Society for Industrial Archeology · New England Chapters

VOLUME 20 NUMBER 2 2000

CONTENTS

CONTRIBUTORS

Mary Boswell, Krista Butterfield, Dennis Howe, Greg Galer, James Garvin, Matthew Kierstead, Peter Kushkowski, Lance Metz, Michael Raber, Victor Rolando

NORTHERN CHAPTER OFFICERS

David Starbuck, President
Betty Hall, 1st Vice President
Walter Ryan, 2nd Vice President
Herman Brown, Treasurer & Secretary

SOUTHERN CHAPTER OFFICERS

Matthew Kierstead, President
Gregory Galer, Vice President
Robert Stewart, Secretary
Rick Greenwood, Treasurer

EDITOR

David Starbuck
PO Box 492
Chestertown, NY 12817-0492
starbuck@netheaven.com

Call for Papers

Annual Conference on New England Industrial Archeology

February 3, 2001
at Central Connecticut State University
New Britain, Connecticut.
Deadline for paper proposals: December 31, 2000.

The Southern and Northern New England Chapters of the Society for Industrial Archeology invite proposals for papers to be presented at the Annual Conference on New England Industrial Archeology. This year's conference is to be held at Central Connecticut State University in New Britain, Connecticut on Saturday, February 3, 2001. Presentations on all topics related to industrial archeology are welcome. The program committee especially encourages papers related to some of the general themes of industry in New England. There is particular interest in proposals from new members and those who have not spoken to the group in recent years. Proposals from non members are also encouraged.

Presentation Formats: Proposals may include individual papers or reports on works in progress and are strictly limited to 20 minutes.

Proposal Formats: Each paper proposal must include: 1) title; 2) an abstract of not more than 300 words; 3) a one page resume for the presenter(s), including postal address, telephone/fax, and e-mail;) a list of audio-visual requirements. All proposers must submit two (2) copies of their proposals. Deadline: Proposals must be received by December 31, 2000.

Send paper copies of proposals to: Greg Galer, SNEC-SIA Program Chair, 9 Day Street, North Easton, MA 02356. Inquiries are welcome at this address, or by phone (508) 565-1403 or (508) 230-0922; e-mail: ggaler@stonehill.edu

Letter to the Editor
Stevenson Hydro Connection to Playwright Eugene O'Neil

A belated reply to "The Stevenson Hydroelectric Complex, Housatonic River, Connecticut," SIA-NEC newsletter, vol 20, no 1, 2000.

As an early-retired (12-30-91) mechanical engineer-manager from Northeast Utilities, I read with much interest the subject story, and have these comments. The Stevenson Hydro story missed an important human-interest item, one that I accidentally stumbled upon somewhere in my poring through Connecticut Power and Light Company lore. It seems that not too many years after the Stevenson Hydroelectric plant went on line an inquisitive, somewhat eccentric, gentleman frequently visited the plant. Plant operators' interviews recorded in CL&P employee publications spoke of this man at length. It seems he wasn't interested so much in the technical aspects of the plant as he was in his being able to soak in the general ambiance and charisma of the machinery with its mesmerizing 60-cycle hum.

