History

The Mine Hill of today is a haven for wildlife and a place for humans to escape from the pressures of urban life. However, the observant visitor will soon note that this has not always been so. In the latter half of the 19th century Mine Hill was no island of nature, but a busy, noisy, and smoky industrial center. The traces of man's quest for profit cover the hill, from clues as obvious as a blast furnace and huge heaps of quarry rubble to signs as subtle as a cluster of young hemlocks in the middle of a hardwood forest.

Where Highway 67 now crosses the Shepaug River a small community formed around the mining and quarrying activities. This thriving little town once supported a post office, a general store, a school, a lumber yard, a coal yard, a creamery, a hattery, a cigar factory, a brass factory, a hotel, several boarding houses, a bar, and a railroad station. Today the general store has been converted to a private home, the cigar factory to an antique store, and the railroad station to a warehouse. Most of the other buildings have disappeared, destroyed by fire or flood or salvaged for the construction of new buildings.

This little town now survives only in the memories of the area's oldest residents. Others know the word "Chalybes" merely as the name of a small road and do not realize that the name of this vanished town refers to an ancient Asian tribe of ironworkers and to the iron ore that provided the original reason for the town's existence.

The history of Mine Hill is very much a product of the hill's geology and ecology. Over the centuries this land has been used in many different ways, but people's activities on the hill have always been shaped by the physical attributes of the hill as well as the demands of their cultures.

Stone cutters at work in the Lower Quarry, ca. 1905

Photo: Joseph West
Presettlement History

Over 10,000 years ago, American Indians reached southern New England. The first people in this region were nomadic hunters and gatherers. About 7000 or 8000 years ago, when the climate had grown warmer and oaks and hemlocks dominated the forests, the early tribes began to depend more and more on gathering and eventually cultivating plants, although hunting and fishing remained vital sources of food.

No American Indian artifacts have been found on Mine Hill, but the discovery of a rich archaeological site just a few kilometers upstream on the Shepaug River shows that Native Americans inhabited this region at least 5000 years ago. Mine Hill was quite likely part of the hunting territory for the tribes living in the Shepaug Valley.

Colonial History

In 1673 the Pootatuck Indians, a branch of the Paugussett Tribe, sold some land along the Pomeraug River to a group of colonists from Stratford, Connecticut. During the next twenty years, these English settlers bought the land of present day Woodbury, Southbury, Roxbury, and other towns from this subsidiary of the great Algonquin Tribe.

Woodbury, which included Mine Hill until the town of Roxbury was incorporated in 1796, was primarily a farming community. During the 18th and early 19th centuries almost all of the land in Connecticut was farmed or at least used for pasture. Only after the federal government and the railroads opened up the flat, rockless, fertile soils of the midwest did New England farmers abandon their land and allow it to revert to forest.

The land around Mine Hill was not portioned out for settlement until early in the 18th century. The records indicate that at first Mine Hill (then known as Spruce Hill) was set aside as common land. Even by the uncritical standards of the 18th century yankee farmer, the rocky eastern slope was too stony and steep to plow or pasture. Only on the till soil at the top of the hill do old stone walls mark the locations of earlier fields and meadows. The hill was almost certainly logged for both building lumber and fuelwood, but very early on, the colonists noted the presence of commercially valuable minerals.

Silver and Lead

Possibly as early as 1724, but certainly by 1750, some enterprising individuals observed outcrops of mineral veins cutting across Mine Hill. In 1751 Moses Hurlbut and Abel Hawley obtained a tract of land from the town for the purpose of mining. Soon afterwards, Abraham and Israel Brownson also acquired property on the hill, some of which was laid out jointly to them and Hawley and Hurlbut, and some of which they owned exclusively.

