



Chapter 6

Study of Charcoal Mounds and Kilns

Study Methodology

Initial charcoal making in Vermont coincided with initial iron making. As settlements grew, foundries and blacksmith shops added an additional demand for charcoal. Whether smithies or foundries operated first can be argued either way (in early times there was often little difference between the two), but charcoal was a requirement for both. Each made its own charcoal, usually locally, until land clearing pushed the forest line back into the mountains.

The problem encountered while researching for ironworks production records was reflected in the search for records of charcoal production: little has survived. Exceptions are some one- or two-page accounts in library archives and the usually vague references in published histories. Much of what has been learned about the charcoal industry in Vermont came from finding the charcoal-making site, estimating its period of operation, and trying to guess where all the charcoal went. Estimating the period of operation, when no documentation was otherwise available, was done after field inspection of the physical remains, not always an accurate method. What was discovered about charcoal making in places outside Vermont was usually applied to the data found in Vermont. As realistic an idea as possible was thus strived for with regard to what was going on in this state.

No doubt there is much "undiscovered" archival information in ledgers stacked on shelves of libraries and bookstores, as well as passing references in personal and business letters saved in family Bibles or note boxes. Likewise, many hundreds of remains and ruins are still hidden in the mountains, waiting to be found and assimilated into the growing bank of knowledge, for reevaluation and reinterpretation of the Vermont charcoal-making experience.

The search for brick-type charcoal kilns was similar, yet somewhat different, than the search for furnaces and forges. Charcoal kilns were not always built near streams and rivers because waterpower was not required in the kiln operation. But the kilns were usually built near sawmills, and these mills did have a need for water. By the period of the major charcoal industry in Vermont (1860–1900), steam-powered sawmills had arrived. And although steam sawmills continued to operate near streams, water now was required only to replace that lost by the boiler in the form of steam. It was a small amount compared to the amount of water previously required to power a large waterwheel or turbine-powered sawmill.

Mounds and kilns were built as close as possible to the source of their wood supply. Rather than build kilns at the foot of the mountain, near flat roads and local transportation, it was determined early on that hauling heavy logs to the kilns should be minimized and effort concentrated on carting the lighter-weight charcoal. Thus, most charcoal mounds and kilns are found well up the higher elevations, near barely visible roads. Hauling tons of iron reinforcement bands, doors, covers, and other

hardware in addition to thousands of bricks up steep mountain roads in the days of non-mechanized transportation must have been a sight. It brings to mind a vivid definition of the term "labor-intensive."

Brick-type kilns in Vermont were each made from 33,000 to 40,000 bricks, depending on various design features. Bricks, therefore, are obviously one of the things to look out for when in the field searching for charcoal kilns. Most of the kiln's bricks tend to remain where they have been since collapse of the kiln structure, except for those moved through flood and ice action or bulldozing as part of nearby trail or road maintenance. A number of kilns were built of stone, and probably because stone is everywhere available in Vermont, stone-built kilns are less vandalized than brick ones. And not all charcoal kilns in Vermont were round or conical. Four ruins found at two sites in Chittenden were rectangular.

Most kiln sites have long since become buried under heavy brush and tall grass. Some kiln ruins are so leveled that the sites can be walked through without being seen. At Ten Kilns Meadow in Mount Tabor, we discovered one morning that we had pitched our tent the day before in thick grass directly on top of the leveled five-kiln site that we were going to spend the day in search of. We had slept all night inside one of the ruins.

If a stream is nearby, a close inspection of the streambed and shore may reveal pieces of brick that worked their way downhill or were thrown into it. If you are in the vicinity of a suspected charcoal kiln site and there are pieces of red brick in the stream or along the trail, keep a sharp eye out for the kiln ruin. Since objects wash downhill with time, search directly uphill from the exact point of the find, regardless of the direction from which the area was approached.

Another clue in the search for a charcoal site is charcoal itself. In the process of discharging the kilns and loading and driving the charcoal wagons, much spillage occurred. The closer to the kiln, therefore, the darker the soil. But black soil can also be caused by things such as rotting vegetation. Charcoal does not significantly disintegrate over centuries, otherwise the process of carbon dating prehistoric sites would today be impossible. But charcoal can be made by other ways than a prehistoric cooking fire or a charcoal kiln. Finding a badly burned tree stump beneath some charcoal could indicate evidence of a forest fire. Nails and domestic debris mixed with charcoal could mark the site of a house or barn fire. Camp fires usually leave charcoal. The presence of charcoal, therefore, does not always indicate a charcoal mound or kiln site. Check the soil for actual bits of charcoal; they can be as small as grains of sand. Having accumulated through dozens of years of kiln operation and being light in weight, much charcoal has washed downhill from the kiln sites in the past century over the ground, along hiking trails, and onto roads.

