



Chapter 4

The Ironworks Study

Study Methodology

Ironworks on an industrial scale commenced in Vermont a few years after the end of the Revolutionary War and ended about a century later. During that 100-year period, blast furnaces, bloomery forges, and foundries made or worked iron in all of the state's 14 counties. A majority of the blast furnaces and bloomery forges lay west of the Green Mountain range, generally in the valley of the Otter Creek.

Because few business records of these industries remain, it is not known for sure where all that iron went. Some Vermont iron found markets in local foundries and mills, but most probably ended up in works at Troy, New York, and Boston. Some iron might even have found its way to markets in Québec. Research into 19th-century canal and railroad records could provide some answers. Other sources of information might be hidden away in state or federal tax records, papers of incorporation, and banking and financial papers. All that remains now of these iron-making operations are the historical records as gleaned from dozens of town, county, and state histories, and their physical remains along mountain and valley streams.

Archival and field information that follows is the result of work done mainly from 1978 to 1988. When this project began in 1978, the author knew of only two blast furnace sites in Vermont: one at East Bennington with the ruins of two collapsed stacks and the other at East Dorset. The sites were visited, neighbors were queried, and some libraries were visited where card files were inspected for anything related with the iron industry (and card files yielded meager results). Files were eventually created while studying town, county, and state histories, trade journals, and maps. Frequent trips were made to the University of Vermont (UVM) Special Collections Library and the Vermont Historical Society (VHS) Library, with the purchase of many new and used books on local history in the process.

Trade journals and reports that provided 19th-century operating and production figures and descriptions for forges and foundries throughout the United States were of immense value. Many of these are found only outside Vermont. Also used were 19th-century county and town histories plus currently published and reprinted histories, publications of historical societies and museums, business directories, and U.S. Census reports. Much ambiguity in the historical descriptions of ironworks was encountered.

One of the more intriguing items was a short article published by the VHS in 1953 by State Geologist Elbridge Jacobs on the subject of ironworks, in which he claimed the following locations and dates of blast furnaces in Vermont:

Tinmouth	1783	Sheldon	1798	Dorset	1831
Bennington	1786	Vergennes	1799	Fairfield	1831
Pittsford	1791	Swanton	1799	Tyson	1837
Fair Haven	1797	Forest Dale	1810	Bennington	1853
Chittenden	1797	Manchester	1821	Pittsford	1859

Blast furnaces were built at many of these locations; forges

were in use in others; both types were found at some of the works (Jacobs 1953:130). Jacobs' source of information was a manuscript sent to him by Charles Rufus Harte of New Haven, Connecticut. In an April 5, 1955, letter to Richard S. Allen of Albany, New York, Harte wrote that what he sent Jacobs was "a copy of a series of abstracts from various Vermont town histories, and for their accuracy—other than to the copying—I accept no responsibility, and of the furnaces I have very little personal knowledge."

Harte was otherwise an accurate and thorough historian of ironworks in New England, and authored a number of valuable articles and booklets on the subject in the 1930s and 1940s. He visited Vermont in August 1935 and photographed furnace remains at Manchester ("the merest trace"), East Dorset ("a beautiful little stack"), Pittsford ("behind a little mill on a side-road"), Brandon ("just south of where [Route] 7 crosses a big brook"), and Forest Dale "the Green Mountain stack, which was in very good condition").

Archival research has not uncovered the same historical references Harte said he was using or the photographs he took. Researching similar-named town histories in other New England states has likewise failed to resolve many of the iron-making site claims made by Jacobs and/or Harte. But this does not mean the data are incorrect. Many iron-making remains are still waiting to be rediscovered in Vermont.

Three series of maps were used to determine the existence, location, and time period of the ironworks. These were the 1796 to 1838 James Whitelaw maps of Vermont; the 1854 to 1859 Scott, Rice, McClellan, Walling, etc., county maps; and the 1869 to 1878 F. W. Beers county atlases. The Whitelaw maps used a Mars symbol ♂ (which in alchemy stood for iron) to indicate iron-making sites without differentiating between forges or blast furnaces. The county maps identify bloomeries and furnaces by owner or company name. Additionally, they display foundries, machine shops, mines and ore beds, raceways, dams, and buildings on village, town, and county scale. Maps with ironworks information were compared, site by site, directly to each other and to county, town, and state histories and gazetteers, ironworks reports, and ironworks-related articles. With this information, the sites were located as closely as possible on current USGS topographic maps and the effort then shifted out of the house and library and into the field.

At first thought, the search for an 18th- or 19th-century stone blast furnace does not seem so difficult that it requires a technique. In terms of its massive size, a blast furnace is about the height of a two- or three-story structure. Blast furnaces were usually made of large stone blocks, were surrounded by other structures and waterpowered devices, and thus should be in the midst of an acre or so of stone foundations. And some standing blast furnaces were quickly located in the field. But a collapsed furnace today resembles no more than a low, brush-covered mound. It can be as deceptively difficult to locate as a fully standing 30- to 40-foot-high stack in the heavily foliated

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Vermont countryside. The location of the few obvious blast furnaces, such as Bennington and East Dorset, were made right from the truck window. The more difficult ruins resulted in many hours, and sometimes many weekends, of hiking through brush and wading in streams.

An electronic metal detector was tried with no satisfactory result. Iron-making and ironworking sites have become recipients of all manner of discarded machinery, some from later industries at the same site, some from trash dumped into water-wheel pits, cellar holes, and abandoned waterways (flumes, canals, and raceways). Searching for ironworks by inspecting the general area with a detector took time better spent looking for more accurate surface clues. One alternative to electronic metal detectors is dowsing. It was not tried but is claimed to have been used with some success around the world to find such things as buried pipes and cables, so why not a forge site (Hume 1969:36-39)?

The most obvious artifact at an iron-making site is the standing or nearly standing blast furnace ruin. The less obvious is slag, that ubiquitous waste by-product of the iron industry. But slag can be a misleading artifact. Good blast furnace slag is usually multicolored with a glassy surface. It will shatter easily if struck, and its slivers will injure unprotected eyes, hands, and feet. The slag can be shades of blue, green, black, and gray. Some slag will betray its former molten state through ripple marks on the surface or holes left by gas bubbles. Some glassy blast furnace slag might contain pieces of stone, iron, or charcoal, but most will not. Blast furnace slag is lighter in weight than bloomery forge slag, which is much heavier for the same size and much less colorful. Because the process of making bloomery iron (wrought iron) does not involve the high temperatures of the blast furnace process, bloomery slag does not appear glassy or multicolored. The lower bloomery forge temperature also results in an incomplete smelting process, resulting in a product that at one end of the bloom is more iron than slag, while at the other end is more slag than iron. Bloomery slag (the waste end of the bloom), therefore, contains much iron; the slag is much heavier and darker than blast furnace slag. Heavy, dark slag will usually indicate the site of a bloomery, and this slag is more often than not loaded with high levels of iron, unburned charcoal, and bits of stone.

Archeological analysis into historic blast furnace slag has been done by Professor John R. White of Youngstown State University, Ohio, who has shown that in addition to its chemical attributes, "the slags have visual attributes such as color, texture, and porosity which likewise provide clues to their use, temperature, effectiveness, etc. The effectiveness of the slag is a primary indicator of the efficiency of the furnace operation and the iron-making process" (White 1980:55). The type of fuel, whether charcoal or coal, for example, can be determined in the laboratory through slag analysis, thus affording further interpretive data on the state of the technology at the given iron-making site.

The extensiveness of slag heaps also indicates the degree of blast furnace activity. But slag accumulations at later blast furnaces were trucked for use as fill or mixed with tar for use in road building. Slag is useful for locating the ruins of collapsed blast furnace sites, first by finding the random pieces of slag along streambeds in the suspected area of the furnace, and

second by following the slag indications upstream until none is found. Since slag and everything else washes downstream, note the increased number of slag finds in the streambed as the inspection proceeds upstream. A marked drop in slag finds signals the time to search for the site itself. But this technique is not always foolproof: bits of slag were tracked a quarter-mile up the Konkapot River, right past the actual forge site at New Marlboro, Massachusetts, to the back fill of a stream-side cemetery. In this case, the slag existed both upstream and downstream of the forge site.

Since early blast furnaces and bloomery forges depended on waterpower to produce the necessary draft, they located alongside dependably flowing streams, usually next to a major falls or rapids. With abandonment of the operations, most of the remaining artifacts worked their way into these streams and were washed farther downstream by yearly cycles of spring freshets augmented by ice movement. The streambeds in the vicinity of mills, therefore, became the depository of all manner of industrial artifacts (and contemporary domestic trash). Inspection of suspect streambeds for artifacts is therefore an essential part of a search for and inspection of the industrial site.

The best time to inspect the stream is late summer, preferably during an extended rainless period when water level and turbidity are low. A clear, sunny day is necessary to see the stream bottom clearly, strolling knee-deep into the stream, working upstream, keeping the sun behind if possible. Each side of the stream was inspected and the middle crisscrossed. Water deeper than knee-high significantly reduced bottom visibility. Care was taken not to step on glass or trip on underwater hazards.

Since the stream probably eroded new channels in the past century, inspection of eroded shorelines and accumulating sand and gravel bars aided in determining where a previous channel might have been and, therefore, where older wash may have accumulated. Heavy iron objects such as mill machinery, gearing, large bolts, braces, and shafts were usually found in deepest midstream or stranded in deep pools. The immediate bottoms of falls, if they are accessible, were good places to inspect. Relatively lighter objects such as bricks and slag were found closer to shore, although slags loaded with iron were also found in deeper pools.

Access to streams was easiest at a bridge, but high stone abutments and steep embankments sometimes caused problems. Residents rarely refused permission to walk through a driveway or backyard to gain access to fields and streams. Neighborhood children were usually quite knowledgeable about what was in streambeds and where "treasures" could be found. At Pittsford, however, hours were spent in a fruitless search for some "old machinery" in Furnace Brook until it slowly became apparent that the kids were talking about the rusted remains of an ancient Volkswagen, partially buried in a midstream sandbar. Another good technique was to inspect stream bottoms with binoculars from the center of bridges. This was especially fruitful when the pools were deep and a bright sun was directly above (mid-day). Drivers do not expect to meet people standing on narrow bridges, so care was taken not to get squeezed by trucks or run down by cars. I wish I had a better answer for the Vermont State Highway patrolman who stopped and asked why I was leaning out from the middle of the concrete bridge at East Middlebury.

Scaled sketches of the streams were made as inspections proceeded. Pencil was superior to ink; water drops smeared the latter. The general shorelines and gravel bars, rapids, quiet pools, and major boulders were sketched. Landmarks such as bridges, houses, and large trees were identified for later reference. Compass checks maintained orientation of zigzagging streams. When an accurate measurement could not be made, distances were paced between dependable reference points (but not trees, which might be cut down or washed away). All artifact finds were located on the sketch whether in question or not, saving a repeat inspection months later when the water was usually higher (and colder). Special attention was paid to evidence of marks such as machined cuts and drilled holes on ledges in the stream and on the shore.

Remains of dams were evidenced by stone block or concrete abutments at facing sides of the stream, although an abutment may have remained on only one side. Early dams were sometimes indicated by only a few one-inch-diameter holes drilled into underwater ledge. When one was found, I looked for others or a series of them every few feet across the stream. They usually marked the base of a dam and usually, but not always, were located at the top of a falls to increase the head. Corroborative evidence, such as remains of an earthen dam that might still exist high up the shore adjacent to the drilled holes, was also checked. The dam might not be directly related to an iron-making site, but a documented reference to a forge built so many feet downstream from another mill and dam often proved the value of the find. And just as a good mill site may

have supported a succession of small mills, so may have the dam, with washouts by periodic freshets resulting in repeated reconstructions and possible enlargements.

A knowledge of dam-building technology and water privilege rights was helpful in further interpretation of dam sites. While searching for an 18th-century iron-making site in the La Platte River at Shelburne Falls, two iron rods were discovered, securely imbedded about twelve feet apart in a ledge on opposite sides of the center of the stream. The rods might have been anchors for cables that added support for a high dam, the remains of which stood on one shore about 50 feet downstream. Although remains of three dams (and a possible fourth) were found at Shelburne Falls, the exact location of Ira Allen's 1792 forge still remains a mystery, probably because it was destroyed by freshets and a succession of mills that followed at this excellent waterpower site.

Results of the Ironworks Study

Forty-three ironworks sites were reported to the State Archeologist during the 1978–1990 period of the overall state-wide study of ironworks and are now part of the Vermont Archeological Inventory. Five other sites, at which inconclusive or no positive surface evidence was found but subsurface material might exist, have been reported to the State Archeologist in the Field Site (FS) category. In-progress archival and field work continues at 51 more sites. The total number of ironworks sites studied is therefore 99 at this writing.

Table 4-1. Ironworks Sites

Site No.	Principal Name	Evidence of Associated Components*				
		Blast Furnace	Bloomery Forge	Foundry	Iron Mine	Charcoal Kiln
<u>Addison County</u>						
AD-146	Monkton Iron Company	Yes	No		Yes	
AD-299	East Middlebury Iron Works		Yes	No		Yes
AD-300	Orwell Furnace	Yes				
AD-339	Eagle Forge		Yes			Yes
AD-340	Little Otter Furnace	Yes				
AD-404	Richville Forge	?	?			
AD-406	Sawyer's Forge		Yes			
AD-407	Salisbury Forge		Yes			
AD-414	Brooks Edge Tool Company			Yes		
AD-415	Wainwright/Davenport Foundry			Yes		
AD-416	Holley Forge		Yes			
AD-417	Lewis Creek Farm Forge		Yes			
AD-430	North Ferrisburg Forge		Yes			
AD-431	Doreen's Forge		Yes			
AD-432	Barnum/Nichols Forge	No	Yes			
AD-493	Baldwin Creek Forge		Yes			
AD-FS50	Ackworth Bloomeries		No			
AD-FS86	Franklin, (etc.) Forge	No	?			
AD-IW01	Downing Forge		No			

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cations found of the ironworks, the later sawmill, or the dam. Neither slag nor charcoal could be found on the ground or for about 100 feet along the river at the site, or at another point about a mile downstream at the Route 100 bridge. Except for good historical accounting that pinpoints the location of the ironworks, no surface remains betray the site of this furnace/forge site. The older house standing at the site was probably that of Thomas D. Poland, who ran the sawmill (Beers *Washington* 1873:55).

