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June 23, 2000

Giovanna Peebles, State Archeologist
Division for Historic Preservation
National Life, Drawer 20
Montpelier, Vermont 05620

Subj:

Encl: Xeroxes of four Mount Tabor charcoal photos, ca1880s

Dear Giovanna:

Enclosed are Xerox copies of four photos I recently had the opportunity to purchase. The price was kind of steep, but I think it was worth getting them if nothing more than to keep them in Vermont. When you are though with them, pass them to John Dumville, if you want. I'm also sending a copy (w/Xeroxes) to Lacy.

I have identified them on the upper-right corner:

#1: Old Job (also known as "Griffith's"), high up Mount Tabor in the center of the charcoal-making area. Charcoal kilns at left; sawmill in smoke distant right. Long Trail now passes directly though this area.

#2: The sawmills at Old Job, taken from top of one of the charcoal kilns (note round kiln tops at lower left), same saw mill is distant haze in photo #1. Long Trail passes between these kilns and the sawmill site. USFS bulldozed the mill remains when it acquired the property in 40s-50s; little surface remains are visible today.

#3: Charcoal kilns (left, background) at today's Danby Station, immediately east of Route 7 and FR10 Road. The "office" at center was probably Silas Griffith's main office, which no longer exists. Track in foreground are today's CVRR main line; spur to kilns now longer exists. I think the far right building still stands.

#4: I'm sure this the road from the railroad (toady's Danby Station) heading east toward Old Job. By the relative flatness of the road and the height of the mountains beside it, I believe it's just east of Danby Station, before the climb gets steep. Today's FR10 zig-zags its way up the mountain draw. The old road goes rather directly up the draw. A few years ago I found the road and followed it up, at least, those sections that still existed, surviving freshets. Some day I'd like to try to find exactly where this photo was taken since that huge boulder at the right shouldn't be too difficult to locate. I'm considering making it a VAW week exercise - invite the public to come along and help an old man find a bigga-rock.

All the photos are signed on reverse "Compliments of S.L. Griffith."and are annotated either "Charcoal Kilns in Danby, VT" (#1-3) or plain "Danby, Vt" (#4), which are incorrect as to place, since they are all in Mount Tabor. The annotations are in pencil and by someone obviously didn't know (an antiques dealer?).

These photo will are part of my library/research materials that I intent to turn over to the Forestdale Interpretive Center (or the Vt Archeology center, whichever occurs first), assuming I'm still around to see either of the two occur.

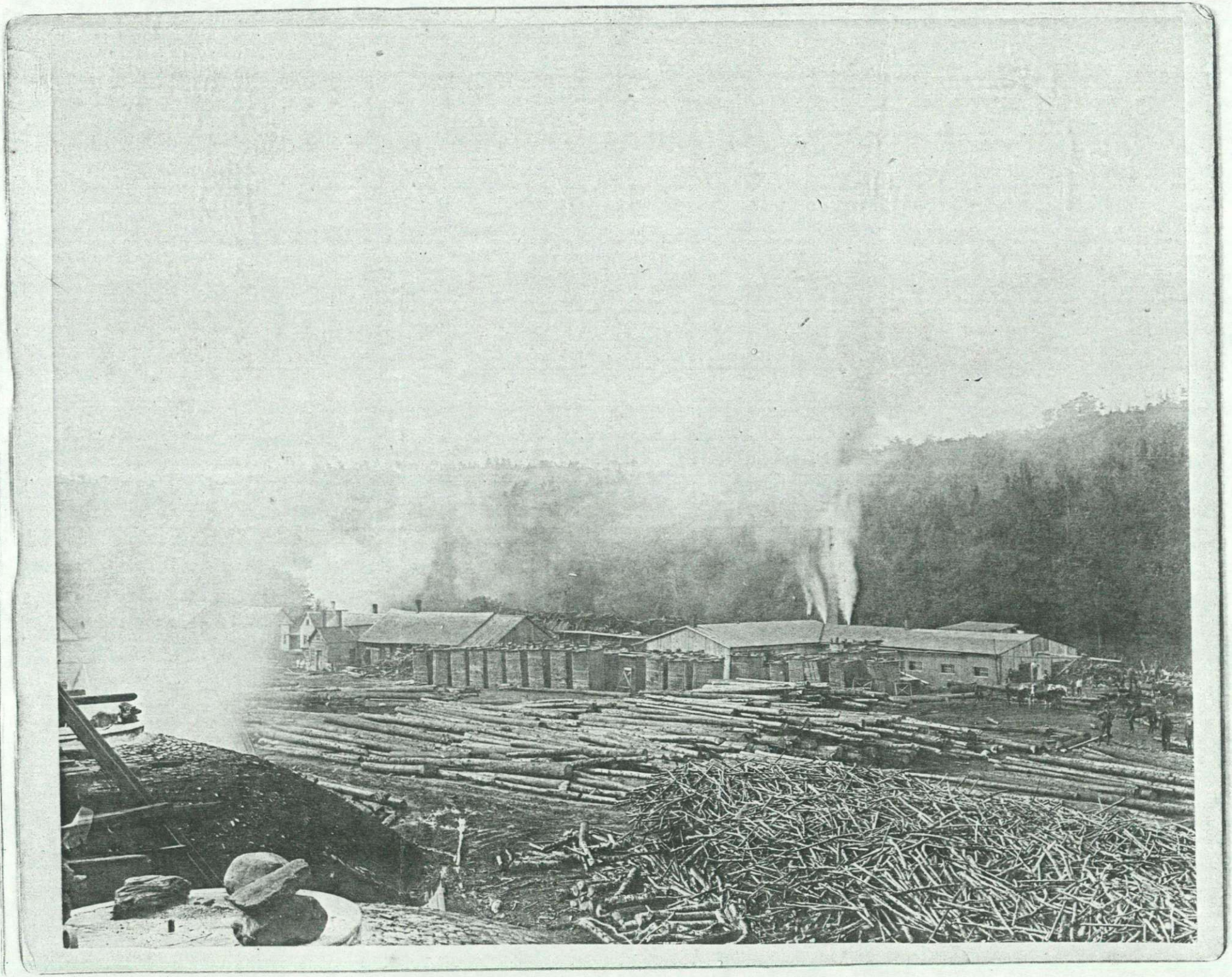
Best,

Victor Rolando

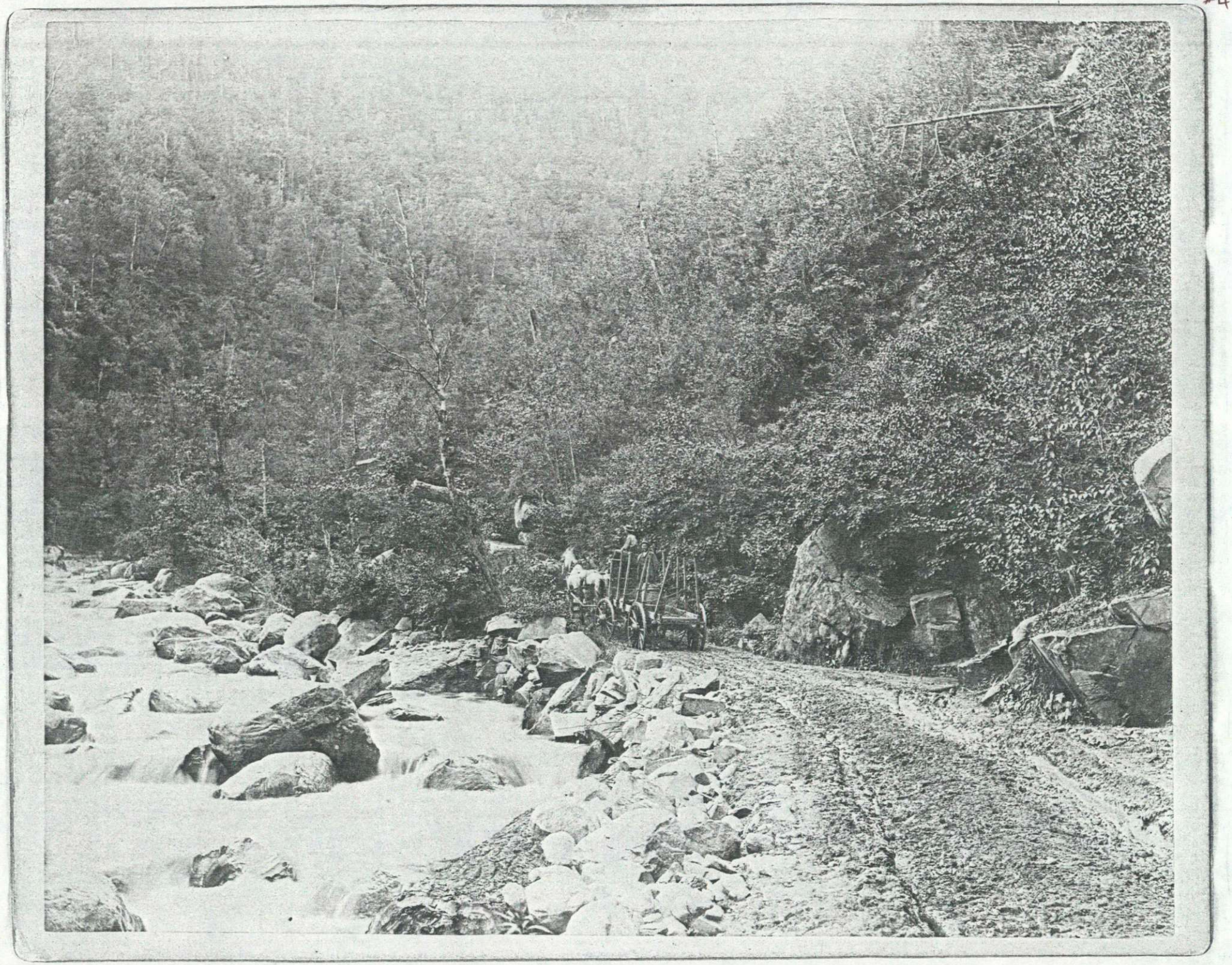
c/D. Lacy, USFS

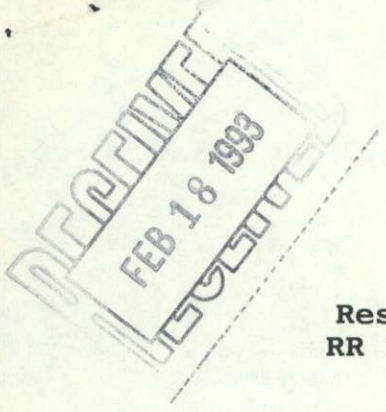
#1

#2



#3





charcoal file
kiln

GJO

for your info.

VC

Victor R. Rolando
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February 16, 1993

Green Mountain National Forest
Attn: David Lacy, Forest Archeologist
P.O. Box 519
Rutland, Vt 05702-0519

Dear David:

Well, it took a lot less time to gin up this list than I thought; I guess I'm more organized than I thought.

The enclosed list identifies, by county and Forest Service site identification, 26 charcoal kiln sites at which there are nearly 100 iron hardware artifacts just waiting to disappear (I haven't started to address bricks yet). At some sites that I recently reinspected I have noticed some pieces of hardware are already gone.

One item that particularly disturbs me because I can no longer find it is the sill plate that was at the Black Branch site (Mtr-019.00). This plate is a unique piece of hardware. Luckily, I measured and photographed it many years ago but it must be found and preserved. I have also noticed some hardware missing from Red Cabin site (Gty-010.01). Another unique piece is the top hole cover at Peru (Pru-050.03) which has sliding hole covers. It was still there at a ca. 1985 reinspection but I haven't returned since. The dozens of top hole covers found at sites offer an interesting study in variety of design.

At most of these sites the hardware is right out in the open although in most cases I have tried to cover the hardware under branches and leaves without compromising the archeological integrity of the site. (When I see the disarray of surface brick, hardware, and trash at most of these kiln ruins it is difficult to feel concerned about "archeological integrity" although God knows that I try to think as professional as I can under the circumstances.)

The purpose of the enclosed listing is not so much as to get someone to immediately go out and pick up all this stuff as much as to alert the powers that be that there is a wealth of artifact and interpretive material just laying around out there on the ground waiting either to disappear or to be preserved. I suggest someone in authority do the following:

1. Identify sites on Forest Service property (I imagine you and Shelly have this kind of data on file that would allow me to do the identification process).

2. Authorize me (and/or whoever) to reinspect the Forest Service sites to do an accurate artifact inventory (measure, sketch, photograph).

3. Set up some medium by which the inventory data is evaluated (you, me, and whoever) with the end object of collecting those materials that are either in jeopardy of disappearing through weather or vandalism, or are unique to the charcoal industry that they should be accorded extra measures of preservation and protection (collect them up, identify what they are, where they came from, and store them).

Another way of evaluating this wealth of diagonistic material is to imagine that there is probably enough brick and hardware out there to graphically, if not physically, reconstruct a realistic, representative charcoal kiln. It would be a tragedy to allow this opportunity to protect these valuable interpretive materials to slip through our fingers.

Anxiously waiting for the spring thaw . . .

Charcoal Kiln Hardware Inventory (Sites Within National Forest Proclamation Boundary)

Site Ident	Site Name	Associated Hardware
Addison County:		
Rpn-043.00	Dragon Brook CKB	Vent liners (6?), unidentified castings (3+?)
Rpn-055.00	Widow's Trail CKB	Vent liners (8?)
Bennington County:		
Gty-009.01	East Fork CKB	Binders, top hole liners
Gty-009.02	West Fork CKB	Binders, top hole liners
Gty-010.01	Red Cabin CKB	Door, top charging hole liners (2), binders
Gty-015.01	East Mtn CKS (north)	Doors (2)
Gty-016.00	East Mtn CKS (south)	Door (piece)
Gty-017.00	NW Glastenbury CKB	Binders (2)
Pru-050.02	Mad Tom 1 CKB	Door (in road)
Pru-050.03	Mad Tom 5 CKB	Top hole cover w/slides
Pwl-044.00	Cotykilns CKS	Door
Rso-054.02	Heartwellville CKB	Door (FS shed)
Smd-053.01	Gulley Brook CKS	Tile vent liners (in-wall)
Smd-086.00	Crazy John Brook CKS	Binder
Sun-???.??	SW Sunderland CKB	Binder and bolts, top hole cover
Wdd-015.01	Bickford Hollow CKB	Binders, door
Wnl-033.00	Bourn Brook CKB	Binders (3?), door, top hole covers (2), rods, RR track
Wnl-056.01	Schoolhouse CKB	Top hole cover
Wnl-063.00	Winhall River CKB	Binders (4), top 2-hole covers (2)
Rutland County:		
Ctn-061.00	Kiln Brook CKB	Door
Ctn-062.00	Furnace Brook CKB	Door (pieces)
Mtr-011.01	Ten Kilns CKB	Doors (2), RR track, top hole cover
Mtr-015.00	Old Job CKB	Top hole cover, door handle, misc. domestic materials in vicinity
Mtr-016.04	Four Kilns CKB	Doors (2?), top hole cover (over bank)
Mtr-019.00	Black Branck CKB	Binding, bolts, rods (east site); sill plate (west site)
Mtr-???.??	Kiln #36 CKB	Door, binders, top hole liner (piece?), misc. domestic materials

V.R. Rolando
February 16, 1993

PHASE 1 ARCHAEOLOGICAL SITE IDENTIFICATION SURVEY FOR THE REVISED ALIGNMENT, WESTERN SECTION, CHITTENDEN COUNTY CIRCUMFERENTIAL HIGHWAY

Submitted by:

Nora Sheehan
Peter A. Thomas

Submitted to:

Vermont Agency of Transportation
Montpelier, Vermont

Consulting Archaeology Program
University of Vermont
Report No. 123
October, 1993

The Archeology of Charcoal Making in Vermont

Victor R. Rolando

Vermont is rich in archeological resources that range from prehistoric to historic materials. Prehistoric materials tell of life in Vermont before the coming of Europeans. Historic materials tell where and how early European settlers lived and worked.

One area of historic archeology receiving close attention in recent years is a new discipline called industrial archeology (IA), that is, the study of both buried and surface remains of early industry. An IA project that started in 1978 by the author as a personal state-wide volunteer survey of Vermont IA sites for the State Archeological Inventory, and assisted along the way by many friends and helpers, has resulted in the identification of 288 sites of 17th- to 20th-century blast furnaces, bloomery forges, charcoal kilns, and lime kilns. There are 319 visible ruins and/or remains at these sites, which might reflect a need for a reinterpretation of the early industrial history of Vermont's iron, charcoal, and lime industries. The ruins and remains of 181 charcoal kilns and mounds were also found as part of this survey.

The charcoal kilns were essentially constructed of two types of materials: brick and stone, and some a combination of both. Brick types accounted for 108 kilns, averaging about 28 feet in diameter; the 22 stone type are divided between 14 stone-only and 8 combination stone-and-brick types, all measuring from 26 to 35 feet in diameter. Also found were 51 mound type remains, measuring 25 to 40 feet in diameter, and one curiosity, a concrete block type kiln from the 1950s.

The kiln ruins were generally found in the south-central part of the state. They date from the early to mid-19th century through about 1900, well past the peak period of iron making activity in Vermont, thus reflecting charcoal making for interests outside the state. It is well documented that during this period, ironworks as far away as Salisbury, Ct. contracted for millions of bushels of Vermont charcoal. Additionally, large tracts of mountain land were leased in that same period by such operations as the Richmond Iron Works (near Pittsfield, Mass.) for reduction of the forests into charcoal.

Of the 108 brick type kilns, one was confirmed through shallow excavation to have been conical in shape, 2 others may possibly have been conical. It was the policy of the U.S. Forest Service in the 1930s and 1940s to dynamite standing kilns on government property to prevent hikers from camping and transients from living in them. The two questionable conical kiln ruins were found in association with an iron door typical in configuration to those used in conical-shaped kilns, and are located at sites a few hundred feet from the known excavated conical kiln. But the sites had been blasted down to their foundation stones, as excavation attempts proved.

Partially standing ruins of most stone type kilns suggest they were of beehive shape, while the combination stone-and-brick type kilns were conical. This has been determined by comparison with period photographs owned by residents of the old charcoal making areas. One stone type kiln was rectangular, measuring 16 feet by 37 feet long and 10 feet high. The 1950s era concrete block type kiln was also rectangular in shape. Kilns were built from 1 to 10 at a site. Found were 11 single-kiln sites; six 2-kiln sites; seven 3-kiln sites; eight 4-kiln sites; four 5-kiln sites; two 8-kiln sites; and one 9- and one 10-kiln sites. Larger sites were of brick construction, averaging 4 kilns per site; stone type and combination stone-and-brick types averaged 2 kilns per site.

They were built from 660 to 2,400 feet above sea level (average state elevation is 1,000 feet). In the area of most kiln finds, 12 mountains rise to between 3,000 and 3,800 feet. Brick type kilns averaged 1813 feet in elevation at a range of 660 to 2,360 feet; the largest concentration of 55 ruins were found between 1,500 and 2,000 feet. Stone types averaged 2,057 feet at a range of 1,560 to 2,400 feet, somewhat higher than brick types but significantly compacted in a tighter range of

elevation. The largest concentration of 10 stone types were found at the 2,000- to 2,500-foot level. Mound remains were found at the lower average of 1,336 feet, in a range of 700 to 2,360 feet with no significant concentration at any elevation. Most sites are found near good-flowing streams.

Stone type kilns were built of unfinished stone, but laid up carefully in up to 3-foot thick walls to prevent as much air as possible from leaking into the interior of the kiln during the process of combustion. Those familiar with Vermont's higher elevation landscape are familiar with its rocky nature. Vermont is still known for its marble, slate, and granite industries, but Vermont farmers would rather forget the miles of stone walls they have built during the past 200 years. Stone-built charcoal kilns therefore reflect the adaptive use of a natural resource to answer a need for a practical building material. Except for iron doors, no hardware was found associated with stone type ruins, probably because their conical beehive design created a much more stable structure.

Brick type kilns were laid up in about 1-foot thick walls, using about 40,000 bricks per kiln. The design provided a stable enough structure until such factors as the vaulting brick roof, heating, expansion, and cooling were considered. Therefore, huge 6-inch wide by ½-inch thick, 28- to 30-foot diameter cast iron rings, held firmly in place by 1-inch bolts kept the structure stable. Other iron hardware found included 6-foot square doors, lintels on which these doors slid across, and cast iron vent-hole linings. Inspection of what hardware survived wartime scrap drives indicates no visible similarity between dimensions of the hardware, suggesting that hardware for the kilns was made "on order" at a foundry. All brick type sites have been vandalized of most of their usable brick. Being such an available material, the best charcoal kiln ruins in Vermont are still those made of stone, although they probably predate the brick type kilns.

Variability in hardware for charcoal kilns is also obvious in the designs of the round iron covers that closed the 6-foot diameter holes at the tops of the brick type kilns. Probably because they are flat and only ½ inch thick they escaped detection of scavengers, and over a dozen variations were found by diligent search in the vicinity of the kiln ruins.

Vent holes, through which draft into the kiln was controlled, also provide an interesting point in study of variability. All brick and stone type kilns contained vent holes that allowed insertion of a standard red brick to completely shut the hole. Stone types used a pair of bricks set side by side with a brick-size space between, laid over and under with a large flat stone. Variations in vent holes were found at one site containing five brick type kilns that had cast iron vent linings. This site was found about 3 miles from an ironworks, which it serviced. At one stone type kiln site, vent hole linings were found that are made of a hard clay material of unknown origin.

Near Manchester, ruins of eight brick type kilns were found along upper Bourn Brook near the abandoned village of Rootville; four other ruins are about a mile east; four more are along the Long Trail north of Route 11/30; and another is along the Trail south of Route 11/30. Two stone types are off Sylvan Ridge Road near Snow Valley. Charcoal was made at Barnumville, named for Milo Barnum, founder of Barnum, Richardson Company of Salisbury, Ct., owner of the kilns (none have been found).

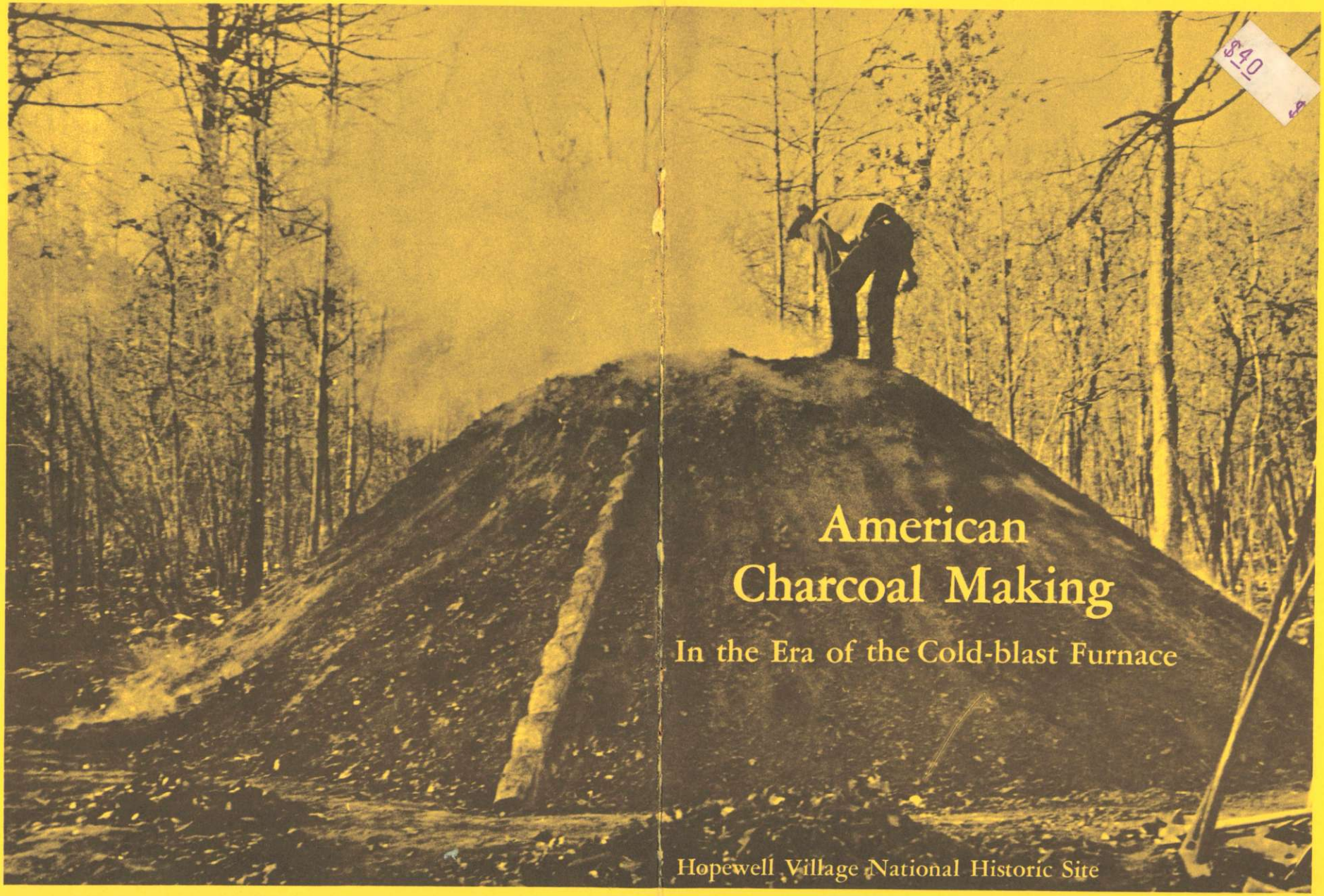
Farther north, dozens of kiln ruins and remains have been found in Dorset, Danby, Peru, and Mount Tabor, and to the south there are many dozens in Sunderland, Shaftsbury, Glastenbury, Woodford, Stamford, and Readsboro.

Most ruins are on U.S. Forest Service property but some are privately owned. Yet, they are all seen by many as a source of free building or scrap materials and have all been severely vandalized. In only eight years it was noticed on reinspection, ruins have been dug into and hardware is missing. That there are dozens of ruins does not excuse this wanton destruction because all sites are in many ways distinctive from each other. Some design features appear constant at these sites, such as the consistent 28-foot inside diameter of the brick type kilns, indicating a common know-

ledge of one aspect of the technology. But the variability, for example, in hardware at these same brick type kiln sites testifies to the individuality of at least one of the number of choices that enterprising Vermont charcoal makers appeared to make the most of. As materials are stolen from the sites, a cultural resource for future interpretation also disappears. We have so little remaining of these kilns today that should the pace of vandalism and destruction continue, there will be nothing remaining for our grandchildren to see and enjoy, as we do today.

We are the custodians our children's heritage. They will hold us personally accountable in history for this cultural trust. It is up to all of us to protect our fragile historical and archeological resources, whether they be on private, state, or federal land, and whether they be remains, ruins, or structures.

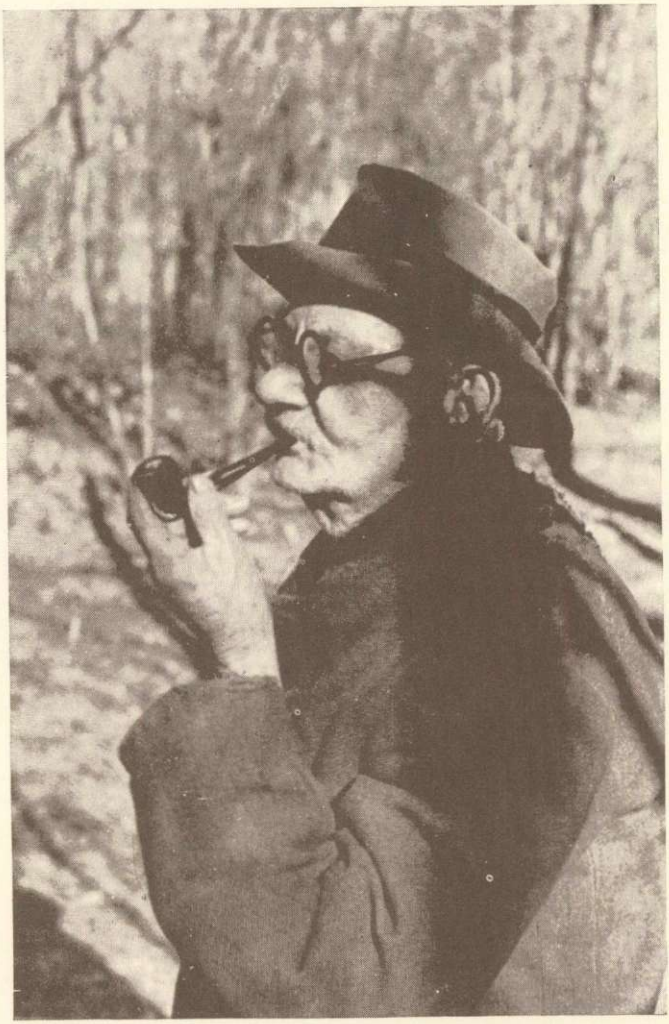
Source: Victor R. Rolando *200 Years of Soot and Sweat: The History and Archeology of Vermont's Iron, Charcoal, and Lime Industries* Burlington, The Vermont Archaeological Society, 1992.



American Charcoal Making

In the Era of the Cold-blast Furnace

Hopewell Village National Historic Site



Lafayette Houck, Hopewell's last collier

Nancy E. Boone

American Charcoal Making

By Jackson Kemper, III
Former Research Assistant
National Park Service, Hopewell Village

HOPEWELL Village National Historic Site, Pennsylvania, contains a 170-year-old cold-blast furnace which was one of the last of its type to compete with anthracite-fueled hot-air furnaces. When it, with others of its kind, gave way before the new processes that were destined to contribute vitally to the development of America's great iron industry, a final chapter was written into the record of a companion technique—the making of furnace charcoal. Aware that an abandoned art eventually might become a completely lost one, the National Park Service provided a demonstration revival of the obsolescent method so that accurate textual and photographic data could be obtained for permanent record. Supervised by octogenarian Lafayette Houck, last of the Hopewell colliers, all steps of the coaling process of an earlier day were reenacted while Mr. Kemper stayed night and day at the site of operations and assembled the information which follows. Ed.]

Two and a half centuries ago the Schuylkill Valley in Pennsylvania, which extends from the present coal region to the city of Philadelphia, was an untouched wilderness. The section was not only rich in metal and water power but possessed also a great wealth of timberland which later became the first source of charcoal fuel for the great iron industry to come.

The first colonists to discover the rich valley were a group of Swedish people who had settled on the Delaware River in 1638.

They went up the Schuylkill by canoe and found a livelihood in trading with the Indians, fishing for shad, and cultivating the rough but fertile lands. In 1681 William Penn received his charter and grant from Charles II of England in consideration of a debt of £16,000 due to his father. With Penn came the great influx of English, Welsh, Dutch, and German settlers to what later was the Province and State of Pennsylvania.

Early colonial writers often mentioned rumors that there was iron ore in the Schuylkill Valley, and Penn himself encouraged the belief. It was not until 1716, however, that steps were taken to transform into pig iron the great natural resources of ore, water power, and timber. It was in that year that Thomas Rutter, who had been in business as a blacksmith near Germantown as early as 1682, moved up the river and constructed in the vicinity of what now is Pottstown the first bloomery forge of the province. The great ore beds, the thick woodlands assuring tremendous reserves of charcoal, and the bold streams promising water power soon induced many capable and hopeful men to follow Rutter's lead in the attempt to make iron. Between 1716 and 1771 more than 50 forges and furnaces are known to have been constructed in the province; and there probably were countless others.

By 1719 Rutter was convinced that his experiment at the mouth of the Manatawny could be developed into a great industry. Accordingly, with his friend Thomas Potts, and with the support of others, he began to build Colebrookdale, the first charcoal furnace in the province. It is interesting that the first charcoal furnace in England to cast hollow ware by the use of sand molds also was called Colebrookdale.

So much jealousy was excited in England by the excellent quality of the ironware produced in the American colonies and shipped to the mother country that in 1719 a bill was introduced in Parliament to prevent the construction of rolling and slitting mills here. The bill was rejected but the news that the colonies could

produce good metal spread quickly and aroused the enthusiasm of many enterprising young men.

William Bird, whose exact antecedents are not known, came to Pennsylvania a year or two before 1728 and soon was recognized as a contemporary with Rutter, Potts, Samuel Savage, and Samuel McNutt in the establishment of forges and furnaces. When Rutter's will was admitted to probate in Philadelphia, November 27, 1728, Bird was a witness. He then was a resident of Amity township, a part of Philadelphia County, and at the age of 23 had attained a position of influence in his community, serving as a commissioner in the laying out of public roads. By 1733 he was working at Pine Forge as a woodchopper earning 2 shillings 8 pence a cord, and a few years later he rented a one-eighth share in the forge at £40 a year. At about that time he began to acquire property for his own enterprises west of the Schuylkill and in the vicinity of Birdsboro. He started construction of a "Hopewell Forge" near Birdsboro in the fall of 1743 and was handling pig iron as early as March of the next year.

Upon the death of William Bird in 1761, the forges at Birdsboro passed to his son, Mark Bird, who took over the management of the family business at the age of 22. On discovering a rich vein of ore about ten miles south of Birdsboro (on present State Game Lands), Mark Bird began the construction of Hopewell Furnace nearby, around 1770. With the outbreak of the Revolutionary War, he answered the call of the new country and, as a lieutenant colonel in a regiment of Berks County volunteers, took command of his battalion and equipped it with his personal funds.

At the height of Mark Bird's prosperity the ironmaster believed himself immune to disaster. "Neither fire nor flood can harm me," an expression of his, was quoted for many years in the community. He was held in high esteem, and welcomed everywhere with the utmost cordiality. He was wont to create an impression when he arrived from Philadelphia in his coach drawn by

A typical collier's hut

four handsome horses. Yet both flood and fire visited him. His vast holdings, spread into several counties of Pennsylvania and into New Jersey and Virginia, suffered from neglect during the war, and his personal means dwindled considerably as a result of his patriotic generosity. The end came in 1788 when he was "sold out" by the sheriff to satisfy various bonds.

With the Hopewell furnace as the center of activity, a little village had gradually developed consisting of the "Big House," where the owner or manager lived, and the many tenant houses for the families of the furnace men, colliers, woodchoppers, molders, miners, teamsters, blacksmiths, wheelwrights, and others . The company store supplied every need of the village inhabitants from food to clothing, while a one-room schoolhouse gave to the younger generation the fundamentals in reading, writing, and arithmetic. A large farm and garden also were operated and maintained by the owner of the furnace to supply the community with much of the foodstuff and to provide hay enough for each family to keep a cow in an adjoining "one-cow" stable.

The lady of the Big House was looked upon as the mistress of the community. When anyone became ill or needed help in any way, she was the first person to be called in and consulted. Social activities at the Big House were festive occasions, particularly at Christmas and New Year's when the entire village took part.

Until 1837 charcoal was the only fuel which could be used successfully in the cold-blast furnace. Many attempts were made between 1815 and 1838 to use the recently discovered anthracite coal, but the experiments generally were unsatisfactory because the heat generated was insufficient to melt the ore. Then James B. Neilson of Scotland obtained a patent for the use of hot air in the blast. On February 7, 1837, George Crane was successful in smelting iron at his works in Ynyscedivin, Wales, by

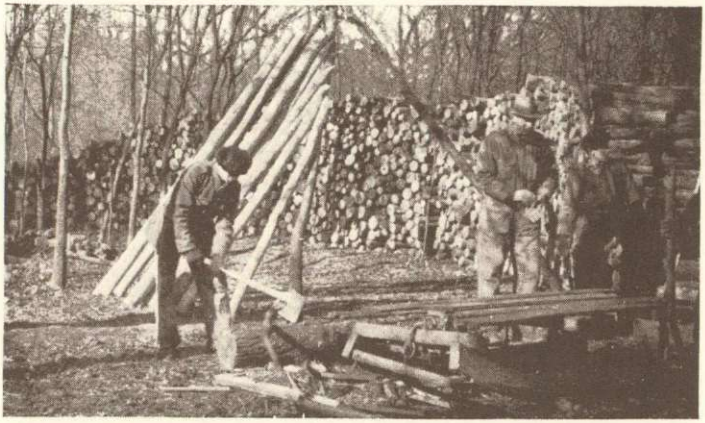
using Neilson's hot air blast on anthracite coal and producing 36 tons a week. In May of that year, Solomen W. Roberts of Philadelphia visited Crane's works in Wales and witnessed the satisfactory results obtained from the method. Upon his return to the United States, he made recommendations which resulted in organization of the Lehigh Crane Iron Company to manufacture pig iron with anthracite coal of the Lehigh Valley. This is believed to have been the first successful furnace of its kind in the country.

The reason that ironmasters of the nineteenth century wished to convert their cold-blast charcoal furnaces into hot-blast anthracite furnaces was based primarily on economic grounds. The maintenance of great wood tracts and the expense of labor for making the wood into charcoal were tremendous items. The use of anthracite coal not only obviated these factors but also brought the industry out of the wilderness, so to speak, and into the cities where product and market were in closer proximity.

It is due to this economic stage in the evolution of the great iron industry of Pennsylvania that the old art of making charcoal has been forgotten. Hopewell furnace remained a cold-blast charcoal furnace to its final blast and was one of the last works of its kind to attempt modern competition.

With this story in mind it is the purpose here to describe the method used by colliers to produce their "coal." Lafayette Houck, the last of that grand old group of Hopewell colliers, who then was more than 80 years old, willingly consented to direct the building and firing of the pit. An old hearth near the village was selected and even a typical collier's hut was constructed on its original site where Mr. Houck and the writer lived during the coaling operation.

From the time the pit was first fired until the last piece of charcoal was hauled away by the teamster, with his large swaying wagon drawn by six sturdy mules, the pit had to be tended con-



Collier's hut under construction

stantly. A master collier and one or two helpers "coaled" together, working as many as eight or nine pits at a time. The hearths were situated about the distance of a city block from one another throughout the various charcoal tracts, and the collier's hut was placed as conveniently as possible to the group of pits then being "coaled."

The hut was always conical in form, having a base about 8 feet in diameter and a height of about 10 feet. Three-inch poles were used for the uprights, and more slender poles filled the interstices between them. Leaves were used to cover the structure and to form a mat so that the final dressing of topsoil would not sift through the few remaining crevices. A door just large enough for one man to get through was placed on the "pit side" of the hut. A wood stove and rough log bunks were the furnishings of this temporary abode.

The hearth, or base, of the charcoal pit was simply a flat space 30 or 40 feet in diameter and free of all brush, roots, and stumps. An open level spot was chosen, and much care was taken that the surface of the hearth was hard and smooth so as to afford good shoveling and raking of the coal. If one side of the chosen location slanted downhill the opposite side was dug out enough to make the fill on the lower side absolutely level. The hearth had to be level to assure uniform burning.

The word *pit* is misleading, for it refers simply to the structure as a whole, including the hearth and the pile of wood; and in no way should it convey an impression of a hole in the ground. When a hearth once had been made, it lasted indefinitely and, in fact, improved with age and use because the charcoal dust which remained after a pit had been burned off was serviceable as a covering for the next pit burned on the same location. Because of the lack of dust on a new pit, wood often was hauled some distance in order to take advantage of an old hearth. Charcoal dust disintegrated little and afforded to plant life a rich supply of food

Preparing a hearth

Hauling in the wood

material in the form of carbon. It therefore was necessary, when preparing an old hearth for refiring, to remove the vegetation and debris so that the old dust might be cleaned and raked back in a ring on the circumference of the hearth in readiness for the final covering of the pit.

The collier's responsibilities did not begin until the wood had been sledded in from the woodchopper's ranks to the hearth and there set on end until the entire surface was filled. This wood usually was cut during the winter months and allowed to season until the coaling operations began in late spring. Because of high winter and spring winds and other unfavorable weather conditions, the pits were fired only during the months from May until late October. Colliers often became woodchoppers during the winter in order to receive a full year's wage.

The area of woodland to be cut off for coaling was divided among the woodchoppers into narrow strips about 20 axhandles apart and extending the full length of the tract. The woodsmen then attempted to fell their trees so that the tops would come together along these dividing lines.

Lap-wood and *billets* are the names given to the two sizes of wood used by the colliers to "set up" their charcoal pits. The lap-wood ranged in size from 1½ to 4 inches in diameter, while the billets varied from 4 to 7 inches. All wood was cut in 4-foot lengths. The billets were split out of the main trunks of the trees, and the branches provided most of the lap-wood. The ends of each billet and pieces of lap-wood were cut purposely on a bias so that in setting the pit a rounded top or head could be formed more easily to keep the leaves and dust, which were used as a smudge blanket, from rolling off the structure.

The woodchopper "ranked" his wood as he cut, separating each cord by upright poles so that the owner, in computing the chopper's wages, could count the number of cords readily. The

Method of placing lap-wood on the dust ring

Filling a hearth with lap-wood and billets

wages were based on the amount of wood cut, 8 shillings and 6 pence a cord being a good price in the early days.

The man who brought in the billets and lap-wood from the woodchopper's ranks to the hearth was called the "woodhauler." A mule, a horse, or even an ox was used to drag his rustic wood sled which, when loaded, would carry perhaps half a cord. The haul from the ranks to the hearth was made as short as possible and always downhill. Hearths were placed so that they were at the bottom of a rise.

The sled was fashioned crudely with wooden runners extending its entire length, which was about 5 feet. Rough boards surfaced the top and four upright posts kept the billets and lap-wood from rolling off. The joints of the sled were constructed loosely in order to allow plenty of "give" under the rack and strain of a heavy load being dragged over stumps, fallen logs, and rough ground.

The road leading to the pit always went right through the center of the hearth so that the hauler could unload easily and drive out at the other side on his way for another load. The hearth was filled by the hauler, not the collier. Driving his sled to the center of the hearth, the hauler, who always walked beside his mule, placed each billet and piece of lap-wood on its end, starting at the outer ring of dust and working toward the center. The first few loads were of lap-wood only. It was laid crosswise on the top of the ring of dust in order to give a substantial support for the billets and other lap-wood to lean against. Another reason for hauling in lap-wood first and placing it on the ring was the next operation of setting the pit. Here work was begun at the center of the hearth and the pit built out to the circumference, thus leaving the small wood to "lap-off" the outside. When the hauler had filled the hearth with wood, his job was finished.