The third clue to consider is the terrain. Kilns were usually constructed into 15- to 20-foot-high embankments. A single-

200 Years of Soot and Sweat

kiln site may have a single concave depression cut into the adjacent low hill; an eight-kiln site may have eight such concave depressions. These concave cuts into embankments were sometimes reinforced with 3- to 5-foot-high stone walls at their highest point, where the kiln was built farthest into the embankment. While the kiln was standing, the distance between the concave wall and the kiln wall was 3 to 4 feet, enough space to allow a kiln tender to walk behind the kiln to maintain vent hole operations or repair the walls. The concave stone-lined embankment is a positive indication of the kiln site.

The hint of an old road might be found leading uphill to the kiln site. Another road might lead around the hill to the top of the embankment. Here, above the kiln, was a wood ramp that allowed access to the charging hole in the roof of the kiln. But some kilns might have been built so far from the embankment that no concave depressions or wall exist. This is true of the site of eight kilns at Old Job in Mount Tabor. And at Ten Kilns Meadow, not far away, the embankments have flat walls instead of concave for each individual kiln. Although the process of making charcoal was generally consistent from operation to operation, field evidence shows that certain specific techniques varied.

A kiln ruin itself can be characterized by anything from visible brick or stone walls 3 to 6 feet high, complete with vent holes, large kiln-girdling iron hoops, and mounds of charcoal, to no walls but a low 30-foot-diameter circular mound of thousands of bricks, or only a circle of very black ground. The nearer the kiln ruin is to public visibility and motorized access, usually the less the remains to view. Also, the nearer to road and heavily used trails, the more evidence of discarded trash (beverage cans, bottles, automobile parts) in the sites and pot-holing in the walls. Over the years, many kiln sites have become the source of brick for chimneys and backyard fireplaces of nearby residents. Since most kiln sites in the Green Mountain National Forest are on U.S. Forest Service property, they are actively protected by forest rangers. Violators are arrested and prosecuted. But this does not entirely prevent sites from being vandalized for brick and scrap iron. The dollars made stealing and destroying a site do not come close to compensation for the loss of a historic and educational resource to the general public.

Aerial photo inspection for charcoal kiln sites was tried at the Vermont Mapping Program, Waterbury, with no success. Photos inspected were 1:1250 to 1:5000 scale orthophotos of Vermont taken at about 30,000 feet (1 inch of orthophoto equals about 416 feet on the ground). After spending hours squinting through a magnifying glass at dozens of these 3-foot-square black-and-white photos and then weekends field-checking some possibilities, the only sites confirmed were those already known. Visible kiln ruins measure less than $\frac{1}{16}$ th of an inch in diameter in the orthophoto and look like tiny moon craters. It was one thing to know where they exist and find them in the orthophoto; it was another to determine whether that tiny round feature was in fact a kiln ruin or an empty swimming pool (Stamford), a circular depression (Tinnmouth), a frozen puddle (Winhall), a silo foundation (Panton), or just a pile of manure (Shoreham).

Searching for the earth-covered mound was much more difficult because no bricks or iron hardware were used in its

construction and, therefore, no hardware remained to guide the way. Neither were they usually built into an embankment as were the structure-type charcoal kilns. And having predated the brick-type kiln, nature has had much more time to hide the evidence with more trees to disguise the site, more leaves and soil to cover the burned pitch floor, and more rains and spring thaws to reconfigure the site and scatter charcoal more thinly over a wider area. One clue to a mound site was the presence of lush vegetation. An 1851 agricultural journal noted that the effect of charcoal dust resulted in the "quickenings" of vegetation: "The spots where charcoal pits were burned 20, and some say even 30 years since, still produce better corn, wheat, oats, vegetables or grass, than the adjoining lands" (Carey 1851:516). The preference of white birch and yellow birch for charcoal-making (and lime-burning) areas was noticed while doing fieldwork in the Green Mountains.

Ground preparation for mound construction in areas liberally covered with surface stones required clearing the area first. The result was a denser distribution of stones in the circular area immediately outside the perimeter of the mound site than the area farther out. A shallow, circular ditch, called the gutter, was dug around the perimeter but outside the mound floor. The gutter and area of stones were good indications of a mound site. Charcoal was made inside the gutter area and this floor was saturated as deep as a foot with charcoal and pitch. Charcoal spilled during unloading was also found outside the perimeter. The gutter was sometimes more obvious in spring and fall, when leaves had blown into it and became trapped in the depression.

The lack of hardware and bricks made finding a charcoal mound site in a random search almost impossible. Since charcoal mounds took longer to prepare, charge, burn, and discharge than the later brick-constructed kilns, the need for a sawmill to cut wood and keep up with the charring had not yet become a necessity. Wood was cut by axe, so the mounds could be remote from a waterpowered sawmill. The site of a number of charcoal mounds was discovered by U.S. Forest Service personnel high up the slopes of Worth Mountain in Hancock and Bloodroot Mountain in Chittenden, far from any obvious sawmill site. They were found during routine surveys of forest tracts for logging potential. Sharp-eyed forest rangers first noticed cellar holes at both sites with scattered bits of charcoal nearby. The remains of six charcoal mounds were found in the immediate vicinity at Worth Mountain and 20 more at Bloodroot Mountain.