LAMOILLE COUNTY

LA-IW01 Cady's Falls Forge (Morristown): In 1826 when Joshua Sawyer started a plan for the opening of an iron ore bed in Elmore, he erected a forge a little south of today's hydroelectric station at Cady's Falls in Morristown (Mower 1935:67). But the operation was plagued by problems with the ironworkers, with the iron itself, and finally in 1828 with nature, as a flood brought disaster to the forge. Sawyer deeded his destroyed forge property and the ore bed to the Lamoille and Elmore Iron Factory and Mining Company. The forge site was thereafter used by various mills; the 1859 Lamoille County map shows a starch mill occupying the site and the 1878 Beers map shows it unoccupied. The village of Morrisville purchased the site in 1895 and built a hydroelectric station either directly on or very near to the north end of the old forge site.

No remains of the forge were visible during a 1979 visit although the steep shores of the Lamoille River were not checked for slag. Local residents knew nothing of any iron-making activity here, but there are locally in existence some iron implements and fireplace andirons that were made at Cady's Falls forge from Elmore ore (Sanders 1953:242).

The Central District

The central district contains the majority of the iron-making sites of the state. Addison and Rutland counties alone contain 63 sites, which is about two-thirds the number of ironworks sites in the entire state. The major blast furnace operations centered in Rutland County while the state's major bloomery forges were in both Addison and Rutland counties.

By the mid-19th century, five bloomery complexes in the central district had become nationally known for the quality iron they produced:

Ackworth Bloomeries (West Lincoln)	ca. 1828 to 1865
East Middlebury Iron Works	ca. 1831 to 1890
Fair Haven Iron Works	ca. 1812 to 1870
Salisbury Forge	ca. 1847 to 1870
White's Forge (Vergennes)	ca. 1847 to 1857

Israel Davey, owner of the Fair Haven Iron Works, bought the Salisbury Forge in 1854 and took Benjamin Nichols as a partner in 1862. These two forges then merged and became the Fair Haven Iron Company in 1867. The next year, the company became part of the Burlington Manufacturing Company, which by then also owned the East Middlebury Iron Works. The Ackworth Bloomeries and White's Forge were never part of these transactions.

A number of pocket furnaces also operated in the central

district. Pocket furnaces have been variously defined and illustrated to be about 5-foot-high stone furnaces with full-size blast furnace capability in regard to smelting iron ore. In some cases these diminutive furnaces could have been production units. They were also used to test the ore as an alternative to the expense of building a full-size furnace. For some unknown reason, there was a concentration of pocket furnaces in the Brooksville area (see AD-IW05).

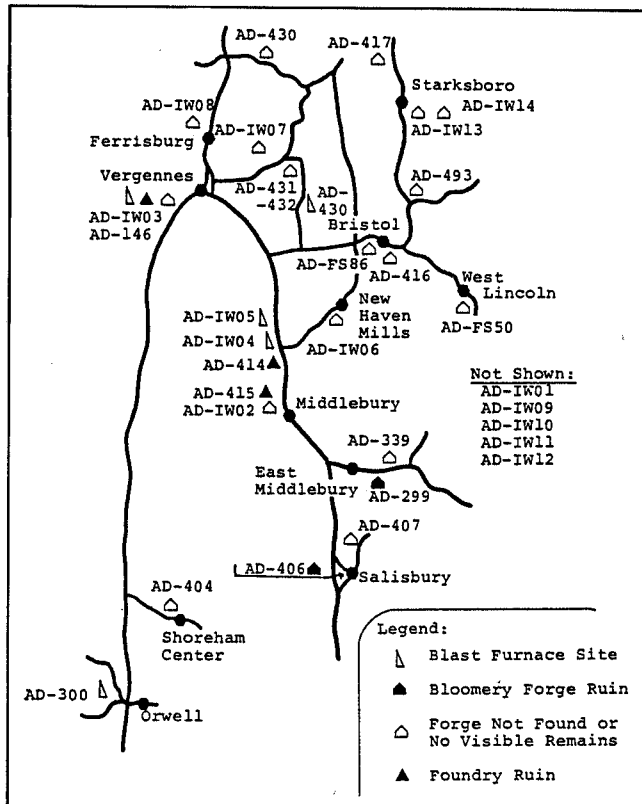
Seven forges were built and operated in and around Bristol village from 1791 to the 1850s. Since no principal name could be found for some of the works, these have been arbitrarily named for owners of record. The forges were contemporary with (and probably similar in design to) the forges at Lincoln. The principal source of ore for these forges was the Bristol ore bed, on a mountain in the northwest corner of the town. Ore was mixed with magnetic ore from Crown Point and other places on the west side of the lake (Munsill 1979:107). The Bristol ore bed is a few miles south of the Monkton ore bed and part of the same geologic system (Adams 1845:22). Ore beds were found in other parts of the town but not in quality or size that justified the expense of mining them. The low price of foreign iron forced the ironworks of Bristol and Lincoln out of the business in the 1850s, never to open again. Many checks for slag were made in and along the New Haven River from Lincoln to well below Bristol village, especially during drier summer months. But the finds were relatively well-distributed small pieces of waterworn slag that could have come from any of the forges along this stretch of the river.

ADDISON COUNTY

AD-IW01 Downing Forge (unlocated): The 1832 manufacturing returns of Vermont listed a forge in Addison County under the name of T. Downing (Kelley 1969:877-907). All other forges in the county included in the returns can otherwise be accounted for. No reference to this ironworks can be found in the county. Inspection of the Downingville area does not suggest any good site for a forge. In 1792 a James Downey, Jr., was involved in a forge at Fair Haven belonging to Gamaliel Leonard (RU-195). But the location of Downing's 1832 forge in Addison County remains a mystery.

AD-300 Orwell Furnace (Orwell): It was at Fair Haven that Matthew Lyon established an industrial base around a series of falls along the Castleton River (RU-FS17). These industries, which became known as Lyon's Works, included extensive ironworks, and there is confusion about whether a blast furnace was part of it. Lyon did, in fact, build a blast furnace and it is supposed to have been in operation in 1788, doing a "considerable business" (Smith 1886:557). But that blast furnace was in Orwell, not Fair Haven. In all the information concerning Lyon's Works at Fair Haven, although there are many references to a furnace or blast furnace, nothing can be found to indicate a blast furnace erected or operating there. The Orwell furnace site is 15 miles north of Fair Haven, and the 1796 Whitelaw map shows a road direct from Fair Haven to the furnace.

During a 1981 inspection of the site along East Creek, exactly where the 1796 Whitelaw map indicates an ironworks, furnace slag was found in a pasture along with burnt bricks, waste iron,



4-12. Addison County ironworks sites.

stone walls, and indications of a head- and tailrace. The site is nearly halfway between Fair Haven and Lyon's iron mine near Port Henry, and also much closer to Lake Champlain. East Creek flows a few dozen feet from the furnace site and is lake-level to within 100 feet of it. Lightly laden ore boats might have negotiated the shallow creek at one time.

A committee of the Vermont Assembly recommended in 1791 that the Lyon blast furnace in Orwell be repaired and set in blast, indicating that the furnace was out of operation at the time (Austin 1981:162). The Orwell stack probably suffered from poor ground insulation that allowed surface dampness to cause a "cold hearth," resulting in a large number of defective castings. And at some times of the year the stream ran too low to drive the waterwheel (Boltum 1881:10). Inspection in 1981 found that the ground at the suspected furnace site was only a few feet higher than the nearby pasture, which had a spongy, soggy feel underfoot. Yet at the time (Labor Day weekend) the creek was running quite low. Lyon's continuing petitions to the state assembly may, therefore, have been unsuccessful attempts to replace the ailing Orwell stack with a better site in Orwell (or maybe Fair Haven?).

AD-406 Sawyer's Forge (Salisbury): Both Connecticut and Vermont have a town of Salisbury, and both towns have an iron-making history. But one recently published history has laid claim to iron cannon and shot being cast in the Vermont town during the Revolution when in fact it was nearly deserted

for fear of marauding Tories and Indians (*Gazetteer* 1976:76). To confuse matters, Ethan Allen (of both Connecticut and Vermont fame) built the first blast furnace at Salisbury, Connecticut, at today's Lakeville village. Salisbury iron was a quality of iron unique to that Connecticut-Massachusetts-New York area and, except for Samuel Keep, has nothing to do with making iron in Salisbury, Vermont.

The first forge in Salisbury (Vermont) was built by Thomas Sawyer in 1791. He had already built a sawmill, gristmill, and tavern in the community known as Sawyers Mills per the 1796 Whitelaw map. Three years later some trip-hammers were built nearby. The works were converted to a shovel factory around 1813 by Harry Johnson, which was possibly operated 20 years later by A. Johnson (Smith 1886:605-606).

Forge construction was directed by Samuel Keep, an iron maker who was born in Salisbury, Connecticut. He arrived at Salisbury, Vermont, via Crown Point and stayed on to work in the bloomery. In 1795, John Deming of Middlebury bought the mills and tavern of Sawyers Mills; Sawyer then moved to New York. Deming and a later partner, J. Woodward, sold to Hascall and Nelson in 1813. Patrick Johnson eventually bought the forge and took Jonathan Kendall as partner, then sold to Ellery Howard and son. They operated the forge until 1853 when it closed in the midst of the nationwide slump in the iron market.

Investigations at the forge site by Salisbury historian Max Petersen in 1976 resulted in finding pieces of iron and hardware, and the collapsed chimney and hearth of the refinery part of the forge (Petersen 1976:16-17). The forge site is on the north shore of the Leicester River, just below the Central Vermont hydroelectric power generating station in Salisbury village. Much slag, charcoal, firebrick, and very heavy pieces of castings were seen during a 1986 inspection.

AD-407 Salisbury Forge (Salisbury): A more modern bloomery was built at Salisbury sometime between 1843 and 1849 by A. B. Huntley but it was abandoned due to financial reasons after making only a few hundred tons of iron (Smith 1886:607). The new forge was about a half-mile upstream of Sawyer's Forge (AD-406). Forges were described as being at many waterfalls near here in 1855, most likely all part of Huntley's forge operations (Swift 1859:15).

Israel Davey, by then owner of forges at Fair Haven, bought Huntley's forges in 1854 and took Benjamin S. Nichols as partner in 1862. The forges merged with the Fair Haven Iron Company five years later, the next year becoming part of the Burlington Manufacturing Company, which also owned the East Middlebury Iron Works, five miles north of the Salisbury Forge (Petersen 1976:25).

Like its sister operation at East Middlebury (AD-299), the Salisbury Forge contained three bloomery hearths, three waterwheels, and a side-lift hammer. Capacity of the Salisbury Forge in 1866 was about 750 tons. In 1864 some 280 tons of iron were made from 500 tons of ore and about 75,000 bushels of charcoal. Chunk iron made from Port Henry ore was used at the Burlington works (Neilson 1866:232-235).

The forge at Salisbury was one of five (others at Fair Haven, East Middlebury, West Lincoln, and Vergennes) known throughout the industry for producing a high-quality wrought iron by the direct bloomery method. Neilson reported in 1866:

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Production		Production	
Year	Tons	Year	Tons
1854	200	1860	0
1855	300	1861	0
1856	300	1862	0
1857	200	1863	0
1858	200	1864	280
1859	200	1865	450

With the end of the economic stimulus of the Civil War and the postwar drop in iron prices, quality iron was yielding to cheaper iron from other parts of the country. Israel Davey died in 1869; the Salisbury Forge closed the following year.

Remains of the forge lie just downstream of the Central Vermont dam, about a half-mile northeast of the village. Slag, charcoal, and the race reveal the course of the waterpower system from the falls to its return to the river. A spool factory, which followed the forge at the site, detoured the race, visible by its extension where the race starts to turn toward the river. Ruins of a more recent mill are just downstream of the forge site.

Plough Shares.



FOR SALE at the EAGLE FORGE

100 Share Moulds,
of a superior quality.

ROGER NOBLES
Middlebury, Sept. 4, 1827. 41f

4-13. National Standard September 11, 1827 (courtesy Sheldon Museum).

AD-339 Eagle Forge (Middlebury): Roger Nobles operated an early forge along the upper Middlebury River in a deep gorge a mile upstream of East Middlebury. Dates of operation are not known for sure, but the forge was in operation as early as 1810 (Smith 1886:342). In 1827 Nobles advertised plows for sale at the Eagle Forge. The forge was abandoned soon after and was washed away by the 1831 freshet.

The river was inspected upstream of the Route 125 bridge in 1984, hiking upstream on North Branch Road and taking an old road that forks off to the right a few minutes walk from the bridge. Up the road is an area of charcoal, which extends from the trail for about 50 feet toward the river and 50 feet along the edge of the road. Other features in the area include a 40-foot-long by up to 9-foot-high stone wall; large (2- to 3-foot-diameter) stones laid in a line, possibly anchoring the shore end of a dam; two levels of ground (the trail and a lower level adjacent to the bottom of the 40-foot stone wall). A path,

cut into the face of the charcoal-covered ground, allows swimmers access through the area to the river, here about 25 feet below road level. There is much evidence of recreation activity all along the road. According to local tradition, the charcoal once burned underground for many weeks before it was extinguished (Victor Rolando paper, 1984). Slag was found in the river during a later field inspection. About 20 to 30 feet upstream of the end of the 40-foot wall, some walnut-size pieces of magnetic iron ore were found, lying where they appear to have fallen from a wagon that might have been carrying ore along the old road. The ore might have come from Crown Point, since that ore was later carted to a forge that operated a few years later below the bridge.

