

# Society for Industrial Archeology · New England Chapters

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## **Michael Brewster Folsom**

Michael Brewster Folsom died suddenly from a cerebral hemorrage on 12 December 1990. A long-time member of the Southern New England Chapter and the national Society for Industrial Archeology, Michael was known to us all for his curiosity, his interest in the way things worked, and has ability to write and speak about the way technological change affected the lives of people everyday.

A native of New York, he graduated from Antioch College in Ohio in 1961 and received a doctorate in English at the University of California at Berkely in 1972. Michael's introduction to industrial archeology in the early 1970s led him to pursue the postgraduate study of anthropology at Brown University between 1979 and 1981.

Michael moved to Boston in the late 1960s to teach in the humanities department of the Massachusetts Institute of Technology. He stayed there, offering instruction in the humanities at first and later in anthropology and archeology, until the early 1980s. In 1980 he founded and became the first Executive Director of the Charles River Museum. Waltham, Massachusetts. The museum is now an important center for the collection and interpretation of the history and archeology of the Charles River Basin. Michael's study of the industries and the people of the Waltham area led him to a research position at Brandeis University during the middle 1980s. From the late 1980s on, he worked as a free-lance exhibit developer and public historian.

Teaching children about the interaction between machines and people was one of Michael's special interests. At the time of his death he was helping the Tsongas Industrial History Center in Lowell, Massachusetts, to develop ways to help children understand water power and its role in the industrialization of early New England. He was active in the development of curriculum materials while at the Charles River Museum, and assisted a few years ago with the curriculum project of the Society for Industrial Archeology.

Michael loved to talk and write about industrial archeology and his projects were many and diverse. He wrote for children as well as for scholars. He participated in numerous national and chapter meetings as a speaker and worked closely with the 1982 Lowell Conference on Industrial History. work. He was Project director for a Middlesex Canal survey in 1979, for the HAER survey of the Boston Manufacturing Company mills in Waltham, 1978-1980, and for the Waltham Historical Resources Inventory by the Massachusetts Historical Commission, 1984-1985.

We will miss Michael. We will miss his sense of wonder about the things that people did with machines in the past and the present. We will miss his supportive criticism and his thoughtful conversation. But most of all we will miss him as a colleague and as a friend. Donations in Michael's name may be made to the Charles River Museum of Industry, 154 Moody Street, Waltham, MA 02154.

> Theodore Z. Penn The Commonwealth Museum

## **President's Report, NNEC**

Those of you who attended the Fall Meeting of the NNEC-SIA in Readfield, Maine, will recognize that we were fortunate to meet in such a distinctive building and to tour such a good example of the intensive use of waterpower in a small New England manufacturing community. The chance to see the Trompe l'oeil murals in the Union Meeting House alone was worth the trip. The opportunity to tour the dam sites and the foundations of the mills and related structures in the Factory Square area showed us once again that small communities in northern New England often depended as much or more on industrial than agricultural activities for their economic well being.

One of the decisions that was made at the business meeting was to authorize a committee consisting of

Michael was also active in survey Dennis Howe, Richard Borges, and David Starbuck to look into the feasibility of instituting a program of publications by the chapter. Any members who have suggestions for such a program should contact one of the committee members directly. I hope the committee will be able to announce the title of our first publication at our Spring Meeting.

> The Fourth Annual Conference on New England Industrial Archeology will meet on February 9, 1991. It will be hosted by the Southern New England Chapter, at the Powerhouse of the Wanalancet Mill, Lowell National Historical Park. We will need to support this event which is becoming an important part of industrial archeology activities in New England.

> Our own Spring Meeting will be held on May 4 and will be hosted by Duncan Wilkie and Plymouth State College. The Theme will be rural mills and we will tour the Moses Pike Steam Saw Mill archeological site in Groton, New Hampshire. Groton is just south of Plymouth, and the sawmill site is just north of Newfound Lake. Duncan and some of his students did some archeological work at the sawmill last summer. In the course of working to record every old house and foundation in Groton, Duncan has identified fourteen mill sites there.

Plans are also being made for a chapter recording project. The exact location is uncertain at this time, but two sites, both in west-central Vermont, are under consideration. The probable date will be over the Memorial Day weekend.

> Walter Ryan Claremont, NH

## **President's Report, SNEC**

The chapter's activities during 1990 focuses on the spring and fall meetings. Each meeting was attended by more than 40 people, from all the southern New England states as well as a few from the north.

The spring meeting was held June 9th in Haverhill, Massachusetts, with the day divided between pianos and shoes. The morning was occupied by a top to bottom tour of the Falcone Piano Company's manufacturing facilities in a newly renovated mill located in downtown Haverhill. Falcone presently manufactures two lines of premium pianos, both of 'grand'' style, as distinct from the upright design. Falcone pianos are the top of the line models, with approximately five manufactured each month. The company recently acquired the design and manufacturing rights to the Mason and Hamlin, a smaller piano whose manufacture will begin in the fall of 1990 and will be produced in greater numbers than the Falcone.

Each piano starts with the fabrication of the rim. The two-part rim of the Falcone pianos has 18 laminae of white maple on the inside and seven laminae on the outside. The rims are manually assembled on rim presses where the



A pattern cutting machine at the McCarthy pattern shop, Haverhill, MA.



Members of the SNEC view a Mason and Hamlin piano soundboard with a "spider" tension resonator during a tour of the Falcone Piano Company.

wood is bent and glued. The sound boards are separately assembled, as are the keys and associated mechanical action. The tour included an explanation of several pieces of specialized machinery including an exceptional bandsaw and a specially designed saw for cutting piano rims. The tour ended with a short recital by the resident pianist and tour guide, Erik Kamen.

After lunch at "The Tap", a recently renovated pub-style restaurant in the Washington Street Shoe District (NRHP), the afternoon tour first stopped at the McCarthy pattern shop. Mr. McCarthy kindly spent several hours explaining and demonstrating the early Twentieth Century pattern making machines designed to cut sheet metal patterns of shoe parts that are used for the hand-cutting of leather. Complementing the older equipment is a newer Computer Aided Design system that Mr. McCarthy now uses to cut patterns from heavy paper stock for hand cutting of leather in overseas (Asian) shoe manufacturing facilities. The afternoon concluded with a tour and business meeting at the Haverhill Historical Society.