Historical references to charcoal making in the early 19th century are skimpy. Statements that charcoal was made "in the nearby woods" define neither distance nor direction. What might have been nearby woods for the forge at Swanton in 1810 could today be someone's backyard in the village. Conversations with older, longtime residents within a 10-mile radius of an ironworks produced some results. One farmer remembered plowing soil that was especially black just after a light spring rain. Another remembered a family tradition of ancestors making charcoal while clearing farmland.

Ironworks in the 1790–1800 period consumed less charcoal than those of the 1870–1880 period. As such, charcoal was made from forests that were closer to the ironworks in 1800 than in 1870. By the 1880s, the brick-type kilns were located well up in the mountains, attacking last stands of hardwood

forest. As the charcoal industry swept across the valleys and up into the mountains, the clearings behind became farmland in many places. The passage of time, therefore, became the measure of distance; the terrain defined the direction.

Results of the Charcoal Kiln Study

Fifty-seven charcoal-making sites were reported to the State Archeologist during the 1983–1991 period of the overall statewide IA study of charcoal kiln ruins and mound remains and are now part of the Vermont Archeological Inventory. Forty-two sites contained 130 kiln ruins: 108 were made of brick, 9 of stone, 12 of a combination of stone and brick, and 1 of concrete block, while fourteen of the sites contained remains of 51 mounds (one site contained both a brick-type and a mound-type). Analysis of the kiln ruins determined that 122 were round, 5 were rectangular, 1 was conical, and 2 remain unidentified. All except two sites are within the new (1991) proclamation boundary of the Green Mountain National Forest; a majority are on federal property. Two other sites have been reported to the State Archeologist in the Field Site (FS) category. There was inconclusive or no positive surface evidence at these sites, but subsurface material of 4 charcoal kilns and an undetermined number of mound remains might exist. Archival and field work continues at 12 more sites in the work-in-progress (CK) category. The total number of charcoal-making sites studied is 71 at this writing.

Brick-type ruins found in Vermont were generally laid up in a modified common bond with headers laid every third course. The walls were laid three bricks thick on the stretcher courses and 1½ bricks thick for the header courses, generally measuring 17½ inches thick. The walls and their reinforcing hardware supported the vaulting brick roof and compensated for the kiln's heating and cooling cycles, which caused the structure to expand and contract slightly with each of these cycles.

In addition to the heavy cast-iron bands that reinforced the brick walls, other hardware found included large front charging doors made of sheets of about ½-inch-thick iron bolted together to form one unit measuring up to 6 feet high by 7 feet wide, iron wall binders with end plates, heavy iron lintels which provided a platform across which the iron doors slid, and cast-iron vent hole linings. Inspection of the few pieces of hardware that have survived scrap drives indicated little similarity between hardware designs and dimensions, suggesting that hardware for the kilns was made "on order" at a foundry. Some front charging doors had U-shaped iron handles bolted or welded to them; other handles were a U-shaped section of long iron bars that reinforced the entire height of the door.

Variability in design of hardware for charcoal kilns was also obvious in the configurations of the round covers that closed the top charging holes by laying flat on the round holes in the tops of the kilns. These 6- to 7-foot-diameter by ½-inch-thick iron covers displayed varieties of vent holes. Most covers had nearly brick-size holes cut lengthwise into the cover so the holes could be closed simply by bricks laying flat on them. One cover found at Peru had holes with small, sliding iron doors that could be opened and closed to control the draft allowed to enter the kiln through these top vents. A few covers had no holes at all. Cover handles varied from pairs of U-shaped

iron units bolted or welded to the covers to U-shaped sections of long iron bars that reinforced the entire diameters of the covers (similar to variations of handle designs on the large iron doors). Probably because of their round, flat shape, these covers escaped detection of scavengers. Except for their uniquely shaped iron doors, no hardware was found associated with stone-type kiln ruins because their beehive design created a much more stable structure.

All kiln ruins, whether brick- or stone-type, contained vent holes that conveniently allowed the lengthwise insertion of an ordinary red brick to close the hole. Stone-type kiln ruins used a pair of bricks set lengthwise side by side with another lengthwise brick-size space between them. These were laid over and under with large flat stones. Variations in vent holes were found at two sites of brick-type kiln ruins that had cast-iron vent linings. At one stone-type kiln site, vent hole linings were found made of an unidentified tile material.

Kiln ruins and mound remains were found at elevations from 660 to 2,400 feet above sea level. Vermont's lowest elevation is 95 feet, at Lake Champlain; the highest point is Mount Mansfield at 4,393 feet. The average state elevation is approximately 1,000 feet. In the area of the most kiln finds, 12 mountains rise to between 3,000 and 3,800 feet. Brick-type kiln ruins averaged 1,815 feet in elevation at a range of 660 to 2,360 feet. The largest concentration of 59 brick-type ruins was found between 1,500 and 2,000 feet. Stone-type ruins averaged 2,057 feet in elevation with a range of 1,560 to 2,400 feet, somewhat higher in elevation than the brick types, but significantly compacted in a tighter range. The largest concentration of 10 stone-type ruins was found between the 2,000- and 2,500-foot level. Mound-type remains were found at the lower average of 1,336 feet in elevation, at a range of 700 to 2,360 feet; there was no significant concentration at any elevation. Most kiln ruins were found in proximity to good-flowing streams.