It was the Brownsons who first decided to mine the mineral resources of the hill with a large-scale operation. They sold stock in their enterprise and hired a German goldsmith named Feuchter to oversee the excavations. Under Feuchter's supervision, a vertical shaft was sunk to a depth of about 45 meters, with a parallel shaft for ventilation. Yet the mine does not seem to have yielded a profit, for the Brownsons soon hired Feuchter and closed down their mining business. According to legend, as the German goldsmith was leaving the area one of his boxes fell off the oxcart and broke open, revealing what appeared to be silver ingots. This reported incident gave rise to rumors that the mine had actually yielded considerable quantities of the precious metal, which had been embezzled by Feuchter.

Visitors at the site of the original silver mine
Photo: Fred Chesson
Perhaps in response to these stories, another company soon formed to try to extract a profit from the minerals of Mine Hill. In 1764 Sampson Simpson, Meyer Meyers, and George Trail of New York leased the mining tract owned by the Brownson brothers and launched an even more ambitious operation than the preceding one. Although earlier mining attempts were for silver, the Simpson venture was apparently primarily aimed at lead.

The three New Yorkers hired another goldsmith, Daniel Feuter (no relation to Feuchter), to manage the mining. Feuter employed 33 miners and laborers and one blacksmith. The miners traced the vein outcrops down the mountainside and tunnelled into the hill horizontally along the vein. This horizontal entrance probably corresponds to the middle level of the current network of mine tunnels.

Despite the careful organization of this mining venture, Simpson, Meyers, and Trail were no more successful than the Brownsons had been, and their mine folded within a few years. At least two other companies formed to work the veins, but neither mining attempt lasted long.

Today, it is difficult to say why any serious silver or lead mining venture was ever launched at all. There are galena (lead sulphide) crystals in the main vein, and galena contains up to 2 or 3% silver, but there is so little of the material that it seems inconceivable that it would be worth hiring workmen and sinking a shaft. Perhaps originally there was a more concentrated deposit, which was exhausted by the early mining operations.

Roxbury’s Iron

Although the amount of silver and lead in the vein can never have been very great, there is no question that Mine Hill has considerable quantities of iron ore. Unlike most of the iron ores found in New England, the predominant ore in Mine Hill is iron carbonate ( siderite) and not iron oxide (magnetite or limonite). Perhaps that explains why the early miners did not recognize it. In 1820, however, Professor Benjamin Silliman of Yale University mentioned the vein on Mine Hill near New Milford as a source of “spathic iron” a type of ore “much valued in Europe.” Then, in 1831 and again in 1837 Charles Upham Shepard, also of Yale University, described the economic potential of the spathic ore in glowing terms. He ended his 1831 article with an outright advertisement for the mine:

Considering, therefore, the inexhaustible supply of the ore and the ease with which it may be raised, — the facilities of wood, water and labor, — and the easy transportation to market, I am authorized by the present proprietor to submit it to the attention of capitalists, whether a surer investment of capital can be made in our country; or one, which, on the whole, would prove more conducive to our national prosperity, than that above described.

Once again, interest in the minerals of Mine Hill ran high, but in the 70 years following the close of the Simpson mine, the property and mining rights on the hill had changed hands many times. Bitter disputes over the ownership of Mine Hill precluded any serious mining attempts. One set of claimants did begin extracting ore and built a powder house and furnace near the old silver shafts, where the remains of these structures can still be seen today. These claimants were dispossessed soon afterwards, though, and the brevity of their tenure may account for the apparent absence of slag around the remnants of their furnace.
Finally, in 1856 the U. S. circuit court awarded the land to Daniel Stiles, the same proprietor who had authorized Shepard to publicize the iron mines 25 years earlier.

In 1864 a company expressed interest in buying the rights to the mine. The Shepaug Spalthic Iron and Steel Company, undoubtedly inspired by Shepard’s report, consulted several geology professors at Yale, a firm of New York mining engineers, and the former foreman of a Prussian steelworks concerning the soundness of the mine as an investment. The response was an unqualified endorsement of the project, so in 1865 the company purchased Mine Hill from Daniel Stiles for $100,000.