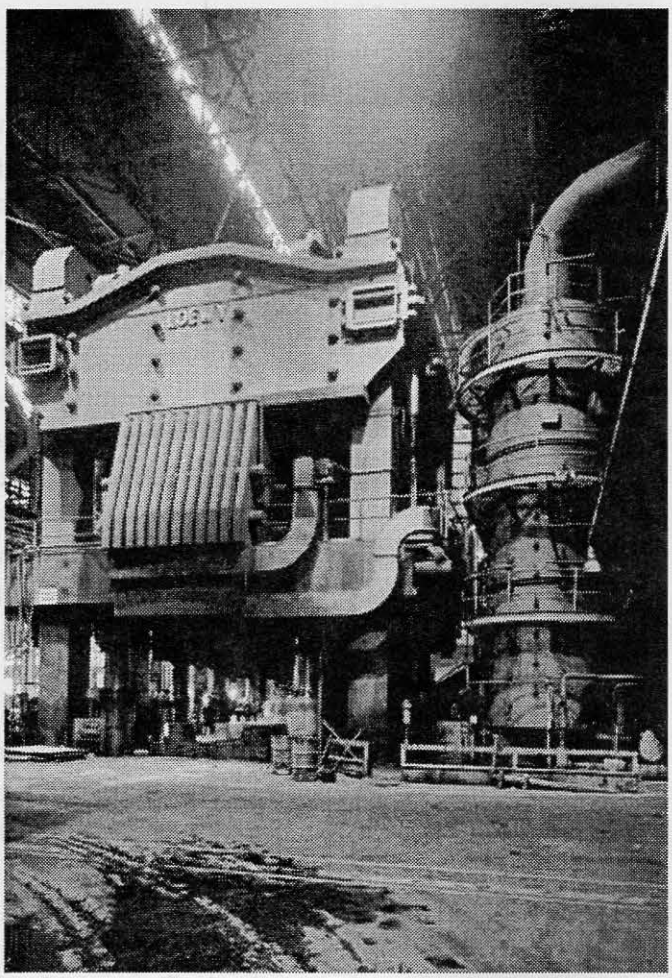
That man turned out to be Connecticut playwright Eugene O'Neil. His visits to Stevenson provided him with the background for a play he composed in the late 1920s (1928?). The play is appropriately titled "Dynamo." Its setting is largely inside a hydroelectric power plant. The macabre drama ends with the protagonist electrocuting himself by taking hold of two generator bus bars. This could be the reason why "Dynamo" never became as popular as other O'Neil plays, but it can be found published in compendiums of The Works of Eugene O'Neil at most public libraries.

My 35-years electric utility career took me to many power plant installations in New England (i.e.; I participated in the startups of 6 units, 3 fossil-fired, 3 nuclear, including the Brayton Point plant in Somerset, MA, toured by SNEC in November, also mentioned in subject newsletter). My historical interests go back to my earliest memories, and were vocationally nurtured throughout my utility career where I always had my camera handy. This resulted in many hundreds of slides taken of the plants I was associated with. The images go back to the mid-1 950s. Some of the plants have since been demolished (i.e.; Narragansett Electric's South Street Station's high-pressure "house" in Providence, RI) or significantly altered (i.e.; repowering of Narragansett Electric's Manchester Street Station with gas-fired units). These slides were the basis for my slide presentation at the 1990 Annual Meeting of the Society for the History of Technology (SHOT) in Madison, WI. It was titled "One Man's Kilowatts: A 35-Year Trek in the Electric Utility Industry." Consisting mainly of power plant images throughout New England, perhaps the show might be deemed worthy of being resurrected for a viewing here in southern New England. I'll be happy to oblige.

List of power plants included in "One Man's Kilowatts":

Salem Harbor Station, Salem, MA, New England Power Company
New England Power Company's Connecticut River hydroelectric plants in New Hampshire/Vermont
Yankee Atomic Power Plant, Rowe, MA, Yankee Atomic Power Company
Manchester/South Street Stations, Providence, RI,
Narragansett Electric Brayton Point Station, Somerset, MA,
New England Power Company Haddam Neck Plant, Haddam, CT, Connecticut Yankee Atomic Power Company
Millstone Point Nuclear Station, Waterford, CT, Northeast Nuclear Energy Company

Peter Kushkowski
27 Crabapple Corner
Haddam, CT 06438
860-345-2887
PKushkowski@prod igy. net



The 50,000 ton press at Wyman-Gordon, a leader in the production of technologically advanced forging. *See* Forge Ahead..., *page 5.*

Chapter Presidents' Reports

President's Report, SNEC

The Southern New England Chapter held its annual business meeting at the Annual "Yankee Steam-Up" event at the Museum of Steam and Wireless at East Greenwich, Rhode Island, on Saturday, October 7 (see the Annual Meeting Report elsewhere in this issue).

One important item discussed at the meeting was the formation of committees to oversee several new initiatives, including creating an "occasional publications" series; marketing promotional items such as a coffee mug, T-shirt, etc. for Chapter members; creating a new chapter brochure and conference display board; developing a membership recruitment program; and a Chapter web site. Your chapter officers encourage members with skills or interest in these areas to come forward.