The fall meeting was held December 1st, with tour sites in Watertown and Waltham. A tour of the Watertown Arsenal was specially arranged and directed by Marie Bourassa and Sam Gilfix of the Army Corps of Engineers. A focus of the tour took place at the "FARM" (Facility for Accelerator for Research in Material science), which features the first reactor designed for neutron radiography. Although the reactor operated for only ten years (1960-1970), the work in materials research at the arsenal was a pioneering endeavor. Tour participants had the opportunity of viewing the distinctive octagonal reactor with circular polar crane. The Rodman House (ca. 1865). the residence of the arsenal's commanding officer named after the somewhat controversial builder and cannon maker, was also featured on the tour.

The late morning was occupied with a tour of the Waltham Watch Company arranged by Mike Folsom. A watch manufacturing facility is still operating in a small area of the original factory. The tour also included a basement portion of the factory which contained the motion-protected calibration facilities. Mike provided a glimpse of, "a model factory in a model community" (as the Waltham Watch Company was described in 1880), through a narrative and a series of historic maps.

A brief business meeting was held during lunch at the Villa Restaurant. Officers elected for 1991 are a follows: Jeff Howry - President, Mike Steinitz - Program Chairman, Martha Bowers Secretary, Maureen Cavenaugh -Treasurer. Mike Folsom invited everyone to the nearby Charles River Museum, where exhibits were viewed and informal discussions were held with various trustees and museum volunteers concerning the museum's future. In the late fall the museum had to shut its doors because of a severe shortage of funds. Ideas and funds for the continued operation of the museum are desperately needed, as the museum remains closed.

A Final Note: In the fall of 1990, Mike and I spoke several times concerning the Charles River Museum and the role of the Southern New England Chapter. For many years the museum has been the official mailing address of the chapter and the chapter's unofficial home. Mike suggested that the chapter consider a greater role in the museum's operation, including participating on the board of directors. I would be most interested to hear from chapter members concerning their thoughts on the chapter's involvement with the Charles River Museum.

> Jeff Howry Lexington, MA



The neutron reactor containment building at the Watertown Arsenal. The reactor operated from 1960 to 1970.

# Report of NNEC Meeting September 22, 1990 Readfield, Maine

### THE BUSINESS MEETING

The meeting, held at the Union church in Readfield, Maine, was called to order by Chapter President Walt Ryan at 10:00 A.M. In the absence of Secretary-Treasurer Vic Rolando, a motion was passed to waive the minutes of the previous meeting. A brief summary of the Chapter finances was given by Walt. He reported that as of November 11, 1989, the balance in the treasury was \$1117.86, of which \$895.90 was from dues. Expenses amounted to \$1103.41. The balance as of September 22, 1990 is \$1509.95. There are now 118 members in the Chapter, as opposed to 102 one year ago.

Suggestions for a meeting site for spring 1991 were discussed. Duncan Wilkie, who was not present, proposed a mill site at Newfound Lake where he and his students worked this summer; it is fairly close to Plymouth, N.H. David Starbuck said he would like to have the meeting in New Hampshire. Dennis Howe offered alternative arrangements if Duncan was unable to organize the meeting. David moved that we try to arrange a spring meeting in New Hampshire. The motion passed.

A letter from Vic Rolando was read. Vic suggested we reprint the new dues rates. The printing was left to the Secretary and the printer. The dues are now \$10.00 annually, except that students dues are \$3.00. The \$10.00 dues would be for an individual or a family and is effective January 1, 1991. Vic also suggested two possible tour sites in Vermont. Vic also suggested that the Chapter support the reprinting of Collamer Abbott's pamphlet Green Mountain Copper.

Walt would like the Chapter to develop a way to reprint many small pamphlets concerning industrial archeology. Discussion on the subject followed. An obvious opportunity would be a paper or pamphlet based on a chapter tour site. David Starbuck said that publishing the papers of the Annual Conference was a good idea, and some costs could be covered as part of the registration fee. Dennis Howe remarked that the Chapter has offered to print the proceedings, but finished papers were not provided by the presenters. David said that people have requested printed proceedings. A tangible result would be a possible increase in the prestige of the conference and a boost in attendance (although attendance has been increasing with each conference). Reprinting conference proceedings would also include the participation of the Southern New England Chapter as well. A motion was made by Dick Borges to establish a committee to investigate publishing papers, and, if determined feasible, to arrange for printing. The motion passed, and the committee will consist of Dick Borges, Dennis Howe and David Starbuck.

Dick Borges suggested a maritime tour of industrial sites in southern Maine and the Piscataqua River, followed by a clambake on the gundalow in the spring of 1992.

The annual election of officers was held. David Starbuck nominated the current officers for re-election. The motion was passed and the officers for the Northern New England Chapter will continue to be Walt Ryan, President; Woodard Openo, First Vice President; Richard Borges, Second Vice President; and Vic Rolando, Secretary-Treasurer.

David Starbuck noted that material was needed for the Newsletter. Articles on ia news, current research, collections, exhibits, and announcements are typical of what is published. All members are urged to contribute articles for the Newsletter.

Krista Jackson displayed an artifact she recently collected from an electrical substation which was formerly used as a trolly depot. The artifact, made of wood with iron straps, was identified as a pipe bender (see photo). It is said to have been used as late as the 1950s, and was tentatively dated to the 1880s or 1890s. Anyone with supporting evidence is invited to respond.

The meeting was adjourned at 10:30 A.M.

### TOUR OF READFIELD, ME

Dick Borges introduced John Knox, who had originally invited the Chapter to meet in Readfield. John represented a group interested in interpreting the industrial ruins and the history of the town. He welcomed the Chapter in behalf of the Readfield Bicentennial Committee. The famous Charles J. Schumacher tromp-l'oeil frescoes of the Union Church were pointed out; the brick Federal style church is on the National Register of Historic Places. The frescoes date from 1867.