The Shepaug Spalthic Iron and Steel Company started with a capital of $300,000. They immediately hired Henry Kolbe, the same Prussian steelworker who had proclaimed the Mine Hill siderite to be comparable to the German and Austrian steel ores and therefore ideal for the production of cast steel of the best quality. Kolbe was to use his experience gained in Prussia to direct the smelting of the iron ore and the production and processing of steel. The rest of the mining and ironworking operations at Mine Hill was to be managed by Colonel A. L. Hodge, a prominent citizen of Roxbury. A. L. Hodge’s responsibilities included overseeing the mining, keeping track of the finances, and keeping the officers of the company informed of the status of their iron business. Because all the experts agreed that a great deal of practical experience was necessary for the production of steel using the process specially suited to siderite, Shepaug Spalthic sent to Germany for six experienced steel puddlers.

Between 1865 and 1868 the firm greatly extended the mine tunnels and constructed a railroad to convey the ore down the hill from the mine. At the base of the hill, near the New Milford road, workmen built two ore roasters, a blast furnace, a steel puddling furnace, and a rolling mill. Long wooden buildings enclosed the working area around these structures. Halfway between the mine and the furnace area, Mineral Spring Brook was dammed to create a reservoir with a reliable water supply. Underground pipes connected the pond to at least three hydrants placed at strategic points in the ironworks.

Some of the structures built during those years still stand in excellent condition; others have been dismantled by subsequent owners or damaged by vandalism and the forces of nature. The physical remains alone would provide valuable clues to the operation of the Roxbury iron works, but by great good fortune, the information from these archaeological resources is complemented by a collection of documents. The books and other records kept by Colonel A. L. Hodge were saved by his descendants, and hold the answers to many questions about the Roxbury ironworks. Colonel Hodge was also a conscientious diarist, and his journals for the years in which the mines were in operation offer many insights into the day-to-day workings of the plant.

Mine History continued on page 30

![The blast furnace, ca. 1905](Image) Photo: Joseph West
The Quarries

When Benjamin Silliman visited Mine Hill in 1817 he was less impressed by the iron and silver ore than by the stone in which it occurred:

It is... singularly perfect in its characters, and it is questionable whether for purposes of architecture the world can produce its superior... 

... The color is of a light, agreeable grey; the finest houses in New Milford have this stone for their door-steps and basements and its natural surfaces, or those, which, at the ends and edges are but slightly modified by the hammer and chisel, are so perfect that nothing finer need be wished for the construction of the handsomest houses in cities. Could it be easily transported to New York, this stone would be a more valuable possession to the proprietor, than the mine of silver or iron.

Over the years, Silliman’s prediction has come true, and while the fortunes of the mines rose and fell, the eight quarries on Mine Hill brought their owners a steady income.

Unfortunately, very few records from the quarrying companies have been found, and even the oldest Roxbury residents remember little about the quarries before the passing of the railroad. It is not clear when quarrying first began, and neither Silliman nor Shepard gave the names of the early quarrymen, although both mentioned the fact that Mine Hill’s granite gneiss was being used for building. Perhaps at that time, the stone was being quarried on an informal basis by individuals, rather than a formal business, for a later source says that the quarries on Mine Hill were first opened in 1850. The first quarries were almost certainly at the top of the hill. Oxcarters carried the quarried rocks to Roxbury and New Milford, but because transport was so difficult, it is unlikely that the stone was used outside the immediate area.