After more than ten years of service to the Southern New England Chapter, Michael Steinitz has stepped down. The Chapter extends its profuse to thanks Michael for his service in the roles of President and Secretary. Michael is replaced by Bob Stewart, who was nominated and voted in as the new SNEC Secretary at the Annual Meeting. Bob organized the national SIA's Fall 1998 tour of the Connecticut River Valley, and is coordinating the SNEC's 2001 Conference on New England Industrial Archaeology, to be held at New Britain, CT, in February 2001.

During 2000 the Chapter continued its series of weekday tours of operating industrial facilities. The Chapter visited Wyman-Gordon and Washington Abrasives in Grafton, MA, and a took a comparative tour of historic and modern nail-making processes in Southeastern Massachusetts (see article elsewhere in this issue).

Matthew Kierstead
Providence, RI

President's Report, NNEC

The Northern New England Chapter held its Fall Meeting and our in Portland, Maine, on Saturday, September 16, 2000. The tour began at the Portland Company and was conducted by Phineas Sprague, Jr. This impressive complex was a focal point of manufacturing from 1846 to 1977. Among the items built there over the years were wood-burning locomotives, steam fire engines, nuclear reactors, marine engines, cannons and various types of ammunitions during the war efforts; William H.Chapman's electrical lab was where the Static Eliminator was invented; and the open carriage design Portland Company Elevator was built here. The future of the complex remains uncertain. A zoning review is currently in progress.

The group then toured the recently restored Portland Observatory. It is the last maritime signal tower remaining in the United States that is still functional. Following this, Herb Adams gave a brief discussion at the Center for Maine History. The tour then proceeded to the Maine Historical Society Library Building, where Bill Barry gave a talk on Portland history.

The tour continued at the Portland Harbor Museum. Immediately following lunch, the Chapter held its Business Meeting and election of officers.Following this, Myron Read of the Portland Harbor Museum gave an enlightening presentation on World War 11 Liberty ship construction in Portland. Several members then continued on to the Spring Point Lighthouse before heading for home.

At is with great reluctance that I must announce my stepping down as a Chapter officer after eight years of service; new life goals and obligations have begun to pull me in a different direction. Taking such a step is a difficult decision for one to make, but I believe there is no better time than now. I do plan to attend every Chapter meeting that I can, as I have for the past eleven years. Thanks to all of you for your support!

Krista Butterfield
Outgoing President
Brownfield, ME

SNEC Business Meeting Report

The Southern New England Chapter held its annual business meeting at the Annual "Yankee Steam-Up" at the New England Wireless and Steam Museum in East Greenwich, Rhode Island on Saturday, October 7, 2000. The meeting was called to order by President Matt Kierstead and Vice President Greg Galer with 12 members in attendance. In addition were two visiting members from the Roebling SIA Chapter, Gerry Weinstein and Mary Habstritt, the latter also a member of the national SIA Board.

Greg Galer presented a summary of the year's activities including tours (six process/site tours completed between July 1999 and September 2000), various letters of support for threatened industrial structures and sites, and other involvements. Matt Kierstead noted that he has received positive comments from the national SIA board about our activities. He also indicated that Pat Martin, editor of the IA journal indicated that we should push members, particularly those with items recently published in the chapter newslet-

ter, to develop papers for IA.

A financial report was presented by Treasurer, Rick Greenwood. The Chapter's checking account contains $4,438.75 and the money market account contains $4,871.11. From May 1999 to April 2000 the organization had $1,435 in income and $1,162 in expenses, leaving a surplus in the checking account of $273. The money market account earned $242 in interest in that time. Membership is up as is the number of people current with their dues.

Greg Galer led a discussion about the need for the chapter to carry insurance to protect itself and the board from liability exposure. The exposure is particularly apparent related to tours and site documentation projects. The chapter organizes events that bring people into factories and other sites that contain hazards. A slip of the foot could lead to serious harm in many of these locations, and serious harm could lead to a law suit. He noted that inquiries to the national SIA board had provided little helpful information, so he contact some insurance agents to get information. The chapter needs general liability coverage. The cost of $500,000 to $1million in coverage would be $500-$600 per year. Galer presented a chart (attached) with income and expenses for the chapter and indicated that the increase in costs of operation (mailings, etc.) since the last dues increase (about ten years ago) in addition to the added cost of insurance suggests a dues increase. There was a lengthy discussion including the following points: we should investigate state law regarding director's and officer's insurance (it was noted that some states cover some limited amount for non-profits), we should contact Nancy Batchelor to determine who carries the national SIA's policies. The conclusion was that the board should acquire insurance for the group.

