearly two hundred bushels of charcoal into a stone furnace, thirty feet high, called a “stack.” A waterwheel-driven wind bellows then blasted cold air into the ignited charcoal to raise the iron ore’s temperature to between 500 to 1,000 degrees Fahrenheit. As the iron ore melted into a spongy mass, slag (impurities and extraneous material) adhered to the limestone, while the heavier iron settled at the stack’s bottom. Workers periodically tapped the furnace at its base and hot iron poured out into a series of troughs that were dug into the sandy “casting floor.” When the iron cooled, it was in the troughs’ shape. Ironworkers referred to the rectangular metal ingots that resulted as “pig iron” because the configuration of the casting-floor troughs was like that of piglets suckling at their mother’s teats. During the 1850s, the average output from such a furnace was about one thousand tons of pig iron per year.

Several factors dictated the location of pig-iron production. Given the inadequacies of the transportation system, the bulkiness and large amounts of iron ore and limestone needed, the fragility of charcoal, and the amount of slag that was sloughed off during smelting, production had to occur close to places where natural resources were found—which meant at rural, if not remote, sites. By making iron there, furnace owners minimized transportation costs for raw materials. And since the pigs they produced weighed substantially less than the resources that went into making them, pig-iron ingots were cheaper to transport than raw materials; furnace owners thus had further encouragement to minimize the distance between their stacks and the raw materials.

Given the usual rural locations of their stacks, furnace owners often imported workers from more populated areas. Given, too, that they needed such large supplies of raw materials, they frequently purchased extensive rural tracts on which wood for charcoal, iron ore, and limestone could be found. On these tracts they built furnace stacks and worker’s housing. They also cultivated crops to feed workers, such tracts coming to be known as “iron plantations.” Owners, such as Warren’s James Biddle, were called ironmasters.

After smelting, ironmasters sold the pig-iron ingots to nearby forges or foundries, where the material, either cold or slightly reheated, was hammered
or cast by blacksmiths and molders into hardware or farm implements. As at Kiskiminetas Iron’s Apollo mill, however, residual impurities often made the pig iron too brittle for hammering or casting. To make it more durable, it had to go through another production step—purification, which entailed either high-pressure hammering or reheating.

During the reheating process—known as puddling—a skilled worker—a puddler—had his helpers melt several pig-iron ingots in a reverberatory furnace until the iron became liquified. The puddler then stirred the material with a long iron rod (known as a rabble) as he brought the hot metal just to the boiling point, when impurities started to drain away. Moving the iron to a cooler spot in the furnace, he then kneaded the metal with long iron paddles as if it were dough. When he judged that the spongy material was ready, he separated it into balls, or blooms, weighing between 150 and 200 pounds. These balls were now “wrought iron.” The puddler then instructed his helpers to remove them from the furnace, place them on hand-wheeled carts, and take them to the “squeezer”—a large press that compacted the metal and removed more impurities. If the puddler had improperly heated, kneaded, and purified the blooms, the squeezer would break them and they would have to be reworked in the puddling furnace. Blooms that made it through without breaking were sent to a “muck” rolling machine, where still more impurities were pressed out. Compacted into bars, the resulting material—muck iron—could more easily be worked by blacksmiths and molders without it’s breaking. It was also more suitable for another production step—rolling—in which skilled “rollers” and their crews shaped the muck iron into various forms—wires, rods, rails, beams, plates, or sheets.