Mr. Knox explained the Readfield Bicentennial, the theme of which is "Building Community Pride and Building a Sense of Place." Readfield is now a "bedroom community" for Augusta and none of its many mill buildings, some dating back to the late



Krista Jackson displays a pipe bender, c. 1890, at the NNEC fall meeting.



One of several dam ruins viewed during the NNEC tour of the Readfield, ME, mill district.

18th century, remain standing. He had chosen to work on the mill site interpretation as his part of the Bicentennial project.

The project began in 1975, when, in conjunction with the U.S. Bicentennial, a booklet was published on Factory Square in Readfield. What is lacking, according to John, is the connection between the old pictures of vanished buildings illustrated in that booklet and the standing community. The committee needs archeological help in locating the foundations and otherwise interpreting the remains. Thus far the committee has been aided by Aileen Agnew, Consulting Archeologist, who helped obtain a planning grant. It is hoped that next year a series of talks and walking tours can be presented, followed by the publication of a selfguided tour brochure. The committee also plans an "Artifacts Day," when people will bring their artifact collections and photos, and talk about them. The talks would be recored on tape. Other concerns of the committee include:

1. Erecting permanent markers at historic sites with an estimated cost of \$170.

2. Finding someone to assist students to build a scale model of the area.

3. Dealing with the town government. There was an historic bridge which carried Mill Street across Mill Brook. It could have been repaired, but was removed by the town. The town has decided to put in a wooden walking bridge, but is ignoring attempts by the committee to participate in designing a historically sympathetic bridge.

John spoke of the need to interpret the old photographs more fully. The group is interested in a National Register nomination, and also possibly creating a local historic district, as well as creating a greenway in the area of the historic ruins. Concern was expressed that the Maine state authorities are only interested in encouraging prehistoric archeology and do not promote or help fund industrial archeology-obviously a big problem for a small town like Readfield. For those who have an interest. John Knox may be contacted by calling (207) 289-1670.

Marius Peladeau, Director of the Farnsworth Museum and former Director of the Maine Society of Museums, was introduced. As a participant in the preservation and interpretation efforts, he described the resources and the industrial history of Readfield. (Please see his article in the "Current Research" section of this Newsletter.)

Following the meeting, participants began the tour to the more distant sites by automobile, returning to the town center for a lavish lunch put on by the ladies of the Episcopal Church. The tour continued in the afternoon on foot to explore sites adjoining the river, including the clearly-visible former mill pond and Factory Square. Chapter members crossed the stream by stepping on rocks near the remains of the dam (which washed out c. 1982), observing the marshy course of the stream and other natural phenomena and by-passing the recently vanished bridge. A number attractive ninteenth century houses gave evidence of the once affluent nature of the town.

In summary, Readfield is a fine representative of the industrialized villages which were once to be found everywhere in New England and are now regarded as sleepy rural villages. Much documentation research remains to be done on the town's industrial history and related sites such as the vanished house and its mysterious cistern. The Readfield Bicentennial Committee is to be commended for its efforts to uncover the town's complex history and make citizens, including students, aware of it. The tour was fascinating, and one can only hope that the resources for documentary research and at least some archeology can be found.

> Woodard D. Openo Acting Secretary

### **Request For Information**

Allen Yale, a NNEC-SIA member from Vermont, is doing research on the E. & T. Fairbanks scale company of St. Johnsbury, Vermont. He is seeking information on installed platform scales in an industrial, commercial or transportation setting. He is especially eager to locate a wooden lever hay scale. If you have any information, please send to:

> Allen Yale 12 Randolph Avenue Randolph, Vermont (802) 728-4043

## **Call For Papers**

An Historic Ironworking Workshop, hosted by the North Jersey Highlands Historical Society is to be held on March 30, 1991, at Skylands Carriage House, Skylands Section, Ringwood State Park, Ringwood, New Jersey. The workshop site is in the iron-rich highlands that brought the ironworking expertise of Peter Hasenclever to the American colonies. Papers addressing any aspect of historic ironmaking or any particular site—furnace, forge, mine, etc.—are sought Submissions from both professionals and nonprofessionals are encouraged.

Presentations should not exceed 25 minutes in length; a slide projector and screen will be provided; presentors are urged to use illustrative material.

If you are interested in presenting a paper, please send a title and abstract to Ed Lenik at Sheffield Archaeological Consultants, P.O. Box 437, 24 High Street, Butler, NJ 07405-0437. Deadline for submission is February 15, 1991. You will be notified soon thereafter as to acceptance and sceduling.

Should you have any questions, Mr. Lenik may be reached at (201) 492-8525.

# Current Research in New England

### Maine

### Readfield

Members of the Northern New England Chapter of the Society for Industrial Archeology spent a pleasant day in Readfield, Maine, during late September visiting a number of diverse early- and mid-19th century industrial sites. While visiting the known locations of various mills and factories throughout the town, the members came across an unexpected bonus: the discovery of a beautifully-made underground cistern of unknown use on the site of what had been, in the past century, a private home. (See the article. NNEC-SIA Meeting: September 22, 1990, Readfield, Maine by Woodard D. Openo in this issue.)

While the cistern was a surprising discovery, what the members had come to visit in Readfield proved equally interesting. The Chapter members had been invited to the central-Maine community because persons working on the local history kept uncovering a wide assortment of industrial sites. Soon the



mere number of sites proved that something unusual had happened in a town that never surpassed 2,000 persons during its peak in the mid-19th Century.

On a small, seemingly insignificant, little stream of water, linking Torsey Pond with Lake Maranacook, researchers found traces and records of 22 industrial or industry-related sites. Starting in the 1790s and continuing until after World War II, these various woolen mills, sawmills, tanneries, slaughterhouses and other enterprises came and went as economic fortunes rose and fell. At four different locations within a mile-and-a-half downstream drop, the stream was dammed four times and power was generated and used four times to drive clusters of mills and shops along the banks. Again, considering the small size of the community, the variety provided by the 22 sites was impressive. Except for the two slaughterhouses and three brickyards, all the remaining industries required generated power of some sort. Along the stream also grew those typical ancillary businesses: the woolen mill workers formed an early union, and so a Union Hall was established; the mill owners needed boarding houses for the workers, and these were constructed. Knowing that hours were long and pay was modest, we can also understand why a Malt House and Brewery arose near what was known as "Factory Square," a compact triangle of buildings bound by Factory Street, Mill Street and the Old Kents Hill Road. The stream ran through this area, just off the center of Readfield.