A motion was made by Grace McIver to direct the board to obtain insurance, that the budget with insurance as presented be approved and a dues increase be made to cover new operating expenses, including insurance. The motion was seconded by Bob Stewart. The motion was amended by Greg Galer to indicate new dues to be $15 for regular members, $10 for students, and $150 for lifetime. The amendment was seconded by Grace McIver. The motion was carried unanimously.

Jonathan Kranz presented information on production of a new brochure for the chapter. His plan was for a two-color three panel brochure. Costs for a designer would be $1,530 and would include two concepts, design, layout, and production coordination. Printing, to include up to six photos would be $1,515 for 1,000 and $1,712 for 2,500. There was discussion and overall concern about this large expenditure. The group agreed that this expense only made sense if an aggressive recruitment campaign was started. It was also noted that better coordination should be made with the national SIA to be sure that information on our chapter is sent to national members in the region who are not chapter members. The board took these comments under advisement and noted that it would seek to establish a committee to review this and less expensive options for a new brochure. A possible committee would be Jonathan Kranz, Karl Danneil, and Ned Connors.

Other items briefly discussed included:

- A possible "Occasional Publi-cation" -- being considered is republication of J.P. Lesley, Iron Manufacturer's Guide... (1859); Frederick Overman, The Manufacture of Iron... (1854); James Swank, History of the Manufacture of Iron (1884) along with an introduction by a chapter member.
- A promotional item that could be sold to members and given to those that provide us with tours.
- A display to bring to various conferences to promote the organization and membership.
- A web site. Currently Karl Danneil posts some of the chapter information on his web site.

The board noted that it would be seeking members to serve on committees to assist with these projects. Greg Galer urged people to get involved in such committees not only to assist with all these projects but also as a way of moving people into leadership roles toward serving on the board.

Greg Galer profusely thanked and acknowledged the service to the chapter of Michael Steinitz, who has served on the board for nearly ten years. At this time Michael has decided to step down from the board for a well deserved rest. His dedication was acknowledged by all with a round of applause.

Matt Kierstead noted that a call for nominations had been sent to all members. He asked for nominations from the floor and receiving none presented the following slate of candidates for officers to serve one year terms:

Matt Kierstead, President
Greg Galer, Vice President/
Program Chair
Rick Greenwood, Treasurer
Bob Stewart, Secretary.

The nomination was seconded by Grace McIver and unanimously approved.

Other business -- Mary Habstritt noted that the Roebling Chapter will be holding its Drew Symposium on October 28 in Madison, NJ. Bob Stewart indicated that Central Connecticut State College has agreed to co-sponsor the New England Conference in Industrial Archeology, this year to be coordinated by our chapter.

Greg Galer

Mark your calander

Saturday, May 12, 2001

Northern New England Chapter
Spring Meeting and Tour
Hinsdale, New Hampshire
see related article, page 14

Southern New England Chapter Tours

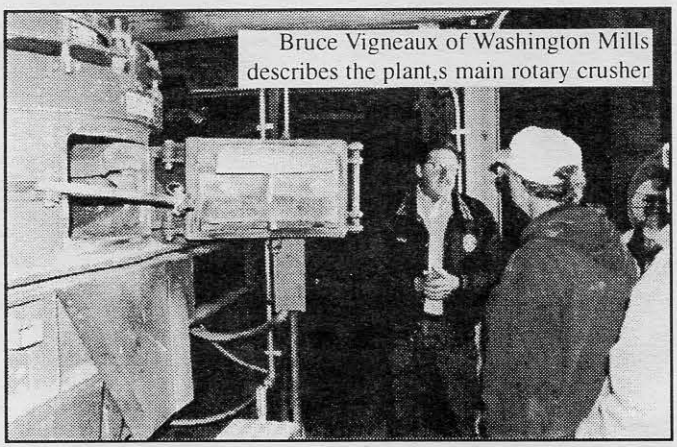
Weekday tours remain a resounding success. Due to limitations imposed by the various facilities we see, the number of people for each tour has been limited to fifteen or twenty. Usually the calls flood in within one or two days of the mailing of the announcement, and we get close to the limited number very quickly. Calls usually trickle in for a few days to fill the final slots. So, if you receive a flier for a tour in which you are interested, call or email immediately to be sure to reserve a spot for yourself.