Before the Civil War, rolling usually entailed the use of a “two-high” rolling machine, which had rolls stacked like an old-fashioned laundry wringer. Before the muck bar’s first pass through, the roller adjusted the spacing between the bottom and top roll. A crew of semiskilled workers (these included catchers, roughers, and matchers) used long tongs to guide the metal (sometimes it was “cold rolled,” although it was much easier to shape the iron if it was hot). Because the rolls moved in one direction only, another semiskilled worker—the hook-up man, or hooker—used a hoist to lift the iron back over the top roll to be reinserted for the next pass. With each successive pass, the roller increased the pressure and flattened, smoothed, and elongated the iron into whatever shape the mill’s owners had decided to make as their specialty—wires, rods, plates, or whatever. If the iron was “hot rolled,” several times during the rolling
process work had to stop as the roller sent it back to the “soaking pit” furnaces for reheating by skilled workers known as heaters.23

Ironmasters usually built their furnace stacks in rural areas. Foundries and forges could be located almost any place where there was a demand for the products they fashioned. But puddling works and rolling mills nearly always had an urban situation. Puddling furnaces, rolling machinery, and other pieces of equipment represented substantial capital investments that needed to produce continually to pay off the debt. Moreover, operating costs increased if furnaces cooled off and had to be reheated. Therefore, mills and puddling works required several shifts of workers that only an urban labor market could easily supply. They also demanded a lot of fuel and pig-iron inputs and were best served at central locations in the transportation network—which usually were urban. In addition, finished products could be more easily dispatched from towns and cities. Thus, Kiskiminetas Iron located its mill close to Apollo to capitalize on its twin urban advantages: population concentration and geographical proximity to the Pennsylvania Canal, coal, and iron resources (see fig. 2.7).24

To stay profitable in Apollo or any urban location, mill owners continually made adjustments—experimenting with new product lines, new technologies, and new workforce configurations. As changes occurred—in demand for iron products and in the organization of the larger industry, in the spatial layout of the transportation network and the availability of natural resources, and in the nature of the workforce—iron makers responded by taking their mills through an industrial restructuring process. They had to do this if they were to compete successfully and survive in an industry that by the 1860s consisted of hundreds of small firms like Kiskiminetas Iron and its successor Cass & McClintock.

The Product Life Cycle and Experiments in Tinplate Making

Between 1860 and 1863, George Cass and Washington McClintock found it difficult to maintain the Apollo mill’s profitability. Cass & McClintock had learned (bettering their predecessor, Kiskiminetas Iron) to produce good quality nails and spikes. The firm closed, however, when most of their workforce joined the Union Army during the Civil War, not reopening until late in 1863, with an additional partner, British iron maker William Rogers Sr. Born in 1827 and raised in Wolverhampton, England, Rogers grew up in one of the major centers of the British iron industry. By the time he emigrated to the United States
at age thirty, he had worked his way up the iron-making occupational hierarchy from unskilled puddler’s helper to skilled puddler, sheet roller, machinist, and then to mill manager. Immediately before arriving in Apollo at age thirty-six in 1863, he built and ran a sheet-iron mill for Everson & Preston (Pennsylvania Iron) in Pittsburgh.25

The changes that Rogers instigated at the Apollo mill after 1863 amounted to experimentation and to an early round of industrial restructuring. His first task involved switching the company’s product line from nails and spikes to blue and planished iron sheets. This, of course, required Rogers to modify the mill and its workforce. He installed two sheet-rolling machines and several additional puddling furnaces and hired more workers, including his son, a roller, William Rogers Jr.

For the first two years that Rogers made sheets at Apollo, muck iron and coal arrived in the town as it had always done—by teamster and on boats that still plied the Kiskiminetas Valley remnant of the Pennsylvania Canal. When the Western Pennsylvania Rail Road built its Kiskiminetas Valley line along the riverbank opposite Apollo in 1865, however, Rogers came to rely solely on teamsters and rail transportation. Teamsters made a short trip across the Kiskiminetas toll bridge in downtown Apollo to meet passing freight trains at the village of Paulton.26

In 1866, Rogers formed a partnership with two Allegheny City (Pittsburgh) residents—Thomas Burchfield and Thomas Hoskinson—to lease the Apollo mill from Cass & McClintock. According to the articles of incorporation filed at the Armstrong County courthouse in Kittanning, Hoskinson was a silent partner whose association with the firm amounted to supplying the company with $7,500 in cash; Burchfield held responsibility for directing the company’s business matters in Pittsburgh; Rogers oversaw production at the Apollo mill.27