None of the industries survive to this day and all the buildings are now gone, although the Chapter members were able to hike to numerous sites with the

David Starbuck emerges from the manhole of a cistern which he inspected at Readfield, ME. help of good 19th- and early 20th-Century maps of the area. The uses of some of the foundations puzzled the Chapter members and much research remains to be done, but the trip was enlightening for local historians.

In brief, the following industries flourished in Readfield during the past 200 years:

- several saw mills
- several grist mills
- two tanneries
- three brickyards
- a fulling and carding mill
- a scythe factory
- a woolen mill
- a sash factory
- a barrel mill
- a malt house/brewery
- · boarding houses for the woolen mill
- a woolen mill factory store and clothing manufactory
- · a second, different factory store
- · a feed store
- a blacksmith shop
- a carriage shop
- · a cheese factory
- a store with workers' meeting hall above two slaughterhouses

Marius B. Peladeau Readfield, ME

### **New Hampshire**

### Livermore Falls Mill Rehabilitation

A project which would utilize existing turbines and races of a mill ruin to produce hydroelectric power at Livermore Falls Gorge on the Pemigewasset River will again become a subject of debate between sportsmen and hydropower advocates on January 20 when the New Hampshire Rivers Management Advisory Committee will hold a public hearing in Plymouth.

The mill had been an important part of the industrial economy of the area



The J.E. Henry and Sons wood fiber grinding mill at Livermore Falls illustrated on a post card with a date of September, 1915. Courtesy of Harold Yeaton.

producing ground wood fiber for the paper mill in Lincoln until the early 1950s. The mill and its hydropower system was constructed in 1899 by J.E. Henry and Sons. It was sold to the Parker and Young Company in 1917 which operated the mill until its shutdown. Two large, 1000 HP, turbines drove line shafts to which were mounted large stone wheels. Logs of two-foot length were inserted into feeders and ground into long fibers which were added to the chemically prepared pulp at the Lincoln mill, adding strength to the final paper product.

About 100 yards from the wood fiber mill are the extremely deteriorated remains of what is said to be the last lenticular truss bridge in the state. The bridge had been originally constructed in 1885 by the Berlin Iron Bridge Company. The hydroelectric power developer, North Stratford Equipment Corporation, intends to restore and preserve the bridge as an exhibit if the hydroelectric project becomes a reality. A permanent exhibit of mill artifacts, including the great stone grinding wheels is also planned in a public area of the site. A new dam would be constructed at the same location as the original timber crib dam which was washed away in 1973. It would incorporate Borland fish lifts that would allow the upstream passage of anadromous fish.

If desired by the New Hampshire Preservation Officer, the new dam which would be a modern concrete structure, would be sheathed in timbers to simulate the original appearance. The hydropower system would utilize the existing 1899 head and tail races, and both of the extant turbines which would drive generators housed in a renovated portion of the mill remains.

The license application to construct the hydropower project and restore the area was first submitted to the Federal Energy Regulatory Commission (FERC) in 1982 after the endorsement of the project by a New Hampshire Legislative Commission. Except for concerns expressed by agencies which are working to restore Atlantic salmon to the Merrimack River (of which the Pemigewasset is a tributary), there has been widespread support for the plan to restore hydropower at the mill.

At the January 20 hearing before the

Rivers Management Advisory Committee the developer will argue that the project will not have a serious impact on the salmon restoration program, will provide safer recreational opportunities at the site, will preserve an important historic resource, and will contribute to goals of fossil fuel conservation and reduction of harmful emissions. It is recognized, however, that without greater public support for the project the mill and bridge symbolizing the area's industrial heritage will likely remain decaying derelicts.

> Dennis Howe Concord, NH

### Connecticut

### **Threatened Industrial Sites**

### THE MERRITT PARKWAY

The Department of Transportation has just presented a twenty-year plan calling for eight lanes along this celebrated scenic corridor. The parkway opened fifty years ago this fall.

# THE COS COB POWER STATION, GREENWICH

The town announced its adament intention to demolish this mammoth landmark of American engineering history after its study of proposals for reuse revealed problems with the condition of the buildings and access to the site. The Spanish Colonial buildings of 1907 housed the largest single component in the first electrified railroad mainline in the country.

### THE PONEMAH MILLS, NORWICH

Here, the threat is vaguer. This is perhaps the most beautiful large nineteenth century mill complex in the state. It was built between 1866 and 1902. Long-term underuse of buildings that now have three different owners, coupled with one owner's sudden demolition of auxiliary buildings without proper permits last month, have roused concern.

### THE LAKE COMPOUNCE CAROUSEL, SOUTHINGTON NEAR BRISTOL

Built in 1911, installed in 1917, listed on the National Register in 1978. A case, brought by the State Attorney General to block auctioning off the carousel animals, is pending.

From Connecticut Preservation News, Vol. XIII, No. 3

### RHODES/NIGHTINGALE MILL

This 3-1/2 story textile mill was built by James Rhodes in 1841 to replace an earlier mill that had burned. Constructed of brick and stone sills and lintels, it has a clerestory monitor roof. A stair tower stands at one end; the other end overlooks the falls of the Quinebaug River. Now vacant, the mill needs a new roof and other structural repairs.

The site also includes several smaller outbuildings. All utilities, including city water and sewer, are available. The mill is currently zoned industrial, but town officials have indicated a willingness to re-zone it for commercial purposes. Size: 110' x 45', 3-1/2 stories plus full basement. Land: 1.69 acres. Landmark status: state register. Contact: Dick Loomis, (203) 928-7991.

From Historic Properties Exchange, May/June 1990

### **Emergency Bridge Program**

The Connecticut Department of Transportation is improving the Route 315 crossing of the Farmington River in Simsbury. The improvements in State Project No. 128-110 include replacement of bridge No. 01587, which currently carries Route 315 over the Farmington River. The existing

structure is historic and is being offered under Section 123 (f) of the Surface Transportation and Uniform Relocation act of 1987. Under this act, a qualified recipient is sought to enter an agreement to "(A) relocate the bridge and maintain the features that gave it its historic significance; and (B) assume all future legal and financial responsibility for which may include an agreement to hold the State Department of Transportation harmless in any liability action." Limited funds shall be made available to the recipient towards costs incurred to relocate and to preserve the historic integrity of the bridge. Eligible reimbursable costs shall not exceed the project cost of demolition of the superstructure portion of the bridge.