It was at this point that the collier and helpers stepped into the picture. As a woodchopper during the winter season he had

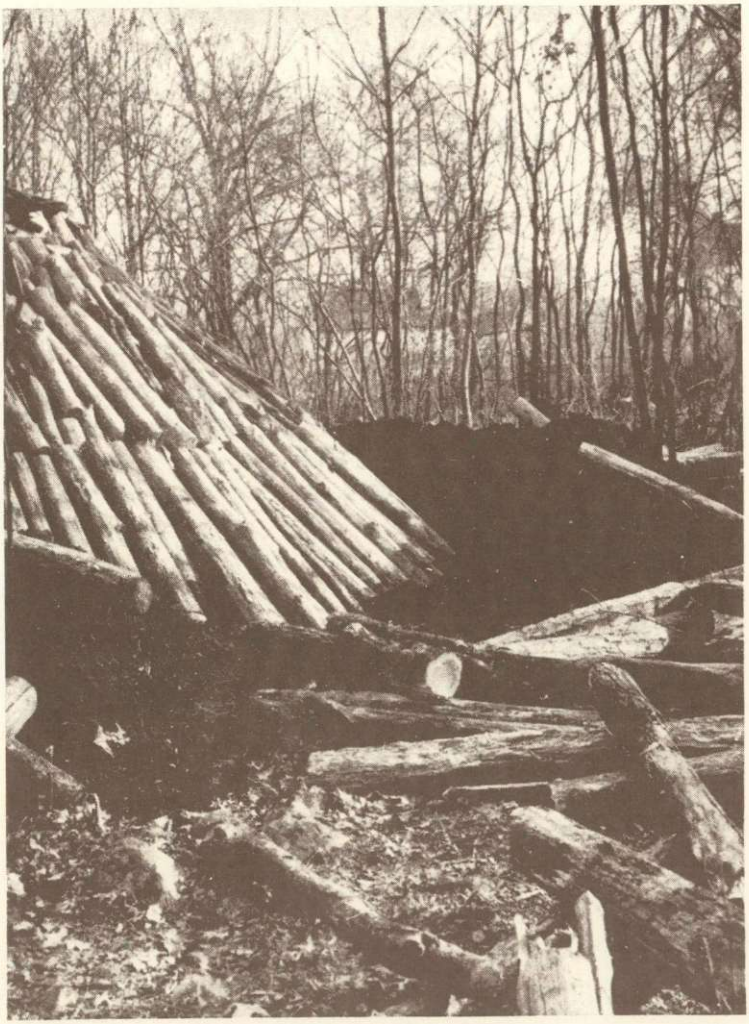
Constructing the chimney

Pit ready for covering

worked at cutting billets and lap-wood and now, with the passing of bad weather, he was ready for a summer's job "on the hill." He first cleared his hearth of all vegetation which had grown there since the last time the tract had been coaled—possibly 30 years before—and raked out all the old dust to its edges. His next move was to locate the center of the hearth and to throw back enough of the lap-wood to enable him to get down to the surface. The *fagan,* a green pole some 18 feet long and 3 or 4 inches in diameter, was driven in at this center point so that it stood upright. A helper handed down to the collier the lap-wood that had been thrown back on the pile, and these pieces were used to construct the three-cornered chimney around the fagan. The chimney had an opening of about 8 inches and was constructed by laying lap-wood triangularly, using each piece as a leg. In this way the chimney could be built as high as necessary.

After the chimney was about 5 feet high, the helper handed to the collier the billets that the latter carefully leaned against it, allowing each piece to protrude slightly at the base. When the first ring of billets had been placed, another ring was begun, the base protruding a little more each time, so that when the ring of charcoal dust finally was reached there would be enough slope to the sides of the pit to enable the final covering of leaves and dust to rest securely without sliding off. Lap-wood was fitted in whenever possible to take up the air spaces. Each billet and piece of lap-wood was placed so that the biased cut of the chopper's ax sloped up toward the chimney. That helped to form the final rounded top and sloping sides of the finished pit.

After this first tier of billets and lap-wood, which was called the *foot,* had been set out from the chimney far enough to give the collier a footing, he climbed up on it, built the chimney up another 4 feet or so, and then started to set the second tier of billets and lap-wood, called the *waist.* Setting the foot and waist out



Dust ring to be used for covering the pit

together, he and his assistants worked until all the billets were used up and just enough lap-wood was left to construct the *shoulders* and *head.*

Standing on the waist and again building the chimney upward another 3 or 4 feet, the collier set the remaining wood, not on end this time, but in a horizontal fashion radiating from the chimney as a center point. Building up shoulders and head in this way to the full height of the chimney, and shortening each layer of the radiating lap-wood until the top of the chimney was reached, he fashioned a rounded structure. Throughout the entire operation great care was taken to set and fit the pieces substantially together to prevent the whole from *reeling* or twisting. A pit hastily slapped together was certain to *reel.*

Lapping-off was the last move in completing the construction of the pile. This consisted merely in using what lap-wood was left to fill in all possible air spaces and cracks on the sides before the final covering of leaves and dust was spread on.

The pit now "set," the collier and his helper busied themselves in notching out a crude ladder from an 8-inch log long enough to reach from the ground to the head. Enough chips and fine kindling were cut to fill the chimney within a foot or so of the top, and a *bridgen* of three billets and several pieces of lap-wood to cover the chimney made the pit ready for "leafing and dusting."

A crude wooden rake, consisting of six or seven 6-inch teeth placed about 2 inches apart in a small head, was used to gather up the scattered leaves on the forest floor. The job usually was done by the collier's helper who, after raking the leaves into piles, carried them to the head of the pit in the collier's basket and scattered them uniformly over the pit to a depth of several inches. These baskets were made by the collier during the dull winter months by weaving together thin strips of lath or reeds around an oval hoop. They held, when heaped over the brim, from 2½ to 3 bushels of charcoal.

Gathering leaves to cover the pit

Covering the pit with leaves and dust

The long-handled collier's shovel was used to spread on the dust which had been raked to the circumference of the hearth in a ring during the early preparation of the site. A slight twist of the wrist in manipulating this tool spread the dust in a scattered spray so that all parts of the pit were covered evenly. Several inches of dust were required for the sides and at least a foot on the head and shoulders.

The pit was then ready for firing. This was done by carefully moving back enough of the dust and leaves from the bridgen, and two of the bridgen billets themselves, to allow a shovelful or so of red-hot coals from the collier's cooking fire to be placed on top of the kindling in the chimney. Care was taken that no dust or leaves fell back into the chimney when the bridgen and covering were replaced.

The lighting of the pit usually was done toward evening in order that the collier might have at least one more good night's sleep before the constant watching began; for it was not likely that the pit would "burn through" or need "dressing" until the following afternoon. Before turning in that first night, the collier first made certain there was ample dust on the head. This dust usually was carried to the top of the pit by the collier's helper and raked around at least 1 foot deep. It was considered necessary to have one bushel of head dust for every cord of wood in the pit.

Charcoal pits varied greatly in size, depending for the most part on the dimensions of the hearth and the amount of wood to be coaled. The average hearth in the Hopewell vicinity, however, was from 30 to 40 feet in diameter and would hold 25 to 50 cords. Any kind of wood may be used to make charcoal so long as it is "solid," but it generally was held that "the harder the wood, the better the coal." It was the practice in the region to cut clean, using everything except the deadwood, and in 30 years'

Dusting the pit

Firing the pit

time the tract could be coaled again. No ironmaster ever conceded that he had enough coal land.

If a charcoal pit was not watched and tended constantly, fire broke through the covering of leaves and dust and might destroy the entire pile. A burning flame was the dread of colliers, for coal could be made only by the charring action of a "dead fire." "Jumping the pit" was a dangerous job. The collier, holding his long-handled shovel in a horizontal position, mounted his crude ladder to the top of the pit and stepped gingerly around the head and bridgen to learn whether there were any soft spots or *mulls*. Finding these, he jumped up and down on the more substantial parts of the surface, working his way carefully toward the mulls. Air spaces in the pit caused by shrinkage of the charring wood thus were closed in part. Soft spots then were dressed by digging them out a little and placing new wood, leaves, and dust in the resulting cavities to preserve the original shape of the pit. The pit was tended in this manner every evening in order to prevent, if possible, its burning through during the night.

The phrase *give 'er fire* should be distinguished from *firing the pit*. The latter referred to the operation of lighting the original fire, the former to the task of providing draft vents to increase the fire within the pit. The burning was governed by means of holes made in the foot on the side where more heat was desired. In order to learn the location of the fire and to see whether it had reached the surface of the hearth the collier used the fagan as a poker, the bridgen first being removed carefully to prevent leaves or dust from falling into the chimney.

Since the pit was lighted from the top, the fire had to char downward. Ramming the fagan down through the loose coal at the head, the collier eventually struck a hard surface, either uncharred billets which the fire had not reached or the surface of the hearth. As it was a part of the collier's training to recognize

Jumping the pit

Raking off the head

the various surfaces struck by the fagan, he could calculate readily the direction in which the charring was proceeding and thereby provide the proper drafts or foot holes which were needed to effect uniform charring on all sides of the pit. When the surface of the hearth was not absolutely level the lower side always "came to foot" first. In the early stages of the burning, holes were placed about 2 feet up from the foot. Later, as the pit came nearer "to foot" the holes were made lower.

When the pit was burning evenly and well, a characteristic blue smoke puffed from the vents at lazy intervals, giving off a pitch tar odor which the colliers considered to be the cause for their tremendous appetites. White smoke was an indication of a poorly charring pit and usually resulted from rapid burning due to too much draft or to the use of old dry wood. Heavy winds caused the pit to burn unevenly, and rains often made it become too hot. When a pit crackled and sputtered it was a certain indication that dry chestnut wood was being employed.

The number of days required for a pit to "burn off" varied greatly with the size of the hearth and the kind of wood. For the average hearth, which held 30 cords or so of partly seasoned wood, it normally took from 10 days to 2 weeks for the pit to come to foot, that is, for all the billets to char. After it had come to foot and before any of the coal was removed, it was necessary to have the dust dry enough to run off the sides like sand. Accordingly, more foot holes were made so that the pit would heat up, char the leaves, and dry the dust.

Once the pit had charred down to the foot, it might be assumed that the fire was out and that the process of raking out the coal would be simple. Charcoal carries fire for a long time, however, and the raking was a tedious and painstaking task because only small amounts could be removed at a time. The collier chose a side of the pit where the dust was driest and with his shovel dug out a portion, starting at the foot. This opening acted

Collier's rake and baskets

as a draft hole and soon there were signs of fire. At that point he stopped his digging and threw back enough of the dry dust to reseal the pit and allow it to cool.

The long iron-toothed collier's rake then was used to draw back into the ring the pile of charcoal which had just been dug out. A few sparks often remained in the coal and the entire ring became ablaze. As the hearths were usually far from water, dry dust was the only means of extinguishing the fires. When the collier and his helper worked around the pit, digging out a little coal here and there, each portion was kept in a separate ring so that a single fire might not destroy the total. The collier always refused to ring out more coal on his hearth than would fill the charcoal wagon because of the extra attention required to attend it. On the day when the wagon was to come for the first load the collier and his men were up and ready to start work at dawn. They spent several hours in ringing out the coal and the remainder of the morning in seeing to it that no fire remained in it.

The same collier's baskets which were used to carry leaves to the head of the pit were employed to fill the wagon with charcoal. The teamster carried the basket on his head after the collier had raked it full and helped him to swing it into position. Charcoal wagons varied in size but those generally in use at Hopewell held 100 to 300 bushels of coal. All were drawn by six-mule teams and equipped with high sideboards and a bottom that would pull out. When the teamster reached the charcoal house he unhooked his lead team from the "spreaders" and fastened their whiffletree to a coupling connected to the sliding floor of the wagon. In that way the load was dumped without effort to the teamster or damage to the brittle charcoal.

From the Colliers' Lexicon

Brands: Partly charred billets which remain after the pit has been coaled.

Butt: The final remains of a burned-off pit.

Coaling out: Act of digging and raking charcoal from the pit.

Foxing the brands: Recoaling the partly burned billets after the charcoal has been hauled away.

Dressing the pit: Refilling a mull, where the fire had burned through, with new wood, leaves, and dust so that the exterior of the pit was restored to its original shape.

Head: The uppermost layer of lap-wood forming the rounded top of the pit.

Head dust: Old charcoal dust placed on top of the pit to form a smudge blanket.

Lapping off: Placing lap-wood on the outer surface to make the pit as tight as possible.

Piece: The pit after some of the coal has been removed.

Pit will blow: Gases generated by the charring wood often cause the top of the pit to blow off.

Shoulder: That part of the pit where the second tier of billets meets the top layer of lap-wood.

Waist: The portion of the pit where the first tier of billets meets the second tier.

United States Department of the Interior

National Park Service

published by: Eastern National Park & Monument Association

olidge facility accessible fires debate in Plymouth Notch

Historians and history buffs relish the authenticity of the roughly 25 buildings that comprise the Plymouth Notch Historic District. But Coolidge's birthplace, his boyhood home, and the one-room school house and Union Christian Church he attended have remained inaccessible to wheelchair-bound visitors.

Efforts to improve accessibility to the century-old buildings have posed a challenge, particularly for the trustees overseeing the church, built in 1840 and acclaimed for its rare Carpenter Gothic interior in which hard pine boards sawn from a local mill were fitted together to form the walls and domed ceiling.

A proposal by the Calvin Coolidge Memorial Foundation to make the building accessible and provide another fire exit has stirred considerable alarm among the preservation community. The foundation, which owns the church, wants to build a ramp along the back and side of the church and breach a side wall to install a door, complete with panic bar and exit sign.

The foundation's board of directors are scheduled to vote on the proposal Aug. 1 at the board's annual meeting. State officials and local residents say they will address the board in a last-ditch effort to get the trustees to consider other options, including doing nothing at all.

"I'm one of those people who is quite upset about this," said Eric Gilbertson, director of the Vermont Division for Historic Preservation, which maintains the other buildings at Plymouth Notch. He pointed to what he called successful changes to other buildings at the

COOLIDGE, Page 30

inches And Concord, N.H., should have had 19.20 inches, but has had only 13.34, the weather service said.

Except for the Great Lakes, Pennsylvania and Maryland areas, "the rest of the Northeast is basically in a mild to extreme drought," Schultz said.

The rivers are following suit, he added. Stream flows are below normal in southern New Hampshire, western Vermont, southern Maine, most of Massachusetts and Rhode Island and all of Connecticut, he said. The reservoirs are generally in good shape, but the rivers are low. Connecticut's rivers, in particular, are not doing well; stream flows are at only 69 percent of normal, he said.

Hydropower operators, who provide up to 10 percent of the region's power, are starting to feel the heat, said Barbara Lynch, a spokesperson for the New England Power Pool, which is fed by nearly all the utility-operated hydropower plants in the region. Their production is down, which has forced coal, oil and nuclear power plants to produce more, she said. So far, no major problems have occured in delivering power to customers, but that

DRY, Page 30

PHOTO / WENDY MAEDA

9th century
st.

MASSACHUSETTS

Boston Globe 7/25/93

Ancient skills applied in charcoal kiln renewal

By B.J. Roche
SPECIAL TO THE GLOBE

HAWLEY – Thousands of miles lie between this mountaintop town in the Berkshire foothills and the ancient mountain nation of Tibet, but some skills travel well.

When Sonam Lama was growing up in Tibet, he learned the art of building stone walls without mortar. Last month, he brought his dry stone wall techniques to the Kenneth M. Dubuque State Forest to restore a landmark of an old New England industry, the charcoal kiln.

Lama, who now works as a stonemason in Greenfield, recently completed the $6,700 restoration of the 123-year-old Hawley charcoal kiln under the auspices of the state Department of Environmental Management.

The beehive-shaped kiln, 25 feet high and 25 feet in diameter, is on the National Register of Historic Places and is one of the last remaining structures from what was once a small industry in New England, the making of charcoal.

The kiln was built in 1870 with four-inch-thick flagstones found in the surrounding fields. No mortar was used in its original construction. Instead, the pressure of the stones upon each other kept the building intact, in the same way an igloo is constructed.

"There aren't too many places around like this left," said John Sadlow, who oversaw the restoration for the Region 4 office of the DEM. "It's not easy to get things like this done, so it's a miracle."

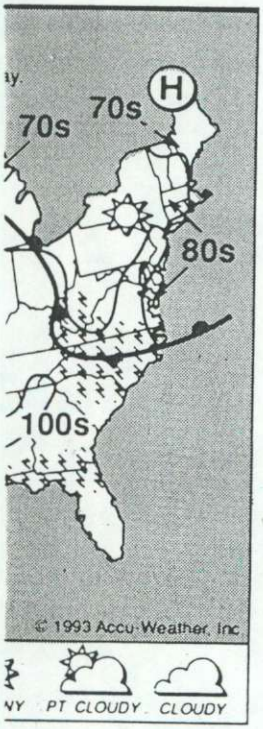
The kiln now sits like an ancient Celtic temple in a quiet clearing just behind the East Hawley firehouse. But it was once a cauldron of activity and one of many charcoal kilns of varying shapes and sizes around New England.

Twenty-five cords of wood, cut on land that is now the Hawley State Forest, were piled high into the kiln, ignited with kerosene, and, over a period of several days, charred at temperatures that sometimes reached 2,000 degrees.

Burning was controlled by several draft holes around the base of the kiln, which were plugged with bricks.

KILN, Page 31

hs to 75



ALMANAC

Sunday, July 25, 1993
(Eastern Daylight Time)

Sunrise . 5:29 Moonrise. 12:58 pm
Sunset .. 8:11 Moonset . 11:29 pm
Length of day 14:42
Day of year 206

	AM	PM
HIGH TIDE	4:19	4:48
Hgt. of tide	10:5'	11.0'
LOW TIDE	10:30	11:06
Hgt. of low tide	-0.5'	-0.3'

MOON'S PHASES

New Moon ..... August 17, 2:29 p.m.
First Quarter ..... Today at 10:26 p.m.
Full Moon ..... August 2, 7:11 a.m.
Last Quarter ... August 10, 10:20 a.m.

HIGH TIDE

	A.M.	P.M.
Orchard, Me.	4:09	4:39
pton Beach, N.H.	4:21	4:50
Island	4:19	4:48
ich	4:17	4:46
cester	4:16	4:45
TON AREA	4:19	4:48
ate	4:14	4:43
outh	4:24	4:53
Cod Canal (E)	4:18	4:47
Cod Canal (W)	2:09	2:38
outh	4:01	4:30
nis Port	5:20	5:49
ham	4:49	5:18
let	4:31	5:00
ncetown	4:33	5:02
ucket Harbor	5:24	5:53
Bluffs	4:49	5:18
Bedford	1:02	1:31
ort, R.I.	12:49	1:18

Ancient Tibetan skills applied in Mass. to restore charcoal kiln

■ KILN
Continued from Page 29

Enough oxygen was allowed to keep a low-burning fire that would remove the moisture, but not burn the wood completely.

Once burned, the charcoal took 10 days to cool down before it could be removed. It was then taken five miles down the road to Charlemont, where it would be shipped by rail to industrial centers, or sold to local blacksmiths.

10 of 14 counties producing

In the mid-19th century, 10 of the state's 14 counties were producing charcoal, which could be bought by the bag in local stores. Western Massachusetts, with its thousands of acres of forest, was a natural for charcoal production.

Agricultural reports note that there were 11 people employed in charcoal-making operations in Hampshire County and 27 in Franklin County in 1855. That year, the town of Erving produced more than 100,000 bushels of charcoal, and in Leverett, 60,300 bushels were produced. Becket charcoal was a major export for that small Berkshire County town, transported to Boston for use in the ignition of anthracite coal.

In those days, charcoal was used to heat homes, and exported to industrial centers to smelt iron, copper and manganese from local mines or to produce potash. In the Connecticut River Valley, charcoal smoke was also used to cure tobacco. In 1835, the Springfield candy company of Kibbe, Crane and Company used 8,000 bushels of charcoal in its production of sweets.

Western Massachusetts, with its thousands of acres of forest, was a natural for charcoal production.

A charcoal kiln run by the Howard Brothers in Leverett operated well into the 20th century before going out of business in the 1960s. During World War II, the brothers produced 1,000 tons in one year for the federal government.

Production ended around 1900

In Hawley charcoal production ended around 1900. The kiln was then used to house pigs and other livestock, and, in 1957, was bought by the DEM and restored to its original condition. Some work was done to the structure in 1977, but in recent years weeds had grown on the structure and roots had loosened and dislodged stones in several spots.

Lama is a quiet man who doesn't have much to say, but he did say that the kiln reminded him of the four-foot tall altars used for prayers and offerings in Tibet.

He gathered the flat stones for the restoration in the same way the original builders did, by scouring nearby fields and woods. He spent about six days restoring the two-foot- thick walls, replacing missing stones, one by one, along the original contours of the kiln, leaving intact narrow outcroppings, which he said may have allowed workers to climb the top of the kiln.

Harrison Parker, head of the Hawley Historical Society, said the town is happy to have its principal historical landmark back in shape and "out of danger."

As for Lama, he's on to a more personal project.

Between jobs building stone walls and patios, he's working with local glassblower Robert Dane to build a stupa, a Buddhist shrine, to house perhaps his most cherished possession: the tooth of the instructor of the Dalai Lama, the exiled religious leader of Tibet.

Lama said that in his Buddhist religion it's a holy relic. And to him, a reminder of home.

Shipyard union official bitter over vote

ASSOCIATED PRESS

KITTERY, Maine – Unity among supporters of the Portsmouth Naval Shipyard appears to be breaking down since the threat of closure temporarily has been quelled.

Arnie Paul, head of the shipyard's Metal Trades Council, is labor representative. The committee is required to have six representatives from the shipyard and six from the community, according to Portsmouth's assistant mayor, Jim Splaine.

"I'm telling you they removed me illegally," Paul said. "It's an organization that's running in

elected to replace him.

Paul did not attend the meeting when the election was held, but said he had indicated he wanted to retain his position for another year. Splaine, a former president of the association, said the election was done according to the group's by-

Vic — please translate FS #'s into VAI #'s + return. Very interesting info + I'd like to x-reference my site file.

Charcoal Kiln Hardware Inventory (Sites Within National Forest Proclamation Boundary)

VAI #?

Marks P.

60.

Site Ident	Site Name	Associated Hardware
Addison County:		
VT-AD-314	Rpn-043.00 Dragon Brook CKB	Vent liners (6?), unidentified castings (3+?)
" -315	~~Rpn-055.00~~ Widow's Trail CKB	Vent liners (8?)
Bennington County:		
VT-BE-46	Gty-009.01 East Fork CKB	Binders, top hole liners
-47	Gty-009.02 West Fork CKB	Binders, top hole liners
-37	Gty-010.01 Red Cabin CKB	Door, top charging hole liners (2), binders
-62	Gty-015.01 East Mtn CKS (north)	Doors (2)
-63	Gty-016.00 East Mtn CKS (south)	Door (piece)
-190	Gty-017.00 NW Glastenbury CKB	Binders (2)
-40	Pru-050.02 Mad Tom 1 CKB	Door (in road)
-41	Pru-050.03 Mad Tom 5 CKB	Top hole cover w/slides
-50	Pwl-044.00 Cotykilns CKS	Door
-51	Rso-054.02 Heartwellville CKB	Door (FS shed)
-55	Smd-053.01 Gulley Brook CKS	Tile vent liners (in-wall)
-107	Smd-086.00 Crazy John Brook CKS	Binder
-143	Sun-???.?? SW Sunderland CKB	Binder and bolts, top hole cover
-45	Wdd-015.01 Bickford Hollow CKB	Binders, door
-44	Wnl-033.00 Bourn Brook CKB	Binders (3?), door, top hole covers (2), rods, RR track
-134	Wnl-056.01 Schoolhouse CKB	Top hole cover
-42	Wnl-063.00 Winhall River CKB	Binders (4), top 2-hole covers (2)
Rutland County:		
VT-RU-155	Ctn-061.00 Kiln Brook CKB	Door
-190	Ctn-062.00 Furnace Brook CKB	Door (pieces)
-79	Mtr-011.01 Ten Kilns CKB	Doors (2), RR track, top hole cover
-78	Mtr-015.00 Old Job CKB	Top hole cover, door handle, misc. domestic materials in vicinity
-85	Mtr-016.04 Four Kilns CKB	Doors (2?), top hole cover (over bank)
-84	Mtr-019.00 Black Branck CKB	Binding, bolts, rods (east site); sill plate (west site)
-108	Mtr-???.?? Kiln #36 CKB	Door, binders, top hole liner (piece?), misc. domestic materials

V.R. Rolando
February 16, 1993

Springfield, Mass Union-News Wednesday 11 Sept. '91

Kiln preservation heats up

Restoration of old site considered

By DAVID A. VALLETTE

HAWLEY — In an attempt to save the historic East Hawley charcoal kiln, the town has gained the assistance of the state, the county and an expert on kilns.

According to Victor Romando of Pittsfield, a GE electrical engineer and president of the Vermont Archaeological Society, Hawley's kiln is unique and ought to get immediate attention to ensure its preservation.

"It's a gem among these type of things," he said.

Romando, who has studied kilns throughout New England, said that most were built out of bricks or large stones, and as such were the targets of thieves wanting the bricks and stone for other purposes.

But the Hawley kiln, built in 1872, has not been a target because it is made of small stones which are readily available.

The fact that the kiln is in a small but watchful community, and that it is of a "beehive" construction which balances structural stress, also helped it last this long, Romando said.

"It held together through thick and thin," said Selectman Harrison Parker, town historian, who got Romando involved.

But despite its pluses, the kiln is now considered in jeopardy, leading Hawley to call on the state Department of Environmental Management to take immediate protective steps. The kiln site is in Dubuque State Forest.

It is nature that has finally come close to bringing the kiln to its knees. Small trees are shooting out from between its rocks, and the outer wall is pushing out from the higher points of the 25-foot structure, thanks to collected water that freezes and thaws.

"Another winter of ice and water could do it. It could fall apart," said County Planner Gwendolyn Hallsmith.

The kiln has also become a partying spot for youths who have left trash and could threaten it by climbing on it, according to Hawley officials. State budget cuts have left only one person to govern the forest.

Karl Honkonen of the state department, who visited the site Saturday at Parker's invitation, said yesterday that while the state has meager financial resources it will cooperate with Hawley and the county to try to keep the kiln safe and possibly restore it.

"We hope to work together to see it stabilized and restored in the near future," he said.

One measure already determined, he said, is to put up a free-standing cover over the kiln to bring it safely through another winter. The envisioned plastic cover will not be in contact with the kiln in order to let the kiln breath to avoid condensation. It will keep rain off the stones to avoid continued breakup from the thawing and freezing cycles of winter.

Meanwhile, the county, through the Franklin County Historic Preservation Project to which Hawley contributed $200 as its share of matching funds for state grants, will try to come up with an architectural engineer to study the kiln and come up with a plan of restoration, including cost estimates. Jerry Pratt, an expert stone cutter in Ashfield, is to provide assistance.

Romando, who is also a member of the Society of Industrial Archaeology to which he is submitting a report on the Hawley kiln, said the society intends to help come up with an appropriate architect and will also lobby for the kiln to state government.

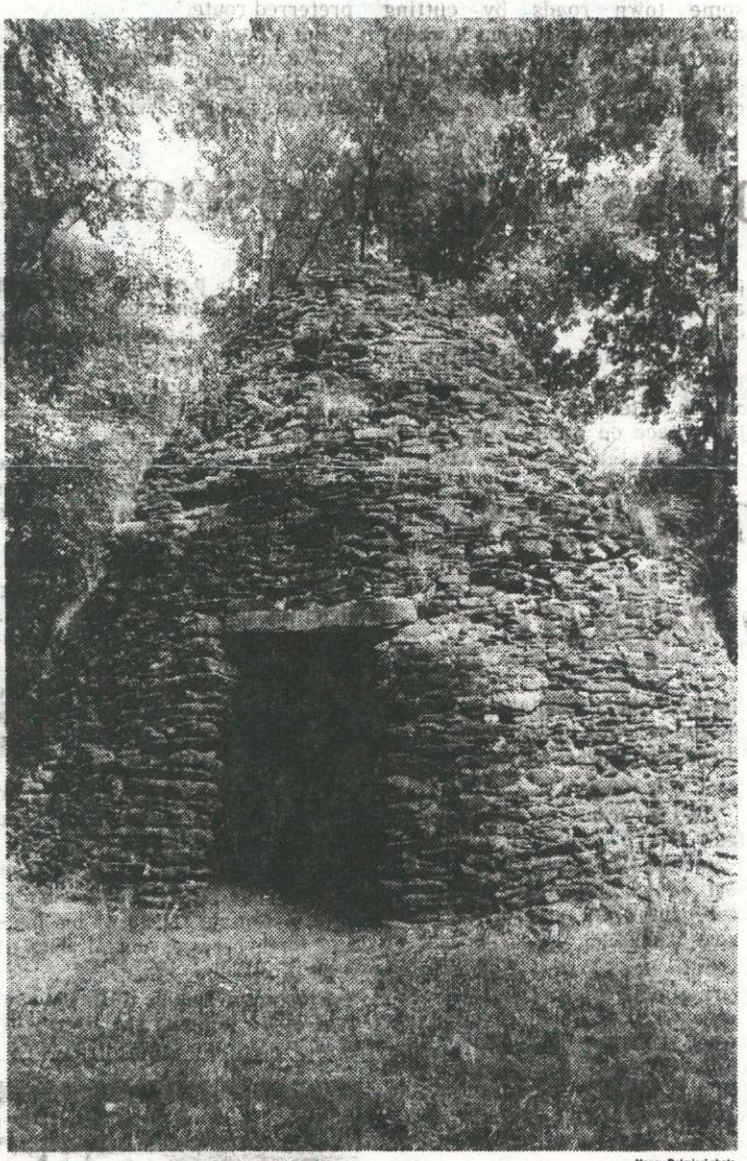
Hawley has a pending application to the Massachusetts Historical Commission for designation of East Hawley as an historic district. Included is the kiln, a church and several homes. The designation could help land restoration grants. Parker hopes favorable decision will arrive in time for Hawley's 1992 bicentennial celebration.

The kiln was built by William Bassett, a farmer who saw potential profits from his wood lot to augment his farming pursuits. Built to both a height and diameter of 25 feet, it could handle 25 cords of wood.

Under the system, the wood was burned in smoldering fashion to create charcoal, and the pure-burning charcoal was used for a variety of industrial and home operations.

When the Bassett farm was absorbed by the J.R. Smith farm about 1900, the kiln was discontinued as a producer of charcoal and instead was used to house Smith's pigs for a time. It was later abandoned.

Then, the Penobscot Lumber Co. secured the property. Later the land was turned over to the state which did some stopgap maintenance many years ago, Parker said.



Nancy Palmieri photo

PRESERVING HISTORY — Efforts are now underway to save this charcoal kiln in the Dubuque State Forest in Hawley. The kiln's beehive design has helped preserve it since 1872, but it is now considered in jeopardy of collapsing.

VICTOR R. ROLANDO
RESEARCHER OF EARLY VERMONT INDUSTRY
41 LEBANON AVENUE PITTSFIELD, MASS. 01201
(413) 442-5985

May 17, 1991

Giovanna Peebles, State Archeologist
Division for Historic Preservation
Montpelier, Vermont 05602

Dear Giovanna,

I received the material on the lime kiln "discovery" at Castleton and have already responded to Prof. Gordon (copy enclosed). No, I hadn't known about it and can't wait to see it. It looks in good condition.

And thank you for the nice words of praise in your letters. I am proud of your confidence in me and am happy to always be at your service.

Bob West and I beat the bush and pounded the trail again last weekend finding another brick-type charcoal ruin complete with iron band and door in the SW corner of Sunderland township (we found another 2 weeks before about ½ mile south in NW Glastenbury). That afternoon we found destroyed remains of one or two more up Benedict Hollow in Arlington. Those tie in with a potential "discovery yet to be made" on Red Mountain, based on archival info I learned last fall plus field work on Red Mtn in 1989. Those were operated by Frederick Miles, who I just happen to recognize as the operator of blast furnaces at Salisbury CT, and Copake, N.Y. Now we know where his charcoal was coming from between the time the local forests in the Copake area were depleted, and he was buying charcoal from North Carolina.

I spent probably a dozen years researching and locating furnaces in Connecticut, New York, and Massachusetts before I ever knew there was a Vermont north of Bennington. And since working in Vermont, with an intensity I never felt in my previous years, I have drawn heavily on what I learned during those previous years. I sometimes feel that everything I ever did previous to April 28, 1978 was just a preparation to my "true calling."

Vic

April 30, 1991

Dear Giovanna,

Bob West and I explored parts of southwestern Sunderland last Saturday (4-27) looking for a brick-type charcoal kiln ruin that Dave Lacy had found a month earlier. We didn't find that one, but we did find another. Later that day, we explored the southwestern corner of Whitingham, along the Deerfield River, for remains of two lime kilns. We didn't find that but we did find extensive and fascinating remains of a carbide plant that operated here circa 1890-1910. I'm now busy investigating the carbide industry to try to figure out what the process was, how the ruins here relate to the process, and what raw material available here caused the plant to be located here. It's south of Readsboro village about ¼ to ½ mi north of the VT-MASS line, on the east shore of the Deerfield River (Sherman Reservoir). Work continuing...

Something I read last night brought a long-ago memory to mind. An article in the current Historical Archaeology (Vol 25, No 1, 1991) about stone chambers (1st page enclosed) describes them as cooking ovens. They look much like your stone chambers. The article talks about the "Italian" connection with the ovens and how the Italian laborers with the railroad built some of these domed rock ovens to bake bread. Regardless that I've had stone chambers on my mind since I've known you, only when I read this article did I remember something my Dad told me - probably when I was a teenager (or earlier). When he was a little boy in his home town in northern Italy (Castellamonte, north of Torino), there was a village oven, made of stone, with a high dome and into which he, as a little boy, used to crawl sometimes. At certain times, the oven would be filled with wood and set afire. After the oven was too hot to touch, the ashes were removed and all the villagers gathered to put their freshly mixed bread dough-loaves into the oven on stone or metal racks. Each person carved his/her initials into the uncooked dough to

later identify whose bread was whose. Cooking took less than an hour. Apparently, the villagers figured out that less wood could be used to bake all the bread at the same time as compared to everyone having their own household ovens. And anyway, according to Dad, it was a great social event as everyone engaged in talking (and drinking vino?) while the bread baked. Dad died in 1985 and so cannot add anything more to this; he was 83½ years old.

Plans for the recording at Pittsford Furnace are proceeding well. Dennis Howe (NNEC) is right now printing up an application flier for all chapter members — some extras for my distribution. I am coordinating applications, costs and disbursements, etc. We're crossing our fingers for good weather without mosquitos (remember Forestdale and the great mosquito plague of 1989?).

I'm $12,000 into book publishing expenses and the editing cycle has already begun. I delivered the illustration package to Dian Post on April 13. Everything is moving along. Donna is more worried about my welfare than I am. It'll do well, over the long haul. If I didn't do this, then it would have always gnawed at me. Now I can sleep — poorer, but more restful).

All best —

Vic

SHA Newsletter Vol. 23 June 1990

PACIFIC WEST

Reported by
Glenn Farris

CALIFORNIA

Red Rock Canyon Mining Features: Archaeologists of the California Department of Parks and Recreation Michael Sampson and Gerrit Fenenga and State Park Ranger Mark Faull are currently conducting archaeological and documentary research on mines in Red Rock Canyon State Park, Kern County. The mining features found to date relate to dry placer operations which began with a minor gold rush in 1893-1895 and continued until the 1960s. Present field work is concentrating upon two canyons within the park which show evidence of extensive mining activity. This evidence includes adits, shafts, propects, a mining camp, cabin remains, and machine mounts. Documentary research and oral history interviews are providing useful complementary information on the mining activities of the park. More field work and historical studies are planned in 1990 and 1991.

Picacho Stamp Mills: Archaeologists Rae Schwaderer and Michael Sampson of the California Department of Parks and Recreation are conducting archaeological field work and documentary research on the Picacho Stamp Mills in eastern Imperial County. The earlier stamp mill at Picacho, constructed in 1879, is a handsome stone structure with three rooms remaining intact. The later mill, constructed in 1901-1902, is evidenced by substantial stone foundations, rock retaining walls, small machine mounts, artifacts, and other remains. A report on the project results to date was presented at the 1990 SHA meetings. Work on the Picacho mills and the associated town is continuing.

NEVADA

Charcoal Production Sites: During the fall of 1989, the Office of Public Archaeology at Brigham Young University completed a Class III cultural resource inventory of 3700 acres, 20 miles southeast of Eureka, Nevada, at the north end of the Pancake Range. A total of 154 archaeological features were found in the project area which were grouped into 49 sites. Six of the 49 sites, which include 100 of the features identified, are affiliated with the Carbonari occupation and utilization of the region during the 1870s and 1880s. Features (identified) among the six Carbonari sites include 87 charcoal platforms, 14 habitation units, two small camps, four chute/trails, one corral and two wood sleds. Each of the six sites are considered a Carbonari Complex, which consists of varying numbers of charcoal platforms clustered around a small number of habitation units.

The history and development of the project area is directly related to the discovery and mining of silver ore. Silver was first discovered in the area in 1864 just south of Eureka. However, it was not until 1869 that mining began in earnest. A secondary industry resulting directly from mining was that of charcoal production.

The production of charcoal for the smelting of ores was practiced extensively in central Nevada from about 1869 to 1891. The practice was carried over from Europe where charcoal was primarily used for industrial fuels until the 18th century when deforestation prompted the switch to coke for fuel. The untouched woodlands of the New World provided fuel for various early industries in the East until the mid-1800s when the use of coked coal became predominant. Growth of the charcoal industry in the West expanded in the latter half of the 19th century, destroying thousands of acres of timber woodlands.

Woodland located in a 50-mile radius of the Eureka, Nevada, Mining District were clearcut for charcoal production. Within this radius are the site complexes identified herein. Charcoal from the Pancake Range may have been hauled to the mines in Eureka, located 20 miles to the northwest or to Mt. Hamilton, situated 15 miles to the southeast. It is uncertain whether the Pancake Range serviced either of the mining districts exclusively, or if it provided a charcoal source for both. The Mt. Hamilton District was actually at its production peak (1870) prior to the Eureka Mining District, despite the fact that the Eureka silver sources were discovered earlier.

Charcoal production, although the most significant economic activity in the area, provided low social and economic conditions for charcoal producers. Most of the workers involved in the charcoal industry were Italian immigrants, who camped in these isolated wooded areas away from community centers. Charcoal prices were low and stayed down as a continuing influx of Italian immigrants increased the labor pool, which grew faster than the demand for charcoal. In 1879, the charcoal producers formed a union and called themselves the "Carbonari." It was to function as a protective association to improve their economic conditions. However, the actions of the Carbonari were generally suppressed with some violence, and no improvement in working conditions were made.

The dwellings constructed by the Carbonari in the remote woodlands of the region appeared to have been occupied by two to six male individuals. The habitation structures identified in the Pancake Range site complexes averaged about 15 feet square to rectangular in shape and primarily consisted of a single large room unit. Most of the structures contained an inside fireplace or hearth and an associated outside circular, igloo-shaped stone oven. These features were all constructed of locally available materials, including basalt rock, pinyon and juniper timbers. The topographic placement of the habitation structures primarily occurred at the convergence of a ridge base and drainage edge and abutted against large boulders or rock outcroppings on ridge slopes. A few structures were constructed in close proximity to each other, and with the exception of one, all the habitation structures were found associated with numerous charcoal platforms. A single structure is not associated or in close proximity to any charcoal platforms nor did it contain an outside stone oven. This structure was associated with the remains of one or possibly two wagons. It is conceivable that this structure may have been occupied by the non-Italian "Teamsters" who worked for the smelters on a contract basis as middlemen in buying and delivering the charcoal to the mines.

Among the Carbonari, charcoal production appeared to have been seasonal. Pinyon trees were primarily used for burning at the earthen ovens and were cut during the winter months when the sap was down. Charcoal production took place during the spring, summer and fall months when the weather was more suitable and mining activities were at their peak. Approximately 95 percent of the charcoal plaforms identified within the project area are situated in drainage bottoms. They range between 10 to 50 feet in diameter and contain a one to three foot gravel mound. The majority of the platforms are about 30 feet in diameter and are dominated by burnt gravels with very little charcoal remains on the surface. All of these features are circular and some are stone- or wood-lined along the downslope edge. The charcoal platforms in the Pancake Range were fairly consistent in shape and form and may represent a one time usage. Some of the platforms appeared to be constructed in topographically significant locations such as drainage confluences. These platforms were larger in size and stone-lined, and appeared to have contained more gravel and charcoal deposits, suggesting they may have been used more than once.

Other important cultural materials included the mostly intact remains of two wood sleds found isolated within a Carbonari complex site area. These horse drawn sleds were used to haul wood from the felling areas to the charcoal platforms. While many sled runner fragments were noted during the project, the two nearly complete sleds measured six feet in length and three feet wide. They consisted of three horizontal cross members that held both skid runners together. One had two vertical posts which appear to have kept the cut wood in place during transport to the oven platforms. Also associated with the site complex areas were a series of trails used for the transportation of wood to the oven platforms within the drainage areas.

Class III inventories in the region have documented significant Carbonari cultural materials, including numerous charcoal platforms, habitations and other related remains in the Roberts Mountains, north of Eureka, Nevada. For further information, contact Scott E. Billat, Office of Public Archaeology, Brigham Young University.

Roberts Mountains Charcoal Industry: Archaeological Research Services, Inc. is undertaking an investigation of the charcoal production industry centered in the Roberts Mountains of Eureka County. This project was instituted by the Nevada BLM to mitigate adverse effects to cultural resources from the Gold Bar II Mine Project and is sponsored by Atlas Precious Metals, Inc. The Roberts charcoal industry developed from the early 1870s to the late 1880s, supplying the needs of smelters at the mining town of Eureka. Pinyon-Juniper woodlands provided the wood, which was processed in open platforms by Italian laborers. This study will review available historic documents, oral sources and previous archaeological studies of charcoal production. This material will be combined with information from excavations of 30 charcoal oven platforms and five habittion structures. A pinyon dendrochronology will be developed for the Roberts Mountains by Desert Research Institute to provide maximum temporal control. Surrounding woodlands and transportation routes will also be included in the study, which is the most intensive effort to document the charcoal industry in Nevada to date. Information regarding any aspect of charcoal production would be greatly appreciated. It may be sent to Ronald L. Reno, Archaeological Research Services, Inc., P.O. Box 701, Virginia City, NV 89440.

SOUTHWEST

Reported by
James E. Ayres

ARIZONA

Historic Tucson: An intensive archaeological testing and excavation project was recently completed in City of Tucson Block 180, located outside the east walls of the former location of the old Spanish Colonial period, Tucson Presidio. A total of 38 trenches with a combined length of over 700 meters were excavated, revealing the presence of over 90 historic and prehistoric features. Controlled excavations were carried out in 27 of these features.

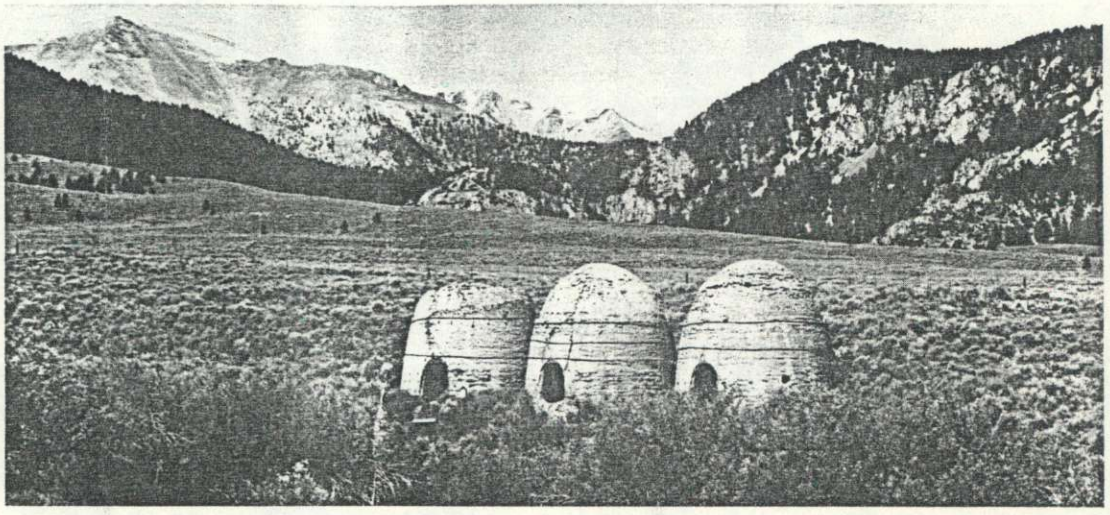
The vast majority of the features date to the American Territorial period between 1870 and 1920. The most common type of features found are house foundations from this time period. In fact, remains of virtually every major historic structure depicted on historic maps of the block have been found. Included are 8 concrete, 20 stone, and 3 adobe foundations. One of the latter is deeply buried and is not indicated on any historic map. This fragment of abode wall may represent the oldest structure found at the site. In addition, three large refuse deposits, each measuring over 20 m in width, were found along with numerous smaller trash deposits dating to the Territorial period. These trash deposits, along with four contemporaneous privies and a possible well, contain rich artifact deposits consisting of tremendous quantities of glass, bone, ceramic, metal, native American pottery, and other historic artifacts that will provide a wealth of information about this period in Tucson's history.