With Hoskinson’s capital in hand, Rogers instigated some of the most abrupt and radical industrial changes that Kiskiminetas Valley would see until the mid-1880s. He started by breaking ground on a second rolling mill six miles downstream from Apollo, in Leechburg, a town with no previous direct connection to iron manufacturing. Within ninety days, the new mill was producing sheet iron and a new product, tinplate. This tinplate was not a plate made of solid tin: it was technically “tinned iron,” a product that proved to be more rust resistant than regular iron and more durable than pure tin.

To understand why Rogers expanded the company’s holdings to Leechburg and the product line to tinplate, two things need to be considered: first, Rogers’s
participation in a process that business analysts now call the product life cycle; and second, the changing geography of natural resources and transportation in the Kiskiminetas Valley.28

At the beginning of the product life cycle, a single firm (or group of firms) experiments with the production of a new item. In the case of tinplate, the pioneering firms that broke into the market at a large scale were in Britain, although the technology and knowledge necessary to make this product had come to Britain from mainland Europe only in the mid-eighteenth century. By the 1850s, however, British tinplate makers had perfected their own manufacturing methods. After rolling iron plates or sheets, tinplate makers boiled them in a bath of molten tin until the tin amalgamated with the iron. As the metal cooled, workers dipped them back in a tin broth several additional times to make sure that they had an even veneer. After the final dipping, they painted the sheets with tallow or palm oil to prevent oxidization during cooling. The British and Americans used this product for making roofing, food-storage boxes, boilers, and (later) containers for various liquids.29

To return for a moment to the product life cycle in general, we may note that during the initial experimentation phase, the pioneering firm (or group of firms) monopolizes the market for that product. In the case of tinplate, before the American Civil War, the British had achieved such efficiency that they could always offer lower tinplate prices in the American market; moreover, U.S. legislation helped them maintain their dominance. Through the 1861 Morrill Tariff Law, the U.S. Congress allowed the federal government to levee a 10 percent ad valorem protective duty on imported tinplate as a way to encourage domestic production. This duty, however, proved to be ineffective at keeping British products out of the U.S. market. And until the early 1890s, British manufacturers and their American sales agents effectively convinced Congress to keep it that way. They argued that any change in the law would inflate tin costs so much that American buyers who wanted to make tinplated cans, drums, roofing, and siding would be adversely affected. In such a business climate, American iron producers could not even think about going into tinplate production.30

The product life cycle predicts, however, that—if conditions allow—other firms will try to compete against the pioneering/monopolizing firm or group of firms. The American Civil War opened a very narrow window of opportunity, during which economic conditions changed within the tinplate industry. In 1862, the U.S. government implemented an emergency tariff of 25 percent ad valorem on foreign tinplate in an effort to raise money for an overburdened fed-
eral treasury. The tariff hovered around 20 percent through 1875, thus giving three American manufacturers thirteen protected years in which to become established in the tinplate industry—the United States Iron and Tin Plate Manufacturing Company in Demmler (near McKeesport in southwestern Pennsylvania’s Monongahela Valley), the American Tin Plate Company in Wellsville, Ohio, and Rogers & Burchfield at Apollo and Leechburg in the Kiskiminetas Valley.31

Rogers competed within this new industrial climate by pursuing two basic strategies: first, he began offering buyers a different kind of product. Britain’s exports to the United States did not necessarily meet the specific needs of individual American buyers so Rogers specialized in making small batches of tinplate to order. Working through an agent, New York City’s Phelps Dodge & Company, Rogers regularly received special orders for tinplate from a St. Louis, Missouri, stamping company that made enameled flatware and tea trays. Within the product life-cycle idea, this strategy is known as product innovation.32 Second, he tried to offer buyers a cheaper product through changes in production technology, a strategy known as process innovation.