Upon completion of the new structure, the historic bridge over the Farmington River will be available for transfer of ownership and relocation. The bridge is a through Parker truss, built about 1894. The single span of 162 feet consists of 2 trusses, one each side of the roadway. Each truss has ten equally spaced panels. The height of the truss varies from 20 feet at the first interior panel point nearest the abutment to about 24' at midspan. A complete description of the bridge and its present condition is available by contacting Mr. Robert E. Swain, Chief of Design, Bureau of Highways, telephone number 666-7230, at the Connecticut Department of Transportation Engineering Office, 160 Pascone Place, Newington, Monday through Friday, 8:30 a.m. to 4:30 p.m., excluding holidays.

Interested parties are requested to respond to this offer by addressing a written request to: Commissioner, State of Connecticut, Department of Transportation, 24 Wolcott Hill Road, P.O. Drawer A, Wethersfield, Connecticut, 06109 prior to December 31, 1990. Please reference Bridge No. 01587 and State Project No. 128-110 in all letters. If no request is received by this date, the Connecticut Department of Transportation will certify to the Division Administrator of the Federal Highway Administration, that the opportunity for relocation of this historic structure has been offered to all concerned and approval of the project will be requested from the Federal Highway Administration.

> Commissioner State of Connecticut Department of Transportation

## Article

## Individuality and Variability in Design of 19th- and 20th-Century Lime Kilns in Vermont

### A Paper Presented to the VAS at Burlington, VT, on October 27, 1990

The state of Vermont constitutes 9,609 square miles, or less than 0.2%of the area of the United States. Yet, a total of 106 lime kiln ruins and remains were found at 65 sites in that small area during the 1984 to 1990 period of a continuing state-wide IA survey, and are now a part of the State Archeological Inventory. Of these ruins, 14 are farm types from the 1800 to 1860 period; 59 are early commercial tpes from the 1850s to the early 1900s: 29 are a later commercial type from the 1870s to the 1920s; and 4 are modern types from the 1920s to the 1950s. Fourteen other sites, at which inconclusive or no positive surface evidence was found, but at which subsurface material might exist, have been reported to the State Archeologist in the Field Site category. In-progress archival and field work continues at 28 more sites. The total number of reported and unreported lime kiln ruins and remains is therefore approximately 151 at this time. The earliest known Vermont lime kiln date is 1794, at Bennington, of which no known surface ruin survives. In terms of something visible, there are 83 ruins in various states of condition to be seen in the field.

Types of kilns employed in lime burning have been grouped into two main categories: intermittent and continuous types. Continuous type kilns have been further divided into mixed feed kilns, separate feed kilns, and rotary kilns. Vermont's only rotary kiln, which was a single unit 8 feet in diameter and 120 feet long, resembling a long smokestack lying on its side, was dismantled int he early 1930s. Only archival materials exist to describe it.

Ruins of 19th-century intermittenttype lime kilns were all constructed of stone, most of which came from the same quarry that provided the stone which was eventually burned inside the kiln. Although this sounds like a peculiar practice, the insides of these kilns soon glazed over from the heat of burning, and the glaze protected the kiln walls from further heat effects. The glaze also helped seal the kiln from unwanted outside drafts, keeping the heat inside and reducing fuel consumption. No mortared walls were found in the early to mid-19th century ruins. Some ruins were built into a hillside or low rise so that the top of the kiln was easily accesible for charging the kiln with stone, while the bottom was left open for supplying fuel and drawing out the burned lime. Some ruins not built into hillsides were covered with a hurdle, which was a coat of earth, leaves, and branches that insulated the kiln, taking care to leave a hole for access to the hearth.

Aside from the general configuration and character of the ruin, which differentiates it from, for example, a charcoal kiln or blast furnace, it is the presence of burned lime in the form of a gray-white grainy powder or small, cracked, white stones caused by the intense heat of burning, in the direct vicinity of the kiln's bottom opening. It was also found scattered about the top of some ruins. Because the bottom opening created a built-in weakness, the front walls of many early ruins were found collapsed and much of their internal stonework slumped outward on the ground, hiding any burnt lime in this area and giving the ruin a random stone-mound appearance.

In charging the kiln, the largest pieces of limestone were first selected and formed into a rough dome-like arch about 5 to 6 feet high, leaving openings around the stones for upward draft. Above this arch, the kiln was filled to the top with limestone fragments with the larger fragments toward the bottom. A wood fire was started under the dome, and the heat was gradually raised to prevent sudden expansion and rupture of the dome. After a bright heat was reached throughout the mass of stone, it was maintained for 3 to 4 days. Complete burning was indicated by a large shrinkage in volume of the contents, the choking up of spaces between the fragments, and the ease that an iron rod could be forced down into the mass from the top of the kiln. The fire was allowed to slowly die out, and the lime was gradually removed from the bottom. The process was simple and cheap, the main expense being for blasting the stone at the quarry and preparing the fuel. One or two kilns supplied a 17th- and 18th-century neighborhood for a year, operating for a week or two, and remaining idle for the remainder of the year.

Lime burned in this manner was used as a fertilizer that reduced the acidity of the soil, and was also used in the tanning and paper-making industries. It was used as a disinfectant, an alkalizer for medicinal purposes, as a filtering agent in the production of coal gas for lighting city streets in the late 19th century. And, of course, it was used in the manufacture of mortar and cement.

Kiln remains found in Vermont were anything from an 18-foot square by up to 20-foot high stone-built ruin, to a barely distinguishable grass-covered stone mound in the woods. Depending on which direction a ruin is approached, from the uphill side it can appear to be no more than a hole in the ground, or from the downhill side the entrance to a crypt or stone chamber. Front openings varied from a simple square hole overlain with a single, massive stone lintel, to a small archway, or to a decorative Gothic archway with a pointed top.