Table 6-1 lists the charcoal kiln and mound sites that have been researched alphabetically by county and numerically within county by site identification number. Sites unrecorded (CK numbers) are those where ruins or remains either have not been found or inconclusive evidence exists to positively identify the kiln or mound site. The table lists the sites' identification numbers; their principal names; number of units (mounds and/or kilns) per site; whether the site is mound-type, made of stone, brick, or a stone-and-brick combination; and if in the Green Mountain National Forest.

Following table 6-1 are three sections that divide the state into the northern, central, and southern districts, as described in the Introduction in the front of this book (see "Presentation of the Study"). In these sections, the history of the charcoal-making site and a description of whatever physical remains exist are presented. Table 6-2 at the end of the chapter summarizes the results of the charcoal kiln study.

Presentation of sites within each section is by county, and within each county, sites are presented either in site number sequence or grouped to reflect a geographic proximity. Grouping does not reflect any commonality that might have existed when the kilns were in operation, but aids in describing them. Accompanying maps provide a geographic sense of the physical disposition of the sites and ruins, without compromising the

200 Years of Soot and Sweat

charcoal-making site can be an area with or without any visible surface mound or kiln features.

WARNING to Hikers and Explorers: Although appearing sturdy, kiln ruins are in fact fragile. Climbing about them loosens stones, weakens walls, and significantly contributes to their progressive deterioration.

The Northern District

CALEDONIA COUNTY

Charcoal was being made in Barnet, Groton, and Walden in the 1880s, possibly to support foundries in St. Johnsbury and along the Connecticut and Passumpsic rivers. Charcoal customers in St. Johnsbury were the Paddock Iron Works and Fairbanks Scales. The scale company annually consumed 100,000 bushels of charcoal in addition to 300 tons of anthracite for working its 2,500 tons of pig iron, 200 tons of bar iron, 38 tons of steel, and 20 tons of copper (Hemenway vol. 1 1867:407; Child 1887:315). Some of the county charcoal burners were Felix Many of East Barnet, John B. Rogers and Frank M. Shaw of Walden who made charcoal about a mile north of Joes Pond, and Thomas B. Hall and Albert S. Clark of Groton (Child 1887:267).

CA-CK01 I.N. Hall & Son (Groton): In 1876 Thomas B. Hall started a charcoal business with his father under the name I. N. Hall & Son (Child 1887:196). Albert S. Clark of Groton also made charcoal for the company. Location of the kilns is not recorded but is suspected to be near Route 302 near West Groton, possibly toward the abandoned railroad grade. No attempt has been made to physically locate the site.

CHITTENDEN COUNTY

CH-1 Pine Island (Colchester): Chittenden County may contain one of Vermont's earliest charcoal mounds remains at Pine Island just north of Burlington. Excavations here in the late 1960s by the Vermont Archaeological Society suggest this is the site where Ira Allen contracted Aaron Brownell about 1794 to make charcoal for the former's forge and anchor shop at Colchester (chapter 4, CH-IW01). The two low mound remains were about 33 feet in diameter with shallow ditches circling them. The center of one mound revealed a center hole, which at one time held the center vertical chimney log. Also excavated was a large charred log. The mounds were covered from inches to a foot with layers of charcoal (Haviland 1973:1-4).

WASHINGTON COUNTY

WA-21 Stevenson Brook Charcoal Mounds (Waterbury): The Waterbury Last Block Company operated a sawmill a few miles east of the county line in the Little River State Park during the 19th century. According to a state park map, charcoal mounds were associated with the mill. The map shows "Coal Pit Bottoms" and "Former Charcoal Pit Burnings" about two miles up Stevenson Brook and west of the main park area near the dam (William Gove letter to author, Nov. 1, 1985).

The trail to the site, which parallels the brook on the west, was hiked in 1986 with no remains of charcoal or mounds being found. Evidence of the sawmill are cellar holes, a large rusty boiler, saw blades, part of a turbine, and unidentified

castings. A wood marker "8" on a nearby tree correlates this area to the charcoal and sawmill site number on the map. Sides of hills in the area of the mill as well as potential areas on the way back down the trail were inspected with no evidence of charcoal found.