Forge Ahead to Grafton, Massachusetts and Get Away from the Daily Grind

On May 30th SNEC toured two facilities in Grafton, Mass. In the morning, we toured Washington Abrasives, which was founded in 1868 and is the oldest operating abrasives company in the country. It is located in a much expanded and modified gristmill dating to 1720. It is one plant of the Washington Mills company, the largest producer of abrasives and electro minerals in the world. Raw bauxite, mostly from China, is converted to Aluminum Oxide at the company's Niagara Falls furnaces and there is crushed to 1"-2" pieces that are shipped by rail to Grafton where the plan operates its own short line rail connection to CSX with a vintage ALCO diesel switcher.

The Grafton plant grinds about one car load per day (about 100 tons) into various sizes and grades of abrasive material. Al the material that comes into the plant leaves as bulk abrasive product, even the dust which is collected and sold as extremely fine grinding material for optics. The material is used in innumerable applications including grinding wheels, sandpaper, refractories, polishing, and wire sawing. Our group was able to see the entire process, from the stock of material shipped in, to the rotary grinding machine, to the extensive sorting and screening tables. It was a fascinating tour and interesting facility. It was amazing to see the 18th century structure holding up against the relentless shaking of the sorting and screening machines.

In the afternoon we toured Wyman-Gordon, a leader in the production of technologically advanced forging for the commercial aviation, commercial power and performance product industries. W-G is a major supplier to companies such as GE, Pratt & Whitney, Rolls Royce, and Allied Signal. The plant we visited focuses on steel, nickel, and titanium forgings. During the tour we saw a great deal of forgings for commercial and military aircraft including landing gear members for large airliners.



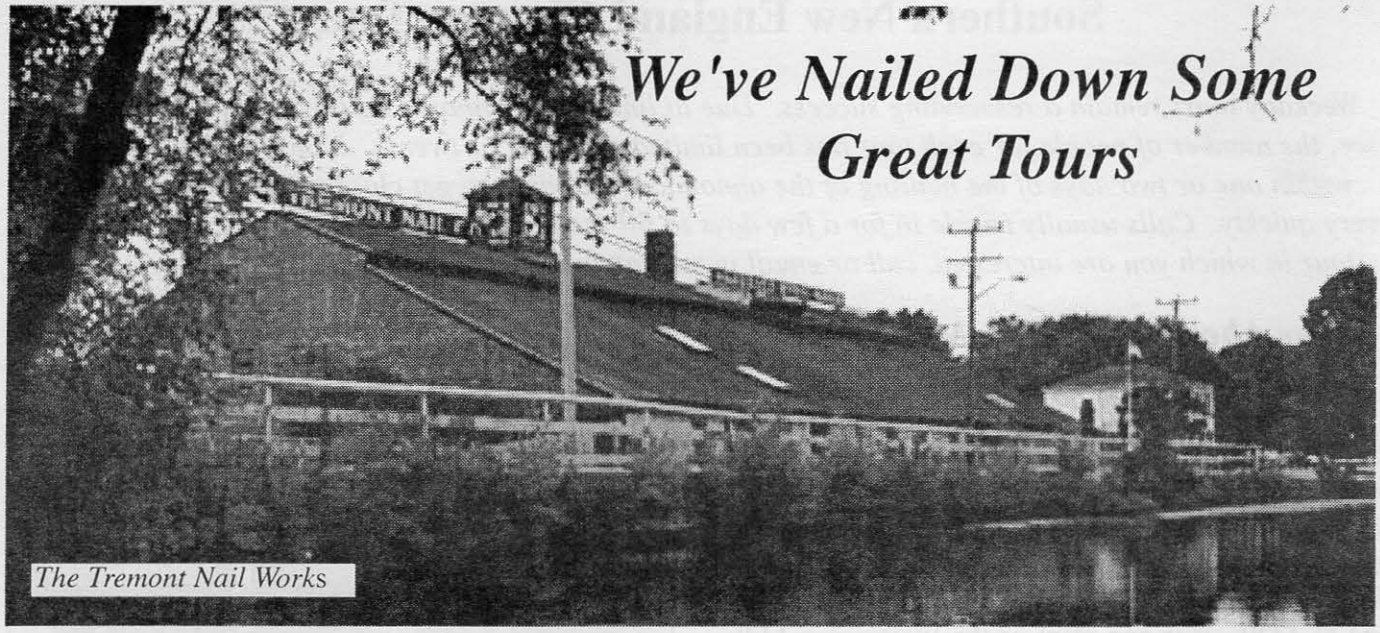
Bruce Vigneaux of Washington Mills describes the plant,s main rotary crusher