Before Rogers could innovate to make special kinds of tinplate, however, he had to be able to make basic tinplate. Between 1870 and 1874, Rogers & Burchfield added bathing and dipping facilities to the Apollo mill and built similar facilities at Leechburg. At Leechburg, the company constructed puddling furnaces and erected several rolling machines. For both mills, Rogers secured the U.S. patents for the latest Russian sheet-rolling and tinning equipment and techniques. Given that southwestern Pennsylvania ironworkers had no experience in making tin, Rogers also hired a skilled workforce of puddlers, rollers, heaters, and tinters from Monmouthshire, Wales, and Rogers’s Midlands hometown of Wolverhampton.33 According to the 1880 U.S. federal census population manuscripts, more than 80 percent of the skilled rollers and puddlers in the Apollo and Leechburg workforce listed either England or Wales as their place of birth.

Rogers made one major process innovation: he experimented with natural gas to heat furnaces and boilers at Leechburg. Nearly the entire Kiskiminetas Valley is underlain by, in addition to substrata deposits of salt and bituminous coal, Upper Devonian Age rocks that hold shallow reservoirs of natural gas. As had been the case in 1859 when Edwin Drake successfully drilled for crude oil at Titusville, one county north from Apollo, the early Kiskiminetas Valley “gas producers” needed to figure out the range of uses to which natural gas could be put. Rogers first used coal to heat the furnaces, but
in 1874 gas was substituted with success, the first use of this clean fuel in the United States. The wells were just across the Kiskiminetas river, and had been drilled by Major (Joseph G.) Beale in 1869. A line of pipe was run across the river and under the boilers, the pressure being reduced by a crude regulator devised for the occasion, and the gas was lit by John Cole, the superintendent, who used a long pole with a torch on the end, fearing an explosion. . . . The gas is much cheaper than coal, and being free from sulphur makes a better quality of iron than can be made with bituminous coal.34

Rogers immediately patented the company’s method for using natural gas for industrial purposes and had similar gas wells dug at Apollo. In an era when northwestern Pennsylvania oil producers were only starting to pioneer the use of pipelines, Apollo and Leechburg’s geographical proximity to ample reserves of cheap, clean natural gas enhanced their profitability as production sites.

The railroad’s arrival in 1865 also enhanced the profitability of the two mills. Here, the town of Leechburg acquired something of an edge. At Apollo, the Western Pennsylvania Railroad built the Kiskiminetas Valley line on the Westmoreland County side of the river, opposite the town and mill. But at Leechburg, the WPRR brought the railroad all the way across the river into town. This is probably another reason why Rogers established a mill in Leechburg. At Apollo, gangs of teamsters had to haul raw materials, iron sheets, and tinplate over a toll bridge before they could be loaded on to railcars; at Leechburg, as soon as a siding was built off the mainline into the mill, railcars could be loaded and unloaded right in Rogers & Burchfield’s yard.

Within the product life cycle, any firm that successfully enters into a pre-existing market and introduces a new product becomes a pioneering/monopolizing firm for that product. Then the product life cycle starts anew. The business literature suggests, however, that many firms fail after breaking into a monopolized market—especially if they overextend their capital resources through simultaneous product and process innovation. They are even more vulnerable during dramatic downturns in the larger economy like the Panic of 1873. Rogers & Burchfield had built the Leechburg mill from scratch in 1872—a facility that was capitalized at $225,000. They also took out a $15,000 mortgage to buy the remaining interest in the Apollo mill held by George and Ellen Cass and Washington McClintock, probably unaware that they were putting their firm at risk. For one thing, Rogers had confidence in his decision-making ability regarding iron making; he had never failed in any business or manufacturing endeavor in
which he had been involved. Like hundreds of other U.S. manufacturers, he and Burchfield simply took advantage of tariff-law changes as well as the new accessibility patterns that had been created during a frenzied burst of post–Civil War railroad building. Banks and investment houses willingly made credit available to him on easy terms to buy land, natural resources, and production equipment.