As a demand for burned lime increased, so did the size and capacity of the kilns increase. Vertical inside walls gave way to slightly tapering walls, resembling an egg standing on end. A kiln 25 to 28 feet high was 10 to 11 feet at its greatest diameter, 5 to 6 feet diameter at the top, and 7 to 8 feet in diameter at the bottom. There was a 5- to 6-foot-high openening at one side to introduce the fuel, and there was a horizontal iron grate, on which the fire was built, placed 1 to 2 feet above the bottom of the kiln to allow space below for ash accumulation and removal.

Due to the enormous loss of heat at each separate burning of the intermittent kiln, a continuous type mixed-feed kiln evolved in which limestone and fuel were introduced into the top of the kiln in alternate layers, with the burned lime drawn from the bottom. But the mixed-feed also produced a lime that was neither as evenly burned nor as white as that from the intermittent type kiln, which led to the development of the separate-feed kiln.

Separate-feed kilns, which were in operation throughout most of the country and Vermont by the early 1900s, were equipped with separate chambers, called "fireplaces", to burn the fuel. Fireplaces were set inside the kiln walls of those made of stone, or outside the walls of iron shell type kilns.

The kiln body proper contained the limestone charge while the fuel was fed into the fireplaces where it burned. The limestone, therefore, never came into direct contact with the fuel, but only

the hot gases of combution, which rose upward through the limestone and out the top of the kiln. All things being equal, these kilns did not have as high a fuel efficiency as the mixed-feed kilns, but the burned lime was of a significantly higher quality and contained no discolorations or fragments of unburned fuel. These kilns were 35 to 50 feet high. The iron shells were 5 to 8 feet inside diameter, lined with firebrick, and had from 2 to 4 fireplaces.

Late 19th- and all 20th-century ruins were found with firebrick linings. Attention to both firebrick and red brick allowed for the approximation of operating dates of some ruins of which little or no archival material was found. One common firebrick contained markings of the McLeod & Henry Company, manufacturer of firebrick at Troy, New York, from 1887 into the 1890s. Another firebrick, similar in configuration to some found at the blast furnace at Forest Dale, is marked Sayre & Fisher, of Amboy, New Jersey. By the late 19th century, firebrick were being made in a variety of shapes to fit the needs of kiln and furnace designs.

Another indication of thecnological progress at lime kiln ruins was the use of binders to stabilize the stack and keep the stonework together. Most common binders were 1-inch diameter iron rods, threaded at ends that protruded out of the walls. The rod ends had large nuts screwed on with washers that snugged the assembly against the kiln walls, holding the structure tight through cycles of firings and coolings. At other ruins, slotted end binders with beveled iron keys were in evidence, much like the type of binding found at the Forest Dale blast furnace. In some

Mid-nineteenth century lime kiln ruin along Turkey Mountain Road in Jamaica, VT. collapsed ruins, the internal lateral criss-cross pattern of these iron binders was revealed once the tangle of bent and intertwined hardware was figured out. Wood timbers were also used for support of the walls, especially wall areas over openings. Probably because they were so thoroughly dried by the internal kiln heat, these massive beams have survived to continue their function today at many ruins. But nowhere, however, did the strength of the lime kiln binding approach that of binding used at blast furnaces, which were much more massive in size.

Lime kiln sites were found to have as many as 1 to 7 ruins per site. There were 43 single-kiln sites; eight 2-kiln sites; one 3- and one 4-kiln site; two 5-kiln sites; two 6-kiln sites; and one 7-kiln site. Sites with largest number of ruins were those of combination stone and concrete construction with iron shells.

Anyone familiar with Vermont's 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 miles of stone walls they have built during the 200-year history of the state. Stone-built lime kilns reflect, therefore, the adaptive use of a natural resource to answer the need for a practical building material.

The variability in design of 19thcentury lime kilns in Vermont reflect the ability of lime burners to adapt the needs of basic kiln design to the available resources. The consistant 8-9-foot inside diameter of early lime kilns, for example, indicates a common knowledge of one aspect of the technology. But the variability in binding, hardware, kiln configuration, and archway design testifies to the individuality that many enterprising Vermonters appeared to make the most of.

> Vic Rolando Pittsfield, Massachusetts

Early twentieth century lime kiln at Leicester Junction, VT. Note collapsed iron shell of second kiln to left of standing ruin.



## Article

## Moses Pike Steam Saw Mill

The Moses Pike Steam Saw Mill is an archeological site consisting of three disconnected groups of stone foundations. This industrial site is situated in the Town of Groton, New Hampshire. The mill is on the Cockermouth River which drains into the north end of Newfound Lake in west-central New Hampshire. The largest foundation grouping (N.H. site 27GR9) is that of the long saw mill (or main mill) in which logs were cut by moving them back and forth on a long carriage. The boiler house foundation and two additional unidentified foundations are attached to the main mill. The remains of a narrow canal are still visible extending from the north-west end of the boiler house to the south bank of the Cockermouth River. Just outside the boiler house to the north east is a noticeable circular depression of unknown function. East of the canal, between the boiler house and the river. is a separate foundation, also of unknown function, designated N.H. site 27GR11. North east of the main mill foundation on the bank of the river is the foundation of the millwright's residence (27GR10). The land inbetween the residence and the mill is low and swampy with a small seasonal brook which passes through the main mill foundation.

The site is a short distance down river from Sculptured Rocks gorge which is heavily used by tourists, swimmers and hikers. The intervening land is steeply sloping with rock outcroppings and a dense cover of conifer trees making an effective natural barrier between the site and the heavily used part of Sculptured Rocks State Park. The stand of conifers continues on into the central part of the site and gradually changes into a bottomland, mixed hardwood community. The site area forms a small, four-acre flood plain on the south side of the river. The north side of the site is demarcated by the south bank of the Cockermouth River. The west border of the flood plain has the steep, rocky slope from the gorge, and as one moves southward around the perimeter of the site the land slopes more gently onto the floodplain. Upon reaching the southeast to eastern perimeter, the land is low and swampy with a small tributary entering the river from the south. A seasonal brook of this tributary flows through the main mill foundation as mentioned previously. The main road from Groton parallels the river at a short distance to the south. The site is between the two but concealed from view by the dense vegetation.