About 200 feet upstream, another stone wall, much less obvious (about two feet high by 10 feet long) was found. No charcoal or slag was found here. Although a narrow path continues another 100 feet, then pinches out in the narrowing gorge at the base of a high cliff, the road itself appears to end here. Topography of the opposite shoreline hints at a bridge having been here, with the low stone wall being the remains of the bridge abutment on this side of the river. No companion feature was seen on the immediate opposite shore; the river is about 15 to 20 feet wide and one to two feet deep here, but most likely much deeper during spring thaw. Farther upstream on that opposite (south) side, the road can be found again, very faintly, still heading upstream. This might have been a predecessor road to the present Route 125 highway or maybe an old charcoal road for the forge(s) below.

Could the charcoal area have been connected somehow with the forge operations at a later period below the bridge? Considering the available space to store charcoal and ore at the later downstream forge site (AD-299), it is doubtful that the downstream forge would have carted these materials upstream to store them at this space-limited location. It is possible, therefore, that this charcoal area is the approximate site of the Eagle Forge, and that this was a bloomery forge operation, since in the early 1800s plows were still being made by hammering wrought-iron plates to form mold boards. With a high cliff on the shore opposite the charcoal area, it was a good place to build a dam, hence the line of large stones along the shore immediately downstream of the site. The old road continues its level about 25 feet above the present river level for about 200 feet upstream to stay above the level of the backed-up forge pond above the dam. There might have been some connection between this forge and Nobel's Forge (BE-IW03) in Pownal.

AD-299 East Middlebury Iron Works (Middlebury): Shortly after the Eagle Forge was washed away by the 1831 freshet, another forge was built downstream and nearer the village by George Chapman (Fenn vol. 13 n.d.:30). George Chapman was followed sometime before 1846 by Middlebury merchant Asa Chapman, who along with some other Chapmans was also running a forge in Lincoln (Walton's 1846-1850).

Asa Chapman ran the forge at East Middlebury until about 1850 at which time the operations became Slade, Farr & Co (Walton's 1850). Chapman also maintained a ledger, which he titled the *Teaming Book*, in which he recorded the daily comings of wagon loads of charcoal and ore, and the departures of wagon loads of iron (Sheldon Museum Library). The period

covered is from August 1845 through October 1848. In the 18 months from April 1846 to October 1847, 396 tons of ore were recorded arriving on 393 wagon loads, about a ton of ore per wagon arriving nearly every day. In the 1860s some ore came from as far away as Seven Islands (Sept-Îles), Québec (Hunt 1870:279-280). But most appears to have been dug at Crown Point, boated across the lake to Vergennes, then shipped by wagon to the forge. Shipped to Vergennes from the forge during that same period were 226 tons of iron in 249 wagon loads, or slightly less than a ton of iron per wagon leaving every other day. In a 2½-month period, it was recorded that "Coal received of John Maganity" was 1,730 bushels in 21 loads, which averaged about 80 bushels of charcoal per load. Altogether, the names of 57 teamsters are recorded hauling ore, charcoal, and iron to and from the forge. It was truly a busy place when all the woodchoppers, miners, colliers, blacksmiths (to service the horse teams and the tools of miners and ironworkers), boatmen, bloomers, and their families are considered. Forge operations either directly or indirectly affected the livelihood of over a hundred people.

The ledger recorded that a freshet destroyed the forge on October 30, 1847. The following month one iron shipment was made; no further shipments were made until May 1848. An itemized list of costs to rebuild the forge totals \$1,661.47. When operations resumed, the forge received 249 tons of ore and shipped 187 tons of iron from May through October 1848. Production ratios of the older to newer forge (1.75 to 1.33 tons of ore per ton of iron) calculates to a significant 23.7 percent increase in efficiency of the forge. Technical improvements had obviously been incorporated into the new forge. The ledger bookkeeping system does not allow comparison of charcoal efficiencies.

That ratio of 1.33 tons of ore to 1 ton of iron output was quite superior in comparison to other forge outputs of about the same period. At the Salisbury Forge the ratio was 1.75:1 while at the West Lincoln forges it was 2.10:1. By comparison, at the Pittsford and Plymouth blast furnaces the ratio of ore to

iron was 2:1 (Neilson 1866:217-218, 232-233). Variations in local ore quality would have affected these ratios.

After Slade & Farr operated the forge, Israel Davey came into control. Davey now also owned the Salisbury Forge, about five miles to the south, in addition to his ironworks complex at Fair Haven. Soon after taking over the East Middlebury Forge, Davey took Benjamin S. Nichols as partner, and they sold the works in 1865 to the Burlington Manufacturing Company. According to Neilson, production through 1865 was:

Production		Production	
Year	Tons	Year	Tons
1854	50	1860	400
1855	50	1861	400
1856	300	1862	400
1857	300	1863	400
1858	300	1864	400
1859	400	1865	500

By 1866 the forge was called the East Middlebury Iron Works and had three bloomery hearths, each with its own waterwheel, and one side-lift hammer. The forge consumed 100,000 bushels of charcoal and 700 tons of Lake Champlain ore in 1864. Annual capacity of the forge was estimated at 750 tons. The main product at the time was billets, which were rolled by the Burlington Manufacturing Company (Neilson 1866:232-235).

Three large waterwheels were supplied by a head of water from a dam upstream from the bridge. Ore still came down the lake from Mineville, New York, but now traveled by railroad to Middlebury Village, and finally by wagon to the forge. The process was reversed for shipping iron to Pennsylvania and New Jersey, where it was converted into steel. The forge complex consisted of a large charcoal and ore shed, the forge building, and a smaller waterwheel house. Iron was drawn from three hearths every three hours, cooled in a circular mold, hammered into a large block 6 inches thick, then cut into 6-inch-square by 18-inch-long 1-cwt blooms (Fenn vol. 13 n.d.:30).

Charcoal was made up the Middlebury River North Branch in Ripton where 60 to 100 men worked cutting trees, tending the kilns, and driving teams. About 9,000 bushels of charcoal were made annually in kilns owned and operated by the East Middlebury Forge Company (Smith 1886:593-594). Built sometime previous to 1859, the kilns were still operating when the forge went out of business. A nearby boardinghouse fed and housed the charcoal workers.

Subsequent to the Burlington Manufacturing Company ownership, the forge continued sporadic operation. The 1871 Beers map identified the owners as Williams & Nichols. Andrew Williams was from Plattsburgh; Harvey J. Nichols was works agent. They rebuilt the works in 1880, annual capacity then being 1,300 tons of charcoal blooms for steel manufacture (*Directory* 1882:169). When it was abandoned in 1890, the forge was the last iron-making operation remaining in Vermont (Swank 1892:113). Around 1900, the hammerheads, tuyeres, waterwheel, shafts, etc., all weighing about 500 tons, were purchased for scrap. At that time, it was reported that the forge building was still standing (Patch 1918:158).



4-14. Foundation remains of the forge at East Middlebury, possibly the waterwheel pit.

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Traces of the forge were still visible in 1985, just downstream of the Route 125 bridge over the gorge. For 100 feet below the bridge there are piles of black, rusty slag mixed with charcoal. A path leads from the highway diagonally through the site. East of the path are the stone wall remains of the forge, coal house, wheel pit, and the long tailrace. A state plan to relocate the Route 125 bridge 100 feet downstream might impact this historic site. Charcoal kilns that probably serviced the forge were found in 1983 near Dragon Brook, about two miles north (chapter 6, AD-314).

AD-IW02 Nichols Forge (Middlebury): The earliest iron-works at Middlebury village was at Frog Hollow, where Jonathan Nichols built a forge, trip-hammer shop, and gun factory in 1794 on the west side of the falls (Smith 1886:284-285). Ore for the works came mainly from Crown Point, mixed with some local ore from Monkton. Jonathan was joined by his brother Josiah two years later and, together with Daniel Pettibone and Ezekiel Chapman, discovered a process for welding cast steel, which they patented in 1802. The same year a federal contract for 1,000 guns was filled and delivered by the gun shop.

The shop was just northwest of the base of the falls under fill that today is a parking area in Frog Hollow along the Otter Creek. Three buildings identified as "Forge, Furnace & Trip Hammer" were drawn on a map in 1885 by Henry L. Sheldon of the first industries at the falls nearly 100 years before (Sheldon Museum Library). Much iron was made and worked here, and the works changed hands many times, eventually coming to Rufus and Jonathan Wainwright, Jr. They built a furnace (cupola?) on the site of the former forge soon after the end of the War of 1812, where stoves were cast (Smith 1886:325-328).

Areas of the parking lot, falls, and lawn behind the Old Stone Mill were inspected in 1984. Slag was found along the shoreline just upstream of the site of Nichols' gun shop and Wainwright's pre-1826 stove foundry. The eroding shoreline has exposed slag for 20 to 30 feet along the shore from the edge of the hillside lawn to well into the creek. Associated with the slag are firebricks of a period later than either the Wainwright or Nichols operations. The site area has been back-filled, hiding from view any slag remains on the older, now-buried shoreline. All archival references to "furnaces" at the falls hint at cupola furnaces rather than blast furnaces. But the possibility remains that for a short time around 1800 a blast furnace may also have operated near the falls prior to being displaced by a cupola.

AD-415 Wainwright/Davenport Foundry (Middlebury): Soon after the end of the War of 1812, Rufus and Jonathan Wainwright, Jr., built a furnace (cupola or air furnace?) on or very near the site of the former Jonathan Nichols forge, which had already changed hands many times (Smith 1886:325-328). In 1821 they advertised cook, parlor, and box stoves and trimmings, caldrons, kettles, andirons, and hollowware. Their offer of terms for cattle, horses, or grain with "a liberal discount for cash" reflected the continuing problem of lack of hard money, nearly 50 years after Ira Allen's similar offers in his ironworks ventures.

Fire destroyed the works in the summer of 1826 along with nearby gristmills and sawmills. A new foundry was built on the east side of Paper Mills Falls, a mile downstream. The

R. & J. Wainwright,
HAVE now on hand and will keep for
sale, during the present season, a gen-
eral assortment of
STOVES,
consisting of
Cook, Parlour Shop and Sheet-
Iron Stoves,
—ALSO,—
Stove Pipe,
and Trimmings of every de-
scription.
Cattle, Grain, and a few good Horses,
will be taken in payment for the above arti-
cles.
Middlebury, Sept. 18, 1821. 5—tf

4-15. National Standard October 2, 1821 (courtesy Sheldon Museum).

December 1841 issue of the *Middlebury People's Press* announced that E. & A. A. (Edward and Alonzo A.) Wainwright were selling cooking, box, and parlor stoves, plows and plow irons, and hollowware "that have been manufactured at this furnace for the last 20 years."

In April 1844, Wainwright made a detailed description of these works (which included a "new building") for fire insurance purposes:

The following is a description of the buildings belonging to Edward Wainwright situated in Middlebury at the lower falls on the East side of Otter Creek and one mile north of the village. The buildings are situated in relation to each other as follows: —the furnace stands immediately on the bank of the creek—and is 80 feet 10 inch by 30 feet 4 inches and one story high, and the roof is covered with sheet iron plates except 17 feet of the north end. The pots for smelting iron [are] placed in the south end of the furnace and in said furnace are two stoves for heating the same. Attached to the south end corner of the Furnace is a wing 11½ feet in breadth by 16 feet 2 inches in length. This wing is a wheel house and covered with sheet iron. Within 1 foot of the wing stands over the floom [sic] a building that is two stories high, is 24½ feet in length by 17 feet 4 inches in breadth and within the said building no fire is kept. North end of this building 21½ feet distant stands the coal House.

The coalhouse [is] directly east of the furnace distant 41 feet 2 inches. The new building stands immediately upon the bank of the creek somewhat west of north of the furnace, 41 feet from it. It is 50 feet 4 inches by 30 feet 4 inches and 2 stories high and is warmed by three stoves. The lower story is used as a machine shop—the upper story for joiner

shop for making stove patterns, &c. Northeast of this last building stands the horse shed, 11 feet from it (*Vermont Insurance* 1844:No. 502, Bk. 2).

The "pots for smelting" would appear to indicate the presence of an iron-smelting blast furnace, but no mention is made elsewhere in the description of a necessary ore house. The building dimensions and distances between buildings, to the inch, are an archeological find.

Five months later, a fire consumed the "furnace building and coal house containing Lehigh (coal) and charcoal plus valuable patterns, tools, &c." (Sheldon, Bk. 178). The loss was \$2,000, of which \$1,600 was covered by insurance. The loss included the 80- by 30-foot furnace building, valued at \$450 (*Vermont Insurance* 1844:No. 504, Bk. 2). The works were rebuilt and continued until the death of Jonathan Wainwright in 1845, at which time Jason Davenport bought the business. An 1849 advertisement listed machine castings, mill cranks and gears, stoves, caldrons, kettles, sleigh shoes, and wagon boxes for sale at the furnace. Davenport continued the business until about 1866.

Inspection of west side Paper (Pulp) Mills Falls in 1985 indicated evidence of the many mills that operated here at one time in the form of an impressive, deep raceway cut into solid rock, scattered bricks, many dozens of nails of all sizes, and many iron rods still firmly implanted in the stream bedrock just downstream of the covered bridge. On the east side of the falls, next to the headrace that leads to the hydroelectric power station, a 1986 inspection during lower-water conditions located some surface patches of slag-appearing material and significant stone wall foundations, which could be the remains of the Wainwright/Davenport foundry operations.

Upstream at Middlebury Falls, standing evidence of the former industrial activity of the village still exists, but no surface remains of the former Wainwright Foundry (or the Nichols Forge) can be found.