The absence of Spanish Colonial and Mexican period remains is unexpected considering the close proximity of the project area to the Presidio. The oldest inhabited portion of the block, however, is not part of the project area and the intensive Territorial period occupation may have obliterated all traces of the earlier occupations. Despite this disturbance, a largely intact grave was found at the foot of a stone house foundation built in the 1890s. The grave contained two adult males of Mestizo ancestry and presumably dates to the Mexican period. Both appear to have died a violent death. A stone arrowhead was imbedded in a back rib just above the heart of the younger male, undoubtedly a fatal wound.

The artifacts from these features are currently being analyzed and a draft report will be completed before the end of 1990. For further information contact Dr. Richard Ciolet-Torrello, Statistical Research, P.O. Box 31865, Tucson, AZ 85751.

SOCIETY FOR INDUSTRIAL ARCHEOLOGY
NEWSLETTER
Volume 16 Winter 1987 Number 4

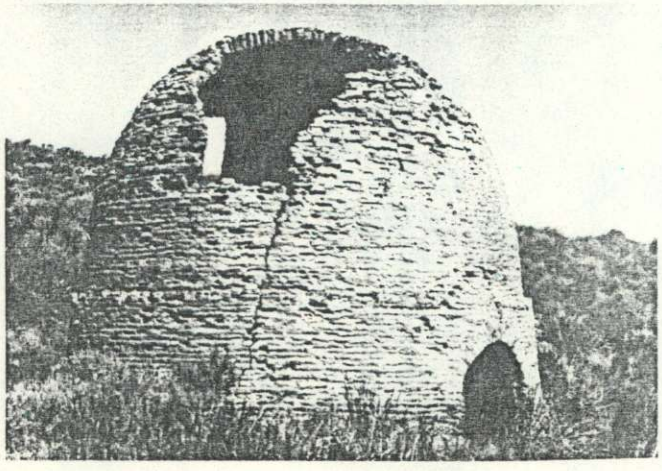
FOREST SERVICE SAVES 1886 CHARCOAL KILNS



In the expansive Birch Creek Valley of eastern Idaho stand three of the four brick charcoal kilns remaining from the original 16 built in 1886. Nearby is the fourth *(below)*, showing some of the deterioration that the current stabilization project is designed to retard. *Photos courtesy U.S. Forest Service.*

Work began this year on a U.S. Forest Service project to stabilize four brick charcoal kilns [1886; NR, HAER] in the Birch Creek Valley of Targhee National Forest in eastern Idaho. They are the only remnants of a short-lived but significant 1880s mine and smelter that once had 16 kilns. Also known as the King charcoal kilns after their builder-owner, they were erected in response to a local demand for smelter fuel. They were used less than three years in a lead-silver operation of dubious long-term return.

Each of the 20-ft.-high, parabolic, wire-rope-tied domes held about 30 cords of local douglas fir and produced 2,000 bushels of charcoal in a two-day burn. Loading was done through lower front doors and upper, ramp-accessed doors in back. Rows of vents circling the base controlled air to the fire, and were sealed with clay and pieces of brick or stone. The bulk of the new work involves reinforcing sections of the foundation with concrete footings to prevent further roof and wall deterioration.



The Birch Creek mines were less well known than similar mines at Wood River and Coeur d'Alene, but equally important. The most productive was the Viola Mine, which yielded about $2.5 million worth of lead and silver between 1883 and 1888, although the mine was more valuable for its lead than its silver. Following its discovery about 1881, relatively small quantities of ore were shipped to Omaha, Neb., and Kansas City. The nearest rail line was the Utah & Northern Rwy. at Camas, 65 miles away, making it far more economical to ship metallic lead and silver than ore, so a two-furnace smelter with a daily capacity of 80 tons was added in 1885.

Initially the smelter's charcoal fuel was made in pits, but beginning in 1886 16 brick kilns were built by Warren King, charcoal supplier to the mining company. About 50,000 bu./mon. of charcoal was produced, and the kilns provided work for some 150 people living in the nearby town of Woodland.

The mine's projected output proved overly optimistic, and initially high dividends were deceptive. It all emerged as a pattern to bilk English investors. In Nov. 1888 the smelter was shut down and the last dividend paid. The investors, who recovered only a third of their money, were not the only ones surprised. An 1890s photo shows a lot of wood stacked behind King's kilns, some of which remains today. Over the years, local farmers dismantled 12 of the kilns to salvage the brick.

For more information on the kilns, contact the Dubois Ranger Dist., P.O. Box 46, Dubois ID 83423.

P.D. with J.McD.

Published by the Society for Industrial Archeology Editor: Robert M. Frame III
Room 5020 National Museum of American History Smithsonian Institution Washington, D.C. 20560

October 31, 1988

Giovanna Peebles, State Archaeologist
Division for Historic Preservation
58 East State Street
Montpelier, Vermont 05602

Dear Giovanna:

We all (Audrey and husband, Dave Starbuck, Dennis Howe, Bill Murphey, and myself) met at Forestdale and spent the better part of 2 hours touring the entire site. I believe that Audrey and Dave were quite impressed at the degree of IA-related material that is visible in the furnace vicinity. We had scattered drizzle and snow squalls while there, but it didn't dampen anyone's enthusiasm. I have some things for Audrey and Dave that I must mail out to them today, regards to the site. I also told Audrey of the manuscript at your office and she may use it as she sees fit.

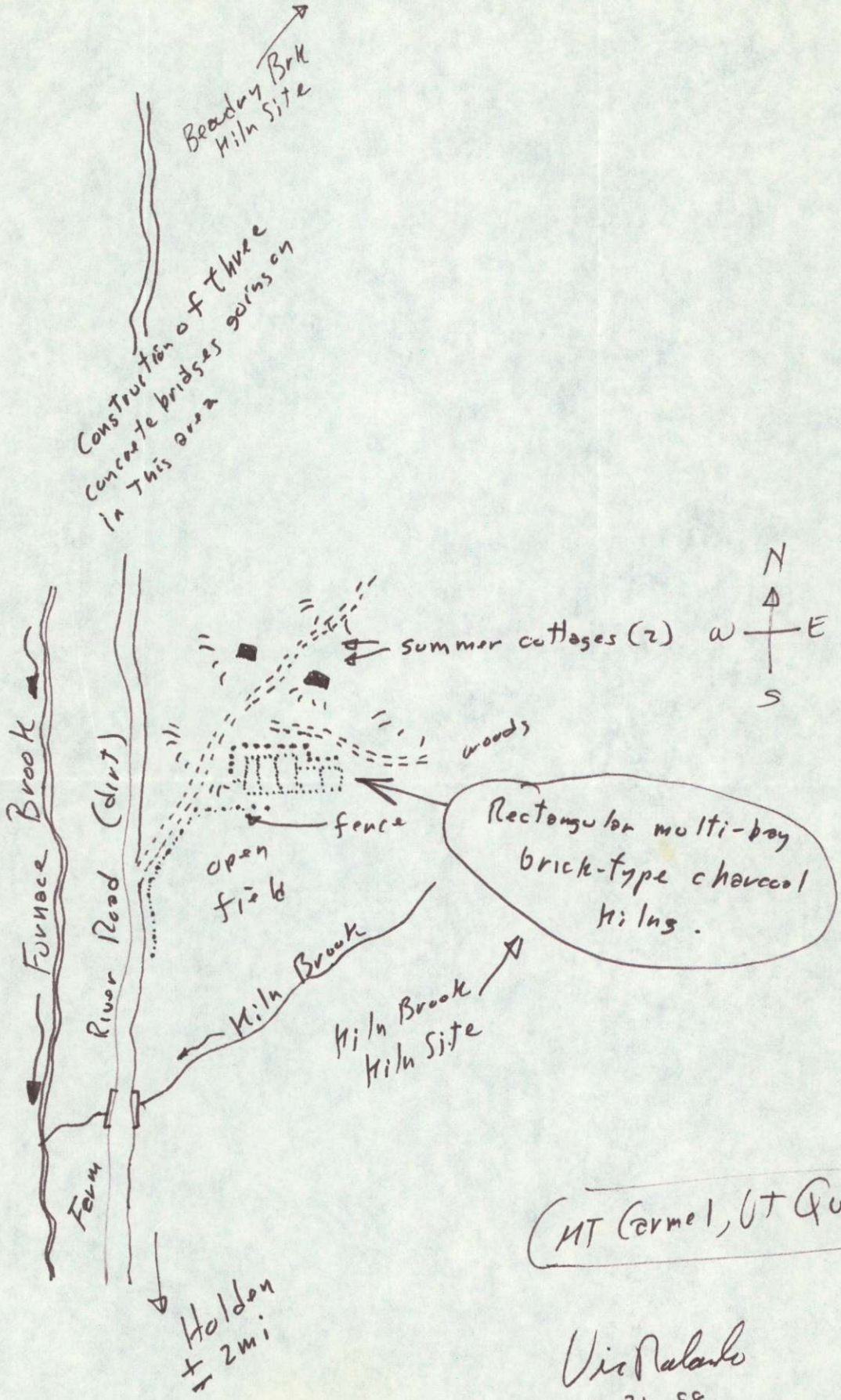
On the way back, Bob West and I stopped by the site of Billee's "field of kilns" to see if we could locate an iron mine in the vicinity, which Alan McBean found a few years ago (I had only recently re-located the map you sent to me). After sliding down the edge of Bloodroot Mtn and finding the remains near the Steam Mill Brook (we'll return to this next spring), we also stopped to inspect a rather high and long stone wall that Bob saw in the woods on the way up the mountian. Talk about serendipity; we found the collapsed ruins of rectangular brick-made charcoal kilns! It was near 5 o'clock and snaowsqualling so I couldn't take pictures, besides it is about a minute walk from River Road (about 2 miles north of Holden - real wild country up there), so I may return for accurate measurements and photos this next weekend. There appear to be three kiln bays, about 10 feet wide by 30 feet long, the inside bays having common walls. Attached at the east end are two or three smaller bays, maybe same width, but shorter in length. The stone walls are partially on the west and east end, and fully on the north (uphill) end. Roads continue from the kilns uphill in various directions.

This is a most significant discovery, worthy of a paper unto inself, since I know of no reference to brick-made rectangular type kilns, and adjoining bays at that, anywhere in New England. Another interesting thing is that the only other rectangular charcoal kiln we found in Vermont, made of stone and single bay, was also found in the town of Chittenden, about 6 or 7 straight-line miles south (reported to you in 1986, I believe). But the multi-bay brick-type kiln ruin has to be something to have seen in operation, with each bay fired, coaling, or discharging independently of the one next door. It was mass-production of charcoal at its best; and it <u>did</u> happen in Vermont, which I have always claimed was at the cutting edge of technology all the time.

One more thing, Bob and I were wondering if, since the North Dorset Furnace is already on state property at the Emerald Lake State Park, and Audrey seems to going to be the Division's furnace person, shouldn't maybe she have responsibility for at least that portion of the Park across Route 7 where the furnace and charcoal areas are? Just a thought.

PS: Please tell Dave Skinner I'll be at DHP on Thurs, AM, Nov 10, in case he has anything for me. (I'll bring the donuts.)

Vic



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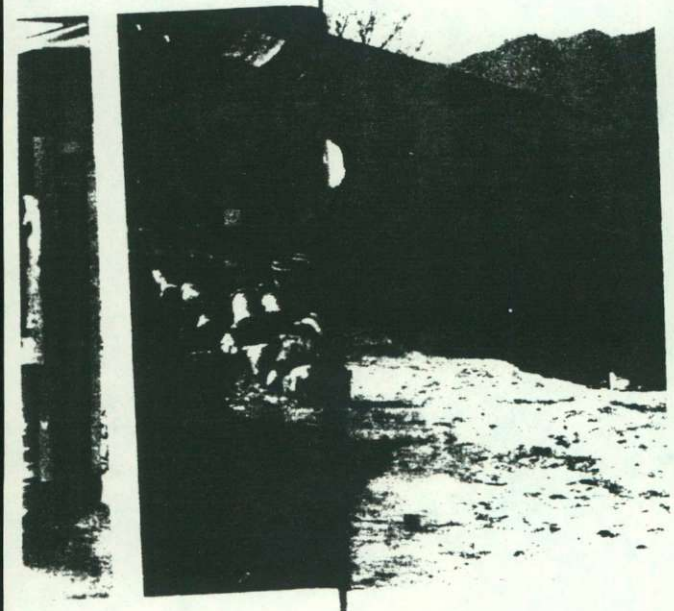
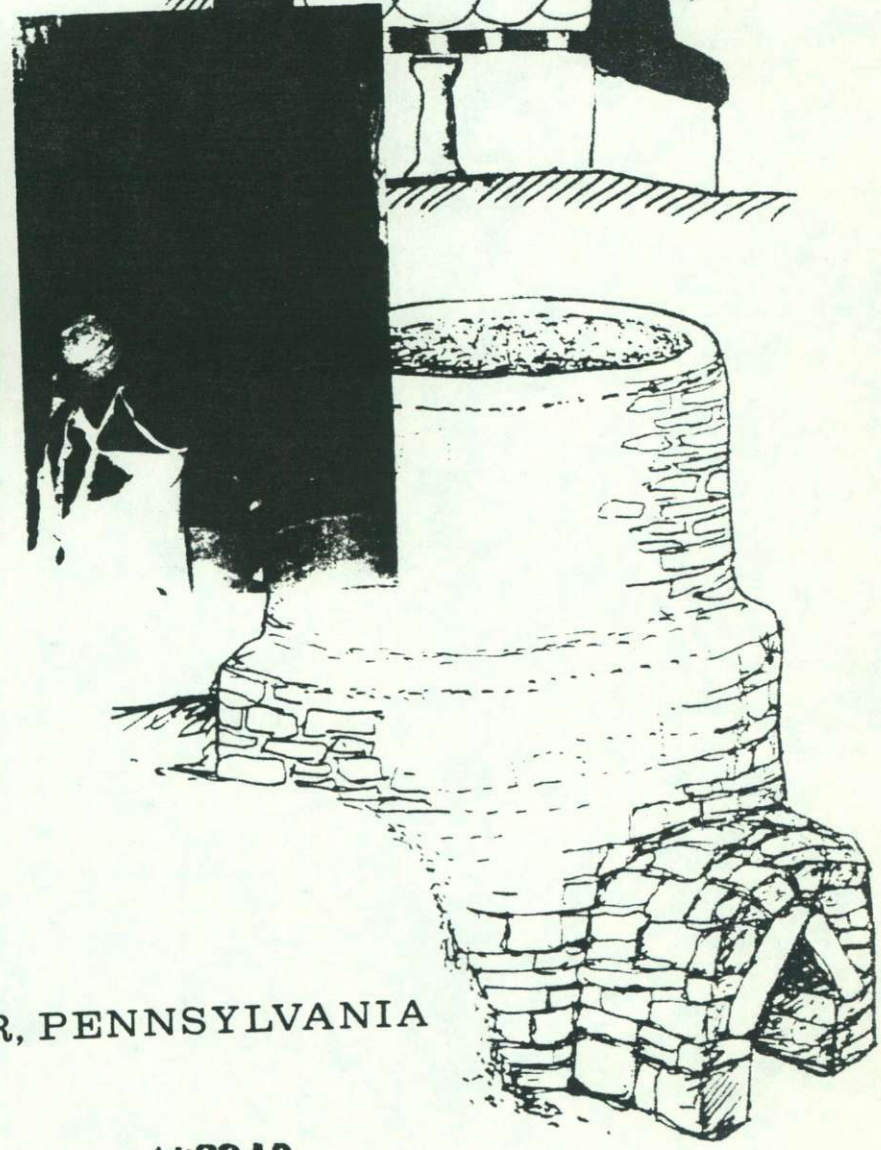
(from memory of 10-28-88
inspection w/Bob West)

DES

KILNS Design, Construction, and Operation





OMPANY

RADNOR, PENNSYLVANIA

All drawings and photographs by the author unless otherwise noted.

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Manufactured in the United States of America

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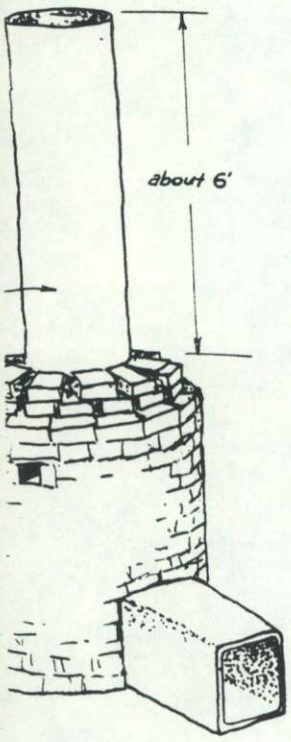
clay inside. The bricks can be layed in a circle for each course and the wedge-shaped spaces between bricks filled with clay. The kiln can be built right on the ground, with some sand placed in the bottom before firing. The fire mouth is made from a flue liner set at an upward slope. The bottom part of the kiln may be partially banked up with earth for additional insulation.

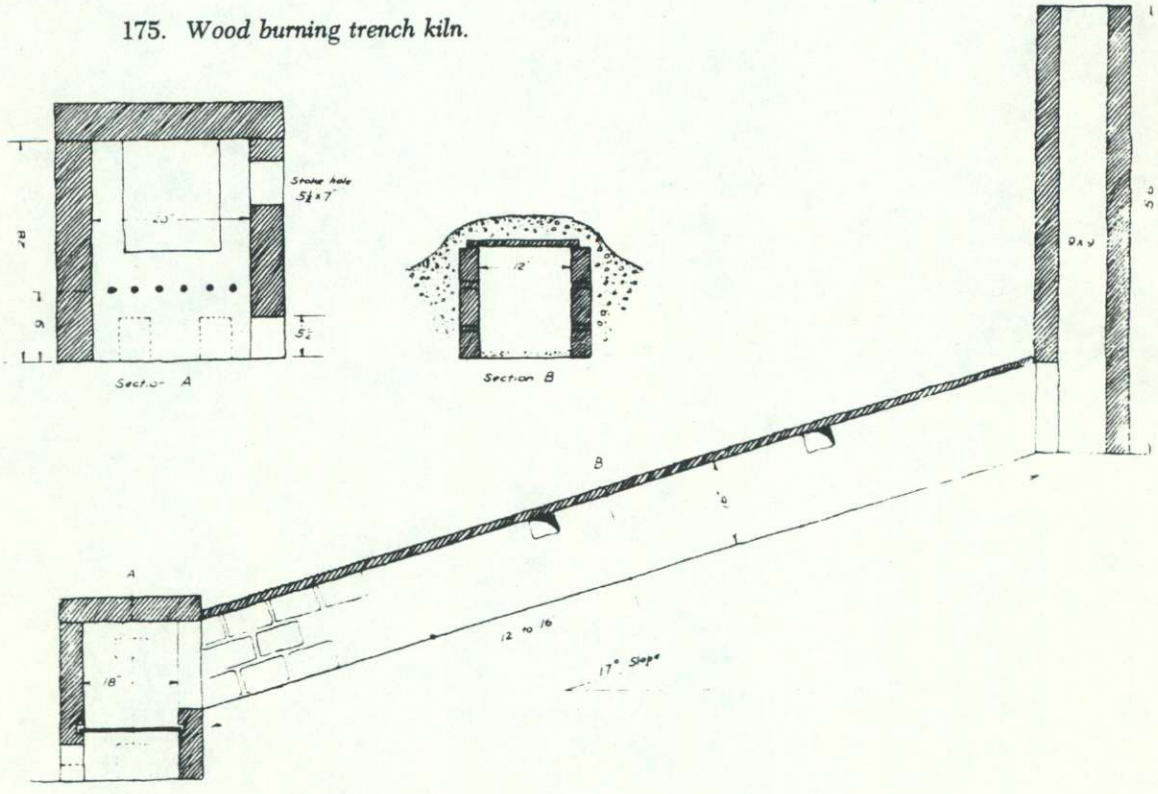
The pots are set up on a shelf arrangement to allow the fire to sweep in at the bottom of the cylinder. Plenty of space must be allowed for the upward circulation of the fire. The top of the kiln is closed over by corbeling in several courses of bricks, with a hole left at the top. A length of galvanized pipe placed over the hole forms a chimney to increase the draft.

A kiln of this sort will reach earthenware temperature with ease, although the bottom is sure to fire hotter than the top. It is certainly not good for exacting work with glazes, but a simple fritted glaze for cone 04, used, perhaps over slips, should work reasonably well. The kiln could easily be built in one day, and if scrap materials are used, the cost will be next to nothing.

Figure 175 is a more elaborate outdoor kiln, also for wood firing. It is based on the principle of the Korean kiln, that is, a sloping trench with fire introduced at the bottom and along the sides. A hillside with an incline of about 20 to 25 degrees is required. The length is somewhat optional, but a tunnel of about 16 feet in length will give an excellent draft. Attached to the lower part of the kiln is the main



175. *Wood burning trench kiln.*



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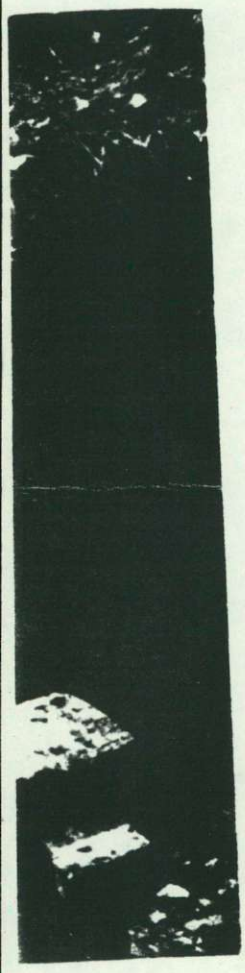

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firebox. Photo by Ed Custer.

VICTOR R. ROLANDO
RESEARCHER OF EARLY VERMONT INDUSTRY
41 LEBANON AVENUE PITTSFIELD, MASS. 01201
(413) 442-5985

October 18, 1988

Giovanna Peebles, State Archaeologist
Division for Historic Preservation

Dear Giovanna:

I would have liked to had been able to talk a bit more with you last weekend but you were understandably busy with other people. I want to restate what I said to you about having some limited money available for strictly emergency purposes, such as possibly losing a site to developers when only time is of the criteria. This is strictly between you and me.

As your providing reports of archaeological projects going on.contemplated in Vermont for the VAS Newsletter, if you want a go-between, then you can count on me. The indexing of the VAS Newsletters has taken much more time than I anticipated but it is coming along and I expect to have an advance copy for you/DHP when it gets to that point (probably sometime after Christmas).

I mailed some site survey reports to Dave Skinas a few days before the VAS meeting not realizing he was laid up (down?). I hope someone is opening his mail in the meantime. More reports will be forthcoming in the next few weeks. I am busy this week preparing for the NHAS meeting this coming Saturday at Concord (see enclosed). Next week back to the remaining reports.

Dave Lacy and I are going to return to the site of Billee's "field of kilns" in Chittenden (town) next spring to re-relook at the charcoal finds there. What I have found to date is included in what I mailed to Dave, called the Beaudry Brook Charcoal Kilns site (site of 20+ kilns). There are probably many more, plus, there are unsolved charcoal traces all over the place. What surprised me most about the place is my discovery a few days ago, after I mailed the report to Dave, that it is the dircet area that Alan McBean found an iron mine (I remember seeing a large 'hole' in the area but didn't think to check the stones for ore). It also is the area Alan said there might be a furnace, but at the time, I couldn't get into the area (spring mud) and I forgot all about it. Now, with the iron mine and charcoal mounds all over the place, maybe there is a furnace remains in there somewhere after all. Dave Lacy said he saw all kinds of stone foundations where Alan indicated a furnace/

Best to all...

Vic

PS: I've been keeping record of expenses and hours regards to locating and recording IA sites. Should these be submitted at some time? Is that program still current? New Forms? I'll be in Burlington Nov 10 eve for VAS board meeting; I could swing by Montpelier on way home the 11th if you wanted to discuss this with me.

1988 ANNUAL MEETING
NEW HAMPSHIRE ARCHEOLOGICAL SOCIETY

SATURDAY, OCTOBER 22, 1988
9:00 AM to 5:00 PM

At The Conservation Center
of the Society for the Protection of New Hampshire Forests
54 Portsmouth Street
Concord, New Hampshire

The Planned Schedule:

9:00 to 10:00 AM: Registration with coffee and donuts.
10:00 to 12:00: Morning program of presentations on current archeological research.
12:00 to 1:30 PM: Buffet lunch.
1:30 to 2:30: Annual Meeting of the New Hampshire Archeological Society with election of officers.
2:30 to 4:00: Program of presentations continues.
4:00 to 5:00: Refreshments.

Preregistration:

A cold buffet lunch will be available. It is advised that persons who wish the buffet lunch preregister using the enclosed form which is to be mailed to Jane Spragg by October 17.

Program:

The morning and afternoon program of presentations on current archeological research will include **Andrea Green**, NHAS, who will speak on two small prehistoric sites in Lyme; **Wes Stinson**, NHDHR, who will present on a Middle Archaic occupation in Merrimack; **Dick Boisvert**, NHDHR, who will present on the survey and excavations on the Saco River; **David Starbuck**, RPI, who will speak on excavations and preservation work on a Revolutionary War site at Arnold's Bay on Lake Champlain; **Victor Rolando**, SIA, who will present an overview of the recording of blast furnace and charcoal kiln sites in Vermont; and **Faith Harrington**, BU, who will give us an update on the archeology of the Isles of Shoals.

Directions to Meeting:

The award-winning passive solar Conservation Center building where the NHAS fall meeting will be held is located on a high bluff above the Merrimack River with a spectacular view of the State Capitol. Take I-93 (or Rt. 4 from the Portsmouth area) to I-393, exit 2, right on East Side Drive, left on Portsmouth Street (approx. 1 mile). Watch for entrance on the left.

United States Department of Agriculture
Forest Service
White Mountain National Forest
719 Main Street
P.O. Box 638
Laconia, NH 03247

Reply to: 2360

Date: JUNE 1, 1984

Vic Rolando
33 Howard St.
Pittsfield, MA 01201

Dear Vic and Grace:
As usual the enclosure did not get enclosed. Will try again this time.

I would be very happy to see the Cowan Brook site; I would also be happy to join you and Bob on one of your more basic hikes.

I assure you that there is no real core of information about charcoal kilns in the Forest Service files or, for that matter, in the personnel's heads. The basic problem is that, until you began your work no one had done anything about charcoal kilns. Foresters, quite frankly, don't know what to look for and don't know what they are looking at when they find them.

In the two northern districts Bruce Flewelling and Dick DeBonis actively seek out resources. In the Manchester District they are found and reported on sale areas but no one goes looking. To date I've spent less time in the Manchester District than in the other two, because I've had more requests for help in the northern districts.

When we get together I would like to take you to the Rutland Office to show you our files. They are yours to use at any time. I also want to introduce you to my boss, the Forest Supervisor and the Surveyors. They are all good resource people.

I will be in the Green Mountain National Forest June 11-15. I will be returning the first week in July for July 2 and 3, then return again the second week in July.

Take care and keep me posted.

Sincerely,

BILLEE HOORNBEEK
Archeologist

June 6, 1984

COPY OF CORRESPONDENCE ON FILE AT D.H.P. MONTPELIER,

Billee Hoornbeek, Forest Archeologist
Green Mountain National Forest
PO Box 638
Laconia, New Hampshire 03247

Dear Billee:

Letters and enclosure finally received, thank you. Reason for doubts about CMNF cooperation on charcoal kilns is a map I found last summer in the Mt Tabor area. It is a Xerox of a typical Forest Service topo, with sites marked and identified with site numbers. Symbols appeared to differentiate between house sites, mill sites, and charcoal-making areas. The map clearly indicated the charcoal sites at Old Job, Big Branch, Greeley, Four Kilns, and Ten Kilns Meadow. The map overflowed into Peru, but indicated no kilns there.

The map was obviously a Forest Service-intended guide to something, and also, obviously had fallen out of someone's back pocket (I found it in the Greeley Mills area, practically atop some charcoal residue. It had to have been dropped only a few days before, at the most, judging from the condition of it.) I showed it to Bob West, and we had a good chuckle over it - wondering what I'm doing running all over God's Green Mountains for things that are seemingly already located and documented.

I made a copy for Bob, and when he next met John Griffith, he showed it to him to which John reportedly exclaimed something like "Where the H___ did you get a copy of that?'!!" From what I gather from Bob, John said that the map represented work done a number of years ago by a college student (college professor?) who surveyed the Green Mountain National Forest and located and identified all the historic sites he (she?) could find. Whether by Beers, Walling, County Histories, or just plain roaming around is unclear, but John also reportedly told Bob that the marked-up maps are not for public release, but are considered 'secret'. And that if I know the right person to ask, I may get a 'peek' at it, but due to their 'secret' nature, I cannot reproduce or copy any of the information down.

Case closed.

JUne 11-15 is bad for me, I'm going to Burlington and places north the 12th, besides it's the buggy season now (although I think I about fed every one of them this past weekend in Woodford. How about July 2 or 3? Why don't I plan to drive right up to Stamford from work (I get out 4:30, so I could be there about 5:30-6:00 pm). You can jump in my car and we'll drive up the mountain to the Cowan Brook site. Besides, I'll be wanting to reshoot some pictures there - they have what appear to be tile vent holes, of all things As far as one of our more basic hikes, it'll have to be a weekender, thats when I do that sort of thing. That weekend is up to you. Let's make it Stamford July 2nd, since you'll probably want to be going back the 3rd for the holiday. My work phone is changed - I've a new job in a different building: (413) 494-4583 hours 7:30 to 4:30 to Labor Day. Send someone to look for me if I'm not at the desk(it's a small building).

Vic

Variability in Design of 19th-Century Charcoal Kilns in Vermont
written and researched by Vic Rolando

Presented to the CNEHA at Troy, NY, November 1, 1986

* The state of Vermont constitutes 9,609 square miles, or less than 0.2% of the area of the United States. Yet, during the summers of 1983, 84, 85, and 86, the sites and ruins of 137 charcoal kilns were located in that small area, part of a state-wide survey of IA sites.

* Basically, the charcoal kilns were constructed of two types of materials; brick and stone, and some a combination of both. Brick-type kilns accounted for 103 kilns, averaging about 28 feet in diameter; * the 18 stone-type and the combination stone-and-brick-type kilns divided evenly in half, nine of each, all measuring from 26 to 35 feet in diameter. * Also found were 15 mound-type remains, measuring from 25 to 40 feet in diameter, and one curiosity, a concrete block-type kiln from the 1950's.

* The kilns were generally found in the south-central part of the state. They date from the 1870's through the turn of the century, well past the peak period of ironmaking activity in Vermont, and thus reflect the making of charcoal for interests outside of the state. * It is well documented that during that period, charcoal makers contracted for millions of bushels of charcoal for ironworks operators as far away as Salisbury, Ct. Additionally, large tracts of mountain land were leased in that same period by such operations as the Richmond Iron Works of Massachusetts, for reduction of the forests to charcoal.

* Of the 103 brick-type kilns, one was confirmed through shallow excavation to have been conical in shape, 2 others may possibly have been conical. * It was the policy of the US Forest Service Service in the 1930's and 40's to dynamite standing kilns on government property to prevent hikers from camping and transients from living in them. The

two questionable conical kiln ruins were found in association * with an iron door typical in configuration to those used in conical-shaped kilns, and are located at sites a few hundred feet from the known excavated conical kiln. But they were thoroughly destroyed by dynamiting, right down to their foundation stones, as excavation attempts proved. * The partially standing remains of most of the stone-type kilns suggest they were of beehive shape, * while the stone-and-brick-combination-type kilns were conical in shape. * This has been determined by comparison with period photographs shared by residents of the old charcoal making areas. * One stone-type kiln was rectangular, measuring 16 feet wide by 37 feet long and 10 feet high. The 1950's era concrete block-type kiln was also rectangular in shape.

Kilns were built anywhere from 1 to 10 at a site. * There were 11 single-kiln sites; six 2-kiln sites; * four 3-kiln sites; seven 4-kiln sites; five 5-kiln sites; * no six- or seven-kiln sites: three 8-kiln sites; * and one 10-kiln site. The largest sites were of brick construction, averaging 4 kilns per site; stone-type and stone-and-brick-combination-type kilns averaged 2 kilns per site.

* The kilns were built at elevations from 660 feet to 2400 feet above sea level. Vermont's lowest elevation is 95 feet, which is the elevation of Lake Champlain, bordering most of the state on the west. It's highest point is Mount Mansfield, * 4393 feet above sea level. Average elevation of the state is 1000 feet. In the area of the most kiln finds, 12 mountains rise to between 3000 and 3800 feet. * Brick-type kilns averaged 1813 feet in elevation at a range of 660 to 2360 feet; the largest concentration of 55 kilns were found between 1500 and 2000 feet. Stone-type kilns averaged 2057 feet, with a range of 1560 to 2400 feet, somewhat higher in elevation than the brick types, but significantly compacted in a tighter range of elevation. The largest

concentration of 10 stone-type kilns were found between the 2000- and 2500-foot level. Mound-type kilns were located at the lower average of 1330 feet, at a range of 700 to 2360 feet; there was no significant concentration at any elevation. Almost all kiln sites are located in proximity to good-flowing streams.

* Anyone familiar with Vermont's higher-elevation landscape is familiar with the rocky nature of the land. Vermont is still known for its marble, slate, and granite industries, but Vermont farmers would rather forget the numbers of stone walls that they have built down through the past 200-year history of the state. Stone-built charcoal kilns reflect, therefore, the adaptive use of a natural resource to answer a need for a practical building material. * The stone-type kilns are built of unfinished stone, but laid up carefully in 3-foot thick walls to prevent as much air as possible from leaking into the interior of the kiln during the combustion process. * Most brick-type kiln sites have since been cannibalized of all usable brick. Stone is such an available resource in Vermont that the best kiln remains in the state are those made of stone.

* Brick-type kilns are laid up in 1-1/2 brick long, or about 1-foot thick walls, which provide a stable enough structure until such factors as the vaulting brick roof, and heating, expansion, and cooling are considered. * Therefore, 28- to 30-foot diameter, 6-inch wide by 1/2-inch thick kiln-girdling flat iron hoops, * held firmly in place by 1-inch bolts, assist in holding the structure together. Except for iron doors, no hardware was found associated with the stone-type kilns, probably because its conical beehive design created a much more stable structure. Other iron hardware found at brick-type kiln sites include 6- by 6-foot doors, * lintels on which the doors slid across, * and cast iron vent-hole linings. Inspection of the few pieces of hardware

that survived World War II scrap drives indicate no visible similarity between dimensions of the hardware, suggesting that hardware for the kilns was made 'on order' at the foundry. But nowhere is the variability in design of hardware for charcoal kilns more obvious * than in the configurations of the circular covers that closed the 6-foot diameter holes at the tops of the kilns. * Probably because of their round, 1/2-inch thick flat shape, they escaped detection of scavengers, * and over a dozen of the artifacts have been found by diligent search in the vicinities of kiln ruins. *

* Vent holes, through which the flow of air into the kiln was controlled, also provide an interesting point in study of variability. * Almost all brick- and stone-type kilns contained vent holes of such a dimension to conveniently allow the insertion of an ordinary red brick to shut the hole completely. Stone-type kilns used a pair of bricks set side by side with a brick-size space between, laid over and under with a large flat stone. Variations in vent holes were found at one site containing five brick-type kilns * that had cast iron vent linings. This site was located about 3 miles from an ironworks, which it serviced. At one stone-type kiln site, * vent hole linings were found that are made of a hard clay material of unknown origin.

* The variability in design of these 19th century charcoal kiln ruins in Vermont reflect the ability of charcoal makers to adapt the needs of the basic kiln design to the resources that were available. The consistent 28-foot inside diameter of the brick-type kilns, for example, indicate a common knowledge of one aspect of the technology. * But the variability in hardware, at these same brick-type kiln sites, testifies to the incividuality of at least one of the number of choices that enterprising Vermont charcoal makers appeared to make the most of. Thank you.

Re: Charcoal industry

August 2, 1982

Giovanna Peebles, State Archeologist
Division for Historic Preservation
Pavillion Building
Montpelier, Vermont 05602

Dear Giovanna,

Enclosed is a very poor copy of some very preliminary work on the charcoal industry in Vermont. It is the basis of some manuscript for the general ironworks book I am working on. Much of the editorial comments show through, some do not. I thought you might like to read it, get some idea of the charcoal industry as I have managed to research it, and then pass this copy on to your father. There are still a number of specific technical errors and questions in this, so don't pay too much attention to details. Look at it in general.

Material about the charcoal end of this business is coming in so rapid these days that I am still unsure whether to include it all in this work, or leave this work general, and maybe do a complete seperate book on the charcoal industry later. It's just that I have the good possibility to publish something now; a possibility that may not come this way again. I guess I tend toward including as much as I can in this version now. I'll be spending years doing follow-up work on questionable blast furnace sites, still-to-be-located forges, and what appear to be never-ending kiln sites.

We're still tearing out walls and painting others at 33 Howard Street. In replacing one wall, I found out that the now-interior wall was once an outside wall. The old line of a porch roof appeared on some hidden siding boards. The house appears to have been built with 2 by 10-inch vertical boards for framing. I'm going to have to do some research on house construction. Many nails are of the square cut variety. Chester Liebs wouldn't be too proud of me. I'm replacing most everything with new 2 X 4 framing and 1/2-inch plaster board. We're hoping to get the major part of the construction (destruction?) over by mid-August so I can get up to Montpelier and Burlington for some library work and fun. I still want to check out the possible blast furnace site at Beldens, north of Middlebury. There's a high dam/falls and hydropower plant there now, but maybe I can find some slag on the west side, downstream from the falls.

Best wishes on your "new" project.

Sincerely,

Vic

(Vic Rolando
33 Howard St.
Pittsfield, MA.)

DRAFT by Vic Rolando July/Aug. 1982 (1)

The Charcoal Industry

Whereas iron mining was more or less tied directly to a blast furnace or bloomery forge, charcoal making was not ~~necessarily so.~~ The iron industry, not only in Vermont but in neighboring New York and Massachusetts, did in fact consume much of the charcoal made in this state. ~~But~~ M uch of it also found markets in the copper smelting operations at Vershire, iron and brass foundries that dealt with metals requiring special characteristics, and also glass foundries.

Charcoal was used for a number of reasons. Unlike coal, it left little ~~if any~~ ash because it was nearly 100 percent pure carbon. It was one less impurity to ~~worry about~~ affecting the characteristics of the iron being smelted. Charcoal was made by the reduction of hardwoods, and Vermont, like ~~as~~ most of New York and New England at the time, abounded in what were considered to be boundless forests. Charcoal was easy and cheap to make (as long as the forests remained boundless) and being light in weight, large quantities could be transported great distances with moderate effort. Since most early blast furnaces and forges were situated next to good running streams, they were also usually situated ~~among~~ in or near a good stand of forest. Thus the distance and time between chopping the trees, coking the wood, and delivering the charcoal to the ironworks were small.

Trees were best ~~chopped down~~ cut in winter, while the sap was held in the roots. This reduced the amount of pitch that had to be burned off, increasing the quality of the charcoal. ~~And~~ In addition to stimulating woodchoppers to work to keep warm, the cold winter snows eased the transportation of heavy loads of wood by animal-drawn sleigh. Leaves, small branches, and sometimes the bark were stripped away, making more efficient use of space for more solid pieces of wood. The wood was cut in to approximately 4-foot lengths. Diameter wasn't considered of much importance except that it be as uniform as possible. Very large pieces were split.

In the early colonial period, ~~prisoners were used to chop wood.~~ wood was chopped by prisoners. Woodchoppers for the 1643 ironworks operations at Saugus, Massachusetts were Scotch prisoners brought by England from Scotland for that specific purpose. ~~from England.~~ (13) In the South, slaves were used. In later years, woodchopping for the charcoal industry provided off-season work for farmers, some of whom periodically harvested stands from their own woodlots. Woodchopping also provided employment for ironworkers who might otherwise be unemployed during winter shut-down periods due to frozen streams.

Both soft and hardwoods were used, but not mixed. (14) Hard wood weighs more than soft wood and was usually preferred by blast furnace operations over soft wood. Bloomary forges preferred charcoal made from soft wood. The following table from the Fletcherville furnace near Mineville, New York (NY) across Lake Champlain from Addison gives weights of charcoal made from various types of wood:

Wood	lbs/bushel	Wood	lbs/bushel
White pine	9.800	Black ash	14.5 ~~475~~
Basswood	10.625	White ash	16.3 ~~325~~
Spruce	11.250	Beech	17.025
Poplar	12.3 ~~275~~	Yellow birch	18.8 ~~750~~
Hemlock	12.850	Sugar maple	19.0 ~~18.950~~

Accuracy is a virtue ☺

Note the high density of the sugar maple charcoal, relative to a majority of the other woods. The loss of huge stands of sugar maple in New York, Massachusetts, and Connecticut to the voracious appetites of charcoal-eating blast furnaces ~~there~~ virtually wiped out the maple syrup industries in most of these states. Since the quality of iron produced in a blast furnace was limited by the height of the furnace stack, this in turn was limited by the crushing resistance of the charcoal. A successful iron production was possible only where the hardest woods were used, resulting in the hardest and heaviest charcoal.

Charcoal was made by controlled burning of wood. The burning was not allowed to progress beyond active smoldering; ~~lest~~ otherwise the entire effort would have been consumed in flames. Properly controlled smoldering provided enough heat to burn off all the spirits and pitch in the wood, resulting in 100 percent pure carbon. The uniformity of the burning process also guaranteed the uniformity of the charcoal's quality. In the quest for both quality and predictable uniformity, various techniques of wood stacking configurations and burning were tried. By the post-Civil War period, a semipermanent structure called a kiln was used with an ignition and burning procedure that ~~was down to~~ had become an exact science.

In the days before charcoal kilns, however, wood was reduced in earthen-covered mounds called ~~meilers~~ meillers, or charcoal pits. Although above ground, the word "pits" was probably a throwback to the coal mining industry - the coal pits. Wood was stacked in a 30 to 40-foot diameter mound, leaving an approximately 1-foot diameter space in the middle to act as a chimney. When stacked, the wood was 10 to 14 feet high at the center. A mound of these dimensions used about 30 cords of wood, the equivalent of about an acre woodlot. After all spaces were filled with smaller pieces of wood to make the mound compact, it was covered with earth and leaves. A 1-foot diameter hole was left at the top of the center chimney and small 3 to 6-inch vent holes were opened around the sides, about a foot above the ground. When all was ready, burning ashes and tinder were dumped into the center chimney and the side vents were opened and closed as needed to supply draft and draw the burning from the middle to the sides. It took about a week to char the wood, depending on the type of wood and skill of the collier.

The tenders of these charcoal operations were called colliers, after English coal miners of the same name. It was the collier's job to build the mound, cover the wood, ~~and~~ correctly ~~light~~ ignite the stack, and control the ~~burning~~ charring. As the wood was reduced to charcoal it shrank, making for a dubiously liked job for the collier - that of walking about the top of the smoldering pit, pushing the earth down with his feet while prodding beneath with a long iron rod to settle the coals. All the time, the collier paid attention to prevent openings in the earthen cover that ~~may~~ might allow air ~~in~~ to enter and ~~bust~~ burst the charcoal (and himself) into a conflagration. Such activities soon covered the collier with black soot, lending more similarity to his coal-mining cousins than name only.