Late in 1873, one of the nation’s largest investment houses, Jay Cooke & Company, failed, sparking a nationwide financial panic. Banks closed, creditors called in their loans, and many manufacturing companies could not stay in production. Moreover, in 1875, the U.S. government dropped the tinplate tariff down to an insignificant 1.1 cents per pound. British tinplate flooded back into the U.S. market. After 1875, tin exports from Britain surged by 140 percent to more than 330,000 tons in 1885.35

Rogers & Burchfield managed to survive the initial financial panic but could not withstand the impacts of the change in tariff. The firm declared bankruptcy in the U.S. District Court for the Western District of Pennsylvania in October 1876. Rogers hung on to the Apollo mill by forming a partnership with yet two more Pittsburgh residents, Philip H. Laufman and Sarah B. McElroy. This company, Rogers, Laufman & McElroy, paid off Rogers & Burchfield’s $15,000 mortgage. The Leechburg mill, however, had to close. At an auction held in May 1877, the Armstrong County sheriff sold it for $75,800, 30 percent of its 1872 capitalized value. The buyer, established Pittsburgh ironmaster J. C. Kirkpatrick, had found a real bargain.36

A local historian who assessed the impact of the Panic of 1873, the ensuing depression, and the Leechburg mill’s temporary closure wrote:

This failure of their chief source of income almost paralyzed the inhabitants of the town, which had just taken a new lease of life and grown from a village of 350 souls to a bustling trade center of 1,500. . . . Some of the skilled workmen went to the newly established mills at McKeesport, for Leechburg had been the first plant in the United States to make tin. Others went back to the coal mines which they had left for the seemingly more desirable work in the mills; and many returned to their farms or hired out as laborers. Most of the workmen were from England and Wales, and had never known other than the iron or tin trade, and to these strangers in a strange land the situation was dark indeed.37

This bleak portrait emphasizes the population growth and economic reorientation from agriculture to industry that occurred in the Kiskiminetas Valley during Rogers’s experiments in sheet iron and tinplate production. It also describes
the mobility of labor during this particularly severe depression. Local farmers, coal miners, and skilled British ironworkers had moved to Leechburg and Apollo to work in the mills during the boom of the late 1860s and early 1870s; during the depression of the mid-1870s, however, they had to go elsewhere to find work. Or they retreated to their rural origins. Skilled Welsh puddler John Benjamin, for instance, left Leechburg after the Panic to go to an ironworks in Tennessee. Apollo heater John M. Fiscus, a local farmer’s son, moved his wife and family to Pittsburgh where he became a roller in the mill of Moorhead, McClene & Co. Ultimately, iron maker William Rogers, a staunch Baptist who had organized Apollo’s First Baptist Church in 1868, saw his congregation weakened when some of the Welsh and English workers left town. Many ironworkers remained in Apollo and Leechburg, however, and waited to see what would happen to the mills.38

Rogers’s Apollo-focused partnership with Laufman and McElroy lasted for only one more year. In December 1877, Laufman and McElroy released Rogers from any responsibility for debts that the Rogers, Laufman & McElroy firm may have incurred, paid him $1,500 for his services, and promised that another $1,000 payment would be coming in four months. The reasons for the making of this arrangement are not recorded. Rogers’s obituary (1901) suggests that he left the Kiskiminetas Valley demoralized:

With the financial reverses of the firm naturally came the breaking to an extent of his strong spirit. His patents on the use of natural gas had been assailed, as others also had strong claims, it cost him a legal battle, which lasted for several years. The mills having been sold, his patents on planished iron and several other valuable patents on the manufacture of iron ware also eventually sold at an assigns sale at Reuben Miller, Jr.’s office on Wood street, Pittsburgh. W. D. Wood bought the planished iron patents, which with what he already had, was a valuable acquisition. Kirkpatrick, Bell [sic] & Co. [Kirkpatrick, Beale & Co.] bought some of the others, which were really almost a part of the mill which they had previously bought, so that the legal title passed and the work of years was gone.