Wyman-Gordon has a long history, being formed 117 years ago. It was owned by the U.S. Air Force for many years, breaking out on its own in 1983. Last year the company was purchased by Precision Castparts. It was great to learn during our tour that the new owner sees Wyman-Gordon as one of its showpiece operations. With the impressive scale of the operations combined with the incredible precision in such large forgings, the desire to showcase this facility is not surprising. This energy towards highlighting this plant was clearly evident in newly cleaned and painted machinery and general orderliness of the facility.

When we walked through the facility the impressiveness of the operation was apparent not only by the size of the 25 acre plant but by the unmistakable heat emanating from large, recently forged items lying about. During the tour we watched some large forging operations in progress as we learned about the variety of operations and details about how the forging is done.

Unfortunately, the most impressive piece of equipment, the 50,000 ton Loewy press, was done operating for the day. This massive machine is eleven stories high (three-fifths under the floor) and four cars can easily park on the press's table. It is huge! The scale is incompressible unless you stand next to it. The operator was kind enough to run the press up and down for us. One can only imagine the impressiveness of watching this machine forge four titanium F-22 fighter jet bulkheads simultaneously!

We've Nailed Down Some Great Tours



The Tremont Nail Works

On September 19 we switched gears dramatically, from the multi-ton products of Wyman-Gordon to the mass production of nails. We toured two fascinating facilities that provided insight into two eras of nail manufacturing, plants that don't usually give tours.

In the morning we visited Tremont Nail in Wareham, Massachusetts which makes a wide variety of specialty square-cut nails ideal for restoration projects. It is one of only two companies in the country making cut nails with sixty percent of cut nails imported, mostly from China. The Tremont factory building was constructed ca. 1800 and is within the Tremont Nail Factory National Register District which was established in 1976. The company was family owned until 1989 when it was purchased by the Maze Nails company. Maze is based in Peru, Illinois and is the largest specialty nail company in the country.

The facility produces about 2 million pounds of nails per year, mostly restoration nails for which the company owns twenty patents. Due to foreign competition, over the years the move has been away from basic cut masonry nails toward the specialty restoration nails which are designed to recreate tradition styles of hand-cut nails. At the Wareham facility steel arrives in sheets and all the work toward finished nails is completed on site except heat treating which is done by another company.