The charcoal operation was complete when the smoke stopped and the shrinking ended. As the earth covering was slowly pulled away, barrels of water were kept on hand, lest a spark restart the burning. Little water, when needed, was used. The charcoal at this stage was still quite hot and the water immediately saturated the burning coals with steam trapped within the quickly-covered mound. After cooling, the charcoal was shoveled into wagons and taken to the forge. Some teamsters gave the charcoal an extra watering just to be safe. There is a story of one New England driver who left a load of charcoal in his wagon for the night. The next morning he found only bits of iron nuts and bolts on the ground where his ~~wagon had~~ wagonload of charcoal had been. (15) ~~61-49,50~~

The collier's burning season ran from the end of one winter to the start of the next. Because if left to accumulate it would deteriorate, charcoal was made only a few weeks before actually being needed at the last furnace. (16) ~~29-64~~ It took a well-organized and alert collier to master the operation of the number of mounds he tended. Should he lose a mound through accidental fire, he was docked the value of the wood. A good collier had to juggle a number of duties, alternately charging and discharging mounds while tending to the vent holes of others. Since the mounds were built ~~up to a city block~~ hundreds of feet from each other ~~so as~~ to give working room and prevent the spread of fires, charcoal tending was difficult. (17) ~~108-1-69-2~~ The collier spent the entire charcoal-tending season high up some mountainside, living in a small hut among his mounds and maintaining a small vegetable garden when his day and night duties permitted. He sometimes augmented his diet with small game when he had the chance to check his traps.

Producing charcoal in earth-covered mounds, however, had a number of drawbacks. Some of these were the amount of time and labor required to produce the charcoal; the difficulty of maintaining complete control of the burning process; and the high amount of dirt that usually mixed with the charcoal from the earth cover. By the end of the Civil War, a solution to these problems was the increasing use of kilns, or semipermanent structures.

Initial kilns were rectangular or round, and usually built of red brick on a stone foundation. Refracting brick was sometimes used, but was not necessary as long as the red brick was hard enough to resist fire.

A typical rectangular kiln in New England measured 40 to 50 feet long, 12 to 15 feet wide, and 12 to 15 feet high. The capacity was 55 to 70 cords of wood, nearly double that of the mound process. The charcoal yield increased from 30 to 35 bushels per cord in the mound to 45 to 50 bushels in the kiln, a significant jump in efficiency. Rectangular kilns, however, were not as common in New England as in the South. Round and conical kilns were more enduring the configuration in Vermont.

Round kilns, also known as round furnaces, were typically 28 to 30 feet in diameter at the base and 12 feet high at the center. Some were built with vertical walls, others with battered walls so that the diameter at the top of the wall was a few feet less than at the base. The disadvantage of vertical over battered walls was the need for heavy iron hoops around the top of the wall, in addition to the usual braces. Because the battered walls leaned inward, they offered better balance under the weight of the heavily arched roof. Yet the vertical wall kiln is more common in photographs of charcoal kilns in Vermont. Each type had about 300 cast iron vents around the base of the wall in three rows of 100 vents each. The vents were cast iron lined and left an opening that could be closed by

inserting a brick ~~inserted~~ lengthwise. The 3 to 5-foot diameter vent at the top was lined with a cast iron ring, which, together with the heavy doors and iron bands, weighed ~~weighs~~ about 3000 pounds. It took about 36,000 bricks to build the kiln.

The 40 to 50 cords of wood took four or five men a day to ~~l~~ load~~ed~~. The kiln was fired with a long handled torch at the bottom in space below the wood that was left by skids. Lighting was usually done at night so that the progress of the flame could be seen and better controlled. When ~~lighted~~ the kiln was lit, all side vents were ~~are~~ open, but as soon as the wood was ~~is~~ burning, the two lower rows of vents were closed. The first four days, the heavy white smoke coming from the upper vents indicated water being driven from the wood as steam. This was ~~is~~ followed by blue smoke, indicating that the kiln was ~~is~~ very hot and the charring was ~~burning is~~ nearly complete. When ~~the charring was~~ complete, all vents were ~~are~~ closed to extinguish the kiln, followed ~~by five~~ then three to 5 to 6 ~~six~~ days of cooling down. Water was no longer ~~not~~ generally used to extinguish the fire and reduce cooling time because it was now found to impair the value of the charcoal for blast furnace use. It took four men a day to unload the kiln. The entire cycle ~~taking ten~~ took 10 to 12 ~~twelve~~ days.

The chief disadvantage of the round kiln was in the heavy iron ~~hoop~~ hoop. It added an initial construction expense, but due to its expansion and contraction ~~tracting~~, numbers of cracks and openings resulted. Some of these holes could not be effectively closed, which resulted in a decreased yield of charcoal. The most economical design resulted from a modification to the battered wall kiln.

– What kind of modification?

By the late 1870's, small conical kilns gradually replaced the larger ones of ~~all~~ other shapes. Generally 25 to 30 feet in diameter at the base and 20 to 25 feet high, they were designed for 25 to 45 cords of wood. Some were built into a hillside so that the charging door was near the top; others had the door at the bottom.

Typical of the conical kiln was one at Readsboro, as wide at the base as its height, 28 feet. ~~Walls~~ Walls were of brick, 12 inches thick at the base, diminishing in thickness with height. About 40,000 bricks were used, but no iron hoops were required. The top vent measured about 4 feet in diameter, and was ringed with cast iron to resist acid attacks on the ~~mortar~~ Mortar. The 75 side vents ~~numbered about 75~~ were divided into three rows around the base. Cast iron vents were usually used for the same reason as the cast iron ring at the top.

Conical kilns held about 35 cords of wood, which took four men 12 hours to charge, ~~a better rate than the round furnace.~~ and the efficient charcoal yield of 50 bushels to a cord was maintained. It was generally conceded by 1880 that the smaller conical kilns holding 25 to 35 cords were the most profitable. They were less expensive ~~to~~ to construct, more easily charged and managed, ~~some~~ gave a better yield, and could be cycled more frequently than any of the other types of kilns. ~~Locality~~, Some representative costs to charge, ~~burn~~ burn, and empty a conical kiln per thousand bushels of charcoal in 1879 were $7.50 at Plattsburg (Norton Ironworks), $7 on Lake George (near Roger's Rock), and $6 ~~at~~ in some Vermont localities.

Statistics of some typical conical kilns ~~were~~ are:

	Charge	Burn	Cool	Discharge
Time (hours)	10	192	72	10
Men per day	6	1	0	4
Horses per day	1	0	0	2

12 days

Footnote

Consumption of charcoal by the blast furnaces varied from operation to operation. As iron production increased, furnaces were forced to look farther each year for quality woodlands from which to draw charcoal. Once stripped of timber, it took about 20 years for regrowth to be sufficient for another clearing. A furnace making 6 tons of iron a day consumed 270,000 bushels of charcoal annually. This factored out to 6750 cords of wood - an average rate of 30 cords to the acre, or 225 acres per year (~~1869~~ 1849 figures). For a constant supply, therefore, a typical blast furnace required 4500 acres of woodland so that growth would equal consumption. Since few furnace operations owned such acreages of woodland, proximity to a railroad for delivery of charcoal from outlying areas became important. By the 1850's, blast furnaces in Vermont were drawing charcoal from an average of ~~ten~~ 10 to ~~fourteen~~ 14 miles away. By the early 1900's, charcoal was being hauled north to blast furnaces in Massachusetts, Connecticut, and NewYork from as far away as North Carolina. (No blast furnaces were operating in Vermont by this time.)

The charcoal industry in Vermont was a reflection of the iron industry, typically rural in the sense that only a few operations approached organizational efficiency. Most were scattered up and down the high western slopes of the Green Mountains in "pocket industries" that supported purely local needs. Up to the early 1800's, when much of the countryside was still being cleared, farmers were able to lay away substantial amounts of money by selling charcoal. (19) By the mid-1800's, the kiln had made its appearance and charcoal making shifted from pin money to profit. Kilns on the eastern side of Lake Champlain found competition from the western side as the charcoal market placed better profit position before local loyalties.

Although relatively evenly distributed among the eastern townships of Addison, Rutland, and Bennington Counties, early charcoal making was also carried on in a few isolated places to the east and north. By the late 1800's and almost into the twentieth century, the charcoal industry was transformed into just a

few highly organized operations whose production statistics reflected what was quickly happening to Vermont's "boundless forests".

In Addison County, early charcoal making centered around the needs of the Monkton Iron Company at Vergennes. Initial needs were satisfied from charcoal pits in the fields of the immediate area. But as the needs grew, the demands forced expansion into tracts of land in nearby towns of Panton and Addison. In time, the company was also looking across the lake for a better price. Such was the need for huge amounts of charcoal by the company that when they advertised in January 1808 that they would purchase charcoal in large quantities, they also built large barns for storing it. In time, there were 15 charcoal storage barns. Another center of charcoal making in the county was in Ripton, up the north branch of the Middlebury River. Here charcoal was made for a number of years to the 1880's, at which time kilns owned by Williams & Nichols of the East Middlebury Forge Company were producing about 9,000 bushels of charcoal per month. Using Hodge's figures, this calculates out to the destruction of about a square mile of forest per year from this moderately-sized operation alone.

At Brandon, a variety of coal then called brown coal was mined and used to drive the steam engines associated with providing blast to the furnace at Forestdale. Not coal as we know it today, it was more of an intermediate between peat and bituminous, today known as lignite. It was not an uncommon occurence in New England. The lignite vein was located about a half mile due south of the Forestdale Cemetery, off Route 73. It descended obliquely, 20 feet wide by 14 feet thick to as deep as 90 feet.

In parts of Pittsfield and Chittenden, the Tweed River Company (successor to the Pittsfield Iron and Steel Company) operated an extensive mining and charcoal making business in the 1880's to support a bloomery forge in Hartford, Connecticut. Ore and charcoal were out of the mountains shipped by wagon to Bethel, then by rail to Hartford. Scott's 1854 map of Rutland County indicates "Coal Kilns"

in Chittenden east of the old mountain road from east Pittsford to Chittenden village. Elsewhere in Rutland County, charcoal kilns were located a half mile southwest of West Castleton (actually just ~~in~~ within the township of Fair Haven) in the 1860's. 26 Kilns might also have been located about a mile northwest of Beaver Pond at Proctor, atop the high bluff; ~~and~~ there were also four kilns along the slopes of Dorset Mountain in southern Danby ~~town~~. 27

The most extensive ~~colaing~~ charcoaling in the county occurred in the latter half of the ~~19~~ Nineteen th century at Mount Tabor. Here, some ~~thirty-five~~ 35 kilns ~~were~~ operated by 28 the firm of Griffith & McIntyre (Silas L. Griffith and Eugene McIntyre). The ~~beginnings of this~~ charcoal industry at Mount ~~Tolen~~ Tabor began ~~commenced~~ in 1872 when S.L. Griffith built six kilns. By the mid-1880's, charcoal was being made at such places in Mt. Tabor as Mill Glen (~~8~~ eight kilns), Summit Job (10 kilns), Greeley Mill (~~4~~ four kilns), Black ~~Brook~~ Branch Job (~~9~~ nine kilns) and at the railroad depot at Danby (~~4~~ four kilns). Each supported small settlements of woodchoppers, colliers, teamsters, ~~plus~~ and families. Altogether, Griffith & McIntyre employed some 500 men and used 100 horses and 18 yoke of oxen. The business converted 20,000 cords of wood in to a million bushels of charcoal annually, shipping it to foundries and furnaces in Massachusetts and Connecticut.

29

The Black Branch Job settlement consisted of 40 to 50 structures. These included a steam operated saw mill measuring 40 ~~x~~ by 80 feet that made lumber from the choice hardwood, and cordwood of the balance for the kilns. There were also a large boarding house for single men, tenant houses and cottages for families, a school-house, general store and office, harness shop, wagon shop, blacksmith shop, stables for the animals, etc. The houses were furnished rent free; supplies near cost; and as many needs as possible made on the spot. About a hundred men in gangs of 12 to 15 men each chopped wood from October to April. Some remained in the woods, living in log shanties. Others returned nightly to the settlements.

After the death of Mr. Griffith, ~~the~~ his property was sold to a New York lumber company, thence to the U.S. Forest Service.

30

Today only empty cellar holes and ~~lonesome~~ hiking trails mark the settlements. The kiln sites are identified by their characteristic wide circles of collapsed brick-work. The bricks are usually coated with a thick crust of burnt ~~brick~~ pitch from the exposure to the charring process. At some sites, the iron hoops that held the structures together can still be found. Ten Kilns Brook flowing through the meadows at Old Job on current U.S.G.S. topographic maps gives the clue as to the whereabouts of this former Mount Tabor industry.

Southward in Peru, Bennington County, C.S. Maltby purchased a mill in the western part of town near the notch where two brooks met to form the Mad Tom creek. 31 Here, early lumber mills ~~earlier~~ sawed railroad ties out of thousands of birch trees, sliding the ties down two miles of wooden flume and water to the railroad below at East Dorset. Maltby, who owned a blast furnace in Millerton, N.Y., from about 1864 in the to 1880's, eventually built a number of kilns at this mill and made charcoal. Farther south, ~~Bannon,~~ Barnum Richardson & Co. (owner of Connecticut blast furnaces) also made charcoal. There were at least 10 kilns operating at this time in Peru, ~~possibly nine.~~ 32 Four charcoal kiln ruins are located along the Long Trail at the Peru-Winhall town line. 33 ~~And~~ In the southwest corner of Winhall near the Bourn Brook headwater at a place once called Rootville, the Barnum, Richardson & Co. also operated eight more charcoal kilns, making an estimated 240,000 bushels annually. 34 The same company also operated an additional two charcoal kilns west of the railroad track a short distance south of ~~the south crossing at~~ Barnumville, 35 ~~about two miles northeast of Manchester Center.~~ 35 Earlier, in 1872, McNaughton and Lawrence also made charcoal at Barnumville. 36

At South Shaftsbury, where Henry Burden & Sons operated extensive blast furnace works, two coal (charcoal) kilns were located about 500 feet southwest of the blast furnace. 37 Burden also operated kilns along Fayville Branch (Pete's Branch) in northwestern Glastenbury. 38 About the same time (post-Civil War), the Bennington and Glastenbury Railroad, Mining and Manufacturing Company was organized. 39

(In those days, company names attempted to cover all business eventualities in one collective title.) The company purchased 18,000 acres of land, built 18 charcoal kilns, and a settlement of South Glastenbury sprang up at the forks of Bolles Brook near the Woodford town line a half mile south. From about 1872 to 1900, the kilns produced a maximum of 28,000 bushels of charcoal a month, transporting it 1200 feet down the mountain to Bennington on an 8-mile railroad.[40] Farther downstream in Woodford Hollow, some seven or eight kilns were operated by James Beckley, who ran blast furnaces in North Adams, Mass., and Chatham, NY.Y.[41] Woodford "City", three miles east, had two more kilns in the 1890's operated by A.W. Hager.[42] Earlier, J.J. Morehouse and E.C. White, both of New York, owned five kilns west of the village, producing 12,000 to 15,000 bushels a month.[43] One of the earliest settlers in Woodford, the Park family, made charcoal for the nearby Bennington Iron Works.[44]

In Bennington, the Bennington Chemical Works of Root & Jones, established in 1875, produced charcoal as a by-product of wood distillation. From the 150 cords of wood consumed monthly in their ovens, they extracted some 225 pounds of lime, four gallons of alcohol, 12-15 gallons of tar, and 40-45 bushels of charcoal per cord of wood.[45] Bennington was also the site of a charcoal kiln patented in 1829 by Isaac Doolittle.[46] And in East Bennington an 1835 sketch of the ironworks there shows distinctly four charcoal kilns immediately northwest of the furnaces.[47]

Elsewhere in the county, the Ames Company of North Adams, Mass., produced 15,000 bushels of charcoal monthly at five kilns, and the large Richmond Iron Works, also in Massachusetts, made 5,000 bushels a month at nine kilns, all near Stamford village.[48] The 1856 Bennington County map indicates 14 charcoal kilns on the Stanford-Readsboro line, east off today's Route 8, and also a half-mile southwest of Heartwellville. Beers also indicates charcoal kilns at three places, one about a half mile and another mile north of Heartwellville, on both sides of the road to Searsburg. Most of the charcoal made in Readsboro was used at the blast furnace in North Adams, 10 miles south.[49]

Charcoal making was not as intense on the eastern slopes of the Green Mountains, probably because it reflected the reduced number of ironmaking industries on that ~~site~~ side. ~~But~~ However, a number of charcoal making centers did exist. One was at Plymouth, in support of the Tyson furnace operation. Charcoal was made on the slopes of Salt Ash Mountain, where the Spaffic Iron Co. maintained a woodlot.[50] Charcoal was also made in the early days of Randolph,[49] where a cord of wood from land being cleared produced about 45 bushels of charcoal.[51] At St. Johnsbury, not only the Paddock Iron Works, but also Fairbanks Scales used charcoal made in the surrounding forests, much probably in New Hampshire. The scale company annually consumed 100,000 bushels of charcoal in addition to 300 tons of anthracite coal for working its 2500 tons of pig iron, 200 tons of bar iron, 38 tons of steel, and 20 tons of copper.[52] ~~And~~ Finally, at the Barney forge in Swanton, charcoal was made by the "pit" method; large mounds of wood covered with earth and straw. When the forges at Swanton failed after running for 68 years, the expense of charcoal was ~~the~~ blamed.[53] What had been so cheap through abundance in the early 1800's had become expensive in its scarcity, which is what happened to the charcoal industry throughout Vermont, in the end.

In the early years when demand was both small and mostly from in-state needs, the supply of charcoal could be met from the clearing of land by settlers and what other was harvested from the forests was replaced by new growth. But in the post-Civil War period, when the construction of kilns introduced a new industry to Vermont, regrowth could ~~nowhere~~ in no way keep up with the efficient cutting of the forests for lumber and charcoal. The preceeding paragraphs account for about 150 charcoal kilns, but ~~of course~~ this is probably ~~only half~~ much less than the number that actually operated in the Green Mountains in the late 1800's.

What became of the charcoal industry in Vermont? Two things, probably happening at nearly the same time: the saw mills had finally managed to cut every available piece of timber, and the technique of coking bituminous coal had developed to a point where mineral coke was replacing charcoal for technical and financial reasons. The ironmaking

industry was stampeding out of New England by the early 1900's, heading for New Jersey, Pennsylvania, and western New York State. And the soot of hundreds of charcoal kilns and blast furnaces finally settled out of the Vermont skies for the last time. And the mountains once again turned green ... for a while.

Trees are once again falling in the mountains of Vermont. Not to the sounds of woodchoppers, but to the whine of modern machinery. And the new byproduct is not the soot of kilns, but the acres of mud churned up by the earth-movers. log skidd
Necessary maybe, but no less a scar on the landscape than past ravages of the charcoal industry.

xref- charcoal kilns

GE Aerospace

Defense Systems Division
General Electric Company
100 Plastics Ave.
Pittsfield, MA 01201

June 15, 1988

Giovanna Peebles, State Archaeologist
Division for Historic Preservation
58 East State Street
Montpelier, Vermont 05602

Dear Giovanna:

After years of pecking out editing comments and forms on an 'ancient' IBM machine, I sort of inherited this beauty (IBM Selectric II - correcting) last week. It sort of compliments the NEC daisy-wheel printer I bought 2 months ago for my PC at home; I can do wonders with both.

I tried phoning you this morning and you are in the field somewhere; tomorrow you will be in DC. What I wanted to know was if there is anything in particular that should be checked out regards to the development of a rather large tract of land in northeastern Vermont. I read in the paper last Sunday that a 67,000-acre tract of forest land, of which 23,000 acres are in Vermont, have been sold to a developer (Claude C Rancourt, a Nashua, NH developer of mobile home parks and condos). The tract is in the Nash Stream Valley of New Hampshire so that the Vermont part of this is probably in the Bloomfield, Vt area. I know absolutely nothing about that area of the state; I don't even have access to a Beers map of Essex County to look at.

There are two state camping areas within 10 miles of Bloomfield so it wouldn't be inconvient for me to take a trip up and give the area some superficial inspection. Do you have anything on this for me?

Bob West and I have completed our field inspection of the Beaudry Brook charcoal kiln area. I have made a fairly good, scaled sketch map of the area indicating old logging roads (trails) and locations of the 20+ mound-type charcoal kiln sites we found. As for Billee's 'field of kilns', we found two directly in that area. What Dave Lacey pointed to as her kilns looked to us more like ancient tree throws. And we couldn't find any of the cut stonewaork she described in a letter. (Dave Lacey accompanied Bob and me on a trip to make sure we were all in the right area.) Billee called them 'one-time use kilns', but considering how much effort goes into ground preparation for a mound site, I doubt any would ever intentionally be used only once. She did find charcoal and if she hadn't, we might never have known the extant of the charcoal sites on the side of that mountain. From the 4- to 6-inch depth of surface charcoal in the mound sites' floors, they coaled charcoal for some extended period although I wouldn't chance a guess at that time frame. As soon as I get my photos ready and forms located in the confusion of my new study at 41 Lebanon Ave, I will get this interesting report off to you.

On our way back to Manchester from one of our trips to Beaudry Brook, we stopped by to inspect what happened to the furnace stack at Mr Conroy's (East Dorset). I took some photos of the badly cracked walls and got the photos from the processor's today, but I want to wait until I find some previous recent photos of the stack to compare them. There definitely is significant damage to the stack. Stones on the outer walls have separated as much as 6 inches in places, and a section of what remained of the inner wall (bosh) collapsed. What stands looks precarious at best. Bob West agreed that if let to itself, the stack could collapse at almost any time.

What is needed now is reinforcment in the way of heavy beams supporting the archway ceilings. Little could return the stack to its pre-settling condition, save an expensive effort of scaffolding and wall reconstruction. Except that I could probably get sued for liable or something, this could make a good article on why people shouldn't dabble with 'restorating' something they don't fully understand, except in Mr Conroy's case, I couldn't convince him that he didn't fully comprehend the potential damage he was doing.

In the course of relocating a short section of the LT about a mile south of Route 30 (Manchester/Winhall area), the trail skirted the edge of a previously undocumented brick-type charcoal kiln. Bob and I inspected the site 2 weeks ago and that also will be reported to you soon. I am also going to suggest that the GMNF people relocate about 100 feet of the LT such that it doesn't physically cut the corner of the ruins. The realignment can be made easily. The ruin is astride an older Route 30 and 11 intersection, which is now overgrown and wild. Because the ruin was so close to an intersection, much of the brick has been vandalized, but for some reason, the round iron top hole cover remains partially buried a few feet from the edge of the site.

And finally, a photo taken outside the chapel after the wedding for you to pass around the office and keep for yourself. I have it in my plans to visit the Division sometime the middle of July and will call before I (we?) come up.

All best to you; please tell everyone I think of them often.

Vic

Victor & Donna Rolando
41 Lebanon Ave
Pittsfield, MA 01201

Variability in Design of 19th-Century Charcoal Kilns in Vermont
written and researched by Vic Rolando

Presented to the CNEHA at Troy, NY, November 1, 1986

* The state of Vermont constitutes 9,609 square miles, or less than 0.2% of the area of the United States. Yet, during the summers of 1983, 84, 85, and 86, the sites and ruins of 137 charcoal kilns were located in that small area, part of a state-wide survey of IA sites.

* Basically, the charcoal kilns were constructed of two types of materials; brick and stone, and some a combination of both. Brick-type kilns accounted for 103 kilns, averaging about 28 feet in diameter; * the 18 stone-type and the combination stone-and-brick-type kilns divided evenly in half, nine of each, all measuring from 26 to 35 feet in diameter. * Also found were 15 mound-type remains, measuring from 25 to 40 feet in diameter, and one curiosity, a concrete block-type kiln from the 1950's.

* The kilns were generally found in the south-central part of the state. They date from the 1870's through the turn of the century, well past the peak period of ironmaking activity in Vermont, and thus reflect the making of charcoal for interests outside of the state. * It is well documented that during that period, charcoal makers contracted for millions of bushels of charcoal for ironworks operators as far away as Salisbury, Ct. Additionally, large tracts of mountain land were leased in that same period by such operations as the Richmond Iron Works of Massachusetts, for reduction of the forests to charcoal.

* Of the 103 brick-type kilns, one was confirmed through shallow excavation to have been conical in shape, 2 others may possibly have been conical. * It was the policy of the US Forest Service Service in the 1930's and 40's to dynamite standing kilns on government property to prevent hikers from camping and transients from living in them. The

two questionable conical kiln ruins were found in association * with an iron door typical in configuration to those used in conical-shaped kilns, and are located at sites a few hundred feet from the known excavated conical kiln. But they were thoroughly destroyed by dynamiting, right down to their foundation stones, as excavation attempts proved. * The partially standing remains of most of the stone-type kilns suggest they were of beehive shape, * while the stone-and-brick-combination-type kilns were conical in shape. * This has been determined by comparison with period photographs shared by residents of the old charcoal making areas. * One stone-type kiln was rectangular, measuring 16 feet wide by 37 feet long and 10 feet high. The 1950's era concrete block-type kiln was also rectangular in shape.

Kilns were built anywhere from 1 to 10 at a site. * There were 11 single-kiln sites; six 2-kiln sites; * four 3-kiln sites; seven 4-kiln sites; five 5-kiln sites; * no six- or seven-kiln sites; three 8-kiln sites; * and one 10-kiln site. The largest sites were of brick construction, averaging 4 kilns per site; stone-type and stone-and-brick-combination-type kilns averaged 2 kilns per site.

* The kilns were built at elevations from 660 feet to 2400 feet above sea level. Vermont's lowest elevation is 95 feet, which is the elevation of Lake Champlain, bordering most of the state on the west. It's highest point is Mount Mansfield, * 4393 feet above sea level. Average elevation of the state is 1000 feet. In the area of the most kiln finds, 12 mountains rise to between 3000 and 3800 feet. * Brick-type kilns averaged 1813 feet in elevation at a range of 660 to 2360 feet; the largest concentration of 55 kilns were found between 1500 and 2000 feet. Stone-type kilns averaged 2057 feet, with a range of 1560 to 2400 feet, somewhat higher in elevation than the brick types, but significantly compacted in a tighter range of elevation. The largest

concentration of 10 stone-type kilns were found between the 2000- and 2500-foot level. Mound-type kilns were located at the lower average of 1336 feet, at a range of 700 to 2360 feet; there was no significant concentration at any elevation. Almost all kiln sites are located in proximity to good-flowing streams.

* Anyone familiar with Vermont's higher-elevation landscape is familiar with the rocky nature of the land. Vermont is still known for its marble, slate, and granite industries, but Vermont farmers would rather forget the numbers of stone walls that they have built down through the past 200-year history of the state. Stone-built charcoal kilns reflect, therefore, the adaptive use of a natural resource to answer a need for a practical building material. * The stone-type kilns are built of unfinished stone, but laid up carefully in 3-foot thick walls to prevent as much air as possible from leaking into the interior of the kiln during the combustion process. * Most brick-type kiln sites have since been cannibalized of all usable brick. Stone is such an available resource in Vermont that the best kiln remains in the state are those made of stone.

* Brick-type kilns are laid up in 1-1/2 brick long, or about 1-foot thick walls, which provide a stable enough structure until such factors as the vaulting brick roof, and heating, expansion, and cooling are considered. * Therefore, 28- to 30-foot diameter, 6-inch wide by 1/2-inch thick kiln-girdling flat iron hoops, * held firmly in place by 1-inch bolts, assist in holding the structure together. Except for iron doors, no hardware was found associated with the stone-type kilns, probably because its conical beehive design created a much more stable structure. Other iron hardware found at brick-type kiln sites include 6- by 6-foot doors, * lintels on which the doors slid across, * and cast iron vent-hole linings. Inspection of the few pieces of hardware

that survived World War II scrap drives indicate no visible similarity between dimensions of the hardware, suggesting that hardware for the kilns was made 'on order' at the foundry. But nowhere is the variability in design of hardware for charcoal kilns more obvious * than in the configurations of the circular covers that closed the 6-foot diameter holes at the tops of the kilns. * Probably because of their round, 1/2-inch thick flat shape, they escaped detection of scavengers, * and over a dozen of the artifacts have been found by diligent search in the vicinities of kiln ruins. *

* Vent holes, through which the flow of air into the kiln was controlled, also provide an interesting point in study of variability. * Almost all brick- and stone-type kilns contained vent holes of such a dimension to conveniently allow the insertion of an ordinary red brick to shut the hole completely. Stone-type kilns used a pair of bricks set side by side with a brick-size space between, laid over and under with a large flat stone. Variations in vent holes were found at one site containing five brick-type kilns * that had cast iron vent linings. This site was located about 3 miles from an ironworks, which it serviced. At one stone-type kiln site, * vent hole linings were found that are made of a hard clay material of unknown origin.

* The variability in design of these 19th century charcoal kiln ruins in Vermont reflect the ability of charcoal makers to adapt the needs of the basic kiln design to the resources that were available. The consistent 28-foot inside diameter of the brick-type kilns, for example, indicate a common knowledge of one aspect of the technology. * But the variability in hardware, at these same brick-type kiln sites, testifies to the individuality of at least one of the number of choices that enterprising Vermont charcoal makers appeared to make the most of. Thank you.

D — FYI — return to me
G

VICTOR R. ROLANDO
RESEARCHER OF VERMONT INDUSTRY
33 HOWARD STREET
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(413) 443-1461

August 1, 1986

Giovanna Peebles, State Archaeologist
Division for Historic Preservation

Dear Giovanna:

Enclosed is a package of goddies for you. Yes, it was a busy July; I don't know how much longer I can keep up the pace, but it helps pass the time. The $1278.90 donated services represent 93+ hours of effort, traveling 1262 miles and hiking another good percentage of that all over Dorset Peak, Bristol Flatts, and elsewhere in rain, sun, and bugs. Love it!

I wrote up the Mt Fuller charcoal area even though I couldn't get to it since I felt that Fred and Edwin Royce' descriptions to me allowed me to pin point it on the topo. You will probably give this one a FS- number.

I am presently hot on the trail of a charcoal kiln in Bristol, a blast furnace site at Waitsfield, and some kind of ironworks operation at Bethel (locust Brook). I had been planning to take a week vacation Aug 9 thru 17, but GE is getting very busy these days and I may have to shift some plans. I wanted to spend a few days working on these sites plus some time at State Papers, but it might not work out.

I can't believe it's August 1st and I've found only 4 charcoal kilns (at 1 site) so far this year. I guess we really have found all the easy ones. We are spending much more time searching, following up peoples' directions, etc., than we ever did without finding much. That's one of the reasons for such high hours for July. I hope that it isn't violating some federal rule, donating unsuccessful time like that.

I have also re-run the Vermont Inventory printout, updating it with the previous site numbers and including entries for the packages enclosed. Note that I have highlighted the county names so they can be found more easily. Discard any previous printouts you have. I will supply undated ones as material becomes available.

Bob West and I met with Noel Fritzinger at Weston this past Sunday. I had thought I knew or heard of him from somewhere before; he apparently the same of me. In the course of conversation, we discovered he was former NY Dept of Education Museum Director, I was former Rensselaer County Historian, and we both knew many common friends in the Education Department. We all meet again in Vermont, of all places. Anyway, Noel is going to suggest to the local historical society Board that I will assist them in recording* the ruins along Cold Spring Brook. There are many ruins up there; a very interesting place, if you have an IA bent. On our return, Noel took us to a circular stone-lined cellar hole (?) just over the line in Mt Holley. Bob thought it might have been a cold cellar for cheese. I could find no slag or lime associated with it. Who knows? Noel said he thought that Warren probably thinks ancient rites were held here. I'll look into it.

See you someplace, sometime. Hi to Cindy.

Vic

* I assume this qualifies for donated services?

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June 10, 1986

Dr David Starbuck, CNEHA Program Coordinator
Dept of Science & Technology Studies
Rensselaer Polytechnic Institute
Troy, New York 12180-3590

Re: CNEHA 20th Annual Meeting
Oct 31 - Nov 2, 1986
RPI, Troy, NY

Dear Dave:

Here is the information I promised you a few days ago:

Title of Paper: Variability in Design of 19th-Century Charcoal Kilns in Vermont

Abstract: Variations in configuration, capacity, building materials, and associated hardware have been found in the over 100 charcoal kiln remains located in Vermont during 1983-86, as part of a Survey and Inventory of Vermont industrial sites.

The paper will be supported by about a dozen slides, in a Carousel tray. I have my own slide projector, if need be. No problem making a 20-minute limit. I think I have something of interest for the CNEHA. I hope you can fit me in some place. It will be good to meet with my many old friends in CNEHA, who I haven't seen ~~in some~~ for too many years.

I'm not sure if you need any biographical info on me, but I think you know enough to 'wing it', if you want.

Sincerely,

Vic

PS: Pittsfield, Mass is a tad out of the way, but if anyone attending/participating in the meeting needs a place to stay, I can put up one or two. Not the Holiday, but under a roof and proximate to indoor plumbing and kitchen facilities. No charge, naturally.

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May 5, 1986

Giovanna Peebles, State Archaeologist
Division for Historic Preservation

Dear Giovanna:

Bob and I found charcoal kiln #110 this past weekend; five up Kiln Brook in northern Chittenden, and a lone kiln near Lefferts Pond, about 5 miles south. The lone kiln is the one that's worth writing to you about.

We weren't looking for this one, but for another about 3 miles away. Some people along the road who we were trying to get directions from told us about it, so we drove to Lefferts Pond to inspect. You can imagine our surprise when we found not the usual circle of bricks, or the partially standing round stone walls, or even a conical kiln, but ... a rectangular shaped kiln!

I've read references to such things and descriptions of them in New York, but I had no inkling that any were built in Vermont. I seem to remember that the only rectangular kilns in New England were in Connecticut, and they are long since disappeared. I will have to check this out again, because if that be the case, this rectangular kiln may be the only one in the Northeast.

It measures 16 feet wide by 37 feet long. One corner stands about 10 feet high. I am in the midst of writing it up for you and as soon as the photos are back, probably about Wednesday, I will get the report and typwritten forms to you for the inventory.

The owner of the property is a ~~20's~~ in his 20's man named Ken Smith, who is related to the Smith family that bought the Granger house at the Pittsford Furnace back in the 1880's. Ken Smith said he was raised in the old Granger house. He also said that he knew there were many more kilns in the surrounding hills, didn't know exactly where, but assumed they were all rectangular in shape. He is quite surprised to learn that his is unique. He wanted to clear the brush and attempt to rebuilt it but I advised him to leave it as it is, somewhat hidden from general view by the surrounding brush. He was interested in learning how it operated, the purposes of the vent holes, etc.

The significance of the rectangular kiln has to be national in level. I will try to write something up on it for the SIA with hopes anyone knowing of any others in the Northeast or whereever might come forward.

It's an utterly fantastic find! It's not an Indian burial ground, but for me, it's an accomplishment of continuing along the trail after kiln after kiln.

There's one thing that I'm not sure how to handle now, though. As I travel through the woods and fields looking for kiln ruins, my eyes are sort of calibrated to look for low, circular features. This being rectangular in shape is the same shape as

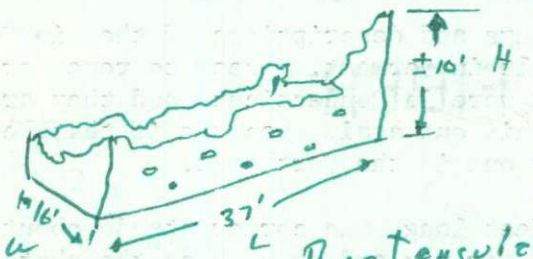
a foundation remain. The problem at had is that now I shall probably be stopping to inspect every cellar hole and stone wall for signs of vent holes or charcoal. How do I get my eyes to calibrate on only rectangular charcoal kilns and not every rectangular feature in the state? It's going to make going much slower in the woods now. Even Saturday after leaving the kiln site, I started stopping the truck at almost every stone-lined wall along the road. Even Bob was wondering how many (if any) rectangular kilns we might have overlooked the past years by not closely inspecting every non-circular remain we came across.

My plans for next weekend in Burlington, Waterbury, and Montpelier are still up in the air; I am having problems finding a campground in the area that will allow dogs. Many campgrounds are restricting pets now. It's going to affect how I plan my trips to Vermont if I have to settle on wilderness camping. I used to like wilderness camping, but I've grown used to hot showers and inside bathroom facilities ~~lately.~~

Tell everybody I said Hi!

Ciao!

Vic



Lampman Rectangular Kiln
ca. 1881

Vic Rolando

file: Charcoal Industry subject file 3/84

Evolution of the Charcoal Industry in Vermont
1870–1910

A. Description of the charcoal making industry in 1870's
1. Markets:
   a. Ironworks
      (1) Blast furnaces
      (2) Bloomery forges
   b. Foundries
      (1) Glass foundries
      (2) Special tools
   c. Other
      (1) Chemical, pigment
      (2) Artist material
      (3) Filters
2. State of the Ironworks industry in 1870's:
   a. Nationally
      (1) Blast furnaces – increasing in size; decreasing in numbers
      (2) Bloomery forges – being replaced by gas-fueled puddling furnace
   b. In Vermont
      (1) Blast furnaces – only one in operation
      (2) Bloomery forges – " " "
3. State of the charcoal making industry in 1870's:
   a. Nationally
      (1) Major works – high structures in place
      (2) Lesser works – in transition from mounds to structures
   b. In Vermont
      (1) In transition
      (2) Still supporting mainly local (Vermont) needs

B. Charcoal Making in Vermont
1. Character of Vermont in the 1870's
   a. Forest cover
   b. Industrial trends
   c. Transportation
   d. Labor force

2. DISTRIBUTION OF CHARCOAL MAKING AREAS; 1870 – 1910
   a. LOCATION VS AVAILABLE FOREST
      (1) RELATIONSHIP TO LOGGING INDUSTRY
      (2) " " SPECIES OF WOOD
   b. LOCATION VS MARKETS
   c. LOCATION VS TRANSPORTATION
3. DOCUMENTATION OF CHARCOAL MAKING SITES
   b. DOCUMENTED REPORTS
      (1) EGGLESTON,
      (2) COUNTY & TOWN HISTORIES,
      (3) TRADE JOURNALS, CENSUS REPORTS, ETC,
   c. OLD PHOTOGRAPHS
   a. MAPS
      (1) WALLING, RICE, ETC (CA 1850's)
      (2) BEERS (CA 1870's)
      (3) OTHERS (?)
4. ARCHEOLOGICAL REMAINS OF CHARCOAL MAKING SITES
   a. GENERAL SITE DESCRIPTION
      (1) ACCESSIBILITY
      (2) VISIBILITY
      (3) VANDALISM
   b. ABOVE GROUND REMAINS
      (1) DISPOSITION OF RUINS
      (2) BUILDING MATERIAL
         (a) BRICK
            (i) TYPE
            (ii) COURSE STYLE
         (b) STONE
      (3) HARDWARE
         (a) DOORS
         (b) COVERS
         (c) TOP HOLE LININGS
         (d) BANDS
         (e) VENT LININGS
         (f) BOLTS, NUTS, ETC.

(4) CHARGING PLATFORMS
(a) NATURAL
(b) BUILT-UP
(i) RETAINING WALLS
(5) RELATED FEATURES (CELLAR HOLES, ARTIFACTS)
(a) SAW MILLS, DAMS
(b) ROADS, BRIDGES, RAILROADS
(c) WORKERS' COMMUNITY
(i) HOUSES
(ii) SCHOOLS

C. EXCAVATED REMAINS
(1) WALL CONFIGURATION
(a) ROUND
(b) CONICAL
(2) KILN FOUNDATION
(a) MATERIAL
(b) DESIGN
(c) DEPTH
(3) KILN FLOOR
(4) HARDWARE
(5) OTHER

C. DECLINE OF THE INDUSTRY (IN VERMONT); 1900-1910
1. DEPLETION OF FORESTS
2. DEVELOPMENT OF COKEING PROCESS
3. DECLINE OF CHARCOAL FURNACES

D. ECOLOGICAL EFFECT ON THE FOREST (IN VERMONT)
1. EFFECTS OF PRE-1910 LOGGING / CHARCOALING
2. ESTABLISHMENT OF GREEN MOUNTAIN NATIONAL FOREST
3. EFFECTS OF PRESENT DAY LOGGING

DEC 1 1 1984

December 7, 1984

Giovanna Peebles, State Archeologist
Division for Historic Preservation
Pavilion Building
Montpelier, Vermont 05602

Dear Giovanna:

Sometime the next few days, you should be receiving a small box containing the current update to my manuscript. Plesae note the following:

Due to duplicating machine problems, some of the pages didn't copy as well as I would have hoped, but it's the office machine, free, so I can't complain too very much about it. If there is some specific information you need but can't read, please don't hesitate to ask me to re-run it. The copier should be fixed by then.

Two chapters, the foundry chapter and the 'restoration' chapter are yet incomplete. The foundry material should be finished in a few weeks (I'm still wallowing into Walton's Vermont Register at Rutland for that), at which time I shall mail a complete chapter to you for the binder. The 'restoration' chapter is something that hasn't gotten beyond the outline stage, and I will work on during January/February. If it hangs together, I may include it in the final manuscript, otherwise I may not incorporate it at all.

The Biblio is also missing from your binder. All the footnotes should be current, but until I am compeletly finished with everything, including the incompleted and yet to be written chapters, there's no use at this time getting into the biblio. Use the existing biblio for now. When the final is configured, I shall at that time send you a copy of it.

Chapter 1, the research technique, has been about 50% rewritten. It includes some personal statements, thoughts on what someone reading the book might like to further the work on registration of industrial sites, etc. There are also statements on legal restrictions to exploring, digging, etc, plus references to a book for further IA techniques, and something about the SIA and the VAS. You might like to review and comment on these. I have letters to Billee and Shelley for additional legal citations for page 1-18 of the chapter, and have left some space there for additional input. When (if) I get something, I'll write it up for 'remove and replace' with the existing page 1-18.

Notice the 3 by 5 card I've attached to the inside front binder cover. Maybe I'm nervous over nothing, but as this manuscript comes to its conclusion of effort, I'm apprehensive about someone 'stealing' all my work. Please let the Division use it as they see fit; but please also do what is necessary to protect it from general access. I know you know what I mean.

As to what is going to happen to this after the first of the year, Bob West insists that Vermont Heritage Press (Sharp brothers, Rutland) is still not only interested, but excited over publishing it. Of course, I find that difficult to believe. I'm excited about it, but I guess I find it hard to imagine anyone beyond you, me, and Rick Allen interested in blast furnace ruins anywhere at all, let alone Vermont. Oh, well. Maybe I'll be pleasantly surprised in 1985!

Hope my input on the Clove Furnace (NY) restoration and other restoration/stabilization ramblings was helpful. I haven't pursued much beyond what I mailed to you, due to wanting to get the manuscript put away by New Years'. Again, Giovanna, please don't feel compelled to respond. All quiet usually tells me all's very busy up there and that's all well for me.

Have a good holiday season, after you dig out from the latest 'present' from the clouds (we had about 6 inches here - I guess the main front drifted a bit further north).

Tell Shelley that I told her about Montpelier winters!

Sincerely,

Vic

PS: Please either destroy the existing manuscript that you will be replacing with the new one, otherwise, hold it for me to pick up my next trip north, probably Feb/Mar at the earliest. Keep the binder for whatever use you have for it. What's coming up in the mail is already in its own binder with index tabs included.

SUGGESTED READING LIST - 19th CENTURY IRON AND CHARCOAL MAKING
Updated to March 15, 1986

Ironworks - General:

W. David Lewis Iron and Steel in America Greenville, Del: The Hagley Museum, 1976, 64pp, illus, biblio, index ($3.50). - Excellant.

David Weitzman Traces of The Past: A Field Guide to Industrial Archeology New York: Charles Scribner's Sons, 1980, 227pp, illus, biblio, index ($17.95). - Good for both young people and 'the experts'.