The Central District

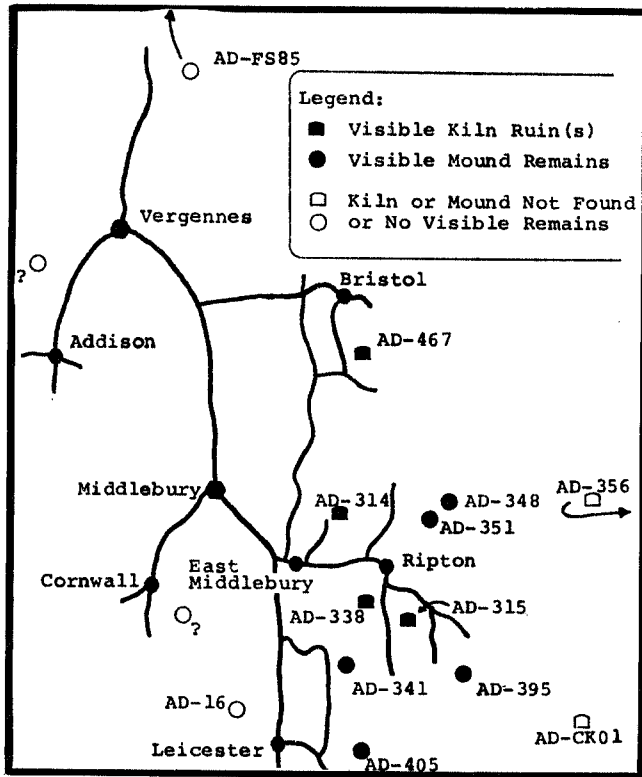
ADDISON COUNTY

Early-19th-century charcoal making in Addison County generally centered around the needs of the Monkton Iron Company at Vergennes. Initial needs were satisfied from charcoal made in fields in the immediate area. One of these areas was Mount Fuller, in western Monkton, where charcoal making is an oral tradition. As charcoal needs grew, it forced expansion into tracts of land in the nearby towns of Pantton and Addison (Smith 1886:666). In time, the Monkton Iron Company looked across the lake for better prices (Seaburg and Paterson 1971:207). So great was the company's expected need for huge amounts of charcoal that when it advertised in January 1808 that it would purchase charcoal in large quantities, it also built large barns for storing it. Eventually, there were 15 charcoal storage barns in Vergennes (Smith 1886:665).

Several mounds, oval to round, were found many years ago at Cornwall with ditches around them. One contained charcoal 18 inches deep (Haviland 1973:1). The remains of another was found about the same time in the middle of a swamp in northern Leicester. Charcoal was made up the North Branch of the Middlebury River in Ripton from 1859 to the 1880s in kilns owned by Williams & Nichols of the East Middlebury Forge, which made 9,000 bushels of charcoal a month (Smith 1886:593-594). Using Hodge's June 9, 1849 figures (see chapter 5, "Charcoal Kilns"), this calculates to the destruction of about 90 acres of forestland per year, from just this one moderate-size operation alone. According to research done by State Archeologist Giovanna Peebles, a possible charcoal mound site "on the highway from Bristol to Burlington, in Edgewood" was found to be in Bristol and Burlington, Connecticut, and not Vermont as the reference alludes (Haviland 1973:1).

Sites of charcoal mounds have been found by Green Mountain National Forest personnel in Hancock and Ripton, north of Ripton village near Huntley Brook, and on the western slopes of Worth Mountain near the Goshen line. Dick DeBonis of the U.S. Forest Service generously spent his weekends guiding us to many northern district sites. Two miles northwest near Dragon Brook are ruins of four brick-type kilns. The ruins of three more lie well hidden atop a mountain a mile southeast of Ripton village. Ruins also lie alongside Forest Road 32 just south of Route 125. At East Granville, kilns at the now-abandoned village of Sandusky made coke from coal that was mined nearby before the 1860s. The remains of mound sites were recently located on the east side of Lake Dunmore, and also a few miles southeast, in Leicester Hollow.

Northern Addison County Charcoal Sites: Because of the number of forges and furnaces that operated in northern Addison County in the early 1800s, significantly more charcoal-making sites existed than have been found in the field or in the archives. Ironworks along the Little Otter, for example, must have made large amounts of charcoal in the surrounding area, which was



6-1. Addison County charcoal-making sites.

forested at the time. Crop and pastureland that replaced the harvested forests erased the surface evidences of these charcoal-making sites. The upper Lewis Creek area east of Route 116 might be another undiscovered charcoal-making area.

AD-467 Barker Brook Charcoal Kiln (Bristol): There are a number of published references to a charcoal kiln along the west side of South Mountain, about two miles south of Bristol village: "Midway between the Money Diggings and Rattlesnake Den, at the foot of South Mountain, lies the ruins of the Barker Charcoal Kiln, so-named from the small stream of that name, on which it was situated. . . . The Barker kiln was more extensive than the usual type being a stone enclosure, laid up with mortar, about 10 feet high and 20 feet square. Openings the size of bricks were made on all four sides for drafts and bricks kept on hand to fill these openings when it was necessary to close the drafts. The south side of this kiln is still in almost perfect condition" (Harvey and Kellogg 1941:94-95).