The original access road to the mill, which is mentioned in a court deed, leaves the site in a southeasterly direction and traverses the gently sloping land on the southeast side of the small flood plain. The faint trace of this road crosses the tributary brook as it leaves the floodplain and ascends to the paved Groton road. At this crossing one leaves the eastern border of State property which is also used as the eastern limit of the site. In summary, the site is bordered on the north by the river, on the west by rocky slopes of the gorge, on the south by the more gentle slopes coming down from the paved Groton road, and lastly on the east by the State property line crossing through the swampy bottomland to the river bank.

The cultural remains of this site include numerous foundations (3 separate groups) and other archeological features which will be briefly discussed:

**27GR9**: The major feature is the foundation of the main mill which is designated site number 27GR9. The outer wall facing the swampy lowland

is 141 feet long and 6 feet thick with an inside height of 4 feet and and outside height of 8 feet at the highest point. The foundation consists of large angular pieces of granite. Some appear to have been minimally cut but most have not. The foundation was considerably higher and numerous stones have fallen into the swampy land outside the wall. At right angles to this outer wall are the remains of another foundation approximately 35' by 38' extending into the swampy land. On the inside of this outer wall is a 21' wide level space reaching the entire 141' length. The log carriage was situated here. The inner wall starts at the same place as the outer wall but only extends 38 feet. On the uphill side of this shorter wall are the remains of another foundation which measures 38' by 32'. These three foundations make up an unusually large rural saw mill. A dressed granite foundation links this mill with the boilerhouse. The small seasonal brook presently flows over the dressed granite structure.

The boiler house foundation is constructed of stone and brick. In the approximate center is a 19-foot long drilled granite foundation for the placement of the iron steam boiler. Surrounding this are the partial remains of a stone footing with the remains of a brick wall (3 rows wide) on top. The boiler area is 27' by 42', and at one end is the entrance of a narrow canal (penstock) into the mill (for boiler feed water), and at the other end are the remains of a tailrace leaving the mill. The penstock and tailrace are not as large would be found in a water powered mill since steam mills require less water. The west side of the boiler house (facing the main mill) has a thick, high stone foundation wall constructed an a manner similar to the one described for the main mill. This type of construction was probably necessary to take the vibrations involved in mill operation, and possibly to protect the rest of the

mill from a boiler explosion. Two large iron reinforcing rods are protruding out of the rubble of a collapsed portion of the wall. This stone wall on the west side of the boiler house collapsed inward. Limited archeological testing in this rubble uncovered a flattened tin bucket. The collapse of the wall may have happened in the 1860s when newspaper accounts recorded the burning of the mill.

In the summer of 1989 other minimal testing was conducted to trace out some of the walls in the boiler area and identify the penstock, headrace and tailrace. Seven post-hole tests were excavated into the swampy tailrace area between the boiler house and the main mill. There is clear evidence of a mantel of recent silt over an earlier historic surface. The few artifacts recovered were inconclusive determinants of either age or function of the occupation. On the northeast side of the boiler house is a large depression which was archeologically tested with one post-hole excavation. The results were inconclusive as to the function of this feature.

The canal is unusually narrow (5'-6')when compared to water-powered mills (16'-18') in this region of New Hampshire, but substantially deep on the basis of limited post-hole testing. It may have been brick and gravel lined. The length of the canal from the boiler house to the river bank is 106'.

**27GR10**: About 180' east-northeast of the boiler house is the foundation of the millwright's residence. This is confirmed in primary court documents, however, some workers lived in the upper floors of the main mill. The foundation is right on the river bank. Its overall size is 14.5' by 26'. The chimney placement is slightly offcenter lengthwise. Millwrights' residences at five other mill sites in the region lack any type of central or quasicentral chimney placements and are smaller in overall size than here at the Moses Pike steam saw mill.

27GR11: Just 53' northeast of the boiler house is a separate foundation measuring 42' by 16'. It is an L-shaped foundation with an interior, rubble talus slope at the closed end. Troweling the surface of this rubble in 1989 uncovered cinders, ashes and a selection of historic sherds. Most of the sherds were salt glazed. Post-hole tests in the middle of the foundation depression revealed that it was indeed a deep cellar. Vehicles may have entered the open east end of the foundation at cellar level to be loaded from the ground level. This may have been a means to remove large quantities of ashes from the site.

This industrial site was first recorded in the fall of 1988 as part of a professional reconnaissance survey of the Cockermouth drainage. It was given three separate State site numbers because of spatially separate foundation clusters. In 1989, an intensive surface survey, limited testing and a comprehensive literature research revealed that all three were historically interconnected as one mill complex. Minimal subsurface testing in 1989 was

nited to the boiler house, canal and ilrace areas of the main mill and the inattached foundation identified as 27GR11. The heavy surface cover of pine needles hides most of the surface artifacts, but in the areas tested there are historic cultural remains at least down to 30 cm as a sheet midden over most parts of the mill complex. Subsurface features such as the canal have artifacts as deep as 60-70 cm. No surface of subsurface artifacts have been recovered from the millwright's residence but great potential exists for significant finds. In 1990, testing is planned for the millwright's residence. The surface silting from past major floods and the accumulation of forest mast makes the recovery of surface artifacts quite remote. Conversely, these factors increase the preservation of sub-



Plan of the Moses Pike steam saw mill archeological site in Groton, NH.

surface artifacts. The site is outside of the heavily traveled tourist and recreation spots in Sculptured Rocks park so vandalism, littering, and other public nuisances do not impact the site. The standing ruins have architectural and historic importance in helping archeologists reconstruct an entire steam saw mill complex with millwright's residence, outbuildings and main mill. The mill burned down in the 1860s, and the site was never rebuilt on the basis of primary historic documents.