Kenneth Hudson The Archeology of Industry New York: Charles Scribner's Sons, 1976, 128pp. illus, biblio, index ($10.00). - North America and Europe.

William F. Robinson Abandoned New England New York: Little, Brown and Co. for the N.Y. Graphic Society, 1976, 211pp, illus, biblio, index ($19.95). - Poorly written but interesting.

Joseph E. Walker Hopewell Village: The Dynamics of a Nineteenth Century Iron-Making Community Philadelphia: University of Pennsylvania Press, 1966, 526pp. illus, biblio, index ($5.95). - Excellant.

Mary Stetson Clarke Pioneer Iron Works Philadelphia: Chilton Book Co., 1968, 80pp, illus, biblio ($3.97). - Good for young people.

Victor R. Rolando A Survey of Stone Blast Furnaces of New England and Eastern New York State Unpublished Ms., 1977, 141pp, illus, biblio, index. - Somewhat outdated by current research. Copies at UVM Library, Burlington and VHS Library, Montpelier.

J. Lawrence Pool America's Valley Forges and Valley Furnaces West Cornwall, Conn: J.L Lawrence, 1982, 211pp, illus, biblio, index ($15.00). - Self-researched and self-published recent history of Buena Vista blast furnace at West Cornwall, Ct (available through J.L. Pool, Box 31, W. Cornwall, Ct 06796).

Helen Schenck and Reed Knox "Valley Forge: The Making of Iron in the Eighteenth Century" Archaeology (magazine) Boston: Archaeological Institute of America, Vol 39, No. 1, January/February 1986, pp. 26-33, 72., illus. -Excellant!

Ironworks -Vermont:

Richard S. Allen "Furnaces, Forges and Foundries" Vermont Life Winter 1956-57, pp. 2-9, illus. - Somewhat outdated by current research but good reading.

Gina Campoli "Current Research in New England: Vermont - The Troy Furnace Site" Society for Industrial Archeology - New England Chapters Vol. 1, No. 2, October 1980, pp. 11-13. - Field work at the Troy Furnace Site, Vt.

Brandon, Vermont: A History of the Town The Town of Brandon, 1961, biblio, index, ($5.95) pp. 11-13. - Brandon and Forestdale ironworks.

Ironworks - Vermont (cont):

Carl Seaburg and Stanley Paterson Merchant Prince of Boston: Colonel T.H. Perkins, 1764-1854 Cambridge, Mass: Harvard University Press, 1971, Chapter 18 "Short Blast on the Otter" pp. 199-210. biblio, index ($22.50). - Monkton Iron Co., Vergennes, ca. 1808-09.

Christine M. Peleszak The Abandonment of Leicester Hollow BS Thesis, UVM, Burlington, 1984, 111pp, illus, biblio. - Awarded Honors by UVM Dept of Agriculture.

Victor R. Rolando Ironmaking in Vermont: 1775-1890 MA Thesis, The College of Saint Rose, Albany, N.Y., 1980, 132pp, illus, biblio. - Somewhat outdated by current research. Copies at UVM, Burlington; VHS Library, Montpelier; The Rutland Historical Society, Rutland; and Sheldon Museum Library, Middlebury.

_____ "Eighteenth Century Forges" VAS Newsletter Burlington: The Vermont Archeological Society, Inc., No. 27, April 1979, pp. 5-6, illus, biblio. - Overview of 18th-century forge sites in Vt.

_____ "Search for Vermont Furnaces Yields Dramatic Discoveries" VAS Newsletter No. 32, August 1980, pp. 1-4, biblio. - Description of blast furnace; sites at Bennington, Dorset, Forestdale, and Troy, Vt.

_____ "Stone Blast Furnaces in Vermont" VAS Newsletter No. 33, October 1980, p. 6. - List of blast furnace sites located as of 1980.

_____"Searches Find More Vermont Furnace Sites and a Standing Ruin in 1981" VAS Newsletter No. 38, January 1982, pp. 4-5, biblio. - Sites located at Bennington, Orwell, and North Dorset.

_____"Current Research in New England: Vermont - Iron and Charcoal Sites" Society for Industrial Archeology - New England Chapters Vol. 5, No. 1, 1985, pp. 13-14. - Background leading to location of ca. 1825 Colburn blast furnace at West Haven, Vt.

Hon. Harvey Munsill, Esq The Early History of Bristol, Vermont The Book Committee of the Bristol Historical Society, (1979?) ($11.75). - "Forges": pp. 107-112. - Forges along the New Haven River and Baldwin Creek in Bristol.

Aleine Austin Matthew Lyon: "New Man" of the Democratic Revolution, 1749-1822 University Park, Penn: The Pennsylvania State University Press, 1981, 192pp, biblio, index ($19.50). - Lyons Works at Fair Haven.

Charcoal Making - General:

Thomas Egleston "The Manufacture of Charcoal in Kilns" Transactions of the American Institute of Mining Engineers Vol. 6, May 1879-Feb. 1880, pp. 373-397. - Copy at UVM Library; includes some Vermont data. An excellant research tool.

Suggested Reading List - 19th Century Iron and Charcoal Making (cont)

Charcoal Making - General (cont):

Jackson Kemper III American Charcoal Making Eastern National Park & Monument Assn., U.S. Dept. of Interior (1960's?) 25pp, illus. - A good little Park Service booklet on making charcoal in mounds.

Rob Woolmington "Coking Charcoal Down in Rattlesnake Gutter" Yankee Magazine December 1979, pp. 80-85, 132-134. - Charcoal kilns in Massachusetts and southern Vermont.

Charcoal Making - Vermont:

Rob Woolmington "The Charcoal Era" Vermont Summer Magazine Bennington: The Bennington Banner, July 7, 1977, pp. 17-20. - Charcoal making areas in southern Vermont.

_____ "Ghost Towns in New England" New England Boston: The Boston Globe, October 23, 1977, pp. 38-40, 42, 44-45. - Abandoned charcoal making towns in southern Vermont.

J.R. Chapin "The Charcoal Burners of The Green Mountains" Outing Magazine April 1885, pp. 4-18, illus. - Charcoal making at Mt Tabor in the 1880's; copy at VHS Library, Montpelier.

Victor R. Rolando "Current Research in New England: Vermont - Charcoal Kilns" Society for Industrial Archeology - New England Chapters Vol. 3, No. 1/2, 1982, pp. 12-14. - Field work in southern Vermont in 1982; copy at VHS Library, Montpelier.

_____ "Current Research in New England: Vermont -Charcoal Kilns" Society for Industrial Archeology - New England Chapters Vol. 4, No. 1, 1984, pp. 3-4. - Field work in southern Vermont in 1983; copy at VHS Library, Montpelier.

_____"Current Research in New England: Connecticut - The Connecticut Charcoal Company" Society for Industrial Archeology - New England Chapters Vol. 5, No. 1, 1985, pp. 5-6. - Present day charcoal making 'the old way', with modern twists; comparative to Vermont work. Copy at VHS Library, Montpelier.

Vic Rolando
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B:SRL

Subject file

VERMONT DIVISION FOR HISTORIC PRESERVATION: THE STATE PLAN

CONTEXT: VERMONT'S CHARCOAL MAKING INDUSTRY (1790-1900+)

1) How it developed (geopraphic; cultural; social; other influences): Vermont's charcoal making industry developed in association with the development of its mineral smelting and production industries. Charcoal fueled furnaces (iron, glass, copper), forges, blacksmiths hearths, foundry cupolas, etc. Early charcoal making required no structure; it was made merely by mounding cordwood, covering it with sod, and allowing it to smolder. Much charcoal (and potash) was made by settlers as a by-product of clearing vast acreages of land for agriculture. Kilns supplied charcoal to local furnaces and forges that initially satisfied local needs. Industrial expansion after 1820, stimulated by the Champlain Canal, demanded more charcoal. By Civil War period, charcoal was being made in stone and brick-built kilns with much of it exported out of state. In 1880-1912 all of it was shipped out as Vermont ironworks phased out and charcoal resources in NY, Mass, and Ct became scarce. By ca. 1912, available forests in Vermont were exhausted and charcoal making ended.

2) Limitations of development: Vermont charcoal making was limited in the early period (pre-1820) by the demand by local metal working industries, which mostly reflected domestic economics. Limitations of middle period charcoal making (ca. 1820 - 1860) still reflected local demand, but charcoal was made on a more regional supply and demand basis; local forests were becoming depleted through settlement and clearing for farmland. Following 1860, charcoal making became an industry unto itself, with charcoal being exported outside the state and forests being rapidly consumed by lumbering interests. Limitations by this period became the resources of the forest stands themselves, which were commercially exhausted by the turn of the century.

3) Known geographic distributions and patterns: During the early pre-1820 period, charcoal making generally centered about the iron making industries, then the largest single consumer of charcoal in the state. After 1820, as iron, copper, and glass industries developed, charcoal making chased the forest lines back into the hills. By the 1860's, it was not uncommon for charcoal to come to furnaces from a dozen miles away. As such, earlier charcoal making sites generally were close to developing industrial communities along the Lake Champlain plateau; later charcoal making areas reached well up into the Green Mountain highlands, with many last operations at 2000-foot elevations. Most kilns, however, still remained west of the center line of the Green Mountain range, with concentrations in the north in the Ripton/Middlebury area; the central area at Mt Tabor/Peru/Winhall; and southern at Glastenbury/ Woodford/Stamford/Readsboro.

4) Historic highlights (i.e., significant events [natural and social], people, technological advances, social trends, etc.): Largest single-owned charcoal making operation in Vermont was Silas L. Griffith of Danby, whose holdings in late 1880-1890's exceeded 50,000 acres, operating at Mt Tabor and nearby some 35 charcoal kilns, 9 sawmills, and 6 general stores. He was the first to use a telephone in the state, con-

necting his lodge at Griffith Pond to his office; was an early advocate of using saws instead of axes to cut trees in order to reduce waste. He was a Vermont State Senator but declined candidacy for Governor. His charcoal plus that made farther south supplied fuel needs of ironworks in the Taconic regions of Mass, Ct, and NY until about 1912, when these resouces failed; those ironworks then importing charcoal from as far away as North Carolina (the region's iron industry failed in 1923). Design and efficiency of round and conical kilns in Readsboro were recognized and written up in a technical paper in 1879-1880, published nationally (at least one Readsboro conical kiln located to date).

5) Time frame: ca. 1785 to 1912 **(justification):** archival research (see Selected Bibliography).

6) Property types known and/or expected: Mound type kilns: circular gutters; collier huts; coal storage sheds; and oval areas coated with burnt pitch. Stone/brick kilns: stabilizing iron hoops; iron vents; iron top hole liners and doors; square and triangular front doors; lintels; battered, round, and conical foundation remains; road/railroad access and loading platforms; charging embankments; coaling villages (schools, postoffices, workers' housing); offices; saw mills; dams; flumes; stables; blacksmith shops; extensive charcoal-laden black soil.

7) Information gaps/research questions: What vegetation predominates in charcoal-laden soil? Where was hardware made for reinforcement and use in kilns (hoops, doors, iron vents, etc)? What was final (pre-collapsed) configuration of stone built kilns (no known photos or sketches)? What generation forest generally stands today? Do any virgin forests remain from prehistoric period? What are the circular, dark areas on the ground in Shoreham located via satellite photos by Dunn of UVM/VAS, but unlocated by ground inspection?

8) Biases: Brick and stone kiln remains predominate in numbers over remains located to date of mound type kilns, due to latter having less distinguishable features. Earlier mounds also built closer to furnaces, later disturbed by furnace/industrial expansion, community growth, stream/river erosion. Stone kilns usually in better shape, higher walls than brick, seem to indicate more recent vintage, but brick usually canabalized by locals for use (lighter unit weight, comparable to modern brick, nearer roads/drivable trails); stone kilns not generally canabalized since stone not in high demand for construction (heavy, cumbersome, common everywhere in Vermont countryside).

9) Relevant constituencies: U.S. Forest Service; Vermont State Parks; SIA; town, county, and state historical and archeological societies; logging/lumbering associations; National Conservancy - Vermont Chapter; industrial and technological historical societies.

10) Selected bibliography: See: Rolando, V.R., 200 Years of Soot and Sweat (unpubl. manuscript) 1985, copy at DHP.

Prepared by: Vic Rolando **Date:** August 13, 1985

Prepared by Vic Rolando 7/85

Charcoal Kiln Report Log

Town	Site (Ruins)	Date Initially Located	Date of Report	DHP Site Ident
Winhall	Bromley Bk (4)	22 May 82	6 Aug 83	VT-BE-43
Mt. Tabor	Old Job (7)	6 Jun 82	28 Sep 82	VT-RU-78
"	" (8th: 7 Apr 83)	—	23 Jun 83	
"	Four Kilns (4)	6 Jun 82	10 Jul 83	VT-RU-85
"	Black Branch Job (7)	10 Jun 82	10 Jul 83	VT-RU-84
	~~(8th: 3 Jul 83)~~			
"	Summit Job (10)	10 Jun 82	9 Jul 82	VT-RU-79
Glastenbury	Red Cabin (5)	20 Jun 82		VT-BE-37
"	East Fork (3)	"	16 Aug 83	VT-BE-46
"	West Fork (5)	"	"	VT-BE-47
Ripton	Dragon Bk (4)	3 Jul 82	"	VT-AD-31[illegible]
"	Widow's Trail (3)	"	"	VT-AD-315
Mt. Tabor	Danby Station [4]	4 Jul 82	4 Jul 82	F.S. No. 19 (RU)
Winhall	Bourn Bk (8)	23 May 83	6 Aug 83	VT-BE-44
"	Winhall R. (4)	4 Jun 83	"	VT-BE-42
Mt. Tabor	Greeley Mill	10 Jun 83	11 Jul 83	VT-RU-86
Peru	Mad Tom - 5 (5)	16 Jul 83	28 Jul 83	VT-RU-41
"	" -1 (1)	"	"	VT-RU-40
"	" -3 (3)	"	"	VT-RU-39
Woodford	Bickford Hollow (3)	31 Jul 83	3 Aug 83	VT-BE-45
Dorset	No. Dorset (1-Md)	28 Aug 83		
Readsboro	Heartwellville Brick (2)	25 Sep 83	3 Oct 83	VT-BE-51
"	" Stone (1)	"	"	VT-BE-50
"	" Conical (1)	8 Oct 83	12 Oct 83	VT-BE-52
Stamford	Cowan Brook - Stone (2)	29 Apr 84	30 Apr 84	VT-BE-55
"	Coty Kiln - Stone (4)	"	16 May 84	VT-BE-53
Readsboro	Dotch Hill [2]	6 May 84	14 May 84	VT-BE-54
Glastenbury	Sterbo Reservoir (1-Md 1-Brick)	4 July 84	5 Jul 84	VT-BE-56
Ripton	Billings (1)	4 Aug 84	6 Aug 84	VT-AD-338
Woodford	Hagen Hill [1?]	7 Oct 84	8 Oct 84	VT-BE-5[illegible]
Salisbury	Kechaydin Camps (4-Md)	7 Apr 85	8 Apr 85	VT-AD-34[illegible]
Sunderland	Bacon Hollow (1-Md)	19 Apr 85	23 Apr 85	VT-BE-58
Ripton	Alden Brook (2+ Md)	5 May 85	24 May 85	VT-AD-348
Mt Tabor	Black Branch Job (8th site)	5 May 85	24 May 85	(see VT-RU-84)

Town	Site (Ruins)	Date Initially Located	Date of Report	DHP Site Ident
Shaftsbury	Bundem Lot (1-Md)	26 May 85	27 May 85	VT-BE-61
"	Bundem Lot (2-Stone)	"	"	-62
Glastenbury	" (")	"	"	-63

From: Soc. for Industrial Archeology – New England Chapters Newsletter 4(1) 1984.

CURRENT RESEARCH IN NEW ENGLAND

Maine

Crawford Notch:

September 3, 1983 saw the last scheduled freight train over the Maine Central's Mountain Division through Crawford Notch. The line is a segment of the Portland and Ogdensburg and was completed through Crawford Notch to St. Johnsbury, Vt. in 1876. This is one of the most scenic sections of railroad in New England and the Maine Central's heaviest main line grade. Traffic from Portland will be rerouted over the Boston & Maine to the south and west and via Bangor and Mattawamkeag for traffic connecting with the Canadian Pacific.

David Engman
Boston, Massachusetts

New Hampshire

Pisgah State Park:

During the summer of 1983 students at Keene State College surveyed and performed test excavations at the Broad Brook Site inside Pisgah State Park, located southwest of Keene, New Hampshire. In a course co-taught by Faith Harrington and Paula Zitzler, the students helped locate, identify, survey and map features of the 19th centry Broad Brook lumbering community: several field stone cellar hole foundations, stone-lined wells, stone dams, holding ponds, streams, ditches, retaining walls, and a submerged wooden turbine box. Test excavations were conducted adjacent to a dwelling house foundation, a blacksmith's refuse area, and in a former sawmill yielding hundreds of mid- to late 19th century domestic and industrial artifacts.

Lumbering operations and a small community of mill workers and lumbermen occupied Broad Brook for about a century beginning in the 1840's or '50's. Documentary, cartographic, and archeological research continues to reveal how Ansel Dickinson, a local entrepreneur, operated his numerous businesses which included the Broad Brook Steam Lumber Mills, the New England Box Company, the Ashuelot Warp Company, and several other partnerships.

Faith Harrington
New Hampshire Historical Society

Sewall's Falls Dam:

Sometime on April 7th or 8th, the world's largest rock crib dam gave way on the Merrimack River in Concord, New Hampshire. Built in 1894, the 633-foot long dam had not been maintained since 1966 when the State of New Hampshire purchased it. The section that was blown out of the dam is nearly 100 feet long, and the State has no plans to rebuild it. The water level in the vicinity of the dam has now dropped by several feet, and upper portions of the timber frame - packed with stones - are now easily visible, affording an unparalleled view of this form of dam construction.

David Starbuck
Rensselaer Polytechnic Institute

Page Belting Company:

The Page Belting Company in Concord, toured by the Northern New England Chapter on October 29, 1983, is easily the largest remaining manufacturer of leather belts in this country. Since the factory was constructed in 1894, it has always been powered by the same Watson Stillman 4-cylinder hydraulic pump which was hooked up to an air-cushioned accumulator. This pump was recently replaced by a new one, and, in response to a request for a home, the National Museum of American History has agreed to take it. Thanks go to John Hilger, Plant Manager, for being unwilling to see it scraped, and Robert Vogel, NMAH, for being willing to accept it.

David Starbuck
Rensselaer Polytechnic Institute

Vermont

Charcoal Kilns:

Field research on charcoal kilns continues in Vermont by Grace and Vic Rolando (SIA) and assisted by Bob West of Rutland, Vermont. Many more kiln sites have been located, from single-kiln sites along the Mad Tom Brook in Peru to an 8-kiln site atop a 2200-foot mountain in Winhall (a 2 mile hike up from the nearest road, on the 4th day of searching). As in 1982, all are within the Green Mountain National Forest, but unlike 1982, variant kiln ruins have been encountered in Readsboro, one of the state's southernmost towns.

Here in September to October were found the remains of a round stone-wall kiln and of at least one brick-constructed conical kiln; two

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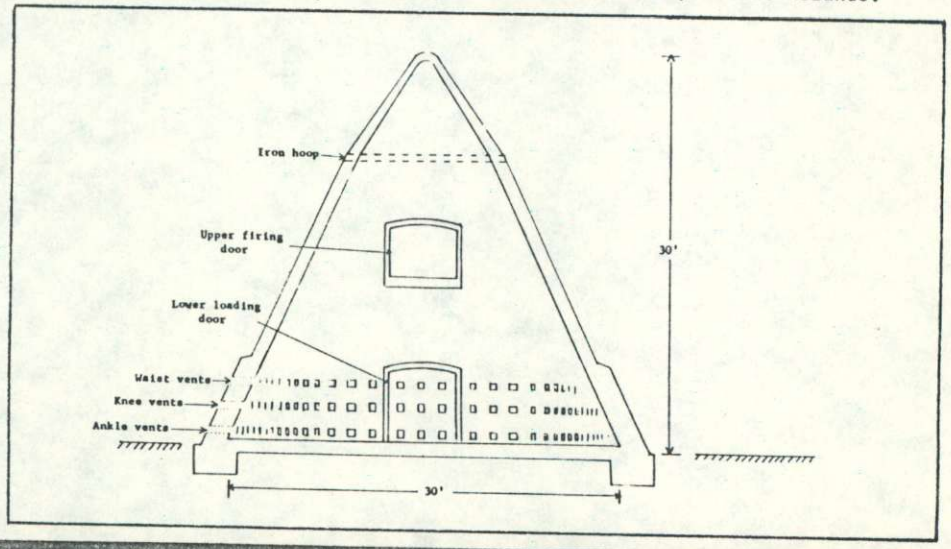
Design features of conical style charcoal kiln, typical of those located at Readsboro, Vermont. Although of smaller capacity than the circular kilns, they yielded more bushels of charcoal per cord of wood. Courtesy of Vic Rolando.



other kiln ruins were also found in the area. All four were located within a few hundred feet of the town's main north-south highway and in the midst of heavy forest. Three of them (including the stone-wall kiln) appear on an 1869 map, but no further specific documentation has been found on them. The fourth ruin, the conical kiln, was located close to the end of what have now become routine all-day bushwacking exercises in circular patterns about the proximity of already-located sites.

The stone-wall kiln ruin presents more questions than answers. Most puzzling is the lack of evidence for what construction material made up the roof of the kiln. The wall is generally 2 1/2 feet thick and 2 to 3 feet high.

One low, wide gap in the wall may have been the loading door area. The inside diameter is 32 feet, resulting in a 37% larger floor area than the common 28-foot diameter ruins found elsewhere in Vermont. Because the kiln was built into an approximately 15-foot high embankment to facilitate loading cordwood through an upper door, the kiln obviously had some structure above the existing wall; but nothing of this upper structure remains. Test holes inside and outside the kiln failed to expose anything more than a few small pieces of stone and brick chips. If the kiln's upper stone structure had been cannibalized, why was the existing stone wall spared and left the same height all around? If it had been stripped for its bricks, why were so many good bricks so obviously left behind, still inserted in the wall's vent holes?

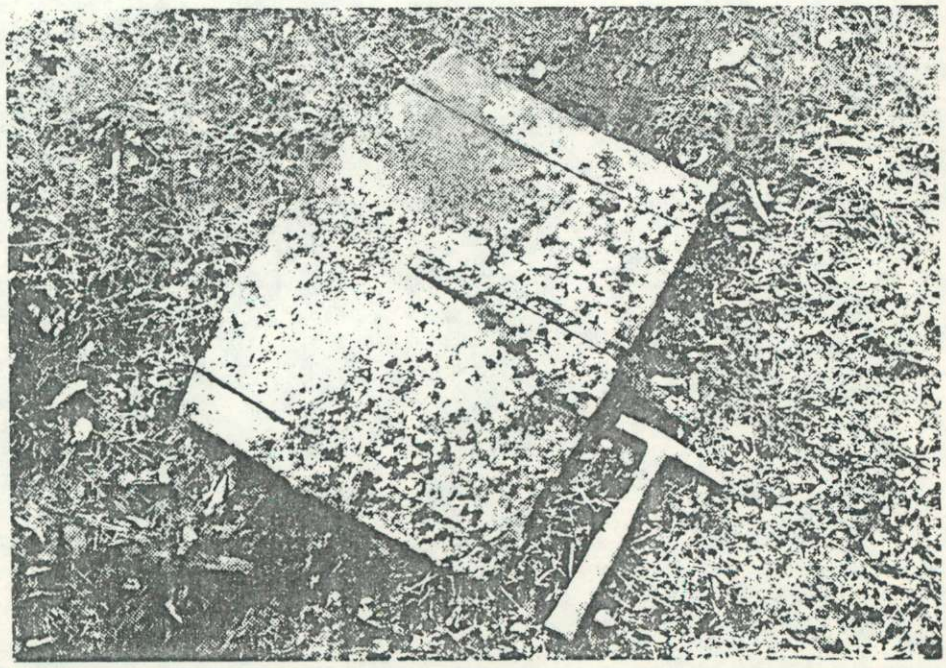
The only known stone-built charcoal kilns in this area are two conical-shaped kilns still standing in Dutchess County, New York, at Wassaic. These were inspected and found to be built of 2-inch thick stone slaps, their 3-foot thick walls rising upward and inward immediately from ground level. The Readsboro stone-wall kiln is made of 6 to 10 inch diameter/diagonal stones, and the wall rises vertically with no evidence of a conical configuration.

The remains of the confirmed conical charcoal kiln were located about a mile away from the stone-wall site, beneath a foot of scattered brick, dirt, and charcoal. A foot-wide section of wall was excavated to a depth of about 2 feet, exposing seven tiers of brick on a stone block foundation. One vent hole at the base is also in this section of wall. Each tier is mortared and set inward about 1/2 to 3/4 inch; stretchers line the outside face and headers the inside face, creating an approximate 1-foot thick wall. The inside diameter to the opposite side (also partially excavated and checked) is 30 1/2 feet.

While reinspecting the other two kiln ruins in the vicinity, Grace found an iron door at one ruin which matches ca. 1880 sketches of conical kiln doors. A limited excavation near the spot of the door find, through 2 feet of randomly scattered brick, exposed a section of circular-laid foundation stones and the burnt pitch floor of the kiln, but no intact section of wall was found.

Also during the summer of '83, the long-sought site of Nathanial Chipman's ca. 1790 forge/furnace in Tinmouth may have been found. This site has Ira Allen connections (Ira was Ethan's brother, a builder of many early forges in Vermont, and founder of UVM). Much heavy, black slag was found near the barest remains of a dam crib; and along the upper reaches of the Little Otter Creek in Ferrisburg (northeast of Vergennes), another elusive blast furnace site has been found. This may have been the forge bought out by the Monkton Iron Company in 1809 to make way for the construction of their main ironworks at Vergennes. This ironwork played a major part in the construction of MacDonough's fleet that went on to defeat the British at the Battle of Plattsburg in 1814.

Vic Rolando
Pittsfield, Massachusetts



A section of conical kiln loading door. Note curved top edge of door. Circular kilns had rectangular doors. This door was found in the vicinity of a suspected conical kiln in Readsboro, Vt. Courtesy of Vic Rolando.

By Vic Rolando 1984

Suggested Reading List - 19th Century Iron and Charcoal Making (continued)

Ironworks - Vermont (continued):

Hon. Harvey Munsill, Esq The Early History of Bristol, Vermont The Book Committee of the Bristol Historical Society, 1979? ($11.75). - "Forges" pp. 107-112: forges along the New Haven River and Baldwin Creek in Bristol.

Aleine Austin Matthew Lyon: "New Man" of the Democratic Revolution, 1749-1822 University Park, Penn: The Pennsylvania State University Press, 1981, 192pp, biblio, index ($19.50). - Lyons Works at Fair Haven.

Charcoal Making - General:

Jackson Kemper III American Charcoal Making Eastern National Park & Monument Assn, US Dept of Interior, 1960s?, 25pp, illus. - good little Park Service brochure.

Rob Woolmington "Coking Charcoal Down in Rattlesnake Gutter" Yankee Magazine December 1979, pp. 80-85, 132-134. - kilns in Massachusetts and southern Vermont.

Charcoal Making - Vermont:

Victor R. Rolando "Current Research in New England: Vermont - Charcoal Kilns" Society for Industrial Archeology - New England Chapters Vol 3, Nos 1/2, 1982, pp. 12-14, also: Vol 4, No 1, 1984, pp. 3-4. - field work in southern Vermont in 1982-83.

J.R. Chapin "The Charcoal Burners of The Green Mountains" Outing Magazine April 1885, pp. 4-18, illus. - charcoal making in Mt Tabor; copy at VHS Library, Montpelier.

Rob Woolmington "The Charcoal Era" Vermont Summer Magazine Bennington: The Bennington Banner, July 7, 1977, pp. 17-20. - charcoal making areas in southern Vermont.

_____, "Ghost Towns in New England" New England Boston: The Boston Globe, October 23, 1977, pp. 38-40, 42, 44-45. - abandoned charcoal making towns in southern Vermont.

Vic Rolando
33 Howard Street
Pittsfield, Mass 01201

July 19, 1984

Furn. Soc. for Ind. Arch.- New England Chapters Newsletter 4(1) 1984.

CURRENT RESEARCH IN NEW ENGLAND

Maine

Crawford Notch:

September 3, 1983 saw the last scheduled freight train over the Maine Central's Mountain Division through Crawford Notch. The line is a segment of the Portland and Ogdensburg and was completed through Crawford Notch to St. Johnsbury, Vt. in 1876. This is one of the most scenic sections of railroad in New England and the Maine Central's heaviest main line grade. Traffic from Portland will be rerouted over the Boston & Maine to the south and west and via Bangor and Mattawamkeag for traffic connecting with the Canadian Pacific.

David Engman
Boston, Massachusetts

New Hampshire

Pisgah State Park:

During the summer of 1983 students at Keene State College surveyed and performed test excavations at the Broad Brook Site inside Pisgah State Park, located southwest of Keene, New Hampshire. In a course co-taught by Faith Harrington and Paula Zitzler, the students helped locate, identify, survey and map features of the 19th centry Broad Brook lumbering community: several field stone cellar hole foundations, stone-lined wells, stone dams, holding ponds, streams, ditches, retaining walls, and a submerged wooden turbine box. Test excavations were conducted adjacent to a dwelling house foundation, a blacksmith's refuse area, and in a former sawmill yielding hundreds of mid- to late 19th century domestic and industrial artifacts.

Lumbering operations and a small community of mill workers and lumbermen occupied Broad Brook for about a century beginning in the 1840's or '50's. Documentary, cartographic, and archeological research continues to reveal how Ansel Dickinson, a local entrepreneur, operated his numerous businesses which included the Broad Brook Steam Lumber Mills, the New England Box Company, the Ashuelot Warp Company, and several other partnerships.

Faith Harrington
New Hampshire Historical Society

Sewall's Falls Dam:

Sometime on April 7th or 8th, the world's largest rock crib dam gave way on the Merrimack River in Concord, New Hampshire. Built in 1894, the 633-foot long dam had not been maintained since 1966 when the State of New Hampshire purchased it. The section that was blown out of the dam is nearly 100 feet long, and the State has no plans to rebuild it. The water level in the vicinity of the dam has now dropped by several feet, and upper portions of the timber frame - packed with stones - are now easily visible, affording an unparalleled view of this form of dam construction.

David Starbuck
Rensselaer Polytechnic Institute

Page Belting Company:

The Page Belting Company in Concord, toured by the Northern New England Chapter on October 29, 1983, is easily the largest remaining manufacturer of leather belts in this country. Since the factory was constructed in 1894, it has always been powered by the same Watson Stillman 4-cylinder hydraulic pump which was hooked up to an air-cushioned accumulator. This pump was recently replaced by a new one, and, in response to a request for a home, the National Museum of American History has agreed to take it. Thanks go to John Hilger, Plant Manager, for being unwilling to see it scraped, and Robert Vogel, NMAH, for being willing to accept it.

David Starbuck
Rensselaer Polytechnic Institute

Vermont

Charcoal Kilns:

Field research on charcoal kilns continues in Vermont by Grace and Vic Rolando (SIA) and assisted by Bob West of Rutland, Vermont. Many more kiln sites have been located, from single-kiln sites along the Mad Tom Brook in Peru to an 8-kiln site atop a 2200-foot mountain in Winhall (a 2 mile hike up from the nearest road, on the 4th day of searching). As in 1982, all are within the Green Mountain National Forest, but unlike 1982, variant kiln ruins have been encountered in Readsboro, one of the state's southernmost towns.

Here in September to October were found the remains of a round stone-wall kiln and of at least one brick-constructed conical kiln; two

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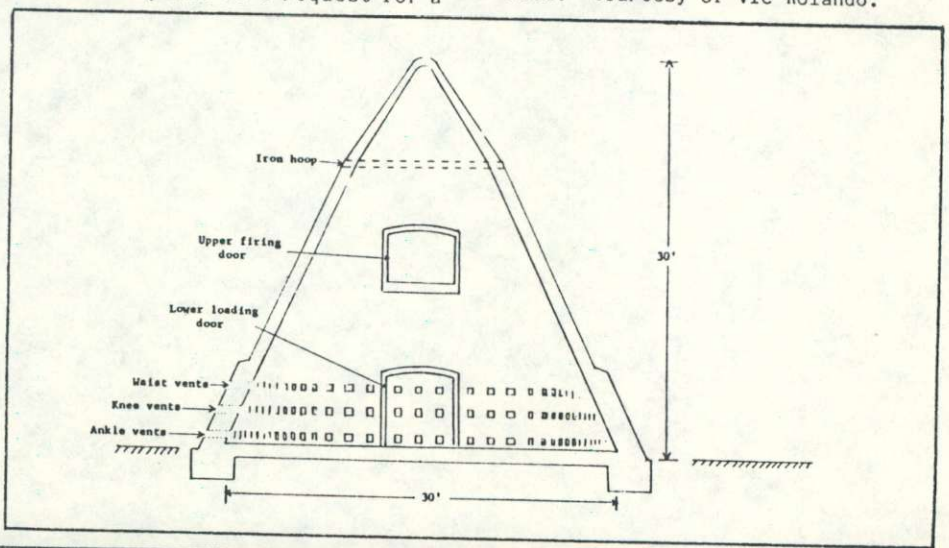
Design features of conical style charcoal kiln, typical of those located at Readsboro, Vermont. Although of smaller capacity than the circular kilns, they yielded more bushels of charcoal per cord of wood. Courtesy of Vic Rolando.



other kiln ruins were also found in the area. All four were located within a few hundred feet of the town's main north-south highway and in the midst of heavy forest. Three of them (including the stone-wall kiln) appear on an 1869 map, but no further specific documentation has been found on them. The fourth ruin, the conical kiln, was located close to the end of what have now become routine all-day bushwacking exercises in circular patterns about the proximity of already-located sites.

The stone-wall kiln ruin presents more questions than answers. Most puzzling is the lack of evidence for what construction material made up the roof of the kiln. The wall is generally 2 1/2 feet thick and 2 to 3 feet high.

One low, wide gap in the wall may have been the loading door area. The inside diameter is 32 feet, resulting in a 37% larger floor area than the common 28-foot diameter ruins found elsewhere in Vermont. Because the kiln was built into an approximately 15-foot high embankment to facilitate loading cordwood through an upper door, the kiln obviously had some structure above the existing wall; but nothing of this upper structure remains. Test holes inside and outside the kiln failed to expose anything more than a few small pieces of stone and brick chips. If the kiln's upper stone structure had been cannibalized, why was the existing stone wall spared and left the same height all around? If it had been stripped for its bricks, why were so many good bricks so obviously left behind, still inserted in the wall's vent holes?

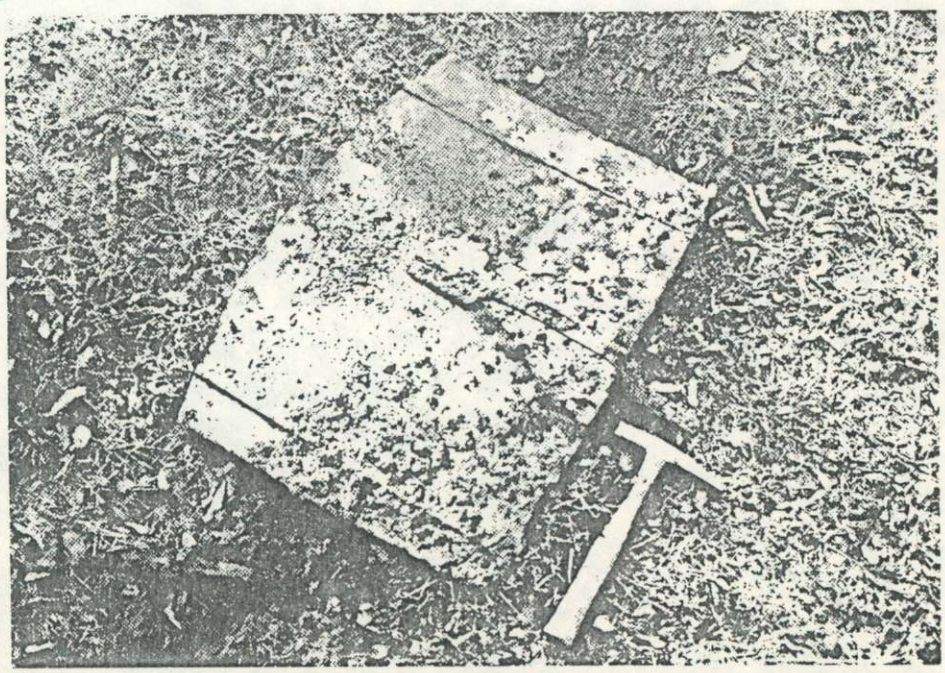
The only known stone-built charcoal kilns in this area are two conical-shaped kilns still standing in Dutchess County, New York, at Wassaic. These were inspected and found to be built of 2-inch thick stone slaps, their 3-foot thick walls rising upward and inward immediately from ground level. The Readsboro stone-wall kiln is made of 6 to 10 inch diameter/diagonal stones, and the wall rises vertically with no evidence of a conical configuration.

The remains of the confirmed conical charcoal kiln were located about a mile away from the stone-wall site, beneath a foot of scattered brick, dirt, and charcoal. A foot-wide section of wall was excavated to a depth of about 2 feet, exposing seven tiers of brick on a stone block foundation. One vent hole at the base is also in this section of wall. Each tier is mortared and set inward about 1/2 to 3/4 inch; stretchers line the outside face and headers the inside face, creating an approximate 1-foot thick wall. The inside diameter to the opposite side (also partially excavated and checked) is 30 1/2 feet.

While reinspecting the other two kiln ruins in the vicinity, Grace found an iron door at one ruin which matches ca. 1880 sketches of conical kiln doors. A limited excavation near the spot of the door find, through 2 feet of randomly scattered brick, exposed a section of circular-laid foundation stones and the burnt pitch floor of the kiln, but no intact section of wall was found.

Also during the summer of '83, the long-sought site of Nathanial Chipman's ca. 1790 forge/furnace in Tinmouth may have been found. This site has Ira Allen connections (Ira was Ethan's brother, a builder of many early forges in Vermont, and founder of UVM). Much heavy, black slag was found near the barest remains of a dam crib; and along the upper reaches of the Little Otter Creek in Ferrisburg (northeast of Vergennes), another elusive blast furnace site has been found. This may have been the forge bought out by the Monkton Iron Company in 1809 to make way for the construction of their main ironworks at Vergennes. This ironwork played a major part in the construction of MacDonough's fleet that went on to defeat the British at the Battle of Plattsburg in 1814.

Vic Rolando
Pittsfield, Massachusetts



A section of conical kiln loading door. Note curved top edge of door. Circular kilns had rectangular doors. This door was found in the vicinity of a suspected conical kiln in Readsboro, Vt. Courtesy of Vic Rolando.

February 6, 1984

RECEIVED FEB 8 1984

Dear Giovanna,

Just some quick words for you. I've been in communication with Rob Woolmington of Bennington again. Rob did some charcoal kiln articles for the Vermont Summer Magazine and also Yankee Magazine a few yaers ago, before removing to Boston where he recently earned his Law Degree. He's back at Bennington again. Anyway, in an article he sent to me, he describes some stone-constructed charcoal kilns at Stamford and Glastonbury. The ones at Stamford are those that Grace and I searched for unsuccessfully last summer; aparently we were practically atop them. I remember much foliage then. We'll return as soon as the snow melts to locate them. According to Rob's artical, the remains (in 1979) were about 6' tall walls. The remains at Glastonbury are in the Fayville area, and area an area Grace and I had already decided to search out. The interesting thing there is that Rob describes the kiln remains to be low stone walls with much brick remains in the middle, apparently stone walls but brick tops. This could be the answer to the stone wall kiln ruin we found this past summer at Readsboro, except there we found absolutely no brick in the center. Rob's photos of wall sections of the stone kilns in Stamford show bricks in the vent holes, exactly what we found in Readsboro. Should be an interesting summer coming up.

As part of the announcement for the upcomming Northern New England Chapter meeting/tour, I'm going to solicit volunteers to help us search and document charcoal kilns this coming summer. We need help, if we expect to accomplish all we want to do, plus get those Nat. Reg. nominations in!

I have a backlog of things to research at the VHS Library and also UVM so Grace and I might be up some weekday this month unexpectedly. Have to take the good days when we get them.

See you soon, macaroon...

Vic

Giovanna – For your interest.

Vic

for charcoal kiln file

October 25, 1983

Eric DeLony, Principal Architect
Historic American Engineering Record
National Park Service
10216 Lorraine Avenue
Silver Spring, MD 20901

Dear Eric:

Enclosed is what I hope to be an acceptable abstract for a paper I'd like to present at the SIA Boston meeting as part of the IA of the American Iron Industry. As you might remember, I have no IA crdentials other than my strong interest in reseraching and recording ironworks-related sites. By full time profession, I am a technical publications production editor at the General Electric Ordnance Dept here in Pittsfield, Mass.

As the abstract details, I have been involved in the charcoal-making aspect of the iron industry in Vermont the past two years. This involvement, although a weekend and vacation time activity, has been a serious one, resulting in the recording of the sites with the Vermont Division for Historic Preservation. And since most sites are within the Green Mountain National Forest, I have also been granted Volunteer status by the U.S. Forest Service, researching the sites under the informal supervision of the Forest Archeologist.

Thank you for your consideration.

Sincerely,

Vic

Vic Rolando
33 Howard Street
Pittsfield, MA 01201

c/ E.S. Rutsch

Nineteenth Century Charcoal Making in Vermont

By the Civil War period, the shortcomings of making charcoal by the ancient-old earthen covered mound process (i.e. pit kilns, or meilers) were becoming more evident. Experiments with kiln structures showed that not only were dirt, stones, and brands in the charcoal reduced, but the percent yield of bushels of charcoal per cord of reduced wood significantly increased. By the late 1860's, retangular brick-constructed kilns were replacing charcoal mounds through most of the central and southern states. And although some rectangular kilns were built in New England, the enduring design here were round, circular, and conical shaped kilns.

Field work in the Green Mountains of Vermont in 1982-83 has led to the location of nearly 100 charcoal kiln ruins. Kiln sites of from 1 to 8 ruins per site have yielded varying quantities of interpretative materials. These materials include cast iron vent hole linings, up to 30-foot diameter cast iron wall stabilizing hoops, top charging hole linings, covers, doors, and miscellaneous construction hardware. Those most remote yield the most identifiable materials; those near trails and highways yield little more than the barest traces of circular brick mounds, nearly invisible in thick underbrush.

Research is disclosing the economic characteristic of each kiln design, factors such as charcoal yield, cordwood charge, charging cycle, and species of cordwood reduced, plus proximity of kiln site to supply and market. By the turn of the century, Vermont charcoal was finding its way to blast furnaces in New York, Massachusetts, and Connecticut. Field and documentary work continues on this little documented sector of the American Iron Industry.