Rogers moved to Boston and seems to have skipped from one iron firm to the next.39

Despite Rogers’s financial failure, the impact of his accomplishments at Leechburg and Apollo during the 1860s and 1870s cannot be underestimated. In response to changes in tin tariffs and the growing U.S. demand for tinplate and tinned sheets for roofing and siding, boilers, drums, biscuit (cookie) tins,
cans, and kitchen utensils, Rogers had transformed the small, problem-ridden, and locally oriented Apollo mill into the producer of Apollo’s Best, a nationally recognized brand of blue sheets and plates. At Leechburg he built a mill where he pioneered the industrial use of natural gas. Moreover, Rogers’s hiring of skilled British workforces at both mills caused new social relations to emerge in the Kiskiminetas Valley. By 1880, these ironworkers had developed a mill culture that had formal connections to national labor unions. They created the social context in which Rogers’s successors—Philip Laufman and George McMurtry—operated during the 1880s and 1890s as they transformed the Apollo mill from an iron and tinplate maker into a major producer of galvanized sheet steel.40

Life and Labor in Laufman’s Apollo Rolling Mill

Like William Rogers, Philip Harrington Laufman had a long-time association with the iron industry. During the 1820s, Laufman’s father, David, was an ironmaster on an iron plantation near Chambersburg, Pennsylvania. Given that young boys commonly helped around antebellum furnaces, forges, and rolls, twelve-year-old Philip had undoubtedly acquired some practical knowledge of iron making before his father’s death in 1834. We do not know whether or not Philip Laufman stayed to work at the furnace, but given the number of highly specialized metallurgical techniques he is said to have invented, he probably acquired a more advanced knowledge of iron making before moving to Pittsburgh during his later teens. After becoming William Rogers’s partner in 1876, however, Laufman attended to financial matters related to the Apollo iron firm from Pittsburgh and sent his son Wilmer to Apollo to oversee production.41

During Laufman’s and Sarah McElroy’s ownership of the mill, their company expanded the existing facility by installing four additional heating furnaces, two more annealing furnaces, and eight extra sets of rolls. Even with these gains, the Apollo mill was small compared with other plants in the industry. For example, based on the 1879 figures for Pittsburgh, the average rolling mill had approximately thirty puddling furnaces and 220 workers; Apollo had only nine puddling furnaces and approximately 140 workers.42

Little information exists regarding Laufman & McElroy’s management practices and relationship with workers at Apollo until Laufman and McElroy became members of the Volta Iron Company in 1883. Based on the available primary evidence and what is generally known about the iron and steel industries
during this period, it is still possible to make four speculative points about the company’s management practices and labor relations in the Apollo mill. First, the mill probably operated two ten-hour “turns” or “stints” (shifts) per day. This system existed in many mills in and around Pittsburgh during the late 1870s and early 1880s. The 1880 U.S. federal manuscript census of population records seventeen puddlers in Apollo and adjacent Kiskiminetas Township, one employee shy of the number needed to work two daily turns at the mill’s nine puddling furnaces. (More puddlers may have resided in Washington Township, where the census enumerator resorted to classifying all rolling-mill employees who were not unskilled laborers as “works at rolling mill.”)

Second, Laufman & McElroy probably paid their rollers and puddlers a set tonnage wage instead of an hourly wage. This pay system was nearly universal in southwestern Pennsylvania iron mills. It existed because owners knew how physically grueling puddling and rolling were. The excessive temperatures in which workers toiled and the amount of heavy lifting they had to perform made workers “old at 40.” To maintain their stamina, puddlers and rollers needed to rest between each heat. An hourly wage, however, might have encouraged the expansion of these rest periods and led to a decrease in output. Mill owners had to allow puddlers and rollers to take breaks during their turns, but a tonnage rate would act as an incentive to maintain a steady pace of production.