Then, on January 1, 1872, the Shepaug Valley Railroad opened with a station in Chalybes. The line ran along the foot of Mine Hill, where in some places the old railroad grade is still discernable today. Now it was possible to transport the stone further away, even as far as New York. In 1890, a new quarry was opened at the bottom of the hill, much closer to the railroad than the older quarries. Nine years later John Eckerson and Louis Beck of New York, Charles Cott of Litchfield, and Charles Hodge of Roxbury formed the Mine Hill Quarry Company to work the Rockside Quarry, as the quarry at the foot of the hill was called. There is no record of who ran any of the quarries before the Mine Hill Quarry Company was formed, and unfortunately, aside from the minutes of the first meeting of directors and a single stock certificate, no records from the Mine Hill Quarry Company have been found either. Still, some of the outlines of the operation can be pieced together from old photographs and the physical traces of the quarrying.

Rockside Quarry is located on the eastern side of Mine Hill Preserve. The Mine Hill Quarry Company ran a private rail line to a loading dock on the Shepaug Valley line. Although the railroad passed the quarry about a hundred meters to the east, the loading dock is situated north, considerably further from the quarry than was the railroad. Perhaps the quarry company could not run their rail line east because they did not own that property, which is excellent farmland.

Photographs taken 1905 by Joseph West of Washington, Connecticut, show the rails and cars for transporting the stone to the main railroad. Many of the blocks still littering the quarry show drill cores where the stone was split against the grain, and deep circular holes in the ground mark the places where derricks were set to bring the stone down from the cliff face and move it to the rail line.
Access to the railroad was also built for the upper quarries. Twin ramps ran from the quarries to the foot of Mine Hill. A spur line connected the railroad to another loading dock located at the bottom of the ramps, just south of the furnace area. A winching system joined cars on both ramps, and the weight of the laden cars coming downhill would pull the empty cars on the other ramp back up to the quarry.

After the railroad opened, Mine Hill Granite Gneiss was used in New York as well as Connecticut. Churches in Litchfield, New Britain, Watertown, and Waterbury, the buttresses of the 59th Street Bridge in New York, and a railroad approach to Grand Central Station all were built with Mine Hill stone.

Like the iron mining of the 1860's and 1870's, the quarrying supported the little town of Chalybes. The town gradually came to be called Roxbury Station after the railroad came through and the ironworks closed down. Some of the quarry workers lived there with their families, others were single men who boarded at private homes or stayed at the hotel. Some quarry workers also lived in Roxbury Center and Washington and went to and from work by way of a suspension bridge that spanned the Shepaug across from Rockside Quarry. Many of the quarry workers were Italian or Irish immigrants. Several workers also had ties to other quarries in New England: William McKay, the last manager of the upper quarries, came to Roxbury from the Stony Creek Quarries near the Connecticut coast; and Frank Collins, the English blacksmith who made and repaired parts for the machines and tools used in quarrying, left his shop by the old iron mine entrance each winter to work at the Stony Creek Quarries.

The upper quarry closed down around 1905, and when the Shepaug Valley Railroad stopped operating in 1935, Rockside Quarry also closed. Without the railroad and quarries, Chalybes slowly lost its population and commerce to the larger industrial centers of New England.

Then, in 1952, Charles Showalter obtained permission from William and Adelaide Matthews (the descendants of A. L. Hodge and former owners of Mine Hill) to cut and sell stone in the lower quarry. Soon afterwards, he moved his operation to the upper quarries, where the stone is easier to work. He and his son worked the upper quarries until 1961, when Gino Perone, a stone mason from Southbury, took over the business of salvaging building stone from the Mine Hill quarries. Mr. Perone and his part time assistant sell the stone they cut for hearths and door steps in houses near Roxbury and New Milford, much as the first quarriers on Mine Hill must have done.
In the spring of 1867, the plant was ready to begin processing the ore into cast iron. Unfortunately, some problems arose during the initial operation of the blast furnace, and the construction of the machinery to refine the iron into steel also encountered difficulties. After having invested so heavily in the construction of the plant, the Shepaug Spathic Iron and Steel Company did not have enough capital left to tide it over early delays in production and necessary repairs to the machinery. Early in 1868, therefore, the firm applied to the state legislature for permission to raise additional capital by selling more stock.