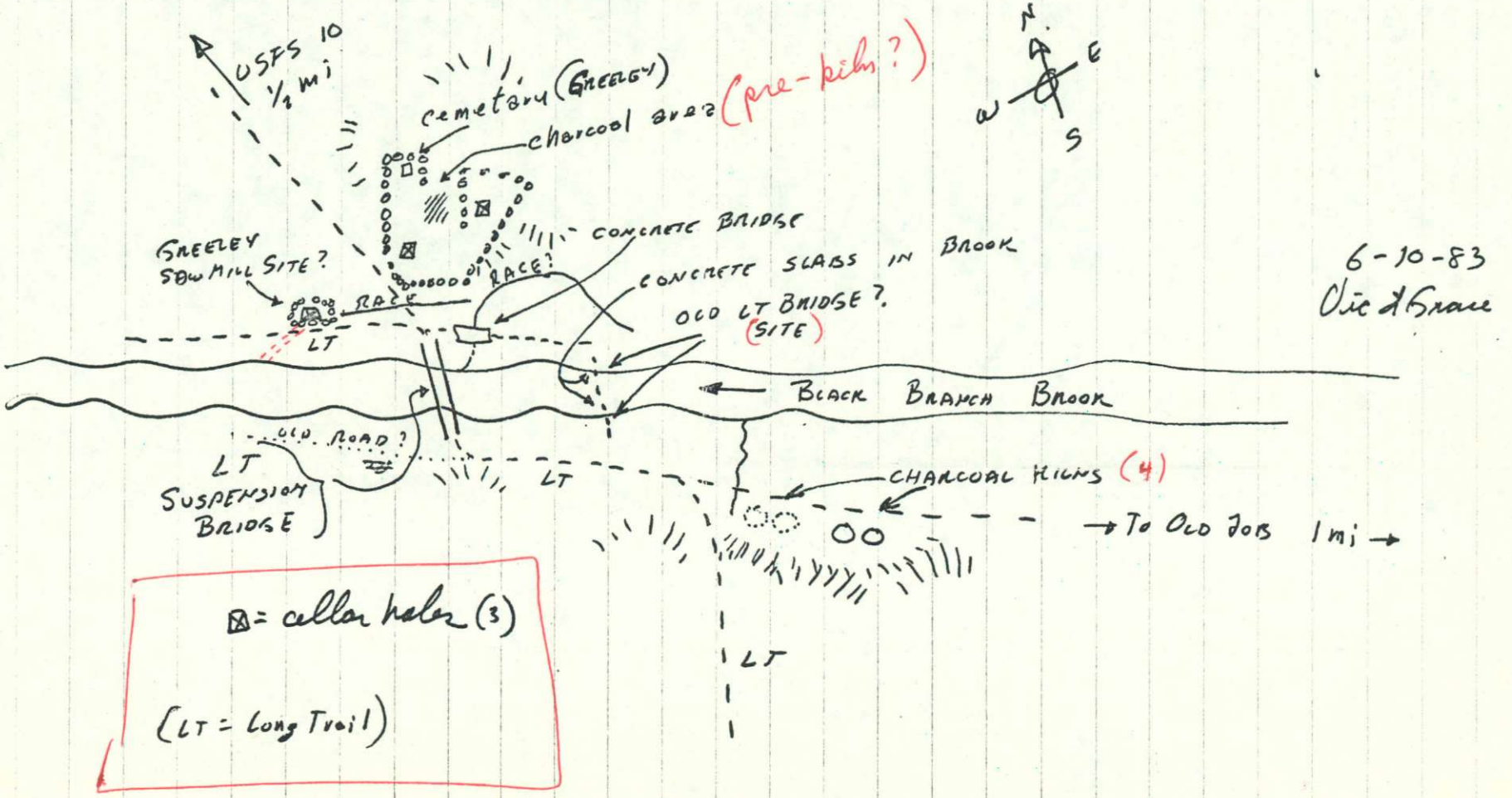
Vic

Victor R. Rolando
33 Howard Street
Pittsfield, Mass 01201

25 Oct 83

Geovanna - this is a very unofficial sketch I did of the "finds" at Greeley Mill - I spent to return to accurately measure & map on the next months

Vic 6/15



6-10-83
Vic & Grace

Charcoal kilns

June 15, 1983

Dear Giovanna,

In consequence of your query about the status of site survey forms for field work I did last summer, my records show the following:

Glastenbury	Red Cabin Site (5)	Vt-BE-37
	Casino Site(3)	No report submitted (need more detail)
	West Ravine Site (5)	- ditto -
Middlebury	Dragon Brook Site (?)	- ditto -
Ripton	Widow's Trail Site (3)	-ditto-
Winhall	Rootville (8)	-ditto-
	(unnamed) (4)	-ditto-
Mt Tabor	Summit Job (10)	Vt-RU-79
	Danby Station (4)	F.S. No. 19 (RU)
	Old Job (8) }	Vt-RU-78
	Four Kilns (4) }	
	Big Branck Job (7)	no report submitted
	Greeley (pre-kiln site?)	no report submitted

note: number in parens is no. of kilns at the site.

Sometime the next month or so I want to clean up all the above unreported sites. The Old Job and Four Kilns can be split into two seperate site nos; Four Kilns was previously reported as having two kiln ruins. Grace and I found barest foundation remains of two more at that site, about 150 feet west of the two good ruins. I have seen references to this being called 'Four Kilns'. These two faint ruins were those I wrote to you earlier; that Bob West had 'discovered' them the day of the SIA tour. When Grace and I went into the area on June 10th, we realized that he was talking of something we had already found last fall. But better double information than none at all. At Old Job, we finally located the eighth kiln ruin; just the bareest trace of a circle at the west end of the seven previously found. I have much data on the Big Branch Job, but there is more to be gleaned from the immed-iate vicinity before I can finish that one. The pre-kiln site at Greeley needs more extensive mapping, since there are some celler holes,a cemetery, much stone walls, inaddition to low mounds of charcoal. I dug down a foot without reaching bottom at one place. The charcoal 'mounds' are a ways uphill from the brook, and also a ways away from the road, so that I suspect it was made close to where it lays; in the midst of series of stone walls. The whole area of the former Greeley Saw Mill and succeeding charcoal kilns across the river is an interesting area, and Grace and I can't wait to get back into it again. As I get more and more into doing kiln work in the field, I learn what to do to avoid repeated hikes back to the same site, not that they aren't all that enjoyable but there are so very many, many places yet for us to visit.

I'm trying not to neglect my blast furnaces this summer also; there are things yet remaining to be checked out at Bristol, Beldens, Tinmouth, and Sheldon (where I am still trying to locate Alfred Keith's date of death). Etc,etc....

It's been in the 80's and 90's here in Pittsfield the past week. Two nights ago while laying in bed and sweating it out, I decided that this is the year to finally buy an air conditioner. No sooner had I made that decision that it suddenly occurred to me that I did in fact buy an air conditioner last summer, having forgotten all about it in the confusion of moving myself and Grace in

and Grace back out last year. I located it in the celler, toted the heavy thing to the bedroom, and slept in comfortable frigidity the rest of the night. And even as I type this to you near midnight, it's so cool in here; not the blast furnace it's outside. Anyway, time to finish off the rest of my glass of wine and get on to bed. We're moving Grace's daoughter to Canaan, NY this weekend; maybe I can extricate Grace out of her place next week too. I still feel funny about having to phone cross-town to make a date to see my wife. Ah... modern marriages (one of the editors at GE wishes his wife lived cross-town from him!).

Vic

6/13

Giovanna —

A quickie response to your most recently-written letter:-

① I do believe I have copies of all charcoal kiln site survey forms. I am, however, in the process of updating some of them & will get them to you soon.

② Don't worry about assigning a site number to anything until I get some good input to you. Grace & I are trying to tie up loose ends on what we believe we already know before going off to "discover" new kiln sites. It will take a few weeks yet, however, since we are renovating Grace's Mom's old house (Grace's Mom died mid-winter, last) for her daughter Lavene to move into; then Grace will move to 33 Howard St.

③ We (Bob, Grace & I) may have found two charcoal kiln sites on East Mtn at Manchester: 8 ruins at one site and 4 ruins at another, about a mile away. I believe Grace & I also found a pre-kiln charcoal making site this past Friday (6/10) at Mt. Talen, across the Black Branch from known kiln ruins. We also found a ca 1858 cemetery of 4 stones in the vicinity (not on topo or in local histories).

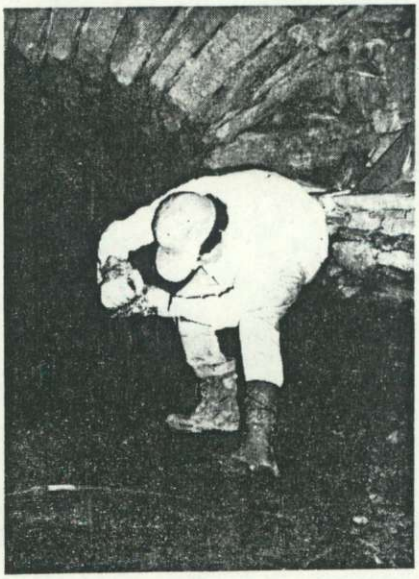
OVER

Every thing very hectic the past 2 weeks - much overtime at GE plus putting a new roof up on Grace's Mom's home in Canaan, N.Y. about 20 mins drive from Pittsfield. Please don't get concerned if nothing "official" seems to be forthcoming the next few weeks. We should be back to normal sometime a week or two into July.

Vic

P.S. - Thanks to Bob West, I'm coming into a good collection of duplicate of old charcoal making photos at Mt Tabor & Manchester. They seem to indicate what a lot of the cellar holes are.

From: SIA Newsletter, New England Chapters. 3 (1/2) 1982



The Excavation in the Wilkinson Mill Wheelpit, at the Mouth of the 1810 Tailrace. Courtesy of Patrick Malone.

site revealed only a single tailrace aperture in the riverwall (which had since been obliterated by a reconstruction of the riverwall). Equipped with this information on the termini of the tailrace, the archeological team plotted a probable route and excavated two exploratory trenches, one just inside the riverwall and the other to the north, at the possible junction of the 1810 and 1826 raceways. These excavations were greatly facilitated by the assistance of a backhoe operated by Bob Fernandes, whose services were generously donated by the Ferland Corporation of Pawtucket. In both trenches the archeologists encountered immense oblong slabs of granite, laid horizontally over a cavity or cavities, at a depth of approximately seven feet below the present grade. The belief that these slabs were the capstones covering the Wilkinson Mill tailrace was confirmed by their similarity to the capstones on the short section of the 1810 tailrace which had been excavated in 1975.

In an effort to obtain a clearer view of the tunnel and to clarify the transition from the two tailraces to the one, the archeologists called on Bob Fernandes to dig a third trench along the projected route of the tunnel from the 1975 excavation to the northern trench of the current dig. After the backhoe excavation and a considerable amount of shovelling and trowelling through 20th century fill, it became clear that this intermediate section of the raceway was no longer intact but had been removed when the Great Flume extension to Sargent's Trench was built across its path some time after the sale of the Wilkinson Mill's water wheel in 1829. It also became apparent that the tailraces to the north of this section had been filled in to prevent floodwaters from entering the Mill, while the remainder of the tailrace to the south had been converted into a spillway that carried off overflow from the flume. Through the opening made in the tailrace for this spillway it was possible to gain an interior view of the tunnel and the mode of construction. The rectangular passage was approximately five feet wide and four feet deep, with dry laid rubblestone sidewalls supporting the granite capstones. This simple but massive style of masonry is identical to that of the 1810 tailrace segment to the north, and it seems likely that the underground tailrace also dates from 1810. It seems apparent that the 1826 tailrace must have fed into this tunnel, but the exact way in which it did remains unknown.

The archeologists also took this opportunity to study the Great Flume extension, which, as part of the Sargent's Trench power canal, has had an important though physically obscure role in Pawtucket's industrial history. This waterway was essentially a wooden trunk, fifteen feet wide, with low masonry sidewalls. While this portion of the power canal was in operation by the late 18th century, it was undoubtedly rebuilt. Most likely this particular structure was the product of a late 19th century rebuilding, perhaps after the destructive freshet of 1886.

Using the data gleaned from the excavations, Charles Parrott, architect for the restoration project, produced the final design for the exterior waterways. MF Construction of Portsmouth, R.I. did the masonry work, and Joseph Pulawski and Sons of Pawtucket restored the exterior carpentry, including the gates and rack for the headrace. In addition to monitoring the construction work, the archeologists, who were frequently assisted by volunteers from Brown University, completed the excavation of the 1810 tailrace as it passes under the south wall of the Wilkinson Mill (see photo).

Rick Greenwood
Brown University

VERMONT

Charcoal Kilns:

From May to November 1982, Vic Rolando (SIA) and Grace Germanowski hiked the Green Mountains for charcoal kiln remains, resulting in the location of over 50 ruins at dozens of sites. The purpose of this survey was to locate, describe, and document the remains in the context of accepted charcoal kiln design in Vermont to support ongoing research of the ironmaking industry of the state. Sites were located through research of town and county histories, old maps, and oral information, followed by much exploratory back road driving and backpacking hikes into suspected areas.

Most ruins were found only a few feet off existing trails and old logging roads, but during high-grass summer months, detection proved the most difficult. Camping during July at

Mount Tabor, for instance, we discovered our tent had been pitched the day before straddling a kiln foundation.

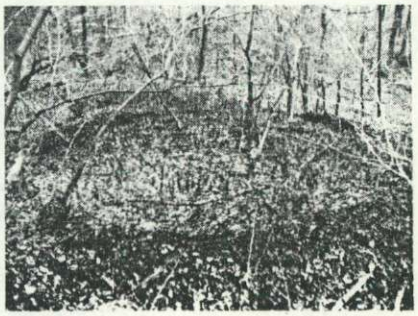
In order to expedite access to data and sites in the Green Mountain National Forest (where most sites were found to be), "volunteer" status was applied for and granted by the Forest Service, and we were assigned to work independently under the informal direction of the Forest Archeologist, Billee Hoornbeek. Field reports were filed with Hoornbeek and also with Vermont State Archeologist Giovanna Peebles.

In an 1880 publication of the AIME, Thomas Egleston described the charcoal kilns of the 1870s as generally being 25 to 30 feet in diameter at the base, 20 to 25 feet high, and designed for 25 to 45 cords of wood. An efficient kiln could yield 50 bushels of charcoal per cord. Most kilns were built into hillsides so as to facilitate loading through a top hole. Others had scaffolding and ramps to the top, while some used only bottom doors. About 300 brick-size vent holes in 3 rows of 100 vents each circled the base of the kiln, venting being controlled by insertion or removal of a brick in the vent hole. Some vents were lined with cast iron. Walls were a nominal 12 inches thick, and it took up to 40,000 bricks to construct each kiln, depending upon whether they were round, circular, or conical in design. Various iron parts included 6- by 6-foot doors, stabilizing rods and bands that looped the outside wall of the kiln, and 5-foot diameter heavy cast iron rings around the top hole to protect the brick lining there from attack by acid in the exhaust smoke.

Remains were found at Mount Tabor (29 kilns at 5 sites), Woodford (13 kilns at 3 sites), Winhall (4 kilns at 1 site), and Ripton (with the assistance of Forest Ranger Dick DeBonis: 6 kilns at 2 sites). Other towns checked with negative (but not yet final) results to date include sites in Peru, Stamford, Readsboro, Glastenbury, and Landgrove, plus unsuccessful searches for additional sites in Mount Tabor, Winhall and Woodford. These finds far exceeded our early 1982 expectations at finding anything at all but now reflect what is estimated as only the "tip of the iceberg" of what is yet to be located in 1983 and 1984. At this writing, about 150 more kilns in dozens of places await field checking. Additionally, a number of "charcoal pits" of the earthen-covered mound type (meillers), which preceded the brick-constructed kilns, await further research along the western slopes of the Green Mountains.

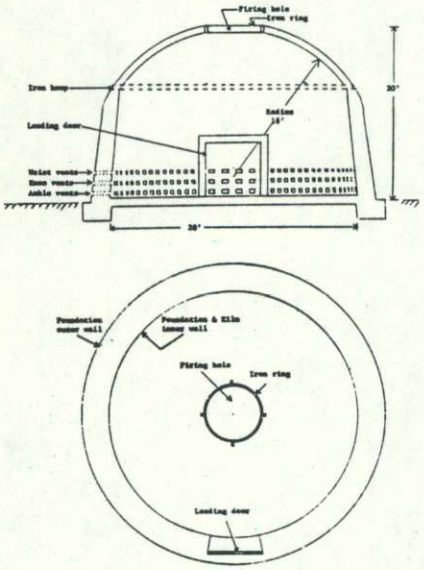
Not charcoal kiln tenders, these, but vacationers from nearby camps up Bolles Brook in northern Woodford, VT (probably ca. 1910, after the kilns had been abandoned). Note vent holes at lower right, kiln loading door at left, and iron band around kiln at middle. Doors, bands, rods, etc. were found at this site, which also had three other kiln remains. Courtesy of Vic Rolando.

In spite of all the advance study of histories and maps plus verbal advice of "where the kilns are," it took many fruitless hikes that could have been frustrating except for the enjoyment of exploring the Green Mountains. Eventually we developed an eye for what the signs were and how to use the terrain to our advantage. The first day we found a kiln we found 9 ruins. The next hike 11 ruins; next 13; and there the interesting progression stopped. But the finds did not.



One of four typical charcoal kiln remains at a site in northern Winhall, VT. This photo, taken in late fall, 1982, is in sharp contrast to what little can be seen in summer, when leaves and ground vegetation obscure the site. Note the Long Trail passes immediately by at upper right. Courtesy of Vic Rolando.

Physical remains of the kilns are meager in contrast to the kilns' operational dimensions. No standing kilns have yet been found, and none are expected to be found. At best, the remains are 28 to 30 feet in diameter, with 3- to 4-foot high brick walls. Most kilns have collapsed of their own neglect; and some were dynamited in the 1930s as safety hazards in the process of laying out hiking trails in the vicinity. Much brick is missing from many of the sites, and some were used as nearby trail and road base fill. Most iron remains were collected during the 1940s for World War II scrap iron drives. But sufficient evidence remains at the more remote sites to determine kiln dimensions, vent spacings and lining (if any), size of stabilizing rods and bands, disposition of individual kilns at a site (7 in a row lie in dense underbrush at a site in Mount



Circular charcoal kilns are the most common type found in Vermont, built with battered brick walls and iron stabilizing hoops. This battered wall design was more stable than the straight wall kiln and permitted the construction of a slightly larger capacity kiln. Courtesy of Vic Rolando.

Tabor), and wall and foundation design, etc.

A limited excavation of facing sides of a 3-foot section of kiln wall was made at Mount Tabor. Vent holes that are normally a few inches above ground level ("ankle vents") were found over a foot beneath the debris of collapsed brick. Additionally, brick-laying patterns and foundation material and design were determined. Much supporting material and data were also located in the immediate area of some sites, such as cellar holes of tenant houses and sawmills, dams, railroad sidings, sections of small gauge track, numerous ax heads, kiln doors, cast iron vent linings, chunks of charcoal and burnt pitch, miscellaneous rods, straps, U-bolts, rivets, etc., and domestic debris. Some sites near much traveled trails (e.g., the "Long Trail") show evidence of potholing.

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Vic Rolando
Pittsfield, Massachusetts

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article on Vt. charcoal kilns starts PS. 12

Society for Industrial Archeology · New England Chapters

Volume 3 Numbers 1/2 1982

Site Plan of the Larkin-Morrill Snuff Mill in Byfield, Massachusetts. This site was recorded by SNEC-SIA members on October 24, 1981. See "Larkin-Morrill Snuff Mill ..." on page 2. Courtesy of Patrick Malone and Ronald Laffley.

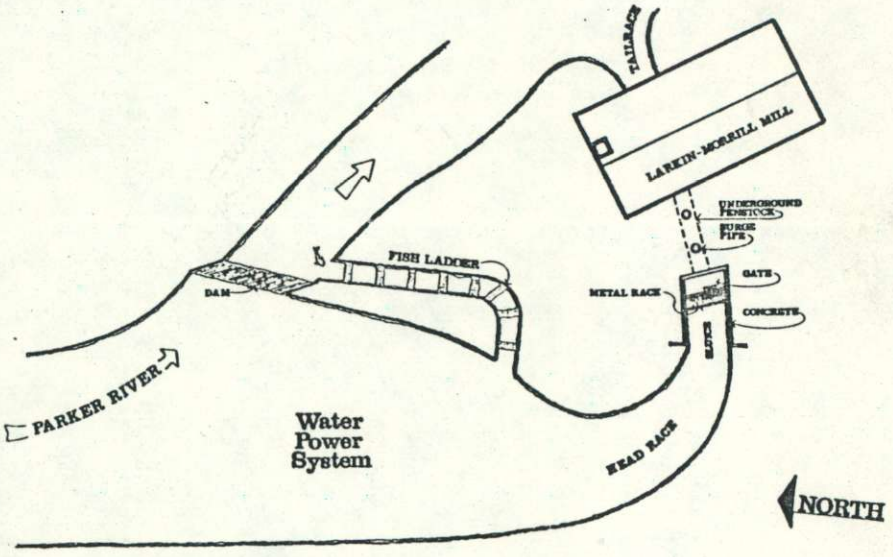
EDITORIAL

This double issue of the Newsletter for 1982 reflects a trend toward longer submissions that present more substantive research results than in the past. Among these are a report (Betsy Woodman) on the SNEC-SIA recording project at the Larkin-Morrill Snuff Mill in Byfield, Massachusetts, an article on the iron and steel industry in New England (Robert Gordon), and a survey of charcoal kilns in Vermont (Vic Rolando).

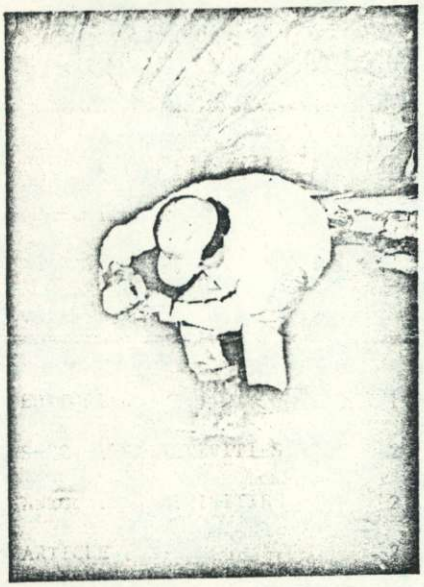
In order to save space, the "SECRETARY'S REPORT" and "PRESIDENT'S REPORT" for each SIA Chapter are not included here, and they have been replaced by a short listing of each Chapter's primary 1982 activities.

The late appearance of this issue is completely the fault of the Editor, and I wish to offer my apologies for its tardiness. I moved to a new position in Troy, New York during the latter part of the year, and my schedule has yet to return to normal!

David Starbuck
Rensselaer Polytechnic Institute



SITE PLAN
not to scale —



The Excavation in the Wilkinson Mill Wheelpit, at the Mouth of the 1810 Tailrace. Courtesy of Patrick Malone.

site revealed only a single tailrace aperture in the riverwall (which had since been obliterated by a reconstruction of the riverwall). Equipped with this information on the termini of the tailrace, the archeological team plotted a probable route and excavated two exploratory trenches, one just inside the riverwall and the other to the north, at the possible junction of the 1810 and 1826 raceways. These excavations were greatly facilitated by the assistance of a backhoe operated by Bob Fernandes, whose services were generously donated by the Ferland Corporation of Pawtucket. In both trenches the archeologists encountered immense oblong slabs of granite, laid horizontally over a cavity or cavities, at a depth of approximately seven feet below the present grade. The belief that these slabs were the capstones covering the Wilkinson Mill tailrace was confirmed by their similarity to the capstones on the short section of the 1810 tailrace which had been excavated in 1975.

In an effort to obtain a clearer view of the tunnel and to clarify the transition from the two tailraces to the one, the archeologists called on Bob Fernandes to dig a third trench along the projected route of the tunnel from the 1975 excavation to the northern trench of the current dig. After the backhoe excavation and a considerable amount of shovelling and trowelling through 20th century fill, it became clear that this intermediate section of the raceway was nq longer intact but had been removed when the Great Flume extension to Sargent's Trench was built across its path some time after the sale of the Wilkinson Mill's water wheel in 1829. It also became apparent that the tailraces to the north of this section had been filled in to prevent floodwaters from entering the Mill, while the remainder of the tailrace to the south had been converted into a spillway that carried off overflow from the flume. Through the opening made in the tailrace for this spillway it was possible to gain an interior view of the tunnel and the mode of construction. The rectangular passage was approximately five feet wide and four feet deep, with dry laid rubblestone sidewalls supporting the granite capstones. This simple but massive style of masonry is identical to that of the 1810 tailrace segment to the north, and it seems likely that the underground tailrace also dates from 1810. It seems apparent that the 1826 tailrace must have fed into this tunnel, but the exact way in which it did remains unknown.

The archeologists also took this opportunity to study the Great Flume extension, which, as part of the Sargent's Trench power canal, has had an important though physically obscure role in Pawtucket's industrial history. This waterway was essentially a wooden trunk, fifteen feet wide, with low masonry sidewalls. While this portion of the power canal was in operation by the late 18th century, it was undoubtedly rebuilt. Most likely this particular structure was the product of a late 19th century rebuilding, perhaps after the destructive freshet of 1886.

Using the data gleaned from the excavations, Charles Parrott, architect for the restoration project, produced the final design for the exterior waterways. MF Construction of Portsmouth, R.I. did the masonry work, and Joseph Pulawski and Sons of Pawtucket restored the exterior carpentry, including the gates and rack for the headrace. In addition to monitoring the construction work, the archeologists, who were frequently assisted by volunteers from Brown University, completed the excavation of the 1810 tailrace as it passes under the south wall of the Wilkinson Mill (see photo).

Rick Greenwood
Brown University

VERMONT

Charcoal Kilns:

From May to November 1982, Vic Rolando (SIA) and Grace Germanowski hiked the Green Mountains for charcoal kiln remains, resulting in the location of over 50 ruins at dozens of sites. The purpose of this survey was to locate, describe, and document the remains in the context of accepted charcoal kiln design in Vermont to support ongoing research of the ironmaking industry of the state. Sites were located through research of town and county histories, old maps, and oral information, followed by much exploratory back road driving and backpacking hikes into suspected areas.

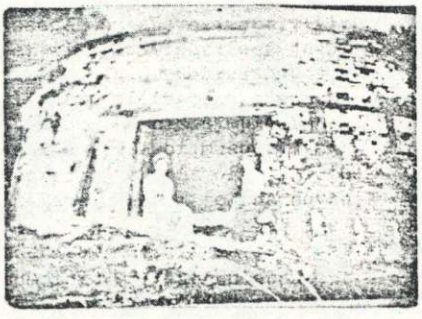
Most ruins were found only a few feet off existing trails and old logging roads, but during high-grass summer months, detection proved the most difficult. Camping during July at

Mount Tabor, for instance, we discovered our tent had been pitched the day before straddling a kiln foundation.

In order to expedite access to data and sites in the Green Mountain National Forest (where most sites were found to be), "volunteer" status was applied for and granted by the Forest Service, and we were assigned to work independently under the informal direction of the Forest Archeologist, Billee Hoornbeek. Field reports were filed with Hoornbeek and also with Vermont State Archeologist Giovanna Peebles.

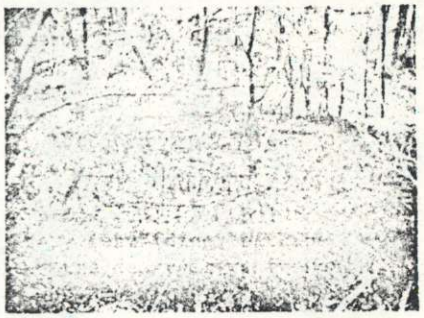
In an 1880 publication of the AIME, Thomas Egleston described the charcoal kilns of the 1870s as generally being 25 to 30 feet in diameter at the base, 20 to 25 feet high, and designed for 25 to 45 cords of wood. An efficient kiln could yield 50 bushels of charcoal per cord. Most kilns were built into hillsides so as to facilitate loading through a top hole. Others had scaffolding and ramps to the top, while some used only bottom doors. About 300 brick-size vent holes in 3 rows of 100 vents each circled the base of the kiln, venting being controlled by insertion or removal of a brick in the vent hole. Some vents were lined with cast iron. Walls were a nominal 12 inches thick, and it took up to 40,000 bricks to construct each kiln, depending upon whether they were round, circular, or conical in design. Various iron parts included 6- by 6-foot doors, stabilizing rods and bands that looped the outside wall of the kiln, and 5-foot diameter heavy cast iron rings around the top hole to protect the brick lining there from attack by acid in the exhaust smoke.

Remains were found at Mount Tabor (29 kilns at 5 sites), Woodford (13 kilns at 3 sites), Winhall (4 kilns at 1 site), and Ripton (with the assistance of Forest Ranger Dick DeBonis: 6 kilns at 2 sites). Other towns checked with negative (but not yet final) results to date include sites in Peru, Stamford, Readsboro, Glastenbury, and Landgrove, plus unsuccessful searches for additional sites in Mount Tabor, Winhall and Woodford. These finds far exceeded our early 1982 expectations at finding anything at all but now reflect what is estimated as only the "tip of the iceberg" of what is yet to be located in 1983 and 1984. At this writing, about 150 more kilns in dozens of places await field checking. Additionally, a number of "charcoal pits" of the earthen-covered mound type (meillers), which preceded the brick-constructed kilns, await further research along the western slopes of the Green Mountains.



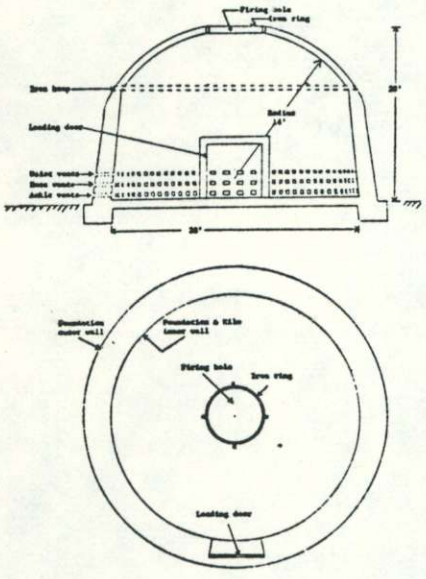
Not charcoal kiln tenders, these, but vacationers from nearby camps up Bolles Brook in northern Woodford, VT (probably ca. 1910, after the kilns had been abandoned). Note vent holes at lower right, kiln loading door at left, and iron band around kiln at middle. Doors, bands, rods, etc. were found at this site, which also had three other kiln remains. Courtesy of Vic Rolando.

In spite of all the advance study of histories and maps plus verbal advice of "where the kilns are," it took many fruitless hikes that could have been frustrating except for the enjoyment of exploring the Green Mountains. Eventually we developed an eye for what the signs were and how to use the terrain to our advantage. The first day we found a kiln we found 9 ruins. The next hike 11 ruins; next 13; and there the interesting progression stopped. But the finds did not.



One of four typical charcoal kiln remains at a site in northern Winhall, VT. This photo, taken in late fall, 1982, is in sharp contrast to what little can be seen in summer, when leaves and ground vegetation obscure the site. Note the Long Trail passes immediately by at upper right. Courtesy of Vic Rolando.

Physical remains of the kilns are meager in contrast to the kilns' operational dimensions. No standing kilns have yet been found, and none are expected to be found. At best, the remains are 28 to 30 feet in diameter, with 3- to 4-foot high brick walls. Most kilns have collapsed of their own neglect; and some were dynamited in the 1930s as safety hazards in the process of laying out hiking trails in the vicinity. Much brick is missing from many of the sites, and some were used as nearby trail and road base fill. Most iron remains were collected during the 1940s for World War II scrap iron drives. But sufficient evidence remains at the more remote sites to determine kiln dimensions, vent spacings and lining (if any), size of stabilizing rods and bands, disposition of individual kilns at a site (7 in a row lie in dense underbrush at a site in Mount



Circular charcoal kilns are the most common type found in Vermont, built with battered brick walls and iron stabilizing hoops. This battered wall design was more stable than the straight wall kiln and permitted the construction of a slightly larger capacity kiln. Courtesy of Vic Rolando.

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September 9, 1982

Dear Giovanna,

I've finally managed to get my desk here at work turned around after a week's vacation so that I have the time to get a long-over-due letter off to you. Grace and I stopped off at the DHP last week, as you know, and found out all the good news. I was hoping for a little girl for you. We both wish everything goes well for you and the growing family. It's good that you and David now have a common tie. Grace wished we could have a child, but with my operation many years ago..., and my feeling that I've raised three already; I've done my part to increase the population.

We started out the week by spending three days-two nights in Montreal. Grace hasn't ever been outside the country, so the experience excited her. She spent most of the driving time sitting next to me with a French-English dictionary, trying to keep up with the road signs. We visited St Joseph's on Mount Royal (which didn't Impress her-as it never did me beyond its sheer massiveness) and Notre Dame with its gold-painted woodwork (which we agreed was the highpoint of the visit). We also walked around Old Montreal, sipped expresso at a sidewalk cafe, did some window shopping, and 'toured' St Cathrine Street. We left early Tuesday morning, arriving at Chambly to visit a restored (in process) fort there, and on to UVM for some Xeroxing by noon. We lunched at the Waterman dining hall for a change of pace, and arrived at DHP just at the time your secretary called. I met Gina Campoli there, bought $140 in books at the VHS store (it took them a half hour to add it up with the same price twice in succession). We got back to Pittsfield late that night.

Thursday morning, we pitched camp at the Ten Kilns site at Mount Tabor (it just happens to be a convenient site to camp - access to other sites). We spent the next two days doing more 'search and discover' in the now-very high weeds. We found at least one and another probable kiln ruin at the Greeley Mills site (there are two prominent ruins there - I still suspect a total of six for that site). At Old Job, we tried to find an eigth ruin, but the weeds are too high. But we did some excavating around both sides (facing sides) of a section of wall of one kiln, and managed to expose the kiln foundation some eight brick courses down. In theprocess we now have a good idea of distance between vents, the locations of the lowest ring of vents, the style of brick courses, and the foundation details beneath the wall. There are also some interesting details pertaining to the courses directly about the row of brick vents. All good, new information now published anywhere that I know of. Before we proceed further with the excavating, I will get Billie Hoornbeck involved.

The work on 33 Howard Street just keeps Grace and I going and going and going! That I went from the 4th of July to Labor Day without visiting Vermont is indicative of how busy the weekends have been with household projects. It's not that Grace and I are trying to make a mansion out of it, but there are so many basic things that keep cropping up and coming to our attention. And I have yet to do some needed roof work, insulate the furnace and steam pipes in the cellar, and finish some frightiningly-extensive plimbing work in my son's front apartment. Grace 's magic is apparent throughout the house; she loves to paint and wallpaper, two things that only serve to frustrate me. I'mthe plumber-carpenter-electrician.

Yesterday, I got off a list of blast furnaces of New York and New England to Eric DeLony (HAER) for a 'world list' of blast furnaces being generated by someone in England. I understand that there wasn't too much response from New Jersey and Pennsylvania sources, but Vermont, at least, is well documented. Without NJ and PA, some future historian could interpret the list as indicating Vermont in the midst of the center of iron making in the USA! We have yet to get up to Beldens to make a determination of a furnace site there, or maybe Bristol. I have also yet to be able to reach Bob West to confirm what to do with everything next. The manuscript is all written. The editing was put off for three weeks the middle of August due to a massive overtime job both the editor of the manuscript and I were put onto. The text should be set by the end of September. The illustrative material is another thing, and may not be compiled for another two months or so. Grace and I have put

off searching out any more new kiln sites in favor of finishing reports on the ones I have found, and also completing the ironworks manuscript. I assume that all kiln reports still go to you at your office, not to your home.

I haven't heard of when the VAS Fall meeting is to be, but whenever, Grace is planning to accompany me. She has yet to miss a trip to Vermont with me (I wouldn't have it any other way). I haven't used any of the film you sent, but plan to do so later in the Fall after the foliage is thinned. I bought myself a wide-angle lens for the Minolta, something I've wanted for a long time. It should make shots in heavily-forested areas better. I haven't used it yet, but am looking forward to it. I plan to re-shoot all the furnace, forge, and kiln sites soon with the lens. It should improve the shots for your film also.

I guess that this is about all I have time for. The minute hand is getting up toward 1:00 pm, and the noon-people are streaming through the halls, so I must finish this up. Grace made a point of making sure I wrote that she wishes you all well, as I also, naturally do. And give a good wish to David and Joshie for me. Will we see you at the VAS meeting? I'll try to look up your father that weekend also.

Incidently, Allan Hitchcock, the owner of the Pittsford Furnace, hurt his back a few days before we were to meet at Pittsford and talk about the stack. At the time he was in the hospital, and his son phoned me. It isn't supposed to be terribly serious, but at advanced age, anything like that is serious, so I don't know what is to become of 'plans' for the stack. He may just be out of action for a long-enough time to lose interest and/or desire to do anything about the furnace. Too bad, for Allan especially. Too few furnace owners take interest in these things.

Gotta go.....

Vic

March 15, 1983

Dear Giovanna,

Good to get your letter yesterday and know that the reins are back again in capable hands. The transition will probably be tough for a long time. I can only imagine your feelings.

I phoned that day merely to welcome you back. I guess I miscalculated. I really didn't have anything new to report.

I have some new leads on charcoal kilns south of Bennington, somewhere east of South Brook. I ran into someone in Bennington a week ago whose brother used to lumber in that area; I've followed up his recommendation that I write to his brother. I've also learned of more kilns up near the old village of Fayville, in northwest Glastenbury. And Grace and I may have located the elusive Woodford blast furnace near the Bennington town line. Anchors for the US Navy during Jefferson's administration were supposed to be made there. Grace and I were out a week ago Friday. The 1983 season has already started. I'm also going to be checking out possible furnaces in Beldens Falls and Bristol this summer.

Grace and I are planning a weekend in Burlington the 26-27th March, for no other reason but to get out of Pittsfield for a while. I'll probably find a few things to do at the UVM library, but we plan mostly to goof-off, look at the falls at Winooski and Vergennes (should be good this time of year), take some slides and B&W's with the film you gave me. I got a new wide angle lens last fall, and it makes a vast difference in field of view. Except that I have been giving photos to Bob West for the manuscript, I have some dramatic photos, especially of the tunnel beside the falls at Vergennes. Two tunnels of about 200 feet total length through solid rock. I 'discovered' them last summer while wading in some high weeds looking for a 'rest area'. What a surprise I got at the bottom of that ravine. The tunnels were head race for ca 1850 forges.

We're also planning to attend the VAS Spring meeting, and a 3 or 4-day trip to Quebec City sometime mid-May. The enclosure you sent me about Bluff Furnace also had something about Les Forges Du Saint Maurice. These forges, I have always understood, predated the earliest US works at Saugus. I've never looked into them, but they appear somewhere between Montreal and Quebec, so maybe I'll drive by on the way back. Anyway, thank you for the Bluff Furnace info. I hadn't known about that and am going to order it. Should be interesting.

I've been getting involved into all manner of census data about the Vermont ironworks experience, so much so that I've abandoned trying to weave it into the mss. I am including some reference to it, but I'll continue it in some other manner. Maybe there'll be a Book II yet?

All else goes well. The pipes have stopped popping; the furnace didn't fail during the winter; I've rewired the house so I can isolate power to the apartment I'm renting out. I've been walking to work every day for over three weeks now, preparing for another hike to Rootville with Bob West next month (he's promised he knows where the kilns are this time). And Grace is straining at the bit for us to get up to Mt Tabor. Speaking of which, I received an order for some out-of-print USGS maps, ca 1890's. The quality was poor, but I do have new data on roads and sites in Mt Tabor now. Additionally, an order for more regular topo maps now brings me up to over 80% coverage of the entire state. I'm developing quite a library here in Pittsfield, of Vermont.

If Grace were here, she'd say Hi, so for her, "Hi!"

See you someday soon, macaroon...

Vic

Another dead-end.
(Somewhere in Mount Tabor; Summer 1982)

See: Ut - RU - 78
(Mt. Tabor charcoal
kilns).

Ut - BE - 37
(Glastenbury kilns)

Ut RU 79

CHARCOAL KILN FIE

July 9, 1982

c/ GP;DHP, Montpelier
JS;USNFS, Rutland

Billee M. Hoornbeek, Archcheologist
Green Mountain National Forest
PO Box 638, Laconia, NH 03246

Dear Billee:

Enclosed is a report on a ten-kiln site at Mount Tabor for your files. I have also mailed a copy to Giovanna.

Grace and I drove up to Middlebury last weekend, met with Dick, and visited the charcoal kiln sites at Worth Mtn., then near Ripton at the Parson Billings kilns, and finally north of East Middlebury at Dragon Brook. I noticed that when I got back, the Beers Atlas of Addison Cty shows more kilns south of Ripton village, so we'll make another trip up later to check these out.

We camped out July 3-4 alongside Ten Kilns Brook at Mount Tabor and finally managed to locate all the ten kiln ruins there. (Report and map enclosed).

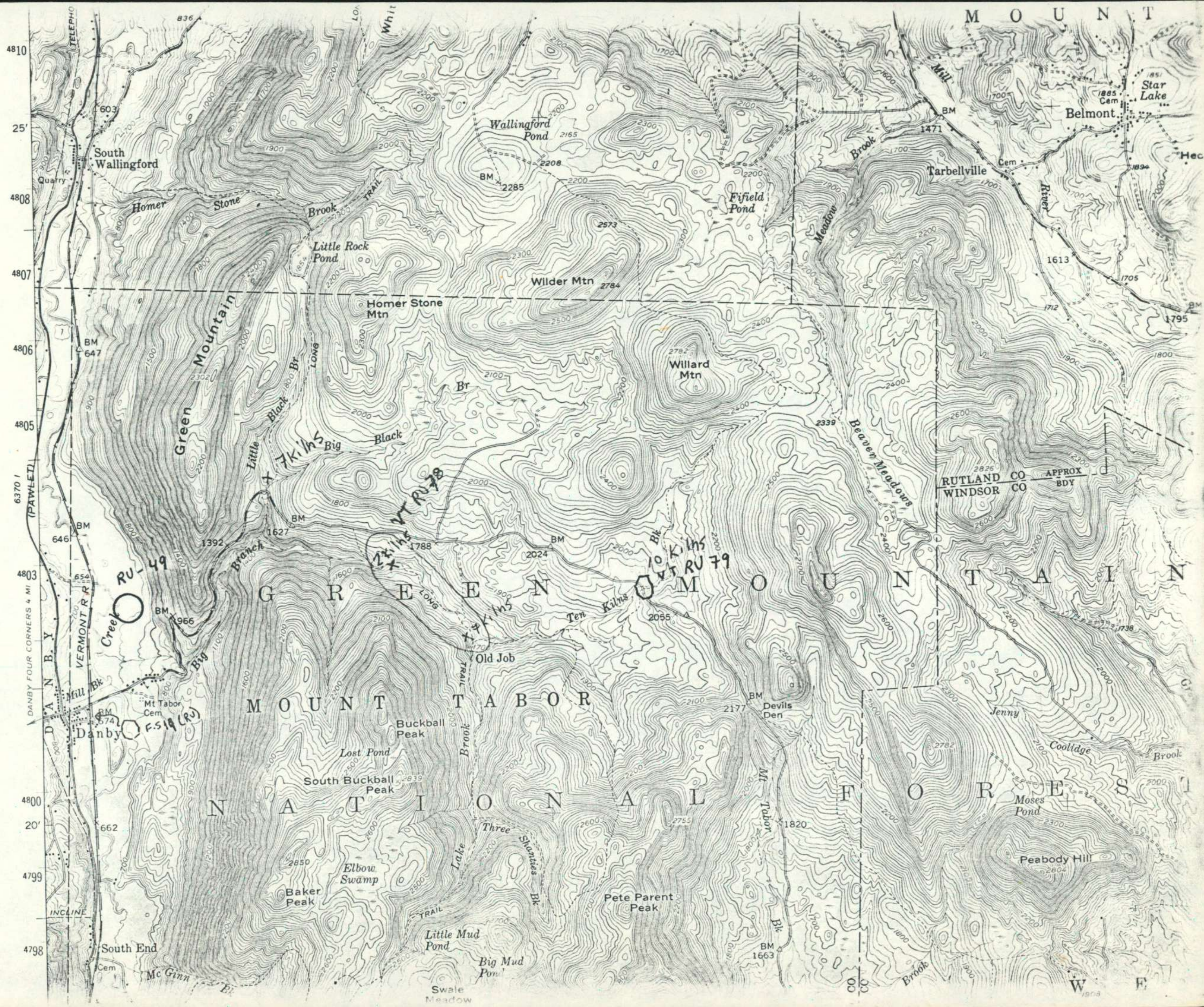
The following is an 'activity report' of time Grace and I have spent in the GMNF to date:

May 22	6½hrs	Peru/Winhall area (4 kilns - 1 site)
May 28	1½ "	Bristol, Forestdale
June 5	3 hrs	Mt Tabor, general observations from roads
June 6	6 "	" " , Greeley Mills (2 kiln ruins - 1 site) and Old Job (7 kiln ruins - 1 site)
June 10	3½ "	Mt Tabor, Big Black Branch (7 kiln ruins - 1 site), and Summit Job (4 ruins - 1 site)
June 18	4 "	Woodford, Glastonbury, search hike, no finds
June 20	8 "	Glastonbury (13 kiln ruins - 3 sites)
June 24	3 "	Mt Tabor, upper Ten Kilns Brook, no finds
July 3 } 28½ hrs		Middlebury/Ripton w/Dick DiBonis; camp overnight at Mount Tabor, Summit Job Site
July 4 }		Mt Tabor, located all 10 Summit Job kiln ruins Danby, located site of 4 kilns (no remains)

No activity is planned for the immediate next few weeks, but more potential sites remain at Stamford, Reddsboro, Woodford, Winhall, Peru, Dorset, Danby, Manshester, Ripton, etc. Hope to have all wound up before the snow flys. I'm in the midst of buying a house, and my daughter returns from a year of college in Italy. Time to get caught up on reports to you and Giovanna.