Third, although the tonnage rate encouraged production, Laufman & McElroy’s puddlers probably decided what the actual pace of production would be. This was a cardinal rule in nineteenth-century iron mills: puddlers simply could not be rushed. If they hurried, they would not properly stir and knead the iron in their furnaces, the iron would break under the squeezer’s pressure, and they would have to do their work over again. Understandably, for puddlers this was a situation to avoid because they were not paid for broken iron as part of the tonnage they produced. Furthermore, if the pig iron being puddled contained a lot of impurities, the puddling process could take even longer. As a consequence, the first puddlers’ union, the Sons of Vulcan, decided in the 1860s that a good pace for any puddler to maintain under the tonnage system was about five heats per ten-hour turn. This pace remained the standard throughout the rest of the nineteenth century. It also determined the rate at which others worked. Skilled rollers sat idle until the blooms came out of the squeezer. While puddlers rested before their next heat, rollers were usually hard at work.

Because mill owners found it impossible to mechanize the puddling process (although they experimented with mechanical rabble rods) and puddlers could
not physically step up the pace of production or amount produced, the only way that rolling mills could increase output was to purchase already puddled muck bars from other producers or to install additional puddling furnaces. Laufman & McElroy did the latter.

Fourth, over the years, a mill culture developed throughout southwestern Pennsylvania whereby puddlers and rollers had absolute autonomy in hiring helpers, matchers, catchers, roughers, and other workers who labored around the furnaces and rolls. In turn, puddlers and rollers paid the wages of these supporting workers out of the tonnage rate that the mill owner paid them. There were practical reasons why this subcontracting system existed. Puddling and rolling involved lifting and working in hot conditions, and the puddlers and rollers simply could not perform their jobs by themselves: they not only needed large supporting crews, but there had to be complete coordination and trust between the puddler or roller and his crew or the result could be wasted time and materials, damaged equipment, and worker injury. Puddlers and rollers thus found it important to hire individuals whom they knew and trusted. Puddlers and rollers sometimes chose family members to work with them, thus keeping more of the tonnage wage in the household. Under this system, the “secrets of the trade” could also be kept within families, passed down from father to son. According to the 1880 census, four Apollo puddlers had employed children living at home with them, and all four had sons who worked as puddler’s helpers or held semiskilled jobs related to the puddling process. Gradually, many of these puddlers and rollers enjoyed so much autonomy in the workplace that they came to consider themselves as independent businessmen—separate from the iron-making firms that paid them. This was the case for several Apollo rollers who listed themselves in the business directory that accompanied the 1879 Pomeroy atlas for Armstrong County.45

In mills like Apollo where arrangements of this type existed, puddlers and rollers created a “craftsman’s empire”; they even referred to themselves as being members of an “aristocracy of labor.” Due to the addition of extra puddling furnaces and rolling machines, however, working for them was a burgeoning workforce of semiskilled and unskilled workers. Labor historian David Montgomery estimates that in the 1870s between 10 and 20 percent of the iron-making workforce were laborers; in the 1890s, this segment had increased to 40 percent.46

In chapter 2 we will see how iron manufacturers repeatedly used unskilled and semiskilled workers in ways intended to topple the craftsman’s empire. For this reason, it is important to know something about the “lower” laboring end
of the occupational hierarchy (as well as something about their rural laboring counterparts). The following discussion uses the U.S. federal manuscript census of 1880—the census year immediately prior to the introduction of steel production at Apollo—as a baseline, although it is difficult to disaggregate the iron-making workforce from the rest of the employed population in Apollo in 1880 due to classification problems in the census. Perhaps as many as 45 percent of the Apollo mill’s workforce performed jobs that made them classifiable as laborers. Most were Pennsylvanian by birth. This contrasted directly with the puddlers and rollers—more than 80 percent of whom were born in either England or Wales.