When it received permission to increase its capital investment to $1,000,000 the company reorganized and changed its name. The American Silver Steel Company moved the steel making facilities to Bridgeport and limited work at Mine Hill to the mining and smelting of ore. For a few years everything went well, but in 1872 the firm found it necessary to reorganize again.

The new company, called the Shepaug Iron Company, soon abandoned the mining and processing of ore completely and simply sold off ore and iron that had been produced before 1872. Although the Shepaug Iron Company stayed in existence for years, they do not seem to have done any further work at Mine Hill.

Through all the changes in company structure and directorship, A. L. Hodge had remained the onsite manager of the mines and ironworks. Finally in 1894, he bought Mine Hill from the Shepaug Iron Company. Under his ownership the mines were not worked for ore again, and as the years passed, maples, ash, and hemlocks reclaimed the land once more.

From Ore to Steel:
The Siderite of Mine Hill

Most iron ore is in the form of an iron oxide. In order to obtain useful iron from such a source, one must heat the ore in the presence of carbon. The oxygen in the iron ore then combines with the carbon, leaving behind nearly pure iron. If this heated iron is hammered vigorously, the impurities from the ore and the carbon fuel are mostly expelled. Although the machines and methods for smelting iron have changed greatly since man first began using the metal, the fundamental principle of heating the ore in the presence of carbon remains the same.

The properties of iron vary greatly, depending on the amount of carbon and other elements mixed in with the metal. If there is less than 0.3% carbon and from 1 to 2% slag mixed in, the metal has a very high melting point and a great deal of strength under tension. This form of iron is referred to as wrought iron. If the iron contains more than 1.8% carbon, it has a much lower melting point and great strength under pressure, but little under tension. This type of iron is called cast iron, because it is shaped by being melted to a fluid and then cast in molds. Iron which contains intermediate amounts of carbon in chemical combination and little or no slag is called steel. The properties of steel vary greatly depending on the amount of carbon and other elements it is alloyed with. The most valuable properties of steel are its superior hardness and resistance to weathering.
19th Century Methods of Steelmaking

The normal method of iron production in the 19th century was to first heat the ore with charcoal or coked coal in large blast furnaces. The molten metal these furnaces produced had a high concentration of carbon from the charcoal or coke, that is, it was suitable for making cast iron. This iron was also known as pig iron, because the molten metal was removed from the furnace by being allowed to run into channels dug into the sand in front of the furnace. The main channel was likened to a sow, the side channels to pigs.

The next step in making steel was to remove the carbon from the pig iron. This was done by heating the cast iron in a refractory oven, so the metal was not in contact with the fuel. The carbon in the metal would burn, that is, it would combine with the oxygen in the air being blown over it, and would escape as carbon monoxide or carbon dioxide. When most of the carbon had burned, the iron would be removed from the furnace and hammered out; the result was wrought iron. Because the iron was constantly stirred while it was in the furnace in order to expose as much of the carbon as possible to the air, this type of furnace was called a puddling furnace.
Finally, in order to make steel, a limited amount of carbon had to be re-introduced to the metal. There were two processes commonly used to accomplish this in the first half of the 19th century. One involved packing the wrought iron with charcoal in a sealed container and heating it for a long time—up to two weeks. This process would introduce carbon to the outer edge of the piece of iron, producing what was essentially steel-coated wrought iron. This process was called cementation, and the product was known as blister steel, because the surface of the iron acquired a dark, blistered appearance. In the second method higher quality steel was produced by further processing of the blister steel. First, shear steel (blister steel which had been broken up, rewelded, and recemented) and flux were placed in a sealed container. This container, the crucible, was then heated beyond the melting point of steel, so the carbon in the skin of the shear steel diffused throughout the metal. In this method any impurities in the steel would combine with the flux, rise to the top of the crucible, and be removed as slag. This resulted in a steel of uniform consistency called crucible steel.