AD-146 Monkton Iron Company (Vergennes): The importance of the great falls of the Otter at Vergennes was recognized at an early time. The first mill here was a sawmill constructed in 1764 (Smith 1886:642). The next year a contract to build a gristmill was made. Considerable contention for these early mills ensued between New York and Vermont interests, including quasi-military actions by Ethan and Ira Allen just previous to the Revolutionary War. Mill construction at the falls proceeded vigorously following the war.

The year 1786 is mentioned as the date of the first ironworks. This forge might have been built by Gideon Spencer of Bennington, who moved to Vergennes that year (Smith 1886:646-647). Ore came from local beds (and Skene's ore bed in New York?), mixed with magnetic ores from northern Vermont (Highgate) and New York. A description of Vergennes in 1788 includes a small forge on the east side of Otter Creek, probably Spencer's (Smith 1886:649). The works changed hands many times, coming to Jabez G. Fitch in October 1789. It was seized the next year by a sheriff's return on a writ against Fitch in favor of some Québec merchants. The property included the residence of a bloomer, one forge with "every implement necessary for operating" one coal shed, and a blacksmith shop (Smith 1886:653). Azariah Tousey operated another forge on the west side of the creek above the falls in 1799 (Smith 1886:662).

IRON FOUNDRY AND MACHINE SHOP

The subscriber having purchased the *Wainwright Furnace*, would respectfully inform the public that he is now ready to execute all orders for

Castings of every Description:

Such as *Machine Castings, Mill Crank and Gearings, Stoves, and Stoves Plates of all kinds Caldron and other Kettles, Sleigh Shoes, Waggon Boxes, &c. &c.*

FORGE CASTINGS OF ALL KINDS CONSTANTLY ON HAND.

TABOR, EAGLE, and almost every variety of *Plough* castings on hand, or furnished at short notice.

THE MACHINE SHOP

Attached to the Furnace, contains facilities for business, and *competent workmen* are employed; and he feels confident in saying that all kinds of Machine work will be done in a workmanlike manner, on short notice, and at prices to correspond with the times.

All orders addressed to the subscriber at the office of DAVENPORT & NASH, or to LEONARD WALKER, *Machinist*, on the premises, will receive prompt attention.

1:1y JASON DAVENPORT.
Middlebury Lower Falls, May 1, 1849.

4-16. Middlebury Galaxy August 7, 1849 (courtesy Sheldon Museum).

These operations were all in place and operating when a gentleman arrived in 1807 from Boston to effect the transformation of the iron industry in Vergennes.

The Monkton Iron Company was exceptional not for what it did or did not do, but for the wealth of historical data the company left behind. The trials and failures of a group of Boston investors trying to turn a profit from an ambitious venture nearly 300 miles away is laid open by the record of papers and ledgers on file at the Bixby Memorial Library at Vergennes. In 1932, Adella Ingham authored an unpublished manuscript titled *In The Days of The Monkton Iron Company of Vergennes, Vermont 1807-1830*, which documented her research into Monkton Iron Company letters and ledgers that had recently come into the possession of the Bixby Library through the generosity of Philip C. Tucker III. As the assistant librarian, she took on the task for personal interest, as only so many valuable little histories are ever written. Not enough credit can

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be given for efforts such as these, in a period when research grants were rare and the Comprehensive Employment and Training Act (CETA) was yet a lifetime away. Through her writing we can follow the daily frustrations of the company and its few slim successes. But were these frustrations reserved for the Monkton Iron Company alone? Nowhere else has such an explicit record been found of another Vermont ironworks operation. We know only bits of information; a starting date here, an abandonment date there, some tonnages and topics of interest someplace else. Everything between this scattered information can only be conjectured. But just as we must be careful not to conclude that the Vergennes ironworks experience was typical for others in Vermont, we must also be careful not to conclude that the others were more successful. A majority of ironworks ventures in Vermont had a short life. Many died in infancy.

By 1807 Boston had become one of the busiest ports on the coast, with merchant ships carrying on trade with ports as far away as China. And though their main attention was directed out to sea, it was not uncommon for Boston merchantmen to look inland for opportunities. That summer found Perkins Nichols of Boston buying up tracts of land in Vermont. Various identified as an engineer, lawyer, and merchant, he was impressed by the potential of the falls at Vergennes and the proximity of iron ore beds a few miles away at Monkton. He was also an associate of a group of other Boston merchants who organized themselves later that year as the Monkton Iron Company (Seaburg and Paterson 1971:199-219).

The company consisted of Stephen and George Higginson, Francis Bradbury, James and Thomas H. "Colonel" Perkins, Benjamin Welles, Perkins Nichols, and William Parsons. Colonel Perkins, the major force behind the partnership, was a Boston merchant who built a fortune in sea trade, canals, bridges, politics, land speculation, and mining. In December 1807 an embargo on foreign trade was put into effect. Shipping dropped to zero and the port of Boston was starting to take on the appearance of a ghost town. The Monkton Iron Company appeared to provide a timely outlet for the Boston money men to put now-idle capital back to work. But because they were relative amateurs when it came to the iron business, the venture proved a financial disaster. They had the political and financial acumen to become the leading spokesmen on the Boston waterfront, but did not have the skill to run a successful iron business. Their hiring of men to supervise the construction of the ironworks through secondhand advice was in complete contradiction to their methods of operating a successful shipping business and it cost them endless problems. But you could not prove it by the people in and around the little community of Vergennes, who knew a good thing when they saw it; or to the U.S. Navy, which a few years later was rewarded with an unexpected tactical coup.

By mid-1808 construction of the furnace hearth had commenced with the expectation that it would go into blast before winter. Construction took place near the southern end of the falls, right side when facing upstream. (The 1810 Whitelaw map indicates an ironworks on the opposite side, not on this side until 1821.) Attempts to speed up the work were protested by the local workers who demanded higher wages despite the high unemployment at Boston caused by the embargo. With

summer, many workers left for haying. The wheelwright who had been hired in March to construct the waterwheel machinery had not yet arrived by July. Waterwheel construction went ahead anyway with local supervision. The wheelwright finally arrived in September and the next month the furnace was completed, but the December date for going into blast was thwarted by an early and unusually cold winter that froze the Otter Creek. Work shut down until spring.

The plans were to build a blast furnace, some forges, plus rolling and slitting mills and nail machines. The company was going to operate every phase of the production: from mining and charcoaling to smelting and refining, thence to casting, machining, and finally, marketing. Even a company store and employee library were planned.

Work on dams, flumes, and the beginnings of a blast furnace was begun as soon as the property came into the hands of the Company. Laborers were hired for the construction work in Vergennes and fifteen or twenty were set at work at the ore bed in Monkton. They spent much time clearing away the earth to prevent its falling in when the blasting was begun. A boarding house was built and a family hired to manage it. Irish and Canadian laborers worked for the small sum of ten dollars a month "and found" [food and lodging].

Well-wooded land was to be had at four or five dollars an acre, and that was an important consideration. The fuel used in the furnace and forge was charcoal and large quantities had to be provided. Mr. Bradbury bought up tracts of woodland in surrounding towns and hired men to cut the timber and convert it to charcoal. Some of the tracts purchased included as many as five hundred acres. He also advertised for charcoal and many settlers went into the business of making it. A boarding house for the laborers in Vergennes was built. At about this time the Company opened a general store in Vergennes.

In March 1808 we find record of a man named Butler cutting a thousand cords of wood at two dollars a cord and another gang of men cutting twelve hundred cords at the same price. How fast the original forest must have been disappearing! Houses for storing the charcoal were now necessary and eventually there were fifteen such houses. Blacksmith shops in Vergennes and Monkton were found to be needed when the ore and charcoal were being brought in to Vergennes. A farm in Ferrisburg, with a small forge near by, was owned by the Company. Here cattle, sheep and hogs were raised to furnish food for the employees.

Mr. Bradbury was a very busy man. He bought timberland, got out timber for the construction in Vergennes and contracted for charcoal, supervised the work at the ore bed and at the Ferrisburg farm, to say nothing of the building of dams, flumes and the blast furnace in Vergennes. Small wonder that he protested that he could not attend to the retail shop. He did not feel competent to select the articles to be kept in a country store and begged the officers of the Company in Boston to put in a man accustomed to such trade. This man was provided and the store stocked and in operation. This was in January, 1808. . . .

In November 1808 more than a hundred men were em-

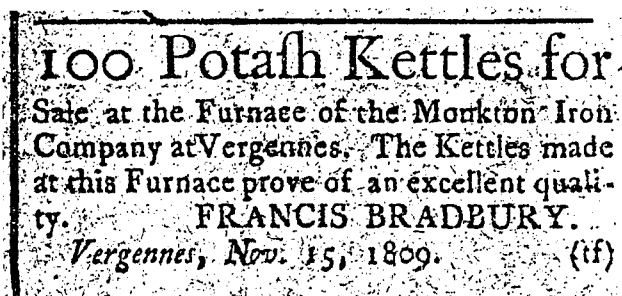
ployed by the Company; colliers, miners, carpenters and masons, and all bought their supplies from the company store. Charcoal was bartered for store goods. . . . Many pairs of oxen and horses were used in drawing the ore from the ore bed to Vergennes and in bringing in the charcoal. . . .

The Company was now running three boarding houses and the matter of provisions was important. Evidently much wheat was then raised in the country round about and frequent mention is made of buying it by the bushel for the boarding houses. Beef, pork and shad were bought by the barrel. Candles were an important item to provide and were often mentioned.

Contracts were made for raising the ore at the Monkton ore bed for seventy-five cents a ton. At the lake ore bed it was one dollar.

Several spans of mules were bought in Hartford, Connecticut to take the place of oxen and were the first to appear in this part of the country. At one time the Company owned thirty-seven oxen, twenty-nine horses and seven mules. Great effort was made on the Ferrisburg and Monkton farms to raise hay and oats for the horses and cattle owned by the Company. Much hay had to be purchased however.

An orchard of five hundred apple trees was planted on the Monkton farm and it is said the remains of it may still be seen' (Ingham 1932:5-13).



4-17. Middlebury Mercury May 30, 1810 (courtesy Sheldon Museum).

The furnace was fired on May 11, 1809 after the repair of the winter ice damage to some of the waterpower equipment. Nine days later the furnace was warm and stabilized. The waterwheel started turning, the bellows began their rhythmic creaking and puffing, and the blast began. An inability to control the speed of the waterwheel caused a hotter than desired blast and some small cracks in the hearth, resulting in fears that it might burn out prematurely. During the early summer the charge was slowly increased with no serious problem, and the yield climbed from 1½ tons to nearly 2 tons of iron a day. But this was far less than the 4½ tons that had been expected. On August 6 the furnace was shut down to rebuild the hearth. The chance to make a killing in the iron market was slipping away. Cheaper iron from Europe was now arriving at Boston with the lifting of the embargo the previous March. In early September the furnace again shut down for repairs.

In two months the hearth was repaired and the furnace was once more back in blast. A month later, results of the repair became evident as the yield rose to 3 tons a day, but still over a ton a day less than hoped for. And although the potash kettles being cast were not moving too well, the stoves were beginning to attract a market; some profits meant some cheerful news in Boston. But just then the tymph stone broke. Failure of the tymph stone forced another shutdown and a time-consuming cooling-down period. Furnace repairs were completed in mid-January 1810; the furnace was refired, then shut down again to replace another burned-out hearth. By June the furnace was back in operation for the fourth time in a year, surviving a leaky flume and the sudden illness of its operators. After a month the creek level dropped and the waterwheel slowed to a stop. With this stoppage, some repairs were made, one of which was to improve the regulation of the blast pressure. By the end of October, the furnace was again in blast, followed by another problem, and shut down at the end of November. A month later, ice stopped the refinery wheels from converting cast iron into wrought iron and on the first day of 1811 everything came to a halt.

So it went at Vergennes with the iron company continuing its unprofitable trial and error ways until the War of 1812 caught up with Vermont. Early in 1813, a contract was made with the government for 300 tons of shot for the small fleet of gunboats on Lake Champlain. By that summer the works were producing 7 tons of iron and 12 tons of shot a week at a cost to the government that approached four times the expense to the company. It had finally struck on a way out of the dilemma of profitless years: a U.S. defense contract! "In December 1812 the United States government ordered three hundred tons of cannon shot from the Company. In February 1813 Mr. Welles writes to George Bamford of the Ordinance [sic] Department [at] Albany. After a long dissertation on the sizes of cannon shot he goes on to say: 'Nothing could afford me higher gratification than to see you at our works. They are the largest in the U.S. and our stock of ore, coal and pigs is so great that we could at once go into very large business for the government'" (Ingham 1932:25-26).

The statement about the company being the largest in the U.S. has been quoted many times in books and magazines and taken as fact. Many large ironworks, however, were also operating during the War of 1812 in northwestern Connecticut, the Hudson River highlands of New York, just south in New Jersey, and throughout many parts of Pennsylvania. Almost all were situated on better transportation routes to more effectively support the American forces along the east coast. That the Monkton Iron Company might have been equal in size to some of these could be true; that it was the largest of them all is doubtful. Most likely, Benjamin Welles was "puffing" to the government agent in hopes of furthering his company's financial gain.

Commodore MacDonough's little fleet of warships went into winter quarters up Otter Creek, conveniently close to the ironworks, and in January 1814 received authorization to construct new gunboats. That September the newly outfitted and armed gunboats sailed out to the lake, thrashed the British fleet at Plattsburgh, and sent the invasion army packing back to Canada. "The battle of Plattsburg in which Commodore Macdonough defeated the British took place September 11, 1814. In October

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Mr. Perkins wrote Mr. Welles: 'I believe in my heart that Macdonough saved our works, but I believe too that our works saved his ships by furnishing a large supply of shot. So that I think it is an even bargain' (Ingham 1932:35).

Hostilities ended three months after the battles on Lake Champlain, and the sweet taste of victory at the ironworks proved short-lived when it was realized that the company had lost its most profitable customer.