The west slope of South Mountain has been inspected many times since 1986, and the "money diggings" and "rattlesnake den" have been found based on information provided by John Peters of New Haven, and Bob Carpenter and Ted Lylis of Bristol. John Peters, who knew where the diggings were, felt that the stream shown on the USGS topographical map was Barker Brook (John Peters letter to author, Sept. 6, 1986). If this is true, a stone ruin found about a 10-minute hike uphill from Town Road 23 at the double culvert (top of the rise) could possibly be the so-called Barker charcoal kiln. An arrow drawn

on a copy of the topographical map by Bob Carpenter, pointing out the trail to the kiln, further reinforces this.

The ruin looks more like the stone foundation of a cellar hole for a small building than a charcoal kiln, and no charcoal was found inside the hole or associated with the foundation. Charcoal was found, however, in a depression about 50 feet north and along the steep trail leading up to this flat area. Whether the Barker charcoal kiln ruin has been found or not remains a mystery.

AD-FS85 Mt. Fuller Charcoal Area (Monkton): North Ferrisburgh resident Fred Royce remembers visiting Mt. Fuller many years ago, taken there on walks by his mother and seeing areas of black soil and charcoal (Fred Royce to author, April 20, 1985). The charcoal area is up Jackey Lane near the south end of the mountain, just north of the Collins Cemetery. Inspection of the USGS map shows a somewhat level area about a half-mile up the south side of Mt. Fuller from the jeep trail, which could be the charcoal area.

An attempt was made in 1986 to inspect the charcoal area, but a barking reception from free-running dogs of all sizes and persuasions (plus my own barking dog in the pickup) and no response from a nearby house to my beeping discouraged further exploration.

The proximity of Mt. Fuller to ironworks that are documented to have operated within a few miles at a number of places along the Little Otter Creek in Ferrisburgh and New Haven, and the Otter Creek at Vergennes, give credence to charcoal being made here at an early time.

Ripton Area Charcoal Sites: Charcoal operations in the Ripton area most likely were connected with the forges at Middlebury village, and later at East Middlebury. Mound remains up the side of Worth Mountain show how deeply the forests were penetrated and exploited in early times. Local tradition indicates that the road between Ripton and Lincoln, which has not been fully inspected as part of this study, was an area of early charcoal making.

AD-314 Dragon Brook Charcoal Kilns (Ripton): This four-kiln site was initially found with the assistance of Dick DeBonis (U.S. Forest Service) in 1982 and revisited alone in 1985 to inspect results of logging operations nearby. The ruins are about two miles up Dragon Brook from the North Branch of the Middlebury River, near the end of a logging road and about 200 to 300 feet east of the brook.

Nothing historical is known about the kilns, but their proximity to the East Middlebury ironworks makes them candidates for providing charcoal to these works. Some interesting cast-iron vent liners were found here, seen at only one other charcoal kiln site (AD-315) in Vermont.

AD-315 Widow's Trail Charcoal Kilns (Ripton): Ruins of three brick-type charcoal kilns were found in 1982, with guidance to the site by Dick DeBonis (U.S. Forest Service), about 1,700 feet up an unnamed mountain a few miles southeast of Ripton village. The ruins are at the top of a cross-country trail named Widow's Trail, in a wet, swampy bog. Two ruins lie together; the other is about 50 to 60 feet to the east. Interesting hardware was also found here, similar to that at the Dragon Brook ruins (AD-314). DeBonis said he believed these kilns were operated by Parsons Billings. Nothing further is known about this site.

200 Years of Soot and Sweat

AD-338 Billings Charcoal Kilns (Ripton): The remains of one of the Parsons Billings charcoal kilns indicated on the 1871 Beers map of Ripton were found in 1984, just off the west side of Forest Road 32. The map shows what appear to be three kilns southeast of Ripton village, identified "coal kilns." Nearby is the residence of "P. Billings." A business notice on the map identifies him as a "Farmer and Manufr of Clapboards, Shingles, and Charcoal, and Dealer in Coarse Lumber." A number of other buildings plus a clapboard and shingle mill are also identified along this stretch of the South Branch on the map.

The ruins are about 100 feet west of the road through some thick berry bushes, about 750 feet south of the upper bridge over the South Branch. One ruin is a semicircular stone wall built into a partially caved-in embankment. Pieces of red brick and charcoal are within the ruin. A large mound of stones lies south of the ruin; there is no known connection with the kiln ruin. The other two kiln ruins might lie north of the located ruin, but poor visibility due to density and height of the thorny berry bushes in the vicinity made complete inspection impossible.

AD-348 and AD-351 Adler Brook Charcoal Mounds (Ripton): Sites of three, possibly more, mound-type remains were found in 1985 along the sides of a trail a mile south of Adler Brook. Dick DeBonis (U.S. Forest Service) led the way to the vicinity of the mound remains (AD-348). He had discovered them as part of a survey of the trail, which might be used by logging operations later in the year. The trail skirts the south side of an unnamed mountain (elevation 1,645 feet) just southeast of the juncture of the North Branch and Adler Brook.

Charcoal-making activities here might have been those of Parsons Billings, who operated a sawmill about one mile northwest of the charcoal area and was a dealer in charcoal (Beers *Addison* 1871:36). Some cellar holes and charcoal-bearing depressions were found in the vicinity, possibly indicating charcoal storage sheds.