Most iron and steel is manufactured from iron oxide ores. The type of iron ore at Mine Hill is not a simple iron oxide, but an iron carbonate; that is, the iron is combined with carbon as well as with oxygen. This type of mineral, siderite, is not uncommon, but it is rarely found in large vein deposits like the one at Mine Hill. Similar siderite veins were, however, mined in Austria and Prussia in the 18th and 19th centuries. The ironworks in both those locations produced steel in an unusual manner.

The siderite steel works in Prussia and Styria essentially avoided the final step in the normal steel making procedure. They produced steel by the superficially simple expedient of stopping the puddling process before all the carbon was driven off. Despite the fact that this method relied heavily on the intuition and “feel” of the workmen, for there was no way to measure the carbon content of the iron in the puddling furnace, the German and Austrian steel were considered to be of excellent quality. The great advantage of this shortened process was not only that it saved an expensive step, but that it could handle much larger quantities of metal than either the cementation or the crucible method. It is therefore not particularly surprising that much of Silliman and Shepard’s enthusiasm about the Roxbury iron stemmed from their belief that this type of ore lent itself to being converted into steel “directly from the pig,” like its European counterpart. In fact, however, the same steel-making methods work equally well on both iron carbonate and iron oxide ores.
The Shepaug Spathic Iron and Steel Company seems to have placed a great deal of faith in the pronouncements of professors Silliman and Shepard. The company launched a very ambitious mining and steelmaking operation that relied on the assumption that they would duplicate the success of the Prussian and Austrian steel-works.

Mining the Ore

The first requirement for making steel at Mine Hill was clearly the production of ore. Local tradition claims that experienced miners were hired from England; the company's records neither confirm nor deny this claim. Mining through the hard Mine Hill Granite Gneiss was a slow business. The miners were paid around $11 per linear foot of tunnel and were reimbursed for their powder and candles. They would use hand drills to drill into the rock, fill the drill holes with powder, and blast the rock loose. By these slow, backbreaking methods about 850 meters of known tunnels were excavated on Mine Hill.

Once the tunnels had been opened, the ore could be removed from the veins. All the ore was loaded into ore carts. These carts moved on 24-inch gauge rails, which ran from the entrance of the lowest tunnel downhill to the furnace area. The empty ore carts were drawn back uphill by donkeys, and to this day the roadbed on which the carts ran is called the donkey path. The first load of iron ore came down from the mines on the 23rd of January, 1867.

Processing the Ore

The first step in the processing of siderite was to heat the ore in one of the two large ovens located west of the main blast furnace. This "pre-roasting" drove off some of the carbon and sulphur contained in the Mine Hill ore. The large amounts of carbon contained in siderite might otherwise have caused explosions in the blast furnace, and even small traces of sulphur render iron and steel crumbly and unworkable when hot. The resulting roasted ore was mainly iron oxides and quartz. On January 30th, 1867 A. L. Hodge wrote in his diary: "today filled the East Oven in the roast furnace the first time."

Next, the ore was sorted. Roasting the siderite into iron oxide made it brittle and easy to hand separate from the unwanted quartz. Remains from the sorting operations can still be seen in two piles of roasted ore near the roasting ovens. One contains a normal amount of roasted siderite, but the other contains little but quartz. Once sorted, the ore was moved down the charging ramp to the furnace. The charging ramp was an enclosed platform reaching from the roasting ovens to the top of the blast furnace. On its way to the furnace, the ore was crushed and mixed with pieces of marble. A pile of marble blocks ready to be added can be seen about halfway down the old charging platform.

Now the ore was ready for smelting. Workmen charged alternate loads of prepared ore and charcoal into the top of the blast furnace. The circular sieve which now lies at the base of the furnace may have been used to sort the charcoal.