The Company was making wire of different sizes and mention is made of stoves. They are described as "common shoemakers' shop stoves, double stoves with ovens, 3 ft single stoves with ovens and mechanics' stoves." The prices were \$40, \$30, \$28 and \$12. Machines were set up for making screws, but there was no market for their product. . . .

Following the period of great activity on the lake came a period of financial depression. The Company made every effort to collect bills and turn into money their varied stock of iron. Debts were put into the hands of collectors and at least one man was imprisoned for debt. The Company continued to make sheet iron and wire but could find little market for them (Ingham 1932:35-36).

The forges continued making stoves, hollowware, and other hardware. But with European iron once more arriving at Boston much cheaper than nearby Monkton iron, the works shut down in 1816. An October 2, 1816 item in a Boston newspaper noted that "the extensive Iron Works, water rights, mills, and estates belonging thereto, situated in the town of Vergennes, state of Vermont" were for sale to anyone who wanted to form a company to carry on the business. It was during this time that 15-year-old Philip C. Tucker was hired and became company assistant clerk and bookkeeper.

[Mr.] Tucker remained in charge of the Counting-house and Works. It was a position of much responsibility and care. To enumerate the duties required of this sixteen-year-old boy: the care of the counting-house, correspondence and bookkeeping, watchful supervision over the grist mill and at least weekly division of the grain brought in, frequent visits to the Ferrisburg farm, the Monkton ore bed and farm where there was stock to be cared for, and occasional visits to the lake property to prevent depredations on the timber land. All the buildings and machinery of the Works were to be inspected and kept in repair.

He made constant effort to sell iron and iron products and advertised in Burlington and Middlebury papers. The matter of the taxes on the New York lands caused him much anxiety and several trips to Essex and Albany New York. Every means was taken to collect bills and many notes were sued. Detailed accounts of all events and conditions at the Works were written to Mr. Welles in Boston, yet this very busy young man found time to read and make notes on the books read.

An ironworker in Fairhaven, Vermont offered to buy the scrap iron, viz., thick and sheet iron trimmings, ends of bars and whatever blacksmiths' scraps there were at \$2 a hundred weight, and it is a sad commentary on the condition of affairs that the Company was glad to accept this offer.

Some pine timber on the Company's land was sold at this time to Capt. Sherman of the Steamboat Company.

The year 1816 was a barren year. All crops were so poor that the stock on the farms could not be wintered. Mr. Tucker sold all the sheep except the merinos. There were eighteen head of cattle and no hay to feed them. On the advice of a business man, Mr. Booth, Mr. Tucker considered killing them and salting the beef to be sold in Canada, but he found there was an embargo on salt beef and pork. He then decided the thing to do was to drive them to Canada and sell them on the hoof. In November 1816 this young lad on horseback, with a drover starts on this long trip driving eighteen head of cattle. . . .

Sale 1 cow	\$ 18.00	
Sale 17 beef oxen weighing	449.77	[sic]
12150 lbs at \$3.70		
Less exchange Bradbury	6.00	
	\$461.77	

Expenses P.C. Tucker driving horse and 18 beef cattle to Montreal		
Common exps.	\$ 68.19	
Ferry across Lake Champlain and	18.75	
River St. Lawrence		
Destruction of cabbage gardens	5.00	
Assistance catching runaway cattle	1.75	
Duties	11.25	
Stowell's bill services selling	5.00	
Drover's wages	16.00	
	\$125.66	[sic]
[net]		\$336.11

It is plainly to be seen that every effort to raise money on the personal property of the Company was being made (Ingham 1932:38-44).

Government thoughts for a while in 1817 of establishing an arsenal near the Canadian border stirred some hope among the Boston merchants that they might yet get bailed out. When President Monroe inspected the extensive (but idle) ironworks he was not impressed. The arsenal was built elsewhere although 11 years later an arsenal did become a reality for Vergennes. When the works closed down it consisted of the blast furnace, a cupola furnace, eight forges, a wire factory, a rolling mill, plus gristmills, sawmills, and fulling mills. An 1817 advertisement mentioned a large number of cast-iron and wrought-iron products on hand and for sale. In his travels through Vermont in 1819, Levi Woodbury arrived at Vergennes on Thursday, May 14, and made the following observation of the ironworks there: "Below the Falls, but so near as to have all its machinery turned by water from above are situated very extensive Iron works. They are at present suspended & decaying. One building contains 8 or 9 chimneys and bellows &c. for making bar-iron. The furnace, the outhouses &c. are 12 or 15 in number. Both bar and cast iron were manufactured here. The ore was dug on the New York side of the Lake & is not I should think the best quality" (Fant 1966:49).

"For a short time in August 1821 the Air Furnace was revived and moulders put to work making castings. Mr. Tucker assured Mr. Welles that he had 'furnished the furnace roof with proper ladders and kept the water buckets continually full. . . .' About this time Tucker sold for the Company a piece of land in

Notice.

The Monkton Iron Co.

Have on hand a large assortment of

BAR-IRON,

Plough Share-Moulds,

Sleigh and Cutter-Shoes,

Waggon-Tire,

10d Nail-Rods,

Horse-Nail-Rods,

Hub-Iron,

Trace and Draught-Chains,

Double, 3 feet, 2 1-2 feet & close

Cast-Iron Stoves,

Pot Ash Kettles,

Farmers' Caldrons,

4d, 8d, & 10d, Cut Nails,

A large quantity first quality

Yellow Ochre :

All of which they offer for

sale on good terms at their store in Vergennes

for cash or approved credit.

BENJ. WELLS, Agent M. I. Co.

Per PHILIP C. TUCKER.

Vergennes, Sept. 27, 1817. 63

4-18. National Standard October 15, 1817 (courtesy Sheldon Museum).

Vergennes, six rods by five, for \$450 which he thought a very good price in Vergennes" (Ingham 1932:45-46).

Not until after the opening of the Champlain Canal did the iron business revive to any degree in Vergennes. By that time, Amos W. Barnum had established himself as one of the city's leaders, holding a number of political posts, including mayor from 1824 to 1828. Barnum saw the value of the Champlain Canal toward promoting the commercial interests of the city's harbor and started a Tow Path Company for towing canal boats to and from the lake, seven miles down the Otter Creek. The towpath was used for several years until the advent of the lake steamers. He and others succeeded in organizing the Bank of Vergennes, which was rechartered the National Bank of Vergennes in 1865. Besides Barnum, the directors included Thomas D. Hammond, brother of Charles F. Hammond, one of the Crown Point Iron Company founders. When Barnum resigned, William Nash replaced him. Nash was a New Haven industrialist and owned a forge at New Haven Mills. Barnum also owned interests in the Stevens House and the American Hotel.

Barnum leased some of his land on the northeast side of the falls in 1824 to Alfred T. Rathbone, who built a blast furnace on it that same year. (Rathbone's father, Wait, had built blast furnaces in Clarendon (RU-97) and Tinmouth (RU-77) some years before.) Stoves and hollowware were cast by Alfred Rathbone, who also advertised to sell tea kettles, spiders, and irons, and plow irons (*Vermont Aurora* July 15, 1824; *National Standard* July 28, 1824). Soon after, Rathbone leased his furnace to Hector H. Crane (Smith 1886:677). In the fall of 1825 and early 1826, Crane published the following advertisement:

Vergennes Blast Furnace—The subscriber informs the public that he has put his blast furnace in complete operation, and is prepared to execute orders for machine castings, from one pound to fifteen hundred pounds, at the Troy prices. He has on hand, a complete assortment of Hollow Ware, such as kettles holding from 2 quarts to 15 gallons, pots of various sizes, Spiders, Pans, Basins, Skillets, Bake Pans, Tea Kettles, Andirons, and Cast and Wagon Boxes. He will be ready in the fall to accommodate his customers with Parlor, Shop, and Cooking Stoves, and Potash and Caldron Kettles. The above articles with the exception of the Machinery Castings will be sold upon the approved credit, or for almost any kind of country products, on as reasonable terms as they can be had at other Furnace in any part of the country. Merchants can be furnished at the Troy prices (*Vermont Aurora* Sept. 22, 1825; Jan. 6, 1826).

The reference to Troy prices reflected competition with Troy, New York, the result of the newly opened Champlain Canal.

Alfred T. Rathbone, who had built this furnace on land leased from Amos Barnum, ran afoul of the law about 1826 when he found himself "financially over-extended." His creditors had him jailed (he escaped briefly) and he lost his furnace in the ensuing court action.

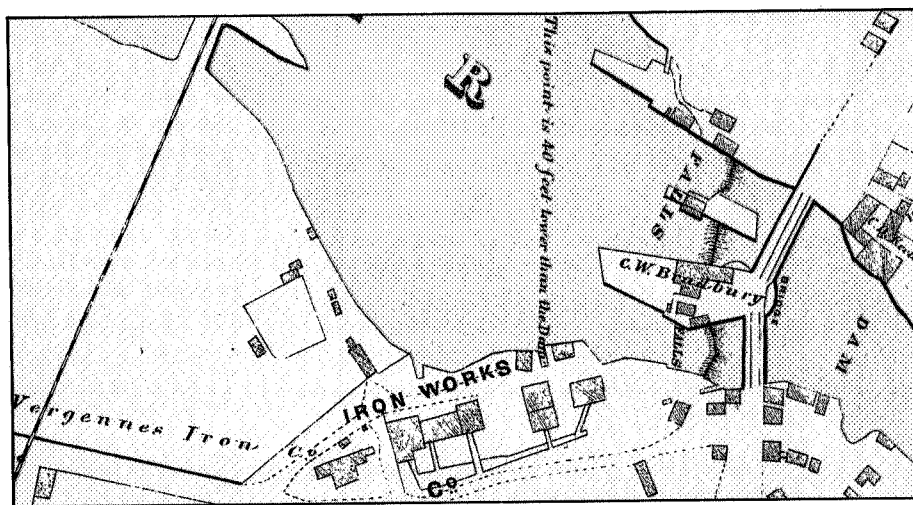
Barnum's ironworks interests also included ore beds in Monkton and near Moriah, New York, and 1,200 acres of timberland near Westport, New York, where the Sisco Furnace operated (*Vermont Aurora* June 18, 1829). Yet despite his vast holdings, he died a poor—and childless—man at age 57 (Smith 1886:676).

After the sale of its property on the falls in 1831, the Monkton Iron Company still owned 2,300 acres of land in New York and 1,500 acres of timber tracts in Vermont. New York acreage no doubt was bought by iron interests there, such as Colburn who owned a blast furnace at Moriah and who bought the nearby Monkton Iron Company ore beds (Ingham 1932:49-50).

The "old furnace" was still standing at Vergennes in 1849, but it is not known for sure if it was that owned by the Monkton Iron Company (Hodge May 19, 1849:305). The 1853 map of Vergennes indicates the ca.-1830 flume cut by Ward, leading from the falls to the site of the Vergennes Iron Works.

The area suspected to have been occupied by the Monkton Iron Company is generally believed to have been on the south side of the Otter Creek, at and just below the falls, although some (or all) operations could have been on the north side as indicated by Whitelaw's 1810 map. Both sides have been thoroughly surface-inspected many times at various times of the year from 1978 to 1990 without finding anything that can be firmly associated with the Monkton Iron Company. Both

4-19. The Vergennes Iron Company on the south bank of the Otter Creek in 1853. Note the flume which runs behind the works, the only visible remains of the works today (Wall and Forrest Map of Vergennes 1853).



sides of the falls have undergone successions of industrial development and each have left bits and pieces of their existence behind in the form of miscellaneous castings, slag, firebrick, foundation walls, and various telltale cuts and modifications to the ledge at the base of the falls. Who knows what industrial artifacts lie at the bottom of the creek below the falls. What surface evidence remains today that can be connected with an ironworks most likely is related to the Vergennes Iron Company and/or the National Horse Nail Company (see AD-IW03, following).

AD-IW03 Vergennes Iron Company/White's Forge/National Horse Nail Company (Vergennes): When John D. Ward bought the lease of the Monkton Iron Company in 1831, he built a foundry and a flume to power it, commenced the hiring of a large number of men, and carried on a renewed iron business.

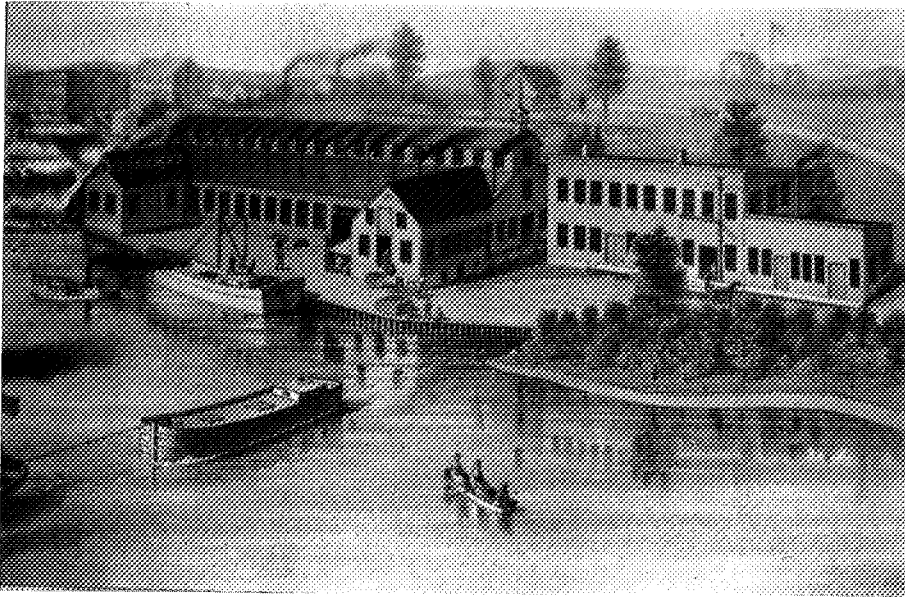
He sold the works in 1836 to Appolos Austin, William H. White, and Henry Hewitt, who formed the Vergennes Iron Company (Smith 1886:689).