The site of a single mound-type remain was found on the return hike down the trail from inspecting the previous kiln ruins (AD-351). It is along the same trail, uphill from the outside corner where the trail turned sharply south on its way back to the highway. A pile of small stones attracted an uphill inspection; some charcoal indications in the vicinity of the stones encouraged a broadened inspection (reason for the pile of stones is unknown). In the process the mound remain was found.

AD-395 Worth Mountain Charcoal Mounds (Goshen/Hancock): Sites of six mound-type remains were found up the west slope of Worth Mountain in 1980 by U.S. Forest Service personnel as part of a cultural resource reconnaissance survey. The remains range from 34 to 39 feet in diameter, lying in no definite pattern. Associated with the remains is a nearby cellar hole, which probably housed the collier. Because the site is some distance from any recognizable landmark, it is not certain if the site is in Goshen or Hancock.

Granville Area Charcoal Sites: Discovering that charcoal was made in this area was surprising until proximity to the railroad that ran through the valley was apparent. The railroad placed these charcoal kilns within an hour's haul to foundries at Randolph and points south, and Montpelier and points north. The "coal mine" at Sandusky (East Granville) sounds exciting and some day might be "rediscovered."

AD-356 Sandusky Charcoal/Coke Area (Granville): You would not know it today when you drive by, but at one time, Sandusky, Vermont was a bustling industrial community. The 1871 Beers map of Granville shows 15 structures including two "coal kilns," a "coal and acid house," a railroad depot, the property of Webb, Chaffee, Cummings & Company, and a sawmill:

There used to be a village called Sandusky just out of what is now East Granville village in the extreme north-eastern corner of town. About 1850, a good vein of coal was discovered there. A mine was opened, kilns were built for burning coke, and a village made it profitable to ship both coal and coke. In 1857 the post office of Sandusky was opened, and for a decade the community flourished. Vermont's Sandusky unquestionably took its name from Sandusky, Ohio, where the name derives from the Iroquois and means "source of pure water." Many young Vermonters had gone west earlier in the 19th Century, and in 1868, Hemenway's *Gazetteer* reprinted several letters from that period that had been written from Sandusky, Ohio, to the folks back home in Vermont. Soon after the Civil War, the coal vein petered out, and the village went out of existence. Today only a few foundations and the abandoned coal mine mark the location of Sandusky in Granville (Swift 1977:41)

The area of the "coal kilns" was inspected in 1985, along the Third Branch of the White River, a few hundred feet east off Route 12A. The site is in a small patch of dense brush, next to the stream. Surface scratching revealed rusted cans, old shoes, sheet metal, nails, broken glass bottles, and some creamware. Testing in spots inside and outside the wooded area unearthed pieces of usual-looking charcoal, nothing at all like coke. No kiln-type brick or charcoal kiln artifact was found.

Inspection of the stream revealed the wood remains of a bridge that carried a spur track from the main line on the east side of the stream to the west side, just as indicated in the Beers map. The map also shows a road crossing to the east side, where the depot stood, but no evidence of either road or bridge could be found. Inspection of the stream for 100 feet upstream and downstream yielded various pieces of rusted iron castings and rod, most apparently connected with the railroad. Some pieces of red brick were found, although none appeared burnt as would charcoal kiln bricks. Railroad tracks lie just a few feet from the east side of the stream, and pieces of ties, spikes, etc., lie along the embankment on that side. Today's tracks, however, might not be where tracks are shown in the 1871 Beers map. If coke was in fact made here, it might have been the only coke made in Vermont.

Between the highway and the falls is the remains of a dam, possibly that of the sawmill. Just upstream, a 5-foot-square thick iron sheet that looks like a door of a charcoal kiln (coke kiln?) was found. A wide inspection around and above the falls area failed to reveal any kiln evidence. More "coal kilns" are shown on the Beers map about three miles south in Braintree (see OR-CK01).

AD-CK01 Cobble Mountain Charcoal Kilns (Hancock): Charcoal kilns were supposed to have operated somewhere up the west slope of Cobble Mountain but a search through the

area in 1989 resulted in no kiln finds. According to verbal directions by Dick DeBonis (U.S. Forest Service), the subject area is west of Route 100 and "a bit south" of the Route 125 intersection. The section of the mountain inspected yielded some old cellar holes many hundreds of feet up the steep slope and some suspicious black dirt, but no positive charcoal finds. We might not have been "a bit south" enough (see also chapter 8, AD-LK02).

Salisbury Area Charcoal Sites: The most interesting mound finds in the county were those made on tiny Huntley Island in the middle of Salisbury Swamp, in the midst of cabins and a rifle range at Keewaydin Camps, and up Leicester Hollow one hot, muggy day amid clouds of mosquitos. The hike up the trail through the hollow is a must for anyone who wants to see a real piece of Vermont wilderness. That pioneers could have eked out a living in this narrow gorge by farming and charcoal making reflects on the character of the people who settled the land.