Great variation existed within the category of laborers in terms of age and household structure. In Apollo, laborers fell into three groups. The first group, about 30 percent of all laborers, consisted of young men (in their late teens and early twenties) who lived at home with their parents in nuclear-family households—Apollo’s prevailing household structure at the time. Typically, the young laborer, another sibling, and their father supported the remaining members of the household, which on average numbered six people. The second group (slightly more than half of all laborers) headed households in the early stages of family formation. Typically, their households consisted of four people—the laborer, his wife, and two young children. Finally, about 20 percent of the laborers were older (in their late forties or older); most had undoubtedly held other iron-working positions in their youth but were so physically spent that they could not continue in their skilled positions. Others may have taken unskilled positions after being injured in their former skilled occupations. Still needing to support themselves and their families, they took jobs as day laborers. Their households typically consisted of seven individuals: the laborer, his wife, and five children, two of whom worked outside the home. Thus, unskilled mill positions were filled by older Apollo men, the mildly incapacitated, and the young. However, most men between the ages of twenty-five and forty-five worked in non-laborer occupations.

Although many of the younger laborers originally hailed from the surrounding Kiskiminetas Valley countryside, the iron industry’s impact on the rural townships cannot easily be seen in the 1880 census (table 1.2). Most household heads still farmed, assisted by a large number of farm laborers (usually, their sons). In Parks Township, near Apollo, each farmer-headed household had, on average, one son at home working as a farm laborer in 1880. From contemporary published biographical accounts, we nevertheless know that some farm boys
had traditionally taken jobs off the farm and perhaps out of the Kiskiminetas Valley altogether throughout the nineteenth century. For example, Henry J. Alms (born in 1820 on a farm in Bell Township) as a teenager worked in the local coal mines, became a boatman on the Allegheny River for three years, and then learned to be a blacksmith. At the age of thirty-nine he purchased a seventy-acre farm near Maysville, where he split his time between farming and blacksmithing. Daniel Shaner’s early life history was similar. Shaner left the family farm in Allegheny Township in 1854 at age twenty-one to work on a farm in Indiana, after which he moved to Kansas to work in a sawmill for two years. In 1860, he bought a fifty-seven-acre farm in Gilpin Township. Thus, some former farm boys eventually went back to farming. Nevertheless, there were a number who
decided to work in the local iron mills or who moved off the farm permanently. Levi Stitt, for instance, was born into a Parks Township farm family in 1860. At age twenty-two he moved into Apollo to work as a carpenter for Philip Laufman. Over the next fifteen years, the firm promoted him to millwright and then master mechanic. When Apollo Iron and Steel put lots on sale in Vandergrift in 1896, Stitt was one of the first to buy.49

The local teenage farm boys came to play a crucial role in the Kiskiminetas Valley iron industry. They made up the majority of Laufman & McElroy’s unskilled labor. By the 1890s, however, with the advent of the steel industry, they fulfilled a different and even more important purpose. In 1893, Laufman & McElroy’s successor—Apollo Iron and Steel—successfully experimented at hiring more of them, their farmer fathers, as well as rural coal miners, for unskilled and semiskilled mill positions that had recently been vacated as the company hastily trained and promoted its pre-existing nonunionized laborers into the ranks of highly skilled workers. This newly reconfigured workforce became the pool from which Apollo Iron and Steel handpicked the original Vandergrift workforce and resident population. Members of the old self-proclaimed aristocracy of labor were deliberately excluded. To see why it was the new steelworkers, not the old ironworkers, who made the trek to McMurtry’s new town in 1896 we need to understand the difficulties that the town of Apollo had during the late 1880s and early 1890s in adapting to industrial restructuring’s next major phase.