As the ore and charcoal worked their way down the furnace, the heat from the burning charcoal would drive off the moisture and gases from the ore. Further down in the furnace, in the intense heat generated by the blast-fanned burning charcoal, the carbon in the charcoal would combine with the oxygen in the roasted siderite and escape as carbon monoxide and carbon dioxide. Only the now molten iron and some impurities such as quartz remained behind. The impurities would combine with the calcium from the marble that had been mixed in with the ore. The resulting material, called slag, was lighter than the iron and floated on top of the molten metal glowing in the crucible of the furnace.

When the crucible became full, the slag was drawn off from the top through a hole in the side of the furnace. The iron was tapped through a hole lower down in the side of the hearth and allowed to run into channels in the sand casting bed, where it cooled into iron pigs. The slag may have been run off on either the northeast or southwest side of the furnace, and the iron was probably tapped on the northeast side.
The brick chimney located just southeast of the furnace was part of the blowing engine that provided the blast. A constant stream of air was necessary to maintain the roaring fire and was forced into the base of the furnace through four pipes called tuyeres.

Some of the pig iron may have been sold without further processing, but the company planned to convert most of it to steel. Presumably, Henry Kolbe (the Prussian supervisor) and the specially imported German workmen employed the techniques and machinery used in Prussia and Austria, but the structures and machines of the steel-making process have been dismantled, leaving only the foundations. William Fairbairn in the book *Iron, its History, Properties, and Processes of Manufacture*, published in 1865, describes the German process of making steel as follows:

In Styria, Carinthia, Thuringia, and other parts of the Continent, steel is produced from crude iron by the decarburising effect of a blast in a furnace similar to a refinery. The pigs are melted by charcoal, and a strong blast allowed to play over the molten surface. The converter stirs up the iron to bring fresh portions under the action of the blast, until he judges, by the consolidation of the mass and the colour of the flame, that the process has been carried far enough.

Perhaps an archaeological investigation could cast more light on the milling machinery and how exactly Henry Kolbe and his German workmen tried to make steel in Roxbury.

**Fuel**

Pre-roasting the ore, smelting, and puddling the pig iron all demanded large quantities of charcoal. Northeast of the reservoir shallow circular ditches mark the location of old charcoal kilns in which Mine Hill’s lumber was converted to charcoal. However, the hill did not have enough trees to run the furnaces long. An acre of land could supply enough fuel to make about 6 to 7 tons of pig iron, on the average. The blast furnace at Mine Hill produced about 100 tons a month of pig iron when it was running well. Thus, the blast furnace alone could have consumed up to 190 acres worth of timber each year.

The Shepaug Spatich Iron and Steel Company looked to the landowners of Roxbury to supply them with fuel. The production of charcoal probably was the main form of employment the mining venture offered to Roxbury natives. Other jobs associated with the mine required skills the local farmers did not have. Some Roxbury citizens simply sold their standing timber to the company. Others operated charcoal kilns at Flaggs Swamp and other locations and delivered finished charcoal to Mine Hill. The old charcoal piles, now covered with trees and leaf litter, are scattered throughout the furnace area.

### The Demise of Roxbury’s Iron

Despite the elaborate planning and heavy initial investment, production at the Shepaug Spatich Iron and Steel Company’s Roxbury works apparently did not go as planned. Shortly after the first run of the puddling furnaces, the German workmen were dismissed. Kolbe left soon afterwards. A little later, in conjunction with the reorganization of the business by the American Silver Steel Company, the steel making machinery was moved to the new plant in Bridgeport.

A. L. Hodge does not offer any reason for these changes in his diary. Possibly, the steel making did not work as well as expected, or perhaps the decision to abandon on-site steel production was based on other factors. Maybe further research can provide the answer.

After the steelworks were moved to the Bridgeport plant, the smelting of cast iron in Roxbury proceeded uneventfully for a few years. Oxcarts carried the pig iron over the hill to New Milford; from there it travelled by rail to Bridgeport. The Bridgeport plant manufactured steel in one of the first American Siemens-Martin furnaces. This type of furnace was the forerunner of the open hearth process, which is commonly used in modern steel production.