AD-16 Huntley Island Charcoal Mound (Leicester): Huntley Island is a slight rise in Salisbury Swamp, one of a group of swamps extending from Middlebury on the north to Sudbury and Brandon on the south. The island is small and during spring floods it probably disappears. It is located in northwest Leicester and borders on the south side of Leicester Creek about a mile before it flows into Otter Creek.

The site was inspected in 1978 by archeologists William Bayreuther, Cindy Cook, Frank L. Cowan, and James B. Petersen of the University of Vermont while canoeing the river. The charcoal remains were described as being a 4- to 6-inch-high 20-foot-diameter mound with a 1- to 2-foot wide rise at its outside edge, resembling a low-profile donut on a level tree-covered area. How and why charcoal was made on an island in the middle of a swamp is unknown unless the area was sufficiently tree-covered and dry at one time to make the effort worthwhile.

AD-341 Keewaydin Camps Charcoal Mounds (Salisbury): Surface remains of four mound-types were recorded in 1985 on the grounds of Keewaydin Camps, about 100 yards from the northeast corner of Lake Dunmore. The site was found through information provided by Polly Darnell of the Sheldon Museum Library, Middlebury.

Israel Davey (of the Fair Haven Iron Works and eventual owner of the Middlebury Iron Works) purchased the former forge (1849) of A. B. Huntley, and "bought a portion of mountain land, across from Keewaydin Camps, where wood was burned to make charcoal for his furnace [forge]. That area is still known by some as Coal Kiln Flats" (Petersen 1976:25). The "across from Keewaydin Camps" had me searching the west side of Lake Dunmore until Polly directed me to the east side.

The remains are on a relatively flat area east and uphill of Route 53, near the end of a trail that joins the highway at the abandoned red schoolhouse. Some of the kiln remains are integrated into camp structures. The remains are characterized by 40-foot-diameter circles of stone plus the round "gutter" at the outside edge. Some remains are more obvious than others. Since three of the remains are grouped relatively close together, with the fourth somewhat isolated, one or more kiln remains might have existed in the area between at an earlier time. There

are many more remains uphill from these (Barry Schultz King to author, May 26, 1989).

AD-405 Leicester Hollow Charcoal Mounds (Leicester): Hiking up Leicester Hollow during bug season must be experienced to be appreciated. A search for a reported rectangular charcoal kiln was undertaken in the hollow the first June weekend of 1986. To make conditions worse, it was a very muggy day and sprinkled on and off just enough to increase the discomfort. As it turned out, the rectangular-shaped kiln was not found, but remains of three mound-types were.

The hollow is a seven-mile-long north-south ravine that is drained by Leicester Hollow Brook. Silver Lake, elevation 1,250 feet and headwaters of the brook, is at the northern end. At the southern end the brook joins Neshobe River. The sides of the hollow are generally steep and rocky, yet the hollow was not only settled from about 1820 to 1900, but industry of sorts was carried on here (Peleszak 1984:6, 11).

The valley floor widens a bit at "the Greenings," halfway up the hollow, where three mound-type remains were found. A cellar hole and some fruit trees indicate where the widow Glynn lived. Charcoal might have been used by a forge that operated in Goshen at an early date; the mounds were most likely connected with blast furnaces in Forest Dale and Brandon village. The remains are 30 to 100 feet east of and parallel to the trail. They are 30 feet in diameter and cut somewhat half-moon-style into the rising embankment.

About 500 feet north of the cellar hole on the same side of the trail is supposed to be remains of the rectangular charcoal kiln. It is "bermed up and the ground surface inside is covered with charcoal" (Billee Hoornbeek letter to the author, March 2, 1986). Inspection of the area turned up nothing. (Iron was also discovered in the hollow in 1815 but it is unknown where or if the ore was exploited.)

ORANGE COUNTY

OR-CK01 West Braintree Coal Kilns (Braintree): The 1871 Beers map of Braintree indicates an "Acid Ho. & Coal Kilns" in northwest Braintree, at the junction of the White River Third Branch and Brackett Brook. Webb, Chaffee, Cummings & Company might have had something to do with this operation since that name is indicated a bit upstream along the brook, and is also associated with "coal kilns" in Sandusky (AD-356).

Inspection of the area in 1985 resulted in finding no charcoal or anything associated with coal kilns.

OR-CK02 Ely Charcoal Kilns (Fairlee): Charcoal kilns operated in the village of Ely in the vicinity of what is now a lumberyard along the Connecticut River (Collamer Abbott to author, May 19, 1990). These kilns made charcoal for the copper furnaces at Vershire. No attempt has been made to inspect the site.

RUTLAND COUNTY

A variety of coal then called brown coal was mined at Brandon and used to drive steam engines associated with providing blast to the furnace at Forest Dale. Not hard coal, it was more of an intermediate between peat and bituminous, known as lignite, and was not an uncommon occurrence in New England. The lignite vein was a half-mile south of the Forest Dale Cemetery