### Brief History of Seven Acre Mill Lot Prepared by Jon Sanborn

The land upon which this mill complex is located was originally part of the David P. Fox farm until 1854, then Fox sold it to Moses Pike (Grafton C. Court Deeds, 226:121). Also in that vear Moses Pike sold seven acres of the former Fox farm to the "steam mill company" (233:246). There are no buildings mentioned in this deed for the seven acres. It was very likely that the steam mill was built later in that year. In 1855 Pike sold the farm minus the seven acres with the mill back to David P. Fox. The first deed to actually mention the mill buildings and millwright's house was in May 1856 (238:311). The saw mill and seven acres of land was mortgaged in 1856 for \$1200, whereas, in 1854 the same land was only valued

at \$55 suggesting improvements in the form of buildings after it was owned by the "steam mill company." Another deed in 1856 (238:142) mentions the construction of a new road just east of the steam mill which is owned by "Moses Pike and others." In the same year, a mortgage was taken on the 'steam saw mill, machinery and fixtures" (239:571). There was no question that it was in operation in 1856 because the New England Business Directory for the year lists under the town of Groton, "Moses Pike and Co. (steam mill lumber company)", and under the town of Hebron. Moses Pike as a "lumber dealer." In 1856 Jesse P. Moses is shown as a co-owner since both he and Moses Pike are listed in two mortgages (238:311, 239:571). The grantee in the second mortgage was Austin F. Pike.

No deed mentions exactly when the mill came into the possession of Austin F. Pike, 1819-1886 (U.S. Representative and Senator). Austin F. Pike received the mill when the mortgage went into default. There is an entry in the Grafton County Deed Index which refers to a writ of possession in the Clerk of Courts Office for "Austin F. Pike versus Moses Pike/Jesse P. Pike' for the November 1863 court term. A January 30, 1860 deed (261:118) for adjacent land to the mill refers "...to the steam mill lot formerly owned by Moses Pike and others." The mill appears to have been destroyed by fire in 1860 using various primary documents. The 1860 map of Groton (Walling's map) shows the mill as two buildings. possibly sites 27GR9 and 27GR11. However, the business is not listed in the 1860 Manufacturing Census for Groton nor in the 1860 New England Business Directory.

The information on the fire comes from a newspaper obituary (*Bristol Enterprise*), August 22, 1895) of David N. Kemp who had a saw mill at the gorge just up the river from the steam saw mill. The newspaper account reports that Kemp was sawing in his mill at night when he discovered the fire in the nearby steam saw mill. He gave the alarm to three workmen sleeping in the chambers of the mill. Two of them escaped by a fearful jump, and a third perished in the flames. The newspaper's 1838 date for the burning is most likely in error because the mill was not built until 1854 at the earliest. Also, Kemp himself would have been only 9 years old in 1838. Kemp owned his saw mill between 1854 and 1898 (186:481, 227:32, 207:414) which coincided with the 1856-1860 dates for the steam mill. The exact date of the mill burning is difficult to determine but it appears that the mill was gone in 1860. Confounding this problem is the lack of deeds for the steam saw mill between 1856 and 1904. In the 1904 deed (469:490) to the sevenacre steam mill lot no buildings are mentioned. Lastly, no mention of the steam saw mill could be found in the probate records for either Austin F. Pike (1886) or his wife, Caroline W. Pike (1890).

### CONCLUSION

Returning to the importance of this site after a brief history, the dates of this mill site, 1854-1860, coincided with the industrial growth spurt just prior to the Civil War for the Northern side in the military conflict. Before this regional growth, the area had a depressed economy, especially in the 1840s and early 1850s. Few rural mills in northern New Hampshire appear to have been built in these years. To the south, however, Lowell, Massachusetts, and other places like Dover, New Hampshire, were busy constructing or enlarging textile mill complexes. The increasing use of the water and steam turbines were slowly replacing the less efficient and older under- or over-shot water wheel technology. As newer

technology spread into the northern interior of New Hampshire, Jesse Moses and Moses Pike built and operated their steam powered saw mill for a few years before it burnt down and they became consumed in debt never to rebuild on the site. The shift from water to steam power in rural saw mills is basically unrecorded in New Hampshire and poorly, at best, recorded elsewhere in New England. Most of the evidence comes from portable steam plants which were placed on wheels much like railroad locomotives. In the southwestern part of New Hampshire, Harrington (1984) excavated the remains of a portable 1880s type of steam saw mill on a wooden base. However, at the Moses Pike mill the steam boiler was permanently attached to a granite foundation and at a much earlier time than the above portable steam mill. Some of the characteristics of the Moses Pike mill suggest a transitional and experimental technology from water to steam power. A canal and penstock-like arrangement at the site reflects the earlier water power technology. The site, both in time and technology, bridges the transition between two basic modes of power production in the American Industrial Revolution. The site was short lived so it is a time capsule analogous to the archeological recovery of a shipwreck. It can be fairly comfortably assumed that most of the features and artifacts date to the few years between construction (1854) and destruction (ca. 1860). The significance of the site is the archeological potential to yield information about the transition in rural from water wheels to steam turbines. Even though the iron turbine is gone its granite foundation is preserved as well as the spacial contextual relationships to other parts of the site. The engineering mechanics of how a permanent steam saw mill was laid out can be studied in detail. The destruction of the mill by fire was swift and complete,

creating a "Pompeii" type of preservation for the archeologist.

The archeological integrity appears from the surface and subsurface testing to be strongly intact and significant. Archeological research and excavation of this site can be used to test a number of assumptions about the transition of water to steam power. How was steam technology adapted to water power sites? How did rural New Hampshire accept this technology? What is the relationship and function of different attached and unattached buildings as preserved in the form of foundations and associated artifacts? What kind of material culture did millwrights and workers have? Is the adaptation of steam at this mill a reflection of the diffusion of technology from southern New England into a regional subculture of northern New England. Are different parts of the technology accepted or rejected due to the cultural context of rural northern communities. How does the archeological material culture evidence support or reject written accounts of the mill?

The Moses Pike Steam Saw Mill site and a number of other rural mill sites will be visited as part of the NNEC-SIA spring meeting at Plymouth State College on May 4, 1990. 19

> Duncan C. Wilkie Jon Sanborn Plymouth State College

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1904	Book 469, p. 490. John		
	W. Sanborn, Grantor,		
	Hannah F. Cilley,		
	Grantee. (Sanborn from		
	heirs of A.F. Pike in		
	1900, 7 acre steam mill		
	lot.)		

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