In the fall of 1871, the company decided to convert the blast furnace on Mine Hill from cold to hot blast. In furnaces operating with hot blasts, the air stream fanning the combustion inside the furnace was preheated. Often, waste gases from the furnace itself provided the heat for the blast. Preheating the blast usually saved fuel and raised the output of the furnace because the hot air did not use up any of the energy generated by the combustion in the furnace.

Normally, the conversion from cold to hot blast was a simple operation, and many furnaces made the change very successfully. At Mine Hill however, the change seems to have damaged the furnace in some manner. Instead of rising, the output of pig iron fell, and the furnace began to malfunction. Within a few months, the furnace closed down for good.

34
A chimney on top of the furnace conducted the smoke away from the workers.

Charcoal and roasted siderite were loaded into the top of the furnace.

On the way down the fiery stack, the carbon in the charcoal combined with the oxygen in the iron ore and escaped as gas (CO₂ and CO), leaving the iron behind.

A layer of sand between the stack and the stone-work allowed the stack to expand in the intense heat.

Arches in the base of the furnace provided access to the crucible.

The hotter parts of the furnace were lined with heat resistant yellow fire brick.

A continuous blast of air blown into the furnace through the tuyere pipes kept the fire roaring.

Molten iron collected in the crucible at the base of the furnace. The lighter impurities in the ore floated on top, forming slag.

The iron was tapped from the side of the furnace and allowed to run into channels dug in the sand floor. Here it cooled to form the iron bars known as pigs.

Cross-section of a Blast Furnace
Epilogue

Many people have wondered why, after such high expectations, the iron mining venture at Mine Hill proved such a failure. In part, the operation suffered from technological problems. The very first run of the furnace resulted in a ruined hearth, when the iron solidified into a “salamander” at the bottom of the crucible. The hearth itself had an experimental design; it was constructed in the form of an ellipse rather than the traditional circle. However, the oval design turned out to be inefficient, and was only installed in four furnaces in the United States. Perhaps the steel produced by the German method of puddling was not as good as had been anticipated, and after the conversion to hot blast, the furnace clearly did not function well. Also, contrary to all expectations, the main iron vein narrows out with depth. Yet a great deal of ore remains in the hill, and none of these technological problems should have been insurmountable. In fact, after the unsuccessful first run of the furnace, the damaged hearth was quickly replaced, and all reports the steel production in the Bridgeport plant was highly successful.

It may be more helpful to look at the iron venture in a broader context. Seen from the perspective of events in the U. S. iron and steel industry from 1865 to 1872, the operation at Roxbury was some ten years out of date.

At a time when most new blast furnaces were running on coal or coke, the Roxbury furnace was built to burn charcoal. The coal and coke burning furnaces had capacities ten or more times greater than that of the Mine Hill furnace.

Even more important, two new steelmaking processes were being introduced which solved the production bottleneck in making high quality steel much more effectively than the German puddling technique. These were the Bessemer/Kelly process and the open hearth process used at the American Silver Steel Company’s Bridgeport plant.

Also, the absence of rail transportation from Mine Hill must have reduced any competitive advantage of the venture from the very start. When the railroad finally did come to Roxbury, the company had already been through two bankruptcies, and the country was entering the depression of 1873. Also, in that time the great iron deposits in upper Michigan and Minnesota were being opened up, next to which the Roxbury siderite deposit was small potatoes indeed. Perhaps, if the land title had not been contested so fiercely and if the iron mining had begun a decade earlier, Mine Hill might have played a more significant role in the history of the American iron and steel industry. Instead, Mine Hill remains a monument to the many small rural industries of New England, which gave rise and gave way to the technological advances of the late 19th century.

Photo: Greg Yovan
Layer of mist forming just outside the entrance to the mine tunnel.