One of the former owners of the Vergennes Iron Company, William H. White, built a bloomery in 1847. The forge operated marginally for 10 years, although it did become widely known throughout the Northeast. Annual production was 75 tons of iron from 1854 to 1856 and 50 tons in 1857 (Neilson 1866:232-235). These were poor economic years nationwide.

When the Vergennes Iron Company ceased operations in 1857, iron making came to an end in Vergennes. The property was bought by the Vergennes Water Company in 1866 to promote the industrial resources of the area. Two years later the National Horse Nail Company was organized, probably moving into the former buildings of the Vergennes Iron Company at



4-20. The falls at Vergennes (left) and the south shore of the Otter immediately after the Civil War. Left-center: the National Horse Nail Company (before the first fire); right-center: the machine shop and the foundry of the Vergennes Machine Company; right edge: Kendall & Miles sash and door factory (courtesy Bixby Memorial Library, Vergennes).



4-21. *The National Horse Nail Company at Vergennes, built after a fire in 1882 but burned again in 1902 (Geo. H. Walker & Co., Lithographer).*

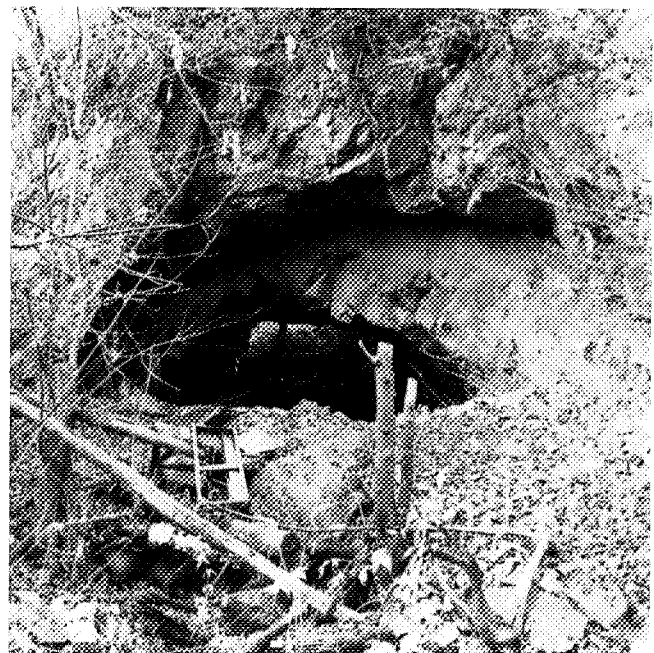
the base of the falls, on the south side of Otter Creek. It continued the iron business there, much more successfully than the ill-fated Monkton Iron Company. The horse nails were made by the "cold cut" process, with nails cut out of cold iron plate. The nail was called National and was unique in being the first horse nail put on the market that was pointed and ready for driving. Previously, nails needed pointing before they could be used (Bixby Library files, p. 18). A ca.-1870 painting (by Rowland E. Robinson?) of the falls and harbor shows a cluster of industrial buildings at the site of the foundry near the bottom of the falls; the cluster includes what appears to be foundry, machine shop, and furnace buildings.

Fire destroyed the entire works on February 9, 1882. The works were rebuilt the next year, the new "hot forged" process substituted for the old, and the horse nail renamed the Champlain. When run at full capacity, the works' 80 employees could turn out 600 tons of horse nails annually.

The 1885 Sanborn map shows the main foundry building parallel to and between the Otter Creek and the raceway cut into solid rock. This race was cut in 1831 by John D. Ward, who had bought the lease of the Monkton Iron Company and built a foundry that eventually became the Vergennes Iron Company. A flume branching away at a right angle from the main raceway drove a waterwheel and blower at the east end (upstream) of the building. Sixteen forges are shown inside this end, eight to a side. The other end contained a machine shop and rooms for finishing, sorting and packing, and shipping. Two separate buildings housed a foundry and a forge for splicing the nail rods.

On Wednesday evening, October 29, 1902, another fire struck, again completely leveling the works, nearly taking the nearby shade roller factory with it: "It was a terrible but magnificent spectacle to see the rolling flames enwrapping the doomed building, everything being reflected luridly in the waters of the Otter Creek, so near at hand, yet powerless to

save the works" (Bixby Library files, p. 18). This time the company chose not to rebuild, joining the many others that had succumbed to fire. The site lay abandoned for nearly 20 years until the hydroelectric potential of the falls was discovered, first by the Burlington Traction Company to power its trolleys and later by the Green Mountain Power Corporation.



4-22. *The middle section of the flume below the falls at Vergennes, tunneled through solid rock. This flume supplied water that powered the foundries at the base of the falls.*



4-23. An abandoned turbine at the upstream end of the tunnel at Vergennes.

Most of the flume remains are still there today, cut into bedrock in some places and tunneled through in others. The easternmost (upstream) tunnel section is about 8 feet high, 12 feet wide, and 83 feet long. There are concrete walls at the eastern end (facing the falls) that show a vertical sluice gate existed here. Some 27 feet farther west is the middle tunnel, 66 feet long. Then comes a 150-foot-long cut that ends at the entrance to the westernmost tunnel. This tunnel is also faced with concrete that indicates another sluice gate operated here. Inside the tunnel (not explored) is a six-foot-diameter iron pipe that ends 27 feet inside, beneath breakdown. It is suspected that beneath this breakdown is a vertical shaft that leads downward to the turbine. The tailrace back to the Otter Creek cannot be located and probably lies beneath fill. Total length of the tunnels and cuts is about 353 feet.

Near the western end of the raceway, much dark, heavy slag can be seen partially buried under the fill. Lighter, blast furnace slag can be found along the stream bank immediately downstream of the hydroelectric station. There are also some pieces of firebrick from Troy, New York, similar to those found at the blast furnaces and lime kilns elsewhere in Vermont. Both shores of the Otter Creek have experienced fires and floods many times, and much earth has been moved about recently to build the waste treatment facility. Closer to the falls is a modern hydroelectric generating and substation switching complex, reflecting the continued industrial vitality of the Great Falls of the Otter.

AD-IW04 Belding/Drake Furnace (Weybridge): Three miles north of Middlebury Falls is Beldens, at a falls on the Otter Creek. Joseph McKee built a sawmill here in 1791 and sold it to David Belding two years later. Belding added a gristmill in 1794 and a small furnace the next year, building up an industrial community (Smith 1886:719). Belding's furnace was one of

many small ironworks that operated in this area in the very early 1800s.

Arriving here about the same time as Belding were Asoph Drake and Ebenezer Scott. They married Belding's two daughters and became associated with their father-in-law's industrial pursuits (Smith 1886:715-716). The vicinity became known as Belding's Falls and the community was established on the Weybridge side of Otter Creek. Items cast and wrought here included nails, spikes, plow irons, and frying pans (*Drake Papers* 1802). The works may have operated until 1806. After the railroad was built north from Middlebury on the east side of the Otter, the community followed the industries to the New Haven side and became known as Beldens (Swift 1977:53).

AD-414 Brooks Edge Tool Company (New Haven): Before the disastrous 1830 flood washed away nearly all the mills along the New Haven River, a number of factories and shops thrived at what was then called Beemans Hollow. These included a trip-hammer shop, carding shop, blacksmith shop, two sawmills, two wagon shops, and two pocket furnaces. Fifteen years after the flood, an industrious blacksmith, Barzillai Brooks, moved to the hollow from New Haven Mills with his four sons, started making edge tools, and eventually established a company that produced fine axes and cutting tools (Smith 1886:537).

Barzillai and all his sons eventually became partners in a family operation, and the prosperous little community that grew around the works became today's village of Brooksville. "To the census enumerators in 1850 they reported using 40 tons of iron, 10 tons of steel, 100 tons of coal for firing the furnaces, and 20 grindstones. Eighteen men were employed, and the factory's output was 35,000 axes valued at \$30,000" (Farnsworth 1984:146).

Following the retirement of the elder Brooks in 1866, one

of the sons, Norman, along with two others, organized the Brooks Edge Tool Company. They built the forge and trip-hammer shop just below the falls (remains of which exist today) and production flourished (Rucker Aug. 1981:3). "An average worker earned \$225 a year in 1860, \$500 a year in 1870. . . . Although a variety of edge tools were made, the company's specialty was axes—as many as 50,000 a year, sold wholesale for \$11 a dozen" (Farnsworth 1984:146).

On September 7, 1877, the following description of the works was published in the *Middlebury Register*:

This is an institution. It always has been. It existed before Brooksville did. The Brookses have always run it. They probably always will. The men employed in the shop are strong, robust, healthy looking fellows, but it is an unwellcome fact that men engaged in this business seldom live to a very great age. It is unhealthy business. Where the disease known as the "grinder's consumption" fastens upon its victim, it works slowly but surely till death. There are few ax factories in America, but the few supply the great demand. This factory is not among the largest, though they sell their wares over almost all the northern states.

Persons in this vicinity having a holiday could not spend it more pleasantly or profitably than by looking through these shops. The managers are gentlemen and will treat you with courtesy.

The factory is now in full blast. The tools manufactured are axes, hatchets, and a queer looking thing with an ax on one end and a hook on the other, used by firemen. They get their "polls" from Cohoes, New York. The first forgers, those who draw out the "bit," are the veterans, Messrs James Nott [Nutt?] and John Shedrick. They are among the few who learned the business at this place, who are at work in the shop now. The most of the men came from the larger factories in New York. Mr. George Keyes and helper take the axes from the first forgers and draw the bit down finer. Mr. Tom Ryan and helper make the other tools. These men with a quick eye and ready hand make a handsome hatchet out of the rough bar of iron. The axes then undergo the inspection of the manager, Mr. Norman Brooks, who with a strong pair of glasses to detect the slightest mark of poor material or careless workmanship, looks them over, and if such is found, back it goes to the forgers. The grinders then have the axes; then the temperer, who places them over a hot fire and heats them to the right heat, which no one can tell but he. Mr. Frank Brooks is the temperer, and while watching his axes, he will tell you a jolly story.

From the tempering room the axes go to the grinders again and then the polishers. The polishing is done with emery fastened by glue upon a wheel, which at swift speed makes the sparks fly every time the axe touches it. In this room we find Mr. Tom Stringham and Sidney Raymond, the old grinder, who has taken to this branch. The axes then go into the finishing room, are wiped off, stamped "N. C. Brooks, Brooksville, Vt.," varnished and bronzed or painted, and hung upon a beam to dry. Then dusted, labeled and each done up in a separate paper wrapper, boxed up and sent to the depot or store room.

The company have two large store rooms. They make

their own boxes, but get their helms from Sandusky, Ohio. They put handles on comparatively few of their tools. Mr. Will Brooks is overseer of the finishing or blacking room as it is called. Here also we find Mr. John Barton, who has worked in the shop off and on ever since he was "so high." . . . J. S.

The 1871 Beers map of Brooksville identifies the Brooks Edge Tool Company axe factory (forge) and other company buildings on the south side of the river, and a finishing and carpenter shop, the residence of N. C. Brooks, and more company buildings on the north side. Altogether, 13 buildings appear to be connected with the company or the Brooks family. A road is shown leading from the main street westward to a depot at the Rutland & Burlington Railroad.

Fire struck the works in 1881, destroying many buildings but not touching the forge. The *Middlebury Register* of May 20, 1881 described the excitement:

Fire in Brooksville—Last Tuesday morning, about two o'clock, the little hamlet of Brooksville was awakened by the alarm of fire, and turned out to find the roof of one of the buildings of the Brooksville Edge Tool Company on the east side of the dam blazing up. It had gained such headway that it was soon seen that nothing could be done to stay it and in a short time all the buildings in connection with the finishing shop, where the fire started, were blazing. The wind blew strongly from the northwest and the flames speedily lapped up the house and barn of James D. Nutt standing nearby. It was feared for a time that the fire would extend to the covered bridge, over the New Haven River, and help was sent for to Middlebury. The steamer was hitched up and had got to the further slope of Chipman Hill when word came that the danger was past, and the steamer returned to its quarters. There was from 8 to 1000 dozen [*sic*] finished axes in the building, of which all but a small portion was thrown out, little damaged so that the loss on the finished stock is not large. The total loss of the Edge Tool Company is less than 5 thousand dollars on which there is seventeen hundred dollars insurance. . . .

There will be but a short delay on the part of the Edge Tool Company in filling orders, as the vacant room in the forge shop on the opposite side of the stream will be speedily fitted for the grinders and polishers, who will probably be able to go back to work next Monday. The work of rebuilding will begin at once, and in a short time things will be as lively as ever.

Within a month, contracts had been let for rebuilding the stone- and woodwork, and in August it was reported that Norman Brooks was in Troy, New York, negotiating for several car loads of iron. The axe trade was described as being "very brisk" (*Middlebury Register* June 17 and Aug. 5, 1881); brisk enough that in 1883, Frank B. Brooks opened a store in the community, later operated by Norman Brooks (Smith 1886:537-538). Two years later when Norman Brooks retired, production was 4,000 axes per year. But the business declined soon after, closing the works sometime in the 1890s. *Walton's Vermont Register* listed the company for the last time in 1892.

Brooksville today is a small, quiet community on a section of highway called Dog Team Road, long since bypassed on

200 Years of Soot and Sweat

the east by a two-mile stretch of Route 7. Downstream of the concrete bridge over the New Haven River are a series of low falls and rapids that, when dammed, provided power to drive the industries. Sparse indications remain of these old pursuits; however, sharp eyes and patient inspection will reveal an abandoned turbine here and there, some firebrick and slag, and pieces of coal and millstones hidden amid the thick (and thorny) underbrush along the shores of the river. Remains of the dam are seen in a line of iron rods along the top ledge at the upper falls.