All best,

Vic Rolando

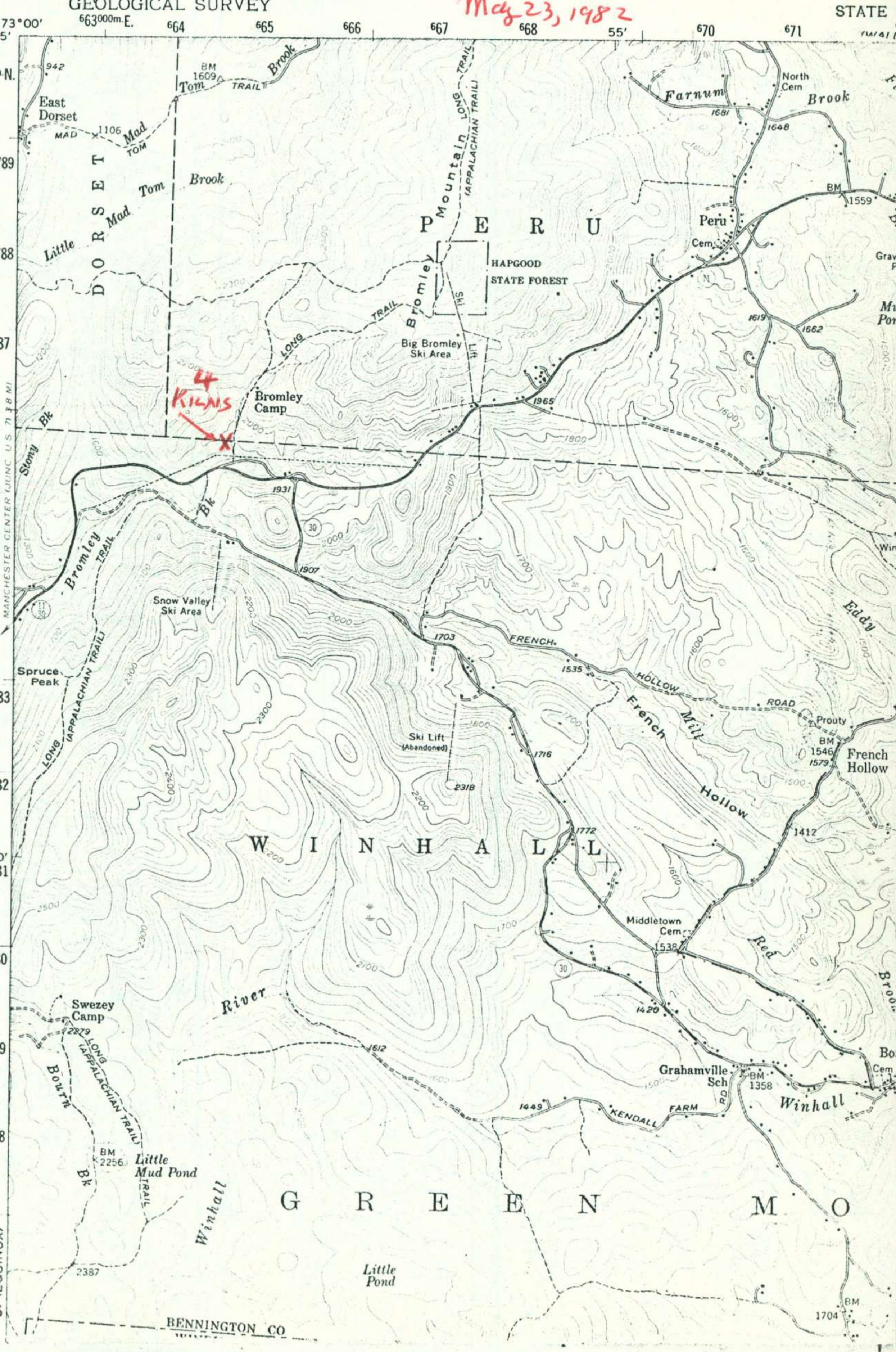


MOUNT
South Wallingford
Quarry
Wallingford Pond
Fifield Pond
Homer Stone Brook
TRAIL
Little Rock Pond
Wilder Mtn
2784
Homer Stone Mtn
Belmont
Star Lake
Tarbellville
Mill Brook
Meadow Brook
Mill River
Green Mountain
Little Black Br
Big Black Br
LONG
Willard Mtn
2782
Beaver Meadows
RUTLAND CO
WINDSOR CO
APPROX BDY
7 Kilns
VT RU 78
12 Kilns
10 Kilns
VT RU 79
4 Kilns
RU-49
F.S.19 (RU)
Big Branch
Ten Kilns Bk
G R E E N M O U N T A I N
N A T I O N A L F O R E S T
MOUNT TABOR
Old Job
Creek
Mill Bk
Mt Tabor Cem
Danby
VERMONT R R
(PAWLET)
DANBY FOUR CORNERS 4 MI
Buckball Peak
Lost Pond
South Buckball Peak
Devils Den
Jenny Coolidge Brook
Moses Pond
Peabody Hill
Elbow Swamp
Baker Peak
Lake Brook
Three Shanties Bk
Pete Parent Peak
Mt Tabor Bk
Little Mud Pond
Big Mud Pond
Swale Meadow
South End
INCLINE
Mc Ginn Bk
Cem
4810
25′
4808
4807
4806
4805
4803
4800
20′
4799
4798

LONDONDERRY, VT
15' QUAD
Vic Rolando & Grace Germanowski
May 23, 1982

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF
CHARLE
STATE C

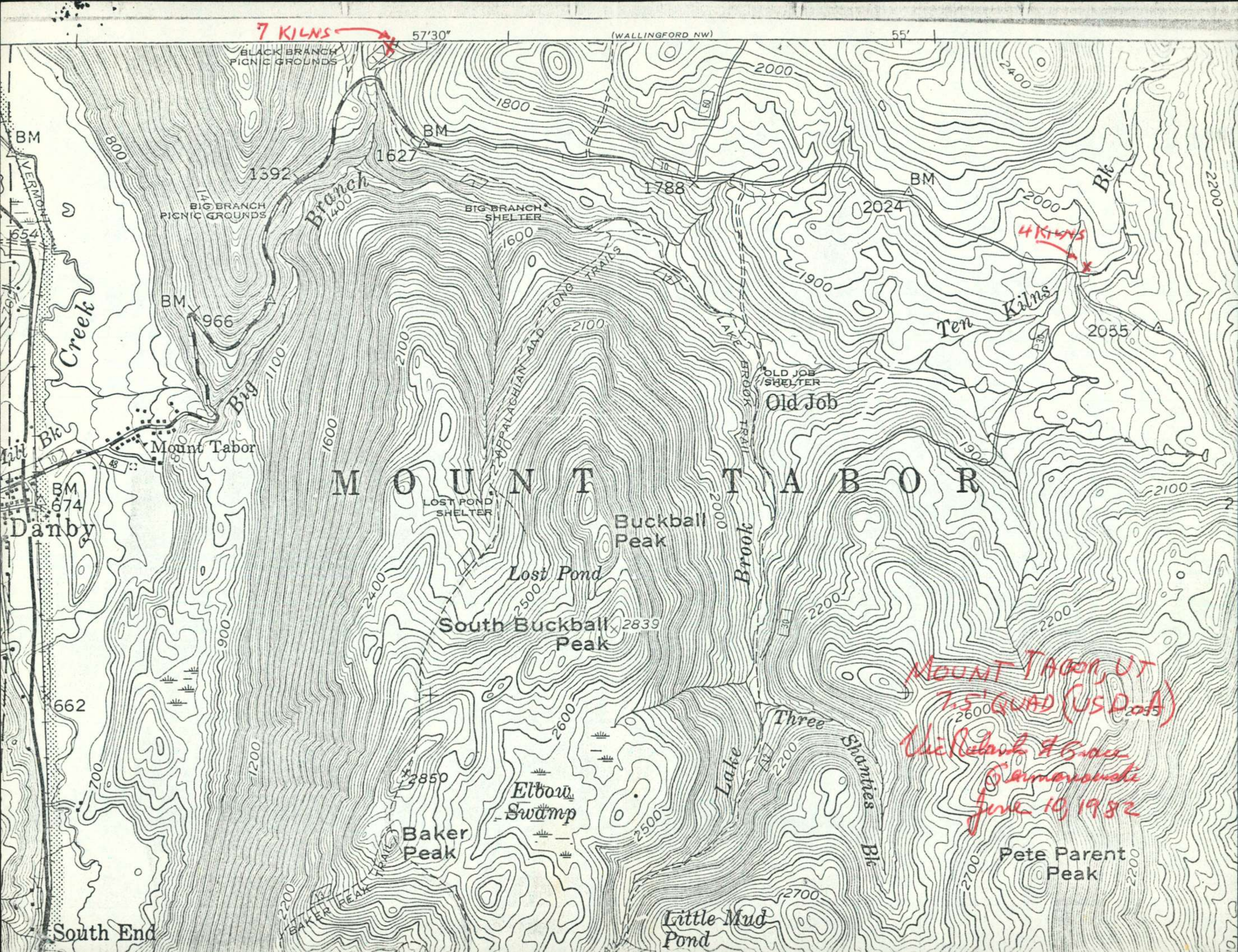


6370 I (PAWLET)
73°00'
43°15'
663000m.E.
664
665
666
667
668
55'
670
671
4790000m.N.
4789
4788
4787
4783
4782
10'
4781
4780
4779
4778
4776
East Dorset
MAD TOM
Mad Tom Brook
TRAIL
BM 1609
Little Mad Tom Brook
DORSET
PERU
Farnum
Brook
North Cem
Peru
Cem
BM 1559
Bromley Mountain
LONG TRAIL (APPALACHIAN TRAIL)
HAPGOOD STATE FOREST
Big Bromley Ski Area
Lift
Bromley Camp
4 KILNS
Stony Bk
Bromley Bk
Bromley TRAIL
Snow Valley Ski Area
MANCHESTER CENTER (JUNC U.S. 7) 3.8 MI
1965
1931
1907
1703
FRENCH HOLLOW ROAD
French Hollow
Mill
Eddy
Prouty
BM 1546
French Hollow
Spruce Peak
LONG (APPALACHIAN TRAIL)
Ski Lift (Abandoned)
2318
1716
1772
1412
WINHALL
Middletown Cem
1538
Red Brook
River
1612
1420
Swezey Camp
2279
Grahamville Sch
BM 1358
Winhall
1449
KENDALL FARM RD
Bourn Bk
BM 2256
Little Mud Pond
Winhall
GREEN MO
Little Pond
2387
6370 II (EQUINOX)
BENNINGTON CO
BM 1704

4 Ch Kilns →

Giovanna -

These are add'l to those found here on June 6. I believe there are yet more in the Old Job/ Ten Hilbers Brook area - and Danby village



7 KILNS
57'30"
(WALLINGFORD NW)
55'
BLACK BRANCH PICNIC GROUNDS
BIG BRANCH PICNIC GROUNDS
BIG BRANCH SHELTER
Big Branch
BM 1627
1392
1788
BM 2024
4 KILNS
Ten Kilns
2055
BM 966
Creek
VERMONT
Lill Bk
Mount Tabor
BM 674
Danby
APPALACHIAN AND LONG TRAILS
LAKE BROOK TRAIL
OLD JOB SHELTER
Old Job
MOUNT TABOR
LOST POND SHELTER
Buckball Peak
Lost Pond
Brook
South Buckball Peak
2839
662
2850
Elbow Swamp
Baker Peak
BAKER PEAK TRAIL
Lake
Three Shanties Bk
Little Mud Pond
Pete Parent Peak
South End
MOUNT TABOR, VT
7.5' QUAD (USDoA)
June 10, 1982

6/21/82

Giovanna —

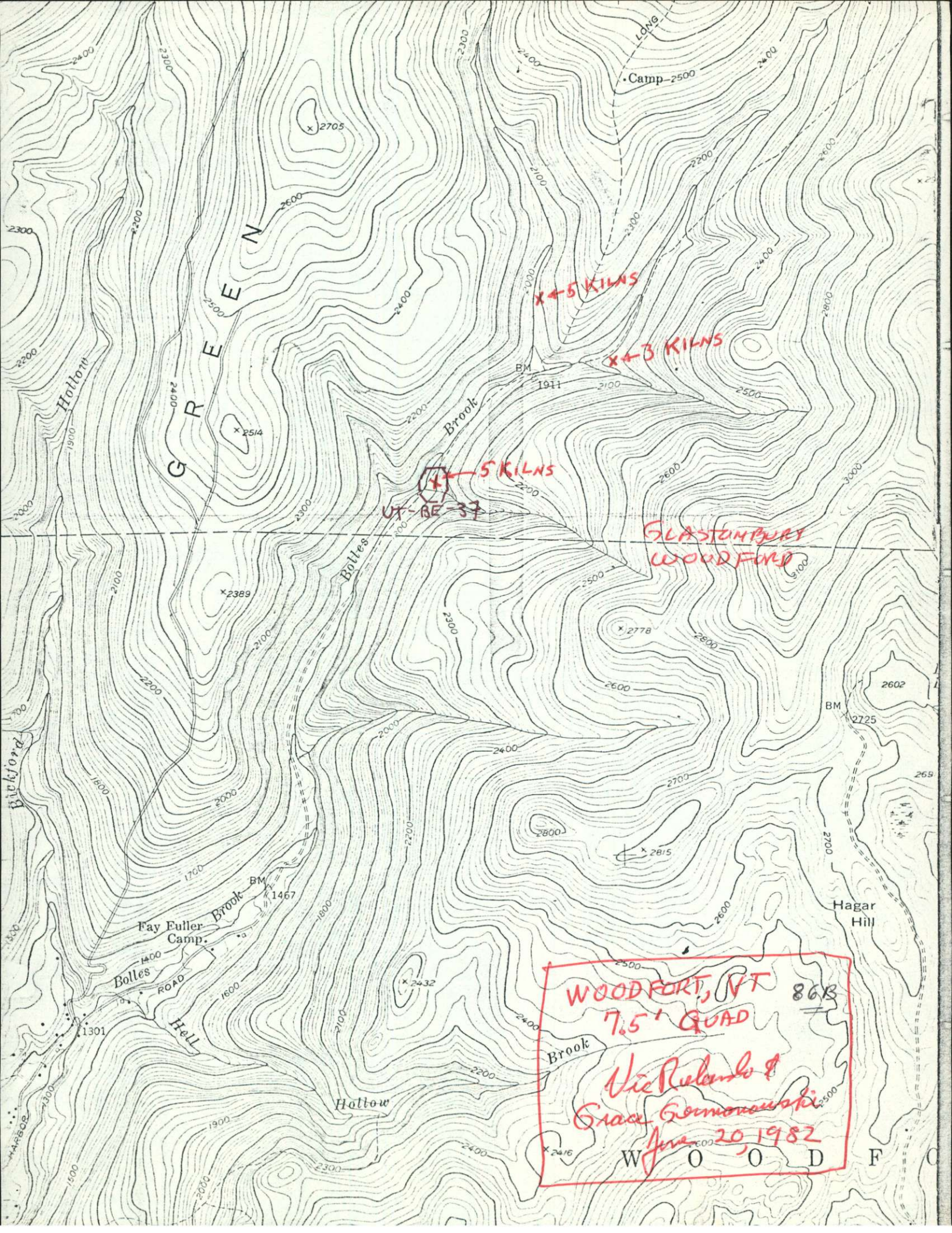
I'm gathering more detailed data on these & past reported sites. The upper Glastenbury sites are the richest in way of artifact remains I found anywhere. Grace is a real woods-woman & kiln hunter. We make a great pair of searchers & usually outdo each other trying to be the "first" to locate a site. She deserves lots of credit for my locating lots of these things.

I owe you a longer letter & lots of info on everything. Will do later.

Love to all

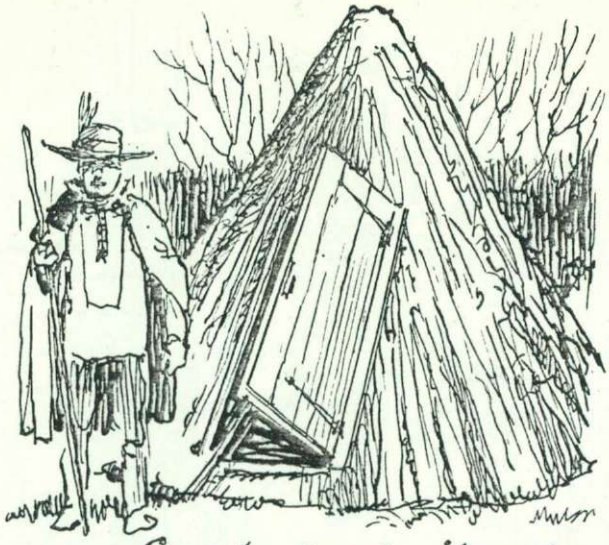
Vic

P.S. — I'm coordinating w/ Billee Hoornbeek on things in the G.M. Nat Forest.

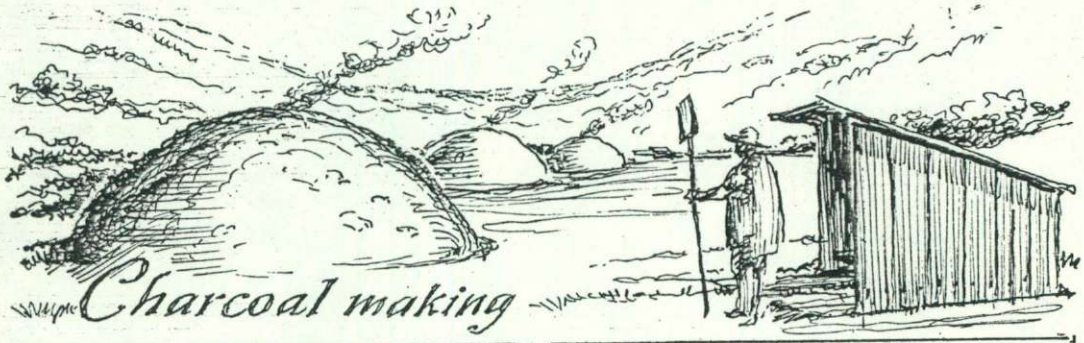


WOODFORT, VT
7.5' QUAD
86B

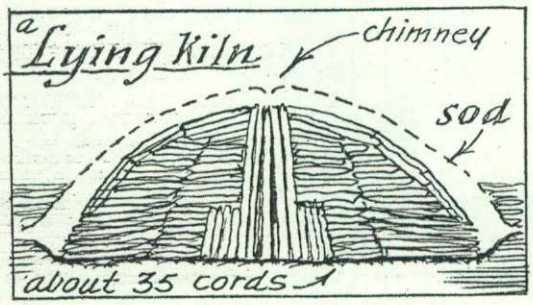
Vic Rolando &
Grace Gormonowski
June 20, 1982

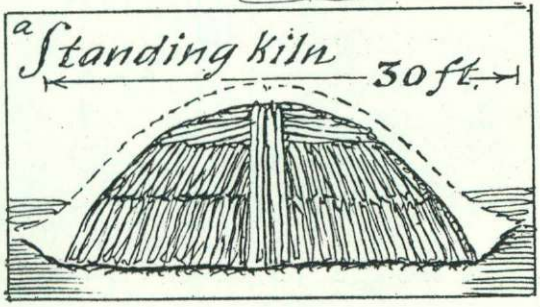


...in Sod-huts similar to their Charcoal Mounds



Charcoal making





Reference on Charcoal Kilns:

T. Egleston 1879/1880. "The Manufacture of Charcoal in Kilns". Transactions of the American Institute of Mining Engineers. Vol. 6, May 1879 – Feb. 1880. pp. 373 – 397.

For additional info on charcoal industry, see:

Vic Rolando 1980. Iron-making in Vermont: 1775-1890. Manuscript. On file State Arch's office, Vt. References. pp. 17-19 & footnotes 17 & 42.

HIGH SPOTS IN BRANDON'S HISTORY III
E.S. MARSH
1931

condition, except for the crack shown. There is no date on it, but it must have been made between 1830 and 1850. Charcoal, usually called coal, was the heat producer, and was brought down from Goshen and from that region in the east part of Brandon known as the "Basin." Here there was a settlement called New Philadelphia. East of there was for some years a township named Philadelphia, afterwards abolished and joined to Chittenden on the south and Goshen on the north. This gave its name to the settlement of the charcoal burners. No vestige of this hamlet survives, except some cellar holes. Tradition has it that besides the dwelling houses there was a store and a school house.

The long lines of charcoal wagons and ore teams delivering their products at a long shed which stood where the Smith block now stands, was one of the great sights of the town. There was a blast daily at 10 a. m. and 4 p. m., when the fanning of the flames could be heard all over the village. A favorite pastime of the young people of the time was to make up evening parties to witness the drawing of the melted ore. The sudden transition from darkness to blinding light, when the hissing, roaring, molten metal flowed into its channel of sand, was a fascinating and thrilling spectacle. Fifty hands were employed here.

Mr. Conant was a Baptist and a Mason, and strong in his support of both institutions. In later years, when opposition to Masonry became pronounced and the platform of a political party, his two sons wanted him to withdraw from Masonry; he replied that when he gave that up he would give up his Bible, which ended attempts in that direction. He built and occupied the house which is now the Episcopal rectory. This house with five others, three on each side of the street, were for years known as the Conant houses, five of them being occupied by his sons or daughters, the other by an inlaw. The street between these houses became known as Conant Square, which name is now applied to the street from the Episcopal church to the Douglas monument.

BRANDON
VERMONT

A History of the Town

DEDICATED
TO ITS CITIZENS

1761 - 1961

PUBLISHED BY
THE TOWN OF BRANDON
1961

The ore-bed teams brought their yellow loads to be weighed on the village scales before being dumped in the "top-house" for smelting. The ore had been washed by putting it into the upper end of a long box, perforated like a strainer and revolving in an inclined position while a stream of water passed through it. The ore rolled over and downwards, of course, falling from the lower extremity into a shallow vat. The blast furnace produced directly from this brown hematite a superior soft grey iron not liable to crack upon exposure to heat, and yielding, thus treated, fifty percent pure iron.

Charcoal was the heat-producer, and was brought down from Goshen, and from that region in the east part of Brandon known as the "Basin." Here there was a settlement called New Philadelphia, east of the farm of Fred Wyman, in the township of Philadelphia, afterwards abolished and joined to Chittenden and Goshen. This was a settlement of charcoal burners, who mingled little with their townsmen. Tradition has it that besides dwelling houses there was a store and school. Some of the old cellar holes may still be seen. The long lines of charcoal wagons and ore teams delivering their loads at a long shed which stood where the Wright Block now stands, was one of the sights of the town. There were blasts daily at 10 a.m. and 4 p.m., when the fanning of the flames could be heard all over the village. A favorite pastime of the young people of the time was to make up evening parties to witness the drawing of the melted ore.

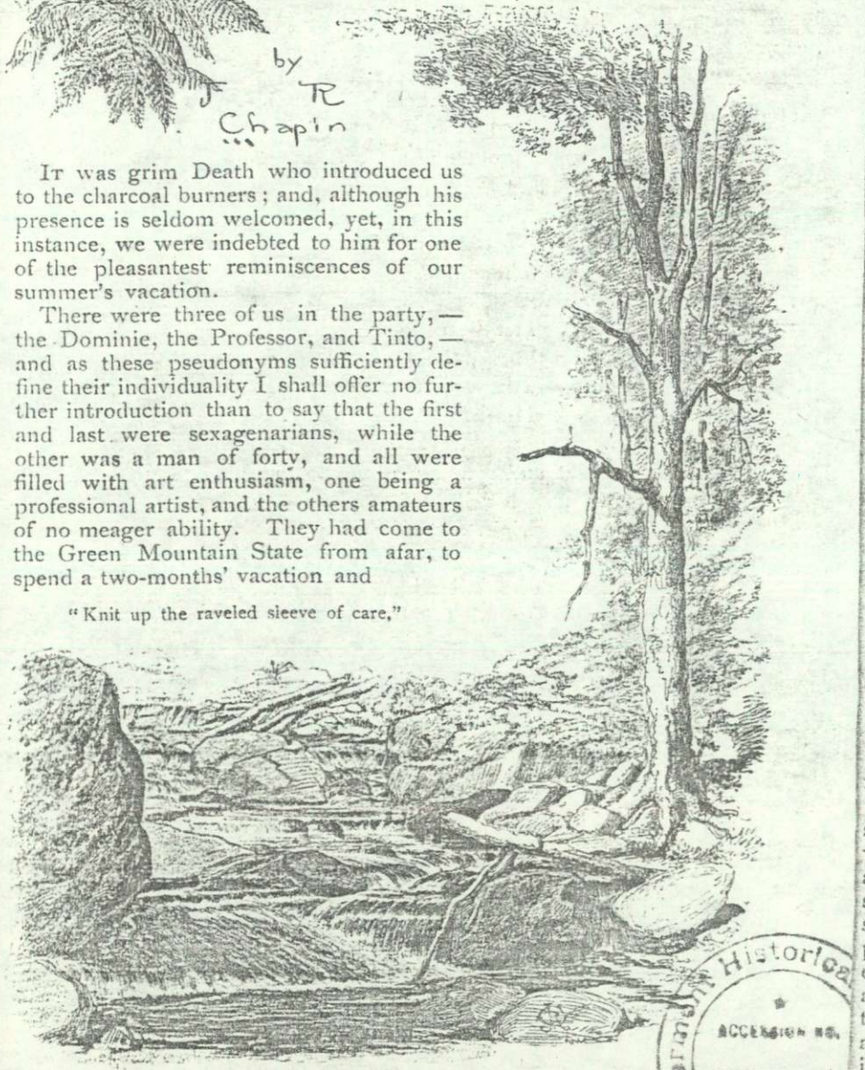
At this furnace was cast the old "Conant Stove"—the first cook stove to be made in the state, and a great invention for the time. Stoves with ovens, but not with boilers, etc., had been made to some extent. The state was being supplied with cooking stoves previous to 1819 by a firm in Troy, N. Y. which had their castings made in Philadelphia. The Conant stove and others that soon followed, took the place of the Troy pattern. The first Conant Stove was made in the Pittsford Iron Works, while work of erecting a blast furnace in Brandon was going on. It resulted in supplying a superior quantity of iron for stove making. Unlike most of the furnaces, the castings for stoves, potash kettles and almost every variety of iron castings were made directly from the brown hematite ore of the region. A footnote in Hemenway's Vermont Gazetteer, 1877, says of the Conant cook stove: "It was the wonder of the farmer's kitchen and sold in all the villages around, and abroad, 'till the more convenient 'rotary' came in for competition. It was the first stove we ever saw—our father bought one and brought it home as a surprise—and never was anything brought into the house that created such an interest. It was the inauguration of a new era in the culinary kingdom—the pleasant old fireplace with its swinging crane of well-filled pots and kettles; hearth-

Frm: Outing [magazine] Vol. VI, no. 1, April, 1885.

THE CHARCOAL BURNERS

OF THE GREEN MOUNTAINS.

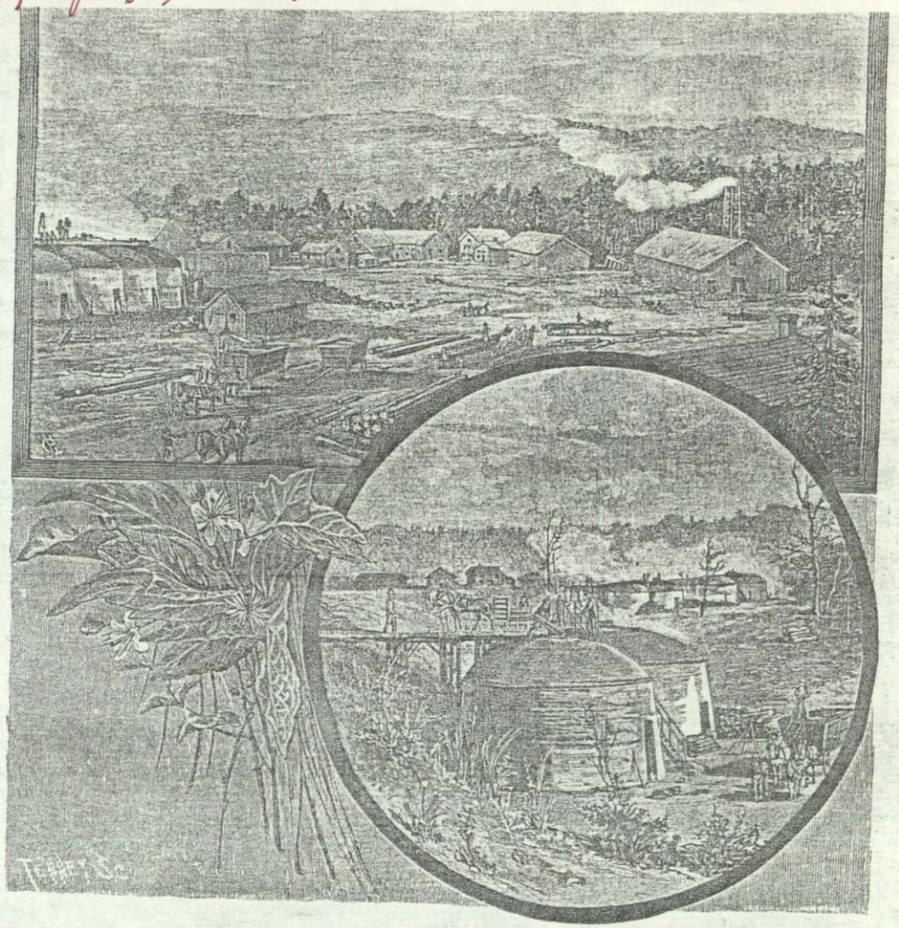
by J. R. Chapin



IT was grim Death who introduced us to the charcoal burners; and, although his presence is seldom welcomed, yet, in this instance, we were indebted to him for one of the pleasantest reminiscences of our summer's vacation.

There were three of us in the party,—the Dominie, the Professor, and Tinto,—and as these pseudonyms sufficiently define their individuality I shall offer no further introduction than to say that the first and last were sexagenarians, while the other was a man of forty, and all were filled with art enthusiasm, one being a professional artist, and the others amateurs of no meager ability. They had come to the Green Mountain State from afar, to spend a two-months' vacation and

"Knit up the raveled sleeve of care,"



THE BLACK BRANCH JOB.

by climbing its mountains, threading its valleys, following up its streams, and in filling their portfolios with sketches from nature in this artist's paradise.

This was the third year that the trio had spent their vacation in the mountains, and when they stepped off the train at "Danby and Mt. Tabor station," the charming scene around them was neither novel nor strange, and they knew just what to expect. It is always the unexpected, however, that happens; and, as they passed around the corner of the station on the way to their inn, they found the way barred by a group of men who were tenderly placing in a wagon an oblong pine box, evidently containing a coffin, with the intent to transfer it to one of the houses in the village.

Reverently raising their hats in the presence of that foe whom the bravest dread to meet, Tinto inquired of a looker-on the personality of the deceased, and was told that it was a man "named Eli Moore, a sawyer, who was killed yesterday at the *charcoal job on the mountain*, by a log rolling onto him."

"Was he killed instantly?"

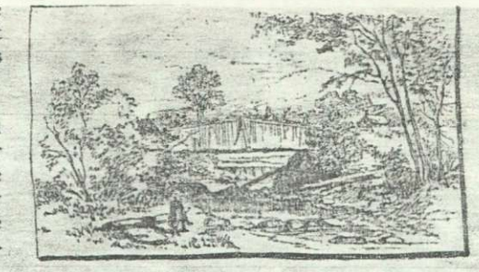
"Yes, as far as I know, he must ha' been. He had sent all his men off somewher' else, and, as he wanted a log for some purpose, he went out to the pile, and must have started it while standing in front of it, for when his wife went out

to look for and call him to dinner, she found him with a log some sixteen feet long and two foot through lying across his chest, and he stone dead. It must ha' crushed the life right out of him."

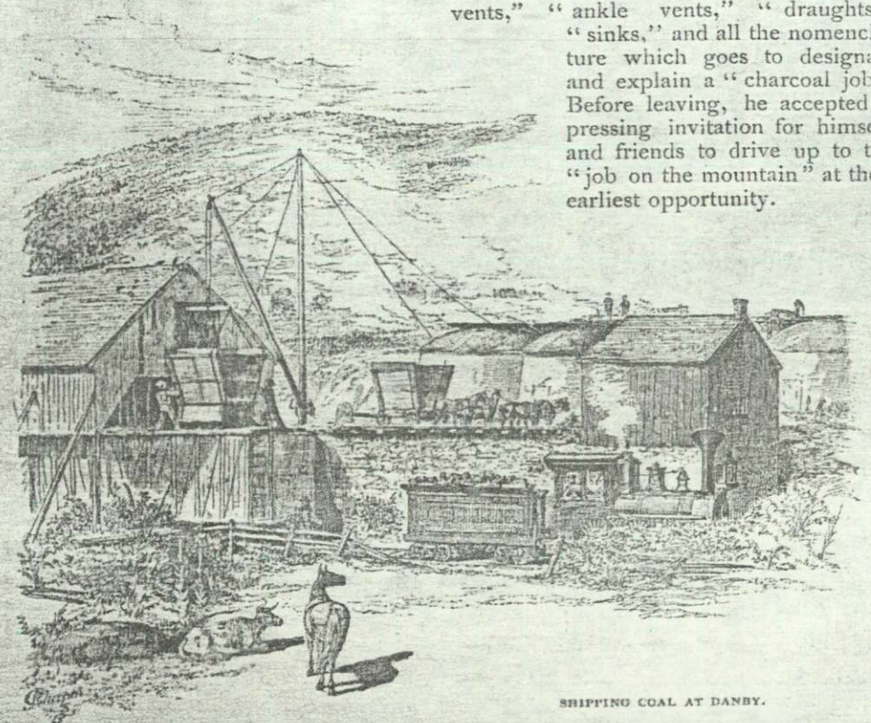
Waiting until the little procession moved on its way, our trio gathered up their *impedimenta* and followed the marble sidewalk to the village inn, where they proposed to stay for a few days as a base of operations in spying out the land thereabouts.

Little was said during the short walk; but through Tinto's sensorium that phrase "The charcoal job on the mountain" was ringing its changes, and he had not reached the inn before making up his mind to know more of its meaning and purpose.

The artist is nothing if not observant; and our friend Tinto, in addition to this usual trait, was possessed of a full measure of curiosity, added to a persistency of purpose that had often stood him in good stead; and after an early supper, while the Dominie and Professor took a stroll in another direction in pursuit of objects of



artistic interest, he followed the marble pathway back to the depot in search of some one who could post him on the "charcoal job." He was not long in finding the office of the institution, in close proximity to the station, and in introducing himself to Messrs. Griffith & McIntyre, the proprietors thereof, explaining to them his desire to know more of their processes and *modus operandi*. Four kilns, situated on a knoll just back of some sheds, which serve as a freight depot, afforded the opportunity, and in the course of half an hour the artist was deep in the mysteries of burning hard and soft wood in kilns, "knee vents," "waist vents," "ankle vents," "draughts," "sinks," and all the nomenclature which goes to designate and explain a "charcoal job." Before leaving, he accepted a pressing invitation for himself and friends to drive up to the "job on the mountain" at their earliest opportunity.



SHIPPING COAL AT DANBY.

called "the artist's paradise," remarked the Dominie, as Tinto rejoined his companions on the veranda of the tavern in the late twilight of the summer evening. "I know of no State in the Union, and no portion of any State, that presents such a diversity of charming scenery as this favored portion of the earth's surface. From the most expansive view over vast and continuous mountain ranges, to the close pastoral scene, and the multitudinous and charming 'bits' that surround us on every hand, this section is replete with pictures that would honor the easel of any painter."

"I wonder," said the Professor, "that these rich artistic placers have not been discovered and utilized long ago by the artists of New York, Boston, and nearer cities. They seem, however, to have been overlooked in the *furor* for the more *fashionable* White Mountains, Coast of Maine, Yellowstone, or the Rockies; and this favored land is given the go-by by artists, who continue to paint the old scenes *ad nauseam*, while directly in their pathway lies a region whose every acre is a mine of artistic wealth, and every mile is filled with æsthetic rapture."

"Well," replied Tinto, to whom these remarks were addressed, "'sufficient for the day is the evil thereof'" (at the same time holding up two fingers to indicate quotation marks, a habit he had acquired when quoting scripture in presence of the Dominie, to deprecate criticism and to intimate the lack of originality). "When other artists shall have made the discovery of this charming Switzerland, and shall have found how cheaply they can live and travel in it, they will come in crowds; the fashionable world will follow, and then adieu to the charming simplicity of its people, its reasonable rates, and unadulterated honesty. Let us enjoy it while we may, and leave the other fellows to find it out for themselves."

our tramp after supper we followed up this little stream that crosses the road here by the hotel, and found some charming cascades and falls, and I propose that in the morning we go out and see them."

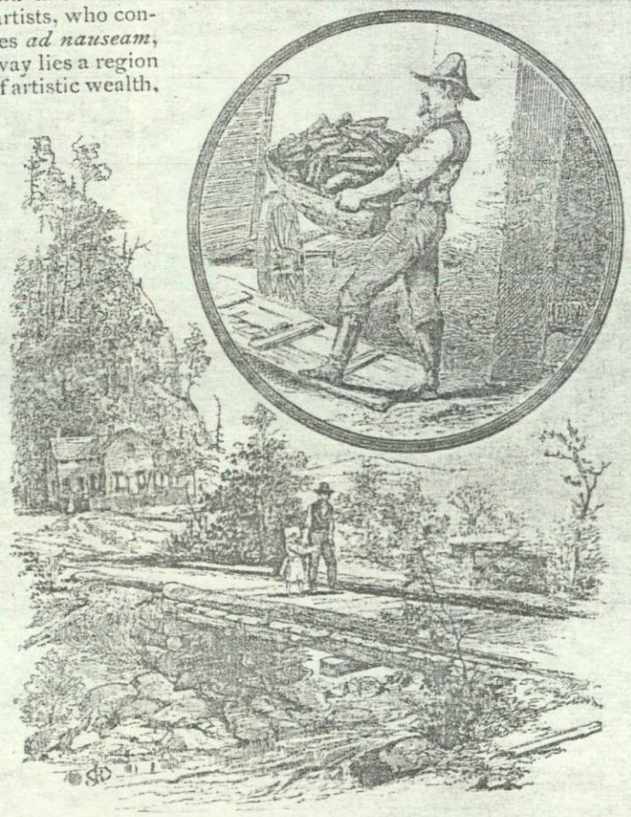
This being readily acquiesced in, the conversation drifted to ordinary topics until bedtime, when the trio sought their respective dormitories, and slept the sleep of the just.

It was the third day after their arrival before they were ready to accept the invitation to "do" the "charcoal job on the mountain."

"Come, arouse thee! arouse thee! my merry Swiss boy,"

warbled the Dominie, as he rapped at Tinto's door in the morning; "it's a long day before us, and we want an early start."

"What an unearthly hour for a Christian



THE CHARCOAL BURNER AND HIS HOME.

noted half-past five o'clock; "however, as we are in Turkey, I suppose we must do as the Turkeys do;" and in the course of twenty minutes he had joined his companions at the breakfast-table.

It was a lovely July morning, and all animate and inanimate nature seemed to rejoice and pay homage to the god of day as he ascended his pathway in the east, and, peeping over the mountain, looked through a lovely pink haze down into the valley. His rays seemed to kiss into life and activity all moving things, from the robin on the hillside to the superannuated old horse down in the pasture; the trees and flowers seemed to rejoice in his coming; and even the staid and sober Dominie felt the exhilarating effects of the delightful atmosphere, filled with ozone from recent showers, and was as playful as a motherly tabby with her first kitten. Tinto and he had been intimate friends for more than a quarter of a century, and the artist and his doings formed excellent butts for the shafts of his sarcastic criticism, which he would not have dared to aim at a less good-natured man.

The little hamlet of Danby, made up of not more than twenty or thirty houses, is situated in a valley between two ranges of the Green Mountains that rise some three thousand feet on either side, and extend north and south for many miles. The range on the west is composed of limestone, and in it is found marble of purest quality, which is worked to advantage, the quarries at Rutland being noted for their extent and the fineness of the material. The eastern range is granitic, and, like all the other ranges, is covered to its top with a dense growth of hemlock, spruce, beech, pine, poplar, birch, and other evergreen and deciduous trees, the former preponderating, thus giving them the right to the title of *Green* Mountains. Along the faces of the ranges, gorges and ravines are formed by the action of water, and are the only means of ingress and egress to and from the interior valleys, for the sides are generally so steep that nothing short of a goat — and he a very sober one — could climb them. Through these gorges there is barely room for the road and the stream, and the former is frequently blasted out of the solid side of the mountain, while the latter — in spring a raging torrent, carrying with and before it massive boulders, logs, and all the débris of a vernal freshet, — makes highway out of existence.

It was up one of these gorges that our trio were to take their devious way to the top of the mountain, and thence over to Weston, a hamlet on West river, where they had spent their previous summer's vacation.

After considerable fussiness on the part of the Dominie, and numerous commands and countermands from Tinto, who, from his having served a term in the Home Guards during "the late unpleasantness," was honored with the command of the party, they were ready to start. The order "Forward!" was given to the driver, a pert lad of fifteen summers, the son of the landlord; and with a cheery good-by to Boniface and several villagers who had gathered on the veranda, they were off for Weston "and a market." Driving through the one street of the place to the depot, they halted long enough to appoint to meet Mr. G—— on the mountain in time for dinner, and to inspect his new stables recently erected by him for the accommodation of such of his horses as may be needed in the valley, or such as may not be able to get back to "the job" before nightfall.

In answer to a question of Tinto's, they were told that the company owned one hundred horses, sixteen yoke of oxen, and frequently were compelled to hire as many more during the busy season.