At the south end of the dam site, a deep cut into ledge can be followed downstream in tall weeds for 100 feet to the stone foundation remains of the axe factory. This cut might have been for a headrace in earlier years; a ca.-1907 photo shows an approximately three-foot-diameter pipe following the cut, supplying waterpower to the turbine at the downstream end of the forge building (Farnsworth 1984:145). On each side of the river at about this place stood the Brooks' factory buildings. They were later used by the Vermont Marble Company, until 1920 (Farnsworth 1984:246).

Bits of rusted iron and slag are found in shoreline crevices; one crevice yielded a badly corroded axe head of undetermined manufacture (it looks nothing like the Brooks axe on display at the Sheldon Museum in nearby Middlebury). And a bit farther downstream, ALMON SHEDRICK VIIIIC [1892?] is chiseled into the broad upstream side of a flat ledge, barely readable, having been washed and worn by nearly a century of ice and gravel flow.

AD-IW05 Brooksville Pocket Furnaces (New Haven): Many small furnaces, called pocket furnaces by some, were built to "test" the local ores as well as the local market. Two such furnaces operated just downstream from Brooksville before 1815 (Smith 1886:537). One was on the north side of the river at the village where it was run by a Mr. Aiken. Nearby was a trip-hammer shop where scythes, hoes, and other tools were made. The other pocket furnace was across the river and just downstream, operated by John Wilson who also ran the sawmill immediately upstream. Nearly all these small industries were washed away in the great New Haven freshet of 1830. The vicinity was also the site of the later Brooks Edge Tool Company foundry and operations.

Inspection of the area in 1986 resulted in finding nothing related to blast furnace operations. The New Haven River area between Bristol village and the river's confluence with the Otter Creek has yet to be completely inspected for evidence of more blast furnaces and forges. This winding 10-mile stretch plus the Beldens area of the Otter Creek could still yield sites of up to four very early "pocket" blast furnaces.

AD-IW06 New Haven Mills Forge (New Haven): A forge (possibly a blacksmith's shop) was built somewhere in New Haven by Timothy Allen and Ezekiel Buttolph "at an early year." Another forge was run by David P. Nash at the mills from about 1794 until "worn out," the last remnant—the anvil block—washed away in an 1831 freshet (Beers *Addison* 1871:4). William Nash may also have been connected with this forge.

Inspection in 1984 of the remains of the many mills that operated at New Haven Mills resulted in finding some slag at scattered locations on the shore and in the riverbed. Due to

later industrial development of the area, no positive evidence could be found of a furnace or furnace site.

AD-340 Little Otter Furnace (New Haven): Francis Bradbury of the Monkton Iron Company at Vergennes became interested in one of the small New Haven furnaces in 1808: "There is a furnace now at New Haven about 5 or 6 miles from the Ore Bed. It is small but might answer well for pigs [pig iron]. It may now be purchased very cheap" (F. Bradbury letter to T. H. Perkins, April 5, 1808). The ore bed mentioned was the company's mine at Monkton, northeast of New Haven. Belding's 1794 furnace would have been farther away, more like 10 miles, even had it still been in operable condition in 1808. Brooksville (then known as Beemans Hollow) likewise was too far away. One good possibility was a blast furnace on the Little Otter Creek, and within the stated "5 or 6 miles" of the Monkton ore beds.

Bradbury mentioned a New Haven furnace in three letters in 1808: April 5, June 9, and October 25. In the June letter a Mr. Washburn is mentioned as the owner of the furnace; the October letter states that the furnace is in blast and doing well. Bradbury further wrote in the October 25, 1808 letter that "it would have been very well in my opinion to have purchased that furnace as I recommended last spring, to have stopped the spirit of others interfering with us, they take much coal [charcoal] that might come to us & continually seeking out ore, that may eventually diminish our establishment."

Bradbury's "Mr. Washburn" might have been Abisha Washburn of Middlebury, who was engaged during the Revolution by the State of Massachusetts to cast cannon at Salisbury, Connecticut. Following the war, he returned to Middlebury and built some of the earliest mills there (Smith 1886:259, 270). He died in 1813 so he was alive when Bradbury wrote his 1808 letters. At the Salisbury Cannon Foundry (Connecticut) in 1777 were a Jonathan Washburn, molder, and also an Abijah Washburn, who performed unspecified duties (Middlebrook 1935:43-44). From an anecdote found among Henry Sheldon's notes at the Sheldon Museum: "He [Washburn] was a founder and used to cast cannon for the Revolutionary War. A neighbor coming into his furnace one day asked him which fire he thought was the hottest, this one here in the forge or that fed by the evil one in the regions below. 'Jump in sir, jump in and you can try them both in half a minute' was his instant response" (Polly Darnell note to author, March 26, 1986).

Along the Little Otter Creek in northern New Haven is the site of an early Vermont blast furnace. Remains of an earthen dam is just east of the North Street bridge. A recent history of New Haven mentions a furnace and casting house that stood here from about 1801 to 1810 owned by Gamaliel Leonard and others, and previously in 1800 by John Gilbert, Ephraim Hubbell, and Jose Gorsline (Farnsworth 1984:250-261).

If Gamaliel Leonard "and others" included the elusive Mr. Washburn it is still a mystery. Leonard previously built and operated a forge along the Poultney River west of Fair Haven (RU-195), and prior to that worked at the Lenox Furnace, Massachusetts. Hubbell was owner of the gristmill originally built by Strong & Chipman on the island in the Falls of the Otter at Vergennes. Hubbell sold the gristmill to Bradbury in February 1810 (Smith 1886:663).

John Gilbert could have been the Job Gilbert whose name

appears in 1797 in connection with a petition for relief from civil prosecution in which he stated that he "has for a large number of years been principally employed & concerned in erecting furnaces stocking putting & continuing them in blast which has been attended with great expense & loss" (Soule vol. 11 1962:33). Job Gilbert came from Mansfield, Massachusetts, where extensive ironworks operated before the Revolution (*Vital Records* 1933:31). During the war he was a captain and by 1781 was owner of a blast furnace at Lenox, Massachusetts (Wood 1969:67-68). He sold the Lenox works in 1783, bought them back in 1785, then sold them again in 1787, at which time he disappears from Berkshire County records. The 1797 Vermont petition, therefore, places this experienced ironmaster at Little Otter Creek. The possibility that John and Job Gilbert were the same person is further supported by another reference to John Gilbert owning the Berkshire Furnace at Lenox in 1783 (Pearse 1876:49-50). Gilbert was also involved with William Gilliland and New York tracts of ore-bearing land between Crown Point and the Bouquet River. Although he was considering digging ore in the Adirondacks in the 1780s, he was not planning to transport the heavy ore to his furnace in Lenox, some 150 miles south, at a time before the Champlain Canal was in existence. He had written to Gilliland in March 1783 that he would like "to be concerned in iron works at Lake Champlain," and doubled the offer of a competitor for an ore bed owned by Gilliland (Allen ms 1980:10). By the 1790s Gilbert was making iron in New Haven along the Little Otter Creek.

Inspection of the Little Otter furnace site in 1984 resulted in finding the remains of a dam just east of the North Street bridge. From the topography, a sizeable millpond could have been created, sufficient to power water-driven bellows machinery. The dam, however, might date to an industry that followed the furnace because slag was found in the body of the dam. Slag and charcoal were found in the vicinity and on both sides of the road. According to John Peters, a gardener plowing Ray Martin's garden across the highway to the west unearthed some slag, but this has not been confirmed.

The furnace could have been on the south side of the creek, tucked into the side of a low hill that gave charging access to the top of the furnace. At the top of this hill are the faint remains of a road. There is also sufficient flat area at the bottom for the casting shed. This is the only practical site in the immediate area considering proximity to waterpower and access to the furnace top. If this is the correct site, the furnace hearth was almost level with the creek's flood plain. Major iron ore beds existed to the northeast in the Monkton/Bristol area, and limestone for flux was conveniently available in the area, all maybe solving Francis Bradbury's "mystery" furnace of 1808.

AD-432 Barnum/Nichols Forge (Ferrisburgh): This is one of a number of small forges that operated along the many falls of the Little Otter Creek in Ferrisburgh, New Haven, and Monkton, taking advantage of local waterpower and exploiting the iron ore mined in the region: "The ore smelted in all the forges of this region was brought from the other side of the lake, except a small portion taken from an ore bed in Monkton, which was of an inferior quality" (Robinson 1934:245, writing about the forges in Ferrisburgh).

The site is along the Little Otter Creek in the proximity of

the bridge that carries the Monkton Road across the creek, three miles east of Vergennes. The present bridge is about 150 feet downstream of the old Monkton road crossing referred to in the following:

Just below the bridge was a forge built by Major Richard Barnum, longer ago than Mr. Luther Carpenter, who was born in the neighborhood, and is now in his ninety-first year, can remember. In 1805 Major Barnum sold the property here to Caleb Farrer, and he sold in April 1807, to Perkins Nichols, of Boston. Nichols sold the same year to Bradbury, Higginson, Well[e]s and others, all of Boston. A coal house, forge, and sawmill are mentioned in the deed (Smith 1886:446).

The forge belonged to the Boston Iron Company together with 400 acres of adjacent land and the Monkton ore bed, whereby hangs a tale of the Yankee smartness. While the Boston Company were negotiating for the purchase of the ore bed, some of its members met the then owners at the forge on an appointed day to see the quality of the ore tested. During the process of the smelting, 30 silver dollars were secretly dropped into the loop, one by one, by a bloomer who was in the confidence of his employer, and the product was of such excellent quality that the Bostonians at once closed the bargain, and came into possession of a mine so worthless that it was soon abandoned. The story has its moral, for the instigator of the fraud, after cutting a great figure for a time [probably Amos Barnum of Vergennes], died in poverty (Robinson 1934:245).

Many inspections were made of the vicinity from 1979 to 1987. Evidences of the forge are scattered concentrations of up to baseball-size pieces of slag eroding from the north bank of the creek, just downstream of the old crossing, and larger pieces scattered along the creek bed in the marshy field 200 feet downstream from the present bridge. The forge site would appear to be, from the disposition of the slag finds, somewhere between the present and former crossing, most likely closer to the former crossing. Associated with the slag eroding from the shore are small bits of charcoal. The slag and charcoal are located along a strata about three to four feet below the surface and run along 20 feet of shoreline. No other forge-related features were seen. The older crossing is evident on both sides of the creek. Although covered by a thick growth of brush, the old road can be followed uphill north to where it rejoins the present road near the top of the hill.

A. T. Keller toured a number of ironworks sites in New England during the 1930s, photographing what remained of them and providing a valuable record of the state of the sites during that period. One of his photos identifies this as the "site of the Monkton Iron Company's charcoal furnace" from the description on the back of the photo. Many attempts to relate the photo to specific terrain features have failed, although it does generally appear to have been taken near this crossing. Construction of the present bridge, earthen ramps leading up to it, and highway straightening in 1950 have drastically disturbed the furnace site. Freshets might have also contributed toward destroying what remained of Barnum's forge/blast furnace site.

AD-431 Doreen's Forge (Ferrisburgh): There was another

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forge farther upstream of the older Monkton Road crossing: "There was a forge on the Little Otter Creek a little above where the Monkton road crosses the stream. I cannot learn by whom it was built or operated" (Smith 1886:446).

The site was found in August 1987, about 1,000 feet upstream of AD-432. Evidence of the forge is a 10-foot-square concentration of up to fist-size pieces of slag on the north side of the creek and half that on the south side. The slag is associated with the remains of what appears to be a washed-out dam. The shoreline topography does not appear more superior here than the rest of this area of the stream with respect to advantageous location of a mill seat. But a dam of moderate height at this point could back up enough water to create a significant millpond in the low-lying swamp just upstream. Lack of head to turn an overshot waterwheel was probably more than offset by quantity of water to power a breast wheel. No charcoal, iron, or iron ore could be found; a shallow depression that might be a cellar hole was found within reasonable proximity of the site.

AD-IW07 Barnum Forge (Ferrisburgh): About a mile downstream from AD-432 is Walkers Falls, the site of a sawmill and tannery works whose remains are still visible. About 600 feet farther downstream was a forge built by (Richard or Amos?) Barnum. The place was called Dover, and small hand-operated nail and axe factories operated here. By 1866 all traces had disappeared (Smith 1886:446). Field inspections in 1980 and 1983 found no slag or evidence of iron making.

AD-IW08 Fuller Forge (Ferrisburgh): Farther downstream from AD-IW07 and west of Route 7 is a major falls at the village of Ferrisburgh, known as Fraser's Falls from John Fraser's sawmill here in the 1820s-1830s. A forge was operated just upstream of the falls early in the century by one of the Fuller family (Smith 1886:446). Attempts to find this site in 1985 were foiled by high water.

The Fuller family of Ferrisburgh was involved in many ironworks exploits in Vermont and New York (see chapter 1, "The Marriage Connection").

AD-430 North Ferrisburgh Forge (Ferrisburgh): The site of a late-18th- to early-19th-century bloomery forge was located along Lewis Creek in 1987 through information provided by the following historical accounts:

At the upper part of the falls, at Ferrisburgh "Hollow" there was a forge early in this century, owned by one of the Fullers. This was on the "minister's lot." In 1822, Robert B. Hazard leased of the Baptist Church a portion of it thereabout, and built a woolen factory, which afterward came into the possession of his brother, William Hazard who in 1832 leased it to Theodore D. and Edmund Lyman. Theodore D. Lyman leased the factory to Edward Daniels in 1864. In 1884 it was burnt, while run by John Vanduysen under lease from Daniels (Smith 1886:447).

Presently, one comes to the Hollow, long ago cursed by John Nutting when he lost his holding through a defective title. But in spite of his curse, it came to have a forge, with the best and busiest gristmill for miles around. . . .

The Forge, which stood thereabouts (of the woolen mill) at an earlier date, was owned by some of the Fullers (Robinson 1934:230-232).