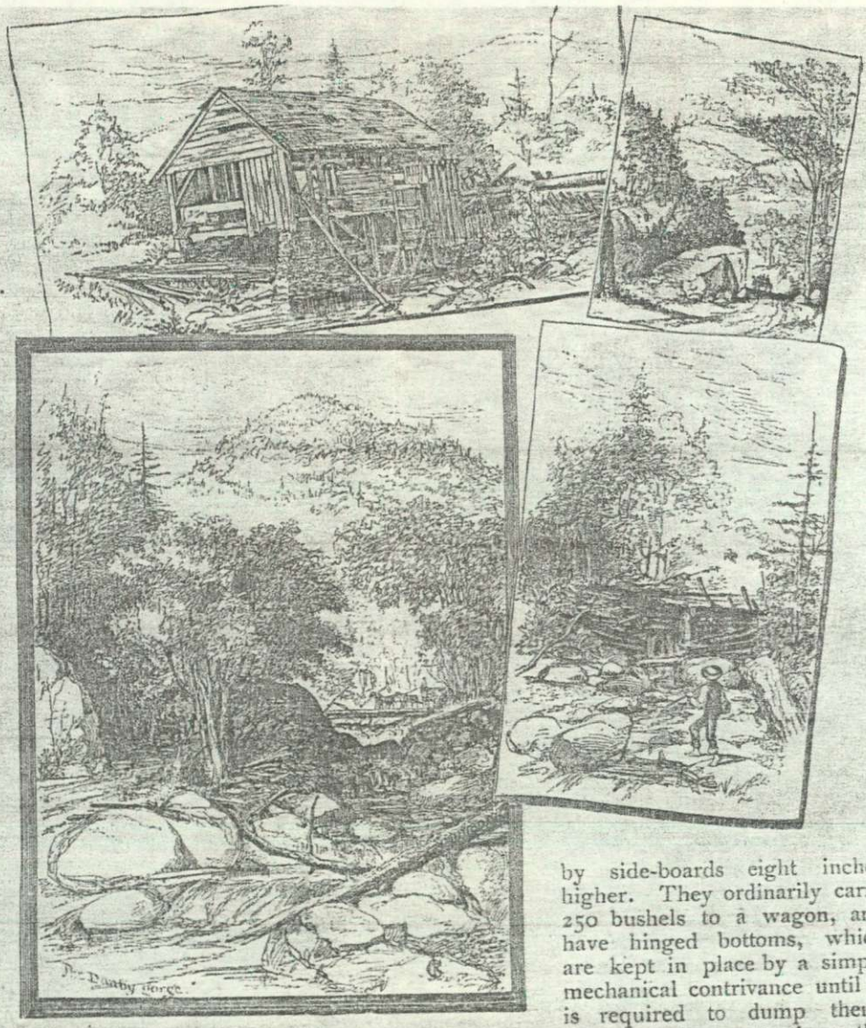
"Come, gentlemen," said Mr. G—— "before you go up the mountain let me show you how we ship our coal; there's a wagon coming in, and you can see it unloaded."

Walking along a little beyond the group of kilns, the party came to a platform, attached to and in front of a freight-shed, by the side of which stood a derrick and its attachments.

"The track is below the platform, so that the top of a freight-car comes about on a level with it, and for convenience the top of the car is open, with hinged covers, as you see," said Mr. G——.

"What is the capacity of one of these cars?" asked the Professor.

"Well, from 1,150 to 1,300 bushels; we own about fifty cars, and could use many more; we frequently have to wait for the return of our cars, causing serious delays. Nevertheless we manage to ship an average of 100,000 bushels per month, which is about the capacity of the four 'jobs;' this one here; the one on the mountain; the Black branch job, and the three kilns over by the large boarding-house on the other side of the mountain."



At this juncture the coal-wagon drove up to the platform, and the driver made preparations to unload his cargo, while the party stepped to windward to avoid the dust.

These wagons consist of a running gear about ten feet long, and four feet two inches wide, on which are mounted two large boxes, say three feet two inches wide on the bottom, by six feet long, and flaring upward to five feet wide by seven feet long, their capacity being sometimes extended by side-boards eight inches higher. They ordinarily carry 250 bushels to a wagon, and have hinged bottoms, which are kept in place by a simple mechanical contrivance until it is required to dump them. Straps of iron extend up the sides of the boxes, with an eye at the top, into which the hooks of the derrick chain are inserted, the windlass put in operation, one box lifted from the gear, swung over the car, the bolt drawn, and the contents dumped into the car, when it is swung back to its place, and the other box goes through the same process.

Such was the operation which our trio witnessed; and, as the dust arose in clouds and blew away to leeward, Tinto remarked: —

"'Dust thou art, and to dust shalt thou return;' I wonder if that is the kind of dust that darkies are made of?"

"Perhaps it is," remarked the Professor; for if the Darwinian theory is correct, the darkey must be first cousin to our great progenitor the ape; and 'thereby hangs a tale.'"

A volley of ohs greeted this sally, the party proceeded to climb into their vehicle, and, after bidding Mr. G—— *au revoir*, started up the gorge. Before entering it, however, they had to pass through the little hamlet of Mt. Tabor, named for the mountain above it, and consisting of a store and post-office, with some half-dozen neat cottages, all with door-yards in front, in which summer flowers were blooming, and all betokening the thrift and comfort so common to the New England villages. Facing mostly to the south and west, their windows commanded charming views down the valley, and across to Dorset mountain, which at a distance of a little over a quarter of a mile rose to an altitude of 3,300 feet.

"Give me a cot in the valley I love,"

hummed Tinto. What a lovely spot to spend the remnant of one's days, dreaming life away in the enjoyment of such delightful scenery and drinking in the rich tones of the sunsets behind yon distant range"—

"Do you suppose for a moment that, with your towering intellect and vaulting ambition, you would be content to settle down in such a quiet spot as this; or do you suppose that the world would allow of it?" said the Dominie. "There are duties one owes to society as well as to one's self, and duties never clash."

"There's a little cottage with half an acre of ground, and a nice barn that you can hire for a dollar a month," said the boy driver, pointing out a neat five-room house they were passing, and evidently wishing to have his part in the conversation, which he took for gospel.

That settled the matter, and the conversation dropped, for the time being.

A hundred yards farther on they entered upon the wild beauties of the gorge, at a point where once had been a massive dam, which, having been swept away during the last spring freshet, the timbers and logs, mixed in the most inextricable confusion with the immense boulders that had caused the destruction, formed, with the rushing waters that roared and swirled through and among the débris, a wild and attractive picture. In a moment the trio were on their feet and out of the wagon; timbers; calling upon each other to admire now this view, now that vista. Crossing the stream on the slippery stones, at the risk of wet feet and broken limbs, they behaved rather like school-boys out for a vacation, or college-boys on a lark, than three elderly professional men, who would have smiled at their own enthusiasm could they have seen it with their ordinary vision.

It was evident that the boy driver had his doubts as to the sanity of his passengers, as with half-open mouth and staring eyes he watched their antics and wondered what there was in so familiar a scene to call forth such demonstrations.

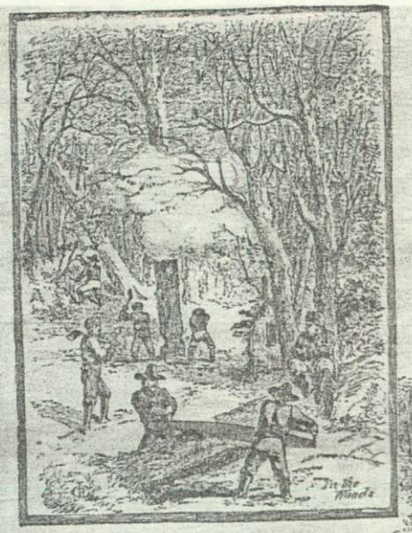
"Oh, that's nothing!" said he, as they returned to the vehicle; "to what it is in the spring; you should see it then if you want to hear roaring. There's no water on now of any consequence."

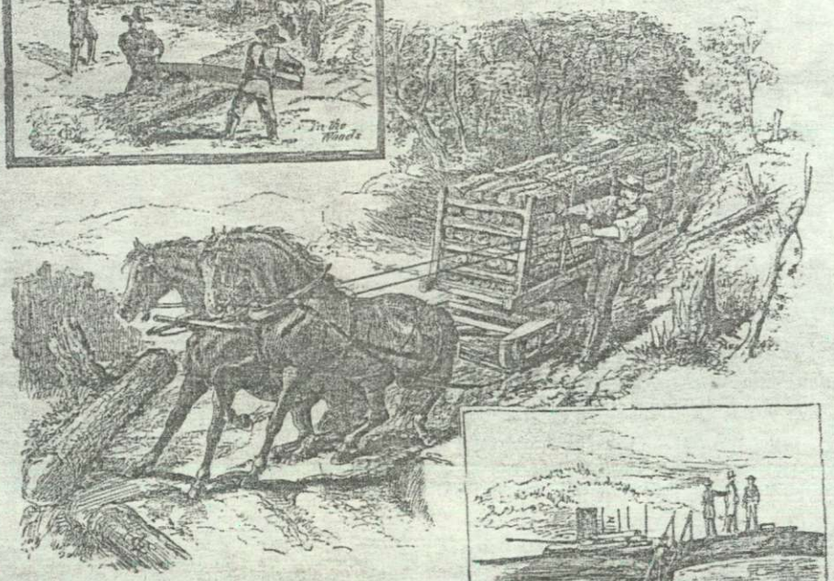
"What is there in the sight of falling water that should fill the artistic mind with such rapture?" asked the Professor, as the trio resumed their seats and the upward journey.

"I think," said the Dominie, who was always ready with his theory, before Tinto had formulated the thought with which to express his idea, "it is because of the untrammeled grace of its movements. Now look at that little fall yonder as it pours over the immense boulder and scatters its volume on the smaller rocks below; here it sweeps boldly to the right under the pile of driftwood which it has erstwhile brought down with it, and then swirls gracefully into that eddy to the left, to plunge again and again in bow-like curves over and among the rounded stones and the débris of its former rage and fury, ever singing its song of freedom. What does Solomon say in his"—

What Solomon said remains unknown, for Tinto ejaculated in a stage whisper to the Professor, "He's got 'em again; we *must* find some antidote for this, or we shall be preached to death;" and the Dominie subsided. A moment later, however, the preacher had his revenge, for his friend exclaimed, "Oh! look there! what a charming picture that is! Stop, driver! I must have that;" and, without waiting for the team to check its headway, he leaped to the ground, and was soon seated on a rock in mid-stream, sketching the scene before him, undisturbed by the Dominie's remark anent the lunatic having escaped his keepers.

They were traveling along the bottom



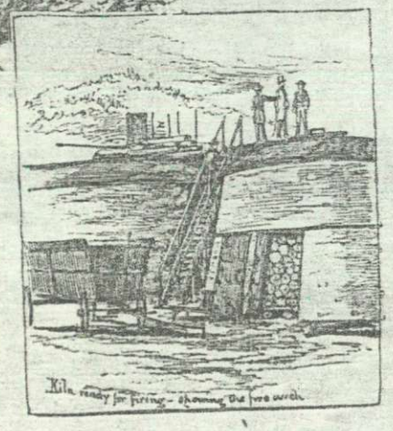


of a V-shaped ravine, in which there was barely room for the stream. The road had been blasted out of the mountain side, and a fringe of trees, left at the water's edge, threw a deep shadow across the bed of the stream, while, beyond the vista thus formed, the sunlight brought out in strong relief the rustic bridge where the road made an abrupt turn and crossed to the other bank; this was the scene which the artist was trying to get for a picture.

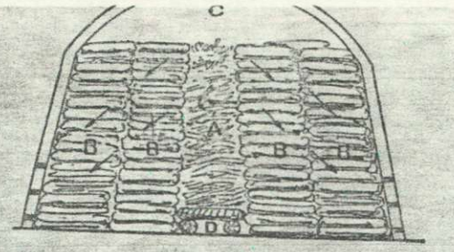
It would be tedious to attempt to describe the beauties of this charming gorge, which in every rod of its devious ascent presented a new and attractive feature that brought forth some exclamation of surprise, admiration, or wonder, or to narrate the several incidents of passing the heavily loaded coal-carts, to which they were

frequent halts to "get" this or that charming bit. Ere they reached the mountain top they found their stock of expletives exhausted; and, as they realized the beauty and extent of the scenes through which they had passed, silence seemed the only way of expressing the rapture which filled them.

About half-way up they passed a spot where another mountain stream came in from the left, and were told by their driver that the rugged road along its banks "led up to the Black branch job."



Continuing on their course, after another hour's climbing, they found themselves passing between two rows of buildings, and emerging into a cleared and level space of about fifteen acres, which, from the kilns on the one hand, and the large saw-mill on the other, with the commodious boarding-house beyond, they recognized as "the job on the mountain."



This unique settlement consisted of about forty or fifty structures, embracing a large steam saw-mill, forty by eighty feet, with all the appliances for converting the choicest hard-wood logs into lumber, which is mainly used by a mowing-machine manufactory in Hoosick Falls, N.Y.; a large boarding-house for the single men among the employés; a general store and office, with an adjoining residence for the chief clerk or manager; a harness shop; a wagon shop; blacksmith shop, and a number of cottages for the employés, besides stables for the animals, sheds for the wagons, sleds, etc.; and last, though not least, four large kilns for burning the coal. The houses are furnished the men rent free; the supplies at as near cost as possible; and everything within its capacity is manufactured on the spot by the company.

Stopping at the office, our trio were welcomed by the manager, who had been telephoned of their coming.

Their first objective point was the group of kilns, and towards these they leisurely made their way, exhilarated by the bracing atmosphere of this elevated region, made more pungent by the pyroligneous vapor arising from two of the kilns which were in full heat.

Arrived before one, which, by its open door and the wagon in front, was evidently being emptied, they were on the point of entering when they were startled by the apparition of a tall, gaunt, Italian brigand, which stalked out of the opening, and with the stride of a giant mounted the plank, one end of which was supported on a tripod at the side of the wagon, emptied the shell-like basket which he carried, and, turning upon his heel, stalked back again without giving even a look of curiosity to the trio of strangers, whom he might have touched as he passed. He was a splendid specimen of a man, and better fitted for the wild fastnesses of the Abruzzi, whence he probably came, than rounded. The surprise of the party was somewhat allayed when they learned that quite a large proportion of the employés were natives of sunny Italy, — a fact which they soon realized in the chattering of the black-haired and black-eyed little picturesque ragamuffins, who congregated about most of the laborers' cottages and ran riot about the place. This brigand was too good a subject to lose, and Tinto subsequently made a sketch of him, which he promised to copy for the Dominie.

They did not enter the kiln, for, upon looking within, they discovered that the coal, now thoroughly charred and cooled, was being raked down, and the whole interior was filled with a fine charcoal dust, in which it seemed impossible to breathe. Three or four men, who looked more like imps than human beings, were breathing it, however, for they were engaged with long iron rakes in tearing down the serried ranks of charred logs, which, as they fell, crumbled and sent up showers of dust, through which the sunlight, entering at the opening above, sent athwart the picture a ray that produced a very weird and startling effect.

While admiring this interesting scene Mr. G—— drove up, and, as it was past noon, he invited his guests to dine with him at the boarding-house opposite the kilns, promising after dinner to explain the *modus operandi* of burning coal.

Now, if the Dominie has one weakness which dominates all his other weaknesses, it is a fondness for the pleasures of the table; and, although his personal appearance would scarcely warrant such a conclusion — for he is lean and gaunt to a degree — the sound of the breakfast or dinner bell has frequently been known to put an end to some of his finest lucubrations, and to check the flow of his most elaborate rhetorical efforts. Knowing his failing in this respect, his companions yielded a ready acquiescence to the call, and in a few moments they were seated at one of the tables in the long dining-room of the boarding-house, doing ample justice to the plain but really attractive food set before them.

An hour later, with cigars between their lips, they returned to the kilns, and their host proceeded, in his matter-of-fact way, to illuminate their minds regarding the mysteries of burning charcoal, as carried on in the precincts of the Green Mountains.

kilns, Mr. G—— began by saying: "We own about thirteen thousand acres in this immediate section, and thirteen hundred in the Black branch job. The wood is mostly spruce, which is the soft timber. Birch is hard timber, and is the hard coal, used in the manufacture of barbed wire.

"The larger logs of spruce are sawed up into lumber, and the smaller ones are burned for coal. There are a hundred men employed in chopping at all seasons, but about the first of October we start all hands into the timber, where they remain until the first of April. They are divided into gangs of twelve to fifteen men each, with a boss for each gang."

"Do they remain in the woods at night?" queried Tinto.

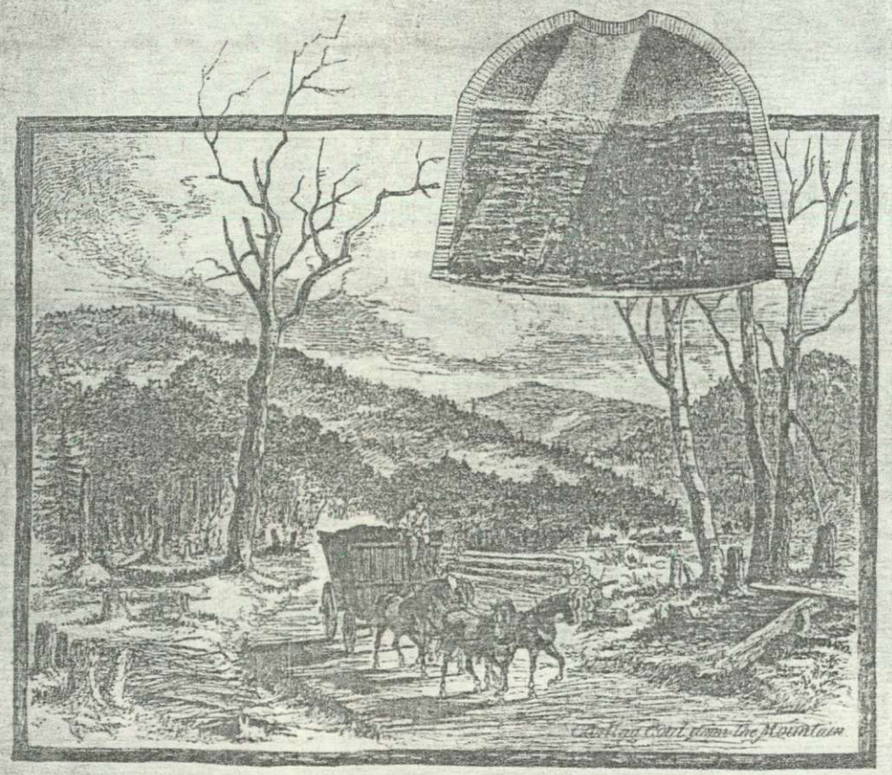
"That depends," replied Mr. G——. "Some who are near the mill come in at night to their families or to the boarding-house, while those who are far away build shanties of logs, covered with boards, many of these improvised houses being connected with the progress of the chopping. They have a cook, and supplies are drawn to them on sleds."

"It must be a hard and monotonous life," said the Dominie.

"On the contrary, the men look forward to the winter season with a great deal of anticipation; although our winters are ordinarily severe, and there is frequently from eight to twelve feet of snow on the mountains, they lead a life of excitement and, to them, one of pleasure. They go to work as early as it is light enough for them to see, and chop until dark, when they repair to their shanties and spend their evenings — and many days together, too, for that matter, when it is too stormy to work — in singing, dancing, card-playing, and thrumming musical instruments of some kind."

"How are they paid?" asked Tinto.

"Some by the day, and some by the cord; and the bosses are held responsible for their proper attention to business. They



are paid off on the 30th of each month, when they come in to get their money and have a quiet spree."

"Do they get intoxicated on ginger pop and birch beer?" queried the Professor; "for those, I understand, are the only beverages to be had in this land of steady habits."

"Well, no," replied Mr. G——; "but they mix those liquors with the water from our mountain springs, and that, you know, is very exhilarating, especially in winter."

By this time they stood before the group of kilns, and Mr. G—— continued: "Our choice of location depends, of course, upon the preponderance of the kind of wood we want; and, having chosen a site, we proceed to cut a road to civilization, to haul our supplies and materials. We next build our houses for the accommodation of our workmen, and then proceed to build our kilns, which, you see, are of hard brick. The walls are twelve inches thick, and the kilns from twenty-five to thirty feet in diameter; twelve feet high to the crown, and about seven feet crown, with a circular opening in the crown of five feet diameter. The only other opening (except the vents) is the door, which is closed by a heavy slab of No. 8 iron. The floor is of clay and well tamped, and the foundations are thoroughly grouted before the structure is commenced, as the kilns expand with the heat, and contract while cooling. There are three tiers of vents, or openings, the size of a brick, left in the walls for the purpose of drawing the fire back and forth,—one hundred and twenty vents to each kiln; and they are called 'waist, knee, and ankle vents.' Now, if you will step this way," continued Mr. G——, "I will show you a kiln almost ready for firing, in which you can see the construction of the pile."

Climbing a steep stair-case, our friends found themselves upon a platform level with the tops of all the kilns, and looking down into one of these they saw the wood piled in two tiers, filling the kiln to within, say, three feet of the top of the crown, the logs radiating from the centre, leaving an interior space of about four feet, which was filled with soft and light wood for kindling. A foundation of logs is first laid upon and covering the floor, except a fire arch from the door to the centre. Then the logs are piled as above described, until the kiln is full, when the centre is filled with kindling, and the pile is ready for firing. A rag pole, and, being lighted, is thrust under the fire arch to the centre, igniting the soft kindling; the door is closed and hermetically sealed; the thimble, or iron circular plate, placed over the opening at the top, and for ten or twelve days the process of charring goes on, being regulated by the vents around the base of the kiln. It is necessary that the fire should begin at the top and burn downward, and for this purpose two openings are left in the thimble at the top, each of which is easily covered with a brick. These are left open or closed, as emergency requires, and the vents are opened as needed, to draw the fire downward through the pile. When the wood is sufficiently charred above these vents, which is ascertained by the smell of the smoke, or by thrusting a bar into the vents, to *feel* whether it is wood or coal; the knee, or middle row of vents, and the ankle vents, are opened in succession, although the lower vents, as a general thing, are not opened; the collier preferring to burn the lower tier of logs in another kiln, rather than run the risk of over-firing.

Mr. G—— having been called away for a few moments, Tinto turned to the Professor for an explanation of the chemical process in the charring operation.

"Wood," said he, "is composed of carbon, hydrogen, and oxygen gases, the latter in proportions sufficient to form water. When fired in the open air it burns with a flame, freely, the carbon being consumed, leaving only a residuum of ashes, or the earthy portion. But when burned in confinement, where the oxygen of the atmosphere cannot reach it in sufficient quantity to unite with the oxygen of the wood, and cause flame, the intense heat liberates the hydrogen and oxygen gases, which go off in pyroligneous acid, which is the thin, vaporous smoke that you see rising from the kiln yonder, and issuing from the vents. The woody fiber, in the form of carbon, remains, and is the wood charcoal of commerce.

While awaiting the return of their host, our trio watched the operations of the men about them on the platform and in the kilns.

The vehicle which brought the logs from the adjacent woods to the kilns was of a peculiar construction, necessitated by the circumstances. It was an ordinary rack, mounted at the front upon runners, but at the back upon skids, which are meant to retard rather than to facilitate the progress steep wood-roads of the mountains, where it would seem impossible for anything but a goat to retain its footing. Yet, habit has become so far second nature with these hardy horses that they manage to handle their loads with an *élan* that is very interesting to behold. The most difficult hauling is on the level ground where the roads are much cut up, and upon the platforms where the wood is unloaded.

Mr. G——, on his return to his guests, conducted them to the interior of an open kiln, where he gave them further incidental information regarding the operations.

"You will understand," said he, "that the process is one of charring, and not of combustion, and the converting of the woody fibre into carbon; hence flame is very undesirable, as it consumes the wood. If, through the carelessness of the collier in "tending vent," as they say in the artillery, flame should once get headway, the kiln would explode, endangering many lives. The presence of flame is indicated by that white spot on the wall there; that is an infallible detective, and tells of the carelessness of the collier.

"How," asked the Professor, "do you judge of the progress of the charring, not being able to gain access to the interior?"

"Well," replied Mr. G—— "we have no means of judging, except by the smell of the smoke, the heat on the door and thimble, and by prodding the vents, as I before explained. Nevertheless, although the period of ten or twelve days, during which the charring is going on, is a time of constant watchfulness and attention to business on the part of the collier, continued every-day experience renders him so expert that we seldom have an accident or lose a firing.

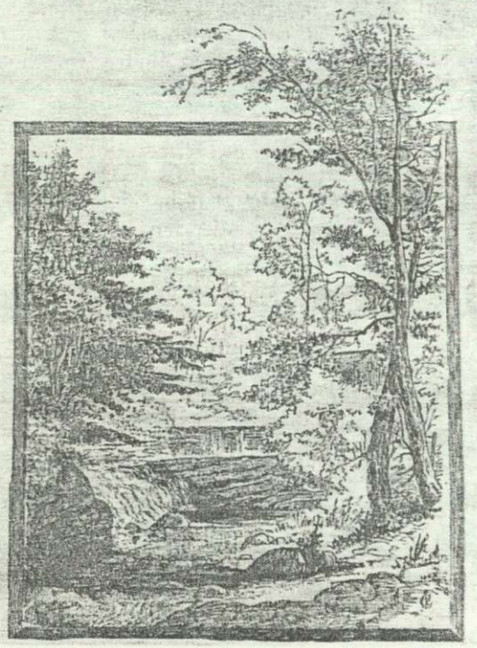
"I wish," said the Dominie, "that you would explain more fully the process of drawing the fire down, as I do not fully comprehend it."

Taking a piece of coal from the ground, Mr. G—— drew the diagram of a section of a kiln ready for firing. "This," said he, "represents the wall of the kiln. A is the kindling, and BB the wood to be charred. C is the space left for the gases, and D is the fire arch. Now when the center kindling has been thoroughly ignited and the flame extinguished by closing the door and putting on the thimble at the top, the pile of kindling is reduced to a mass of red-hot embers, and this fire is drawn back and

"Yes," said the Dominie, "but *how?* that is what I do not understand."

"Well, the fire works *against* the wind. Why, I cannot explain. I leave that to more scientific men. You will see that these kilns have a northern exposure, and, when the wind is from that direction, great care is necessary not to burn too fast. When it is from other quarters the burning is more regular. Sometimes a *sink* occurs, which means that the fire is drawn down too rapidly, leaving a middle portion uncharred. This is to be avoided, and can only occur through the carelessness of the collier. After the charring operation is complete the vents are stopped, the body of the kiln is thoroughly whitewashed, and the crown covered liberally with coal tar, to make everything air-tight, and the kiln left for two days to cool off. It is then opened, and the coal can be taken out immediately. Thus you see that it requires fourteen days at least to burn a kiln; two to fill, ten to burn, and two to cool. The secret of good coal, however, is to *take time*, and we prefer to give it twelve days to char, unless we are behind our orders, which, I am sorry to say, is generally the case."

Turning to his companions, the Dominie



was nothing without his friend, who was his *alter ego*, the party walked out into the sunlight to see what had become of him.

It was not until after an hour's wandering about the precincts of the "job," during which they stumbled upon many delightful little bits of scenery, that, in crossing a rustic bridge they discovered his genial face through the attic window of a tenantless house where he was engaged in sketching one of the numerous homes of the charcoal-burners.

"Oh, you renegade!" exclaimed the Dominie, shaking his alpen-stock in a threatening manner at the artist; "here we have been hunting you for an hour or more, while you have been perched in an attic, redolent, I have no doubt, of onions and potatoes, having us in view all the time."

"Well, I knew," said Tinto, as he rejoined his companions on the bridge, "that I could safely rely upon you to absorb the information communicated by our friend, and that all it was necessary for me to do was to squeeze the sponge and gather the residuum." He placated the Dominie's anger by showing the sketches he had got, and then added: "It is time for us to start if we expect to reach Weston for supper," which fact being acquiesced in, the driver was hunted up, the team gotten ready and farewell said to their host, whose pressing invitation to spend a day or two longer with him they were reluctantly compelled to decline.

Weston, the little hamlet where our trio had spent their previous summer's vacation, and to which their attention was now directed, is situated in a depression of the mountains about five miles from "the job;" and although the road was less rough than that from Danby up the mountain gorge, it was wild and romantic enough to satisfy the most enthusiastic artist, and to fill the party with delightful emotions, to which they were continually giving vent in exclamations both loud and deep.

The horses in this section of country are trained to take the most precipitous hill at a gallop, and to keep their gait when going down hill, so that, what with the exciting drive, the bracing mountain air, the wild and rugged scenery, which was now lighted by the declining rays of the setting sun, now shadowed by fleeting clouds; the pleasant companionship and the frequent interchange of repartee, the even the boy driver.

"I often wonder," said Tinto, while the three friends were admiring the tints in the sky as the sun sank behind a bank of clouds, lighting up their edges with all the hues of the rainbow, "how these men whom we meet feel, and what they think, surrounded as they are continually by scenes which excite in us emotions that *will* vent themselves in words. They seem so stolid that one can hardly believe they see the beauty which encompasses them, and which we have come so far to enjoy."

"Men see with what they have to see with,"

quoted the Dominie.

"That's Kingsley," said the Professor, *sotto voce*, as his friend had failed to hold up his fingers indicating quotation marks.

"Two men shall stand upon the slope of a mountain looking toward the western horizon," continued the preacher, without noticing the interruption, "where the sun is lighting up with his departing rays a rich bank of clouds sweeping grandly up to the zenith, while broken fragments of vapor catch and reflect the glow of the setting orb, their edges gilded with golden light, which shades off into cooler purple and aerial grays, until the whole atmosphere is filled with gorgeous color, making the appreciative soul leap for joy that God has made the world so beautiful. Between the observers and the sun range after range of mountains catch the glowing light, while the intervening valleys are filled with that warm purple haze which floats and glimmers in the sunlight; and the foreground is made up of such glorious scenery as that round about us, thrown into shadow as the sun goes down, betokening the gloom of night.

"One of the observers shall be a farmer, born and bred near the spot where they stand; and he looks upon the scene with utilitarian eyes, seeing only the promise of fine weather to-morrow, and a chance to 'cut that grass down in the meadow.' The other shall be an artist, who, like yourself, is accustomed to prairie-like surroundings, where a hill ten feet high is a mountain, and who has traveled a thousand miles to witness and enjoy the scene before them, which his companion values so lightly. Their feelings, expressed in words, would be:—

"'What a magnificent picture! How grandly beautiful; can anything be more charming and complete in picturesqueness? I envy you a life in such a land,—a land replete with all the charms which go to make up an artist's paradise.'

"'Humph! I reckon if you had to make a living out of this paradise, as you call it, you wouldn't think it so beautiful.'

"That expresses it to a certain degree," said the Professor, "but you leave out the element of training and culture. Now, I doubt if even Tinto would be so eloquent in the description, or enthusiastic in his admiration, were it not that he has cultivated his tastes to the point of appreciation."

Approaching a spot vernacularly known as "the Devil's Den," they took a short tramp into the woods until they came to a ledge of bold, overhanging rocks, covered with the primeval forest growth, whence, looking down into a chasm several hundred feet in depth, they could see the tops of trees which had never heard the sound of woodman's axe; and thence up and away across a wide expanse of landscape, embracing extensive mountain ranges, bathed in all the glorious tints of the setting sun. It was a scene to fill the soul with rapture, and so apposite to the Dominie's recent and eloquent description, that Tinto and the Professor exclaimed with one accord, "The Dominie's picture!" It was indeed a wild and romantic spot, and one—were it better known—that would become a favorite resort for the artist, the tourist, and the leisure traveler.

After taking a hearty drink at a clear spring, whose waters percolated through a crevice in the overhanging rock by the roadside, they drove on in the fast deepening twilight, silent now in the presence of that calm, still, mournful beauty, which settles down upon the face of nature as she draws the veil of night across her features. Each was storing away in his sensorium bright reminiscences of a delightful day well spent, whose close found them domiciled at the little inn at Weston, where they received a warm and hearty welcome from simple but honest hosts.

For four weeks our trio of artist friends remained in this delightful retreat in the heart of the Green Mountains, enjoying to the fullest extent the charming scenery, filling their books and portfolios with sketches, taking in large draughts of the pure mountain air, and laying up great stores of health with which to combat the malarial influences of their urban homes. Separated by twelve miles of mountainous country from the nearest railroad station, located seventeen hundred feet above tide water, and surrounded by mountains from two to three thousand feet in height, with no opportunity of spending money beyond the mere pittance paid for board and the hire of a team occasionally to drive to distant points, the days were spent in rambling among the glens and watercourses, the evenings in dreamy discourse or mild discussion on the veranda, and the nights in sound, refreshing, and dreamless sleep.

Sitting on the veranda on the evening previous to the day of their contemplated departure from this elysium, watching fair Cynthia as she rose from behind the mountain before them, it was proposed that on the morrow they should climb to the top of the aforesaid mountain, if peradventure they might discover where the moon came from.

Morning came, cool, bright, and bracing, and after an early breakfast, with alpenstocks in hand, and with spirits as buoyant as those of boys let out of school, they started. Younger and less experienced men would have dashed boldly at the face of the mountain and carried the ascent by storm, but our sexagenarians chose a more circuitous, if longer route, and, following a gradually ascending road which ran around its base, found themselves, after an hour's pleasant ramble, with only about one-third of the height to master. Taking this very leisurely, stopping now to explore the inmost recesses of a sugar-house, now to "get this bit" of a fence corner, or that group of trees; perchance a quiescent ruminant (cattle being Tinto's specialty); they found only the last fifty feet of climbing at all fatiguing or tiresome. Arrived at last upon the summit, they gathered upon the bare surface of a large rock, which was voted to be "tip-top," and looked about them.

If one can imagine himself upon the top of an immense wave in mid-ocean, surrounded upon all sides by the swelling forms of storm-vexed billows,—and if those forms could be suddenly congealed or rendered motionless,—he would have an adequate conception of the scene upon which our trio admiringly gazed. Away off to the north the range, upon one of the spurs of which they stood, trended away in ever-changing and varied shapes, until the more distant peaks melted tenderly into the cool grays of the clouds, and it

became a matter of discussion which was vapor and which solid earth. To the east the undulations were less abrupt, but the eye wandered over the contour of the billowy ranges, resting at last upon the far distant horizon, where the peaks of the White Mountains cut the sky-line and stood plainly revealed against the azure of the heaven above. Looking southward, the landscape gradually assumed a more pastoral appearance, the extreme distance being bounded by the Holyoke range, sixty miles away; while, westward, the Green Mountains surged and swelled in rocky waves, peak rising above peak, range above range, culminating in the shadowy Adirondacks, whose rugged outlines alone separated them from the blue ether about them. The middle distance in each view was made up of

"Hills rock-ribbed and ancient as the sun,
With vales stretching in pensive quietness between,
Venerable woods, — rivers that
Moved in majesty, and complaining brooks
That made the meadows green," —

with here and there the bright sheen of a silver lake, the taper spire of a village church, or the lazily ascending smoke of a rustic factory, making altogether a scene so mindful of Bryant's grand Psalm of Nature that Tinto felt in his enthusiasm that no more fitting rostrum could be found, and voiced its sonorous words, while his companions drank in the gorgeous beauties of the scene which had called them forth.

"Verily, our last day has been our best day," sighed the Dominie, as the friends, after two hours of quiet converse with nature and with each other, picked their way through the woods and followed their devious pathway back to the little inn. "Could we take this to our homes, or were we able to visit it occasionally under such bright auspices, we should have no need of the Sabbath in which to worship God, for his praises would be continually upon our lips, and adoration forever welling up in our hearts for the Creator of so much beauty, of so much grandeur."

And Tinto and the Professor cried "Amen!"

J. R. Chapin.

IDYLLIC.

To lie beneath a cloudless sky
  On moss beside a shallow brook
Where smells of wild-flowers in the dells
  Make me forgetful of my book, —
To dream of shepherd with his crook,
  Of sheep on grassy slopes asleep, —
To catch a visionary look
  Of shepherdess, and hear her step
Fall like a whisper on the ground, —
  To watch her sunny smiles, and see
Her dainty garments, soft and snowy,
  Fold gracefully her form around, —
'Tis like a day in Sicily
  With Daphnis and his sweetheart Chloë.

Frank Dempster Sherman.

Charcoal

Van Wagemem, Jared
1947 "The charcoal burner." In The Chronicle of Early American Industries Assoc. vol. 3, no. 13, Sept. 1947. pp. 113, 118

(check index for other articles on charcoal)

Woolmington, Rob
1979 Coking charcoal down in Rattlesnake Gutter. Yankee 43, Dec. pp. 132-34. with photos.
- describes 19th ct. charcoal industry in Mt. Tabor, Glastenbury & Woodford, VT.

Chapin, J.R. Charcoal Burners of the Green Mountains. In Outing [Magazine]
1885 vol. VI, no. 1, April.
- shows drawings of charcoal furnaces; a little bit of technical information.

Crockett, Walter Hill. The Industrial History of Vermont.
1930.

~~Charcoal. MSS 2 II 16~~

~~AC 880101~~ ~~misc. 61 & 56?~~

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1958 A History of Technology. Oxford:

CHARCOAL KILNS

ARCHEOLOGICAL SITE SURVEY FORM

Vermont Division for Historic Preservation
Agency of Development & Community Affairs
Pavilion Building, Montpelier, VT 05602
(802-828-3226)

FOR OFFICE USE ONLY

Note: Forest Service No. not assigned
Site No. _____ F.S. No. 13 (RU)
Town Goshen County Rutland
Prehistoric ☐ Historic ■ Isolated Find ☐
On NR ☐ Elig. NR ☐ Inelig. NR ☐
Insuff. info. NR ☐ District ☐
USGS Quad Bread Loaf 7.5' ■ 15' ☐
USGS Coord. 43 52' 73 61'
UTM / / / / / / / / / / /
Zone Easting Northing

IDENTIFICATION

Town: Goshen County: Rutland Site Name or Field Site No.: Worth Mt. Kilns
Recorded by: G Neudorfer, DHP Date recorded: 8/80
Address: _____ Project title: _____
Phone No. _____
Organizational affiliation: _____
Site found by (if different than recorder)/address: Billie Hoornbeck, U.S. Forest Service in-house cultural resource reconnaisance 7/80 (actual survey performed by
Owner: Federal ■ Name: U.S. Forest Service, Green Mountain Phone: Richard DeBonis
State ☐ Address: National Forest, Rutland, Vt.
Municipal ☐
Private ☐
Attitude toward site/archeology: _____

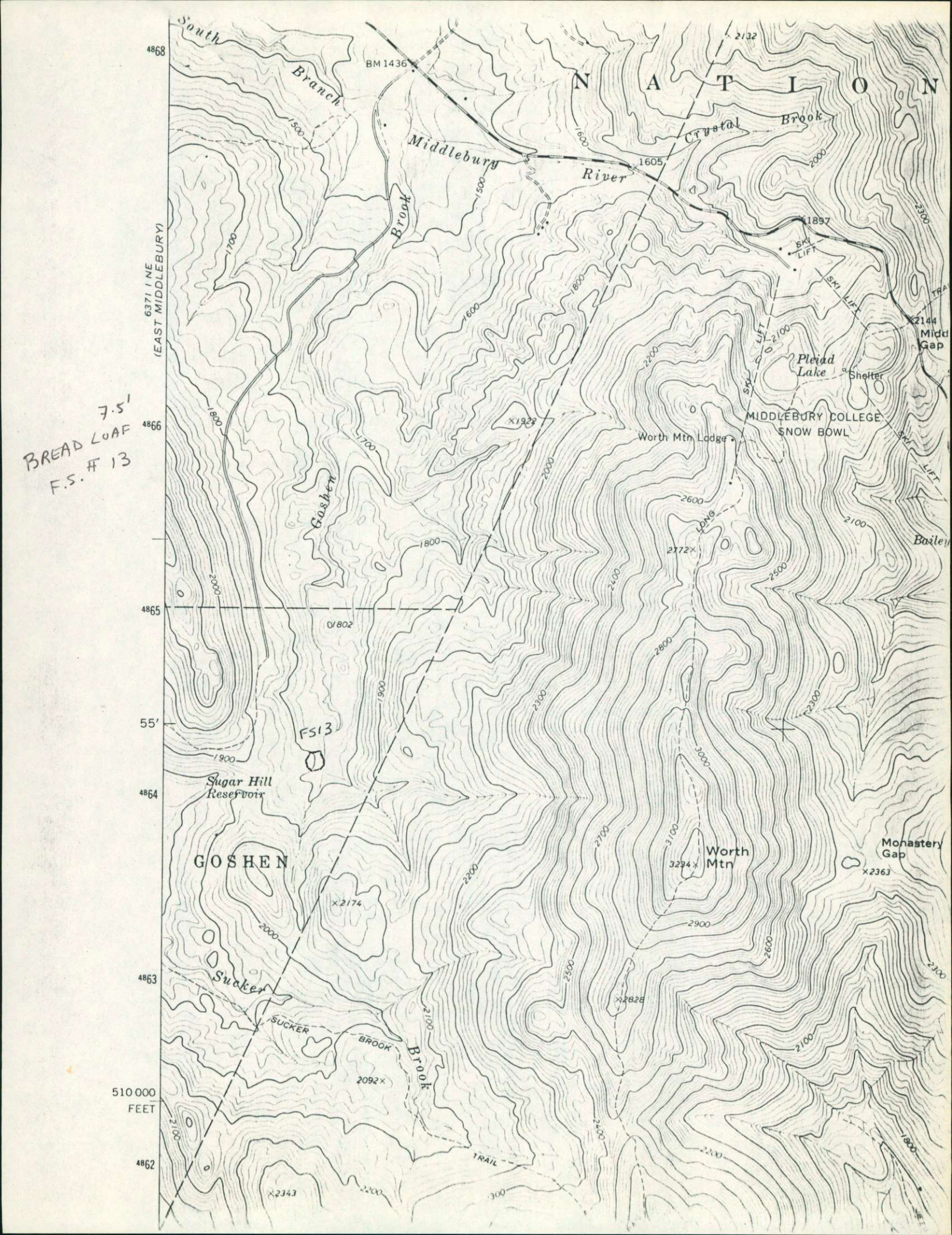
Site located by: survey crew ■ archival ■ informant ☐ avocational collector ☐
How located: cultivated/plowed field ☐ eroding bank ☐ other surface ■
subsurface testing ☐ other ☐ specify:

DESCRIPTION/LOCATION

Description of site: The site, presently unevaluated, consists of 6 charcoal kilns with possible storage house or shed(s) located at an elevation of 1750'. The site consists of collapsed ruins. F.S.
See site description and additional information in Cultural Resource Reconnaissance Report (CRR # 09-20-01-00) on file with DHP, in Rutland County Contract Report file.

How to reach site (attach map if possible):

Site map (use USGS if possible):


South Branch
Middlebury River
Crystal Brook
Brook
BM 1436
1605
1897
2132
2144
Pleiad Lake
Shelter
Worth Mtn Lodge
MIDDLEBURY COLLEGE SNOW BOWL
SKI LIFT
Gosher
FS13
Sugar Hill Reservoir
GOSHEN
Worth Mtn
3234
Monastery Gap
Sucker Brook
TRAIL
2092
2174
2343
2828
1928
2772
1802
6371 I NE (EAST MIDDLEBURY)
7.5'
BREAD LOAF
F.S. # 13
510 000 FEET
4868
4866
4865
4864
4863
4862

Charcoal Kilns

Mt. Tabor - Forest Lands
CHARCOAL KILNS

- Go up onto Mt. Tabor, Long Trail north to Little Rocky Pond.
½ mile from Rocky Pd. (a few hundred yds up trail - left hand side)

Residents of Danby who know about Kilns: John B. Griffith
Link Spangler

"10 Kilns meadow" - beyond the above mentioned Kilns.