The site is about a quarter-mile upstream of where the Hollow Road crosses Lewis Creek at North Ferrisburgh. Evidence of the forge is slag eroding out of the shoreline in the vicinity of stone walls, these most likely the remains of the later woolen mill. Some large (basketball-size) pieces of slag were found, with the slag distributed over a 50-foot section of the shoreline. No slag was found upstream of the site. No dam remains were found, although the 1871 Beers map of Ferrisburgh shows a dam at or near the site.

AD-FS50 Ackworth Bloomeries (Lincoln): In contrast to its present quiet, rural environment, nestled high up a mountain along a cold and bubbling stream, West Lincoln in the early 19th century was a major hub of industry which included a number of nationally known bloomeries among its many mills. These forges were contemporaries of bloomeries at Salisbury, East Middlebury, Fair Haven, and Vergennes.

In the early 1800s the community was called Ackworth, from a town in New Hampshire that Joseph Blanchard, Isaac Houston, and William and Andrew Mitchell left in 1827 to come to Vermont. (Esther Swift locates Ackworth at Rocky Dale, in Bristol.) About 600 feet east of the bridge at West Lincoln they built a bloomery and a sawmill. The forge started making bar iron the next year. About the same time or possibly a year earlier, Henry Soper and Philetus Pier built a forge another 500 to 600 feet farther downstream from these forges (Smith 1886:492-493). Both forges were probably on the north side of the river. They operated only a few years, being carried away in July 1830 by a flash flood, which washed away the fully stocked coal house, stacks of ore and iron, and the sawmill, as well as houses, the original bridge, and many acres of top soil. Both forges were rebuilt that same year.

The upstream forge was built on or near its former site. The 1857 Addison County map shows forges just upstream of the confluence of Isham Brook and the New Haven River. The downstream forge was relocated about 300 feet farther downstream from its original site, probably where the map indicates a forge and dam. This forge was built by Oliver W. Burnham of Vergennes, who became part owner with Pier just before the flood. He became sole owner of both forges around 1840 and continued to make iron until he died about 1860. The operations were continued by his heirs.

A thrifty little manufacturing village developed about the forges and other mills as men with capital invested here. It fast became the business heart of the town. Iron ore came from the Adirondacks across Lake Champlain, and the hauling of ore and iron to and from the forges gave steady employment to a great many people who owned teams. The charcoal was furnished mostly by those who owned and cleared woodlands in the nearby forest. The wealth of the town previous to 1850 was to a great extent due to the ironworks and it was the nucleus of about the only business in which large sums of money were annually paid to employees. When the forges were run to their full capacity, they were capable of making 300 tons of iron yearly to each fire. The forges were enlarged in 1843 and again in 1854. In 1856 the ironworks was managed by O. W. Burnham (Lesley 1859:149). In 1858 there were four fires and two hammers operated by two waterwheels (Lesley 1858:75).

Neilson reported in 1866:

Production		Production	
Year	Tons	Year	Tons
1854	672	1860	0
1855	560	1861	0
1856	616	1862	150
1857	80	1863	150
1858	0	1864	160
1859	0	1865	100

[The forges were] owned up to 1856 by Oliver W. Burnham. About [1856] the owner died, and the bloomeries became the property of the heirs. Very little was done until about 1863, when the fires in one of the bloomeries—there were formerly two—were started up. In 1864 the bloomery was purchased by Lincoln, Cain & Co., and operated by them until December 1865, when it was abandoned. A saw and stave mill now occupies its site.

In 1865 the forge contained 5 forge and 3 run-out fires, 2 trip-hammers, and 2 waterwheels (Neilson 1866:235).

Neilson also reported that in 1864 the forges consumed 34,500 bushels of charcoal, 336 tons of Lake Champlain ore, and five tons of scrap iron. In a description of another flash flood in October 1869 that carried away or damaged mills, no mention was made of the forges (Smith 1886:560). A clapboard and stave mill appear next to the dam and millpond on the former forge site in the Beers 1871 map of Lincoln village.

The stream has been inspected in West Lincoln as well as farther up and downstream many times, especially during low-water periods, but nothing significant has been found to indicate the existence of such an extensive ironworks operation here at one time. Stone walls along the shore might have been associated with the forges or with later mills. Occasional bits of slag, rusted iron, and charcoal can be found in the stream from hundreds of yards upstream of the village to places among the downstream boulders to Rocky Dale, and as far downstream as Bristol.

AD-IW09 Scott, Munsil, and Eaton Forge (Bristol): The first of Bristol's two early forges was built in 1791 by Amos and Cyprian Easton, Amos Scott, and Gordon Munsil (Munsill 1979:107-110). It was located on the west side of the New Haven River and stood near today's bridge just downstream of the village. In addition to bar iron the forge made plows, crow bars, and tire iron (wheel rims).

Remains of the forge were probably destroyed by construction of the Bristol Manufacturing Company in the late 19th century, the ruins of which still existed when inspected in 1983. No evidence of a forge was found.

AD-IW10 Scott Forge (Bristol): Bristol's second forge was built by Ebenezer and Amos Scott soon after and near the first forge, on the west side of the stream. It made similar hardware, some used locally and some shipped to Troy, New York to pay for goods purchased there (Munsill 1979:108). Its remains probably suffered the same fate as the first.

AD-FS86 Franklin, Arnold, and Hobart Forge (Bristol): On April 5, 1808 Francis Bradbury of the Monkton Iron Company wrote to Thomas H. Perkins of Boston about progress with construction of their blast furnace at Vergennes. The letter

included a reference to stone lining material for a furnace at Bristol: "I also have heard of a slate stone on the border of the lake that may answer for the lining. This can be examined when Mr. Bates comes up. I think also it best to say nothing of this slate for a furnace at Bristol, my avocations at present are so many that I cannot attend to it as it ought to be." Was Bradbury referring to the possibility of building a blast furnace at Bristol in addition to the one at Vergennes? Might he have been considering improving an existing furnace at Bristol?

This might have been Bristol's third forge, built in 1802 along the river at the base of the village by John Arnold, Henry and Joshua Franklin, and Nehemiah Hobart. It made bar iron for many years but might have had a blast furnace in addition to the bloomeries. The forge was successful in spite of its cramped location between the river and the high bank that is immediately behind buildings on the south side of Main Street. Partial and full owners included over a dozen men. Forge workers came from as far as the iron districts of Salisbury, Connecticut to work here. Seven proved an unlucky number for this forge. It burned in 1809, 1816, and 1823, and was rebuilt each time. The end came, of course, seven years later in 1830 when a freshet that ravaged the New Haven River valley finally destroyed the stubborn ironworks. Only the deeply imbedded foundation pilings remained by the 1860s to mark the spot (Munsill 1979:110).

One day in 1808, the owners of the Monkton Iron Company rode over from Vergennes to inspect their ore beds in Monkton and "a furnace in the neighborhood" (Seaburg and Paterson 1971:205). It is unclear whether "the neighborhood" meant Monkton, Bristol, Ferrisburgh, or somewhere else. The 1802 forge at Bristol was the closest one to the ore beds, but we now know that there also had been a blast furnace only three miles away along the Little Otter in nearby New Haven (AD-340).

The river and shore at Bristol village where the forge and/or furnace operated was inspected in 1983 with no evidence found of either. The river starts curving south just downstream of the site, and to reduce shore erosion here a high stretch of riprap was laid up against the shore, significantly disturbing the suspected area of the site. Disturbance has also been caused by trash dumped down the high embankment directly on the forge site. Somewhere beneath Bristol's trash and riprap might be the buried ironworks.

AD-493 Baldwin Creek Forge (Bristol): The fourth forge in Bristol was erected in 1832 by Thurston and James Chase, George C. Dayfoot, and Nathaniel Drake up Baldwin Creek in the northeastern part of town. Waterpower was poor, especially in summer months, but some profit was made at the forge by Thurston Chase and Philo S. Warner (Munsill 1979:110).

Since 1981, many checks were made for slag in Baldwin Creek in and below Chase Hollow. Chase Hollow is a deep ravine through which Baldwin Creek runs after it crosses into Bristol from Starksboro, paralleling Route 17. Up to fist-size pieces of forge slag were finally found in 1990 along the bank of the stream about 100 feet downstream of the present Route 116 bridge. A single slag find was made between the bridge and the concrete abutment of the former bridge, just upstream. All slag finds were on the east side of the stream. Along the

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east side of the stream downstream of the bridge is a wide, silted-in area, under which the forge site might lie. Inspection of current and older maps indicate at least three bridges were built in this proximity, all contributing in part to disturbing the forge site.

AD-416 Holley Forge (Bristol): Bristol's fifth forge was built by Enos Soper, Chester Buel, and Henry Soper (who also owned a forge in Lincoln). It was on the north shore of the New Haven River about a mile upstream of the village. The 1857 map of Addison County indicates the forge opposite the home of Winter H. Holley, who owned it for a while (Munsill 1979:111).

The site of the forge was inspected in 1980, behind and adjacent to a mobile home park on Route 17. Here were found many pieces of slag, some charcoal, and a dozen three-foot-diameter iron hoops that held a large wooden pipe together that might have powered the forge waterwheel. Further remains of the forge may possibly still lie beneath the wall of domestic trash that lines the shore behind the mobile homes, or under the woodlot adjoining the park to the east.

AD-IW11 Burnham Forge (Bristol): The sixth forge in Bristol was built by Oliver W. Burnham of Vergennes (who also operated the forge at West Lincoln). It operated briefly up Baldwin Creek near the Starksboro town line and had a brief life (Munsill 1979:111). This site also remains unlocated.

AD-IW12 Munson, Dean, and Gage Forge (Bristol): Bristol's seventh and final forge was built a half-mile downstream of the village by Luman Munson, Bennet B. Dean, and Datus R. Gage. A dam and flume conveyed waterpower to the forge, located about 500 feet from the main channel, safe from freshets. Ownership changed hands while bar iron production varied through good times and bad. The principal market was Troy, New York. The forge was out of operation by 1860 (Munsill 1979:112).

A few pieces of slag-appearing material were found near here in the river during a 1982 field inspection, but they could have washed down from any of the many forge sites farther upstream. The site of this forge has not been found.

AD-404 Richville Forge (Shoreham): In the kitchen of the Penfield Homestead Foundation Museum at Ironville in Crown Point, New York, is a beehive oven with a heavy cast-iron door, on which reads:

PATENT
C. RICH SHOREHAM VT.
NO. 2.

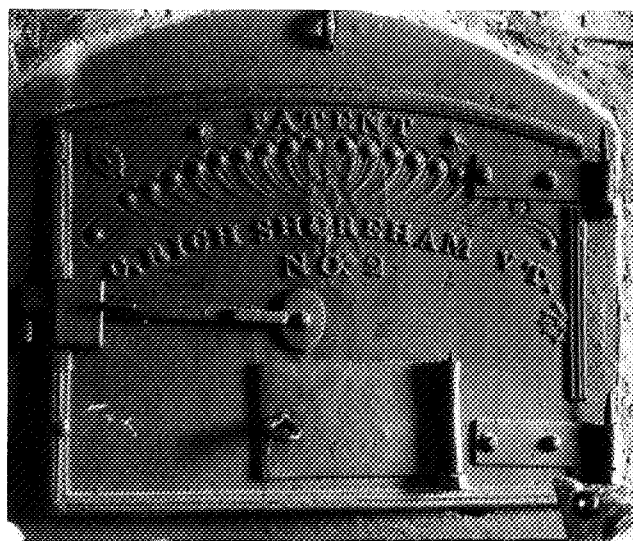
Since the Penfield house was built in 1828, a furnace of some sort was producing castings during that time somewhere in Shoreham. The 1796 Whitelaw map indicates an iron forge, gristmill, and sawmill at a point where today's Shoreham Center is. It was named Richville in earlier years.

A high dam today backs up the Lemon Fair River, creating Richville Pond. But a century ago two other dams existed a short distance farther downstream. In 1785, Thomas Rich of Warwick, Massachusetts purchased land at the falls near the upper of these two earlier dams. The next year he constructed a sawmill. Jacob Atwood moved into the community in 1788 and a few years later built a forge at the north end of the same dam. A few years later another forge containing two bellows

and four hearths was built 100 feet farther downstream where the other dam stood. In 1797 Ebenezer Markham built a nail factory and trip-hammer shop on the north side of the upper dam, possibly right on the site of the earlier Thomas Rich forge. The nail factory was later converted into a cloth factory (Smith 1886:622-623). Ore for the forge was mined a half-mile to the northeast, but the ore's high sulfur content forced its mixture with ore from Crown Point, in order to produce bar iron (Goodhue 1861:94). (Matthew Lyon also used some ore from Shoreham, making castings from it at his blast furnace at Orwell, five miles south.) Along with Thomas Rich came his 16-year-old son, Charles. In addition to owning and operating many mills, Charles Rich went on to serve in the U.S. Congress for 10 years. He died in October 1824, from complications caused by standing too long in the Lemon Fair River while fixing one of his mills (Goodhue 1861:189-190).

Charles Rich (Jr.), son of Charles Rich (the congressman), is probably the "C. Rich" whose name appears on the cast-iron oven door at Ironville, since the senior Rich died four years before the Penfield homestead was built. But nothing substantial can be found about any Richville furnace and/or foundry or the involvement of any Charles Rich with an ironworks beyond that intriguing oven door at Ironville. Charles W. Rich of the same family was born in Richville and moved to Swanton in 1840. There he opened quarries and built many lime kilns, establishing a successful lime-burning business (see chapter 8).

Ruins of the mills at Richville were inspected in 1986. High stone wall ruins and two breached dams were found in heavy underbrush, just below the modern dam. Some bits of charcoal and slag were found on the north side of the river, about 100 feet below the remains of the lower dam, but of an insufficient amount to confirm this a site of an early blast or cupola furnace. Later mills obliterated surface traces of the forge, sawmills, and gristmills that the Whitelaw map indicated here in 1796.



4-24. Door of the beehive oven at Penfield Homestead Foundation Museum, Crown Point, New York, made in a Richville foundry at Shoreham.