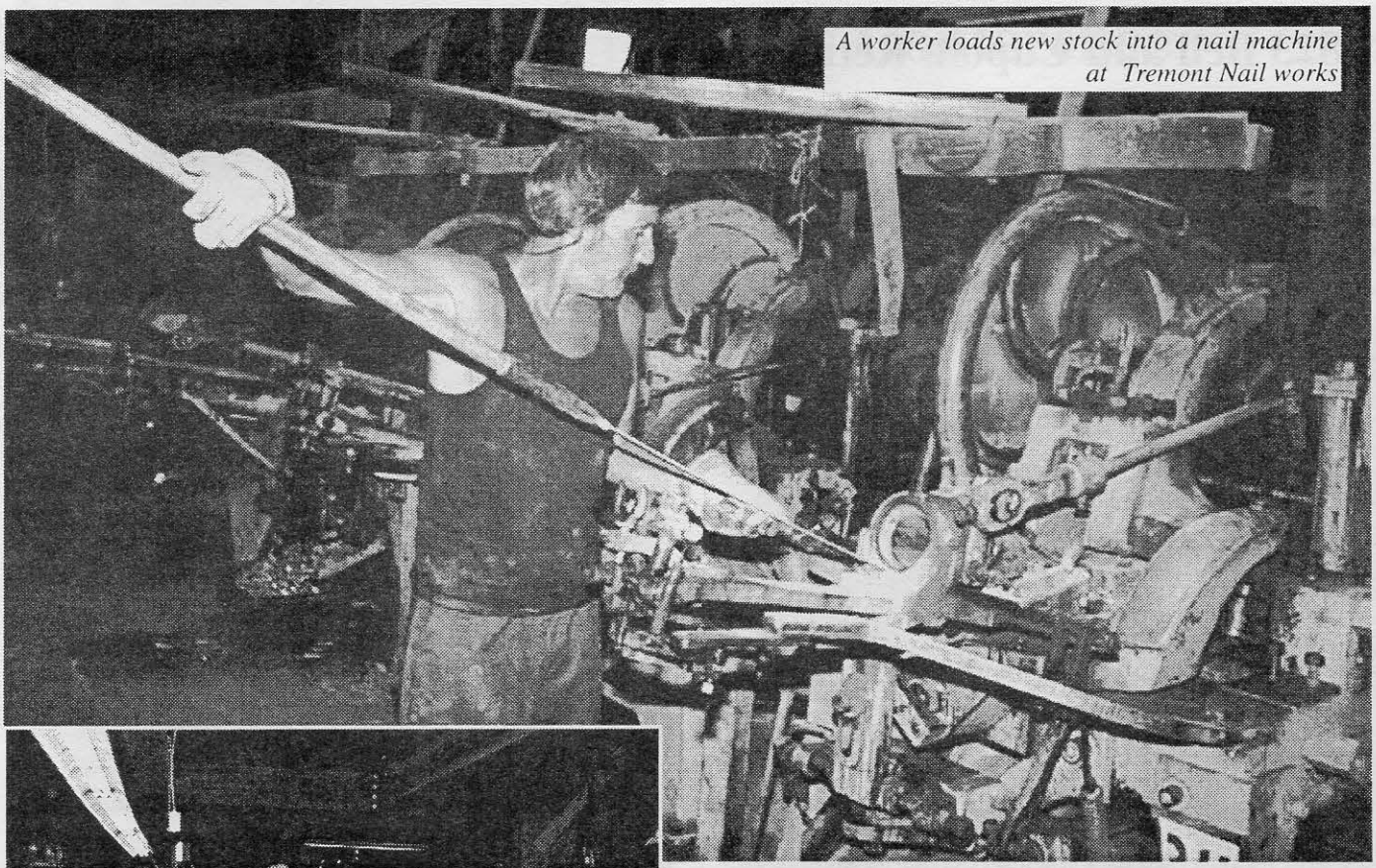
Banks of nail machines, many belt driven, and most about 140 years old are tended by machine operators, each man tending four machines. Strips of iron are clamped to the end of a wooden pole which is then fed into the machine. The machine feeds and rotates the stock 180 degrees between each cut to produce the required angled sides. A heading mechanism forms the head of the nail. When the strip of iron is fully cut the operator removes a small, scrap end piece from the clamp, inserts another strip of steel and feeds it into the machine, walking up and down the line tending to each machine in the battery. All nails except large spikes are cut cold.

Tremont has a wide variety of machines for various size nails, and each slightly different due to the varied construction and numerous modifications over the years. The most highly skilled occupation in the plant is that of "nailer," described as "a combination machinist and magician." These are the men who keep these unique machines in operation, a job that requires much on the job training. One of the nailers at Tremont is the fourth generation in his family to hold this valued position. Tremont has two machine shops, one with more modern equipment used on a regular basis and one the original belt driven machine shop, which is still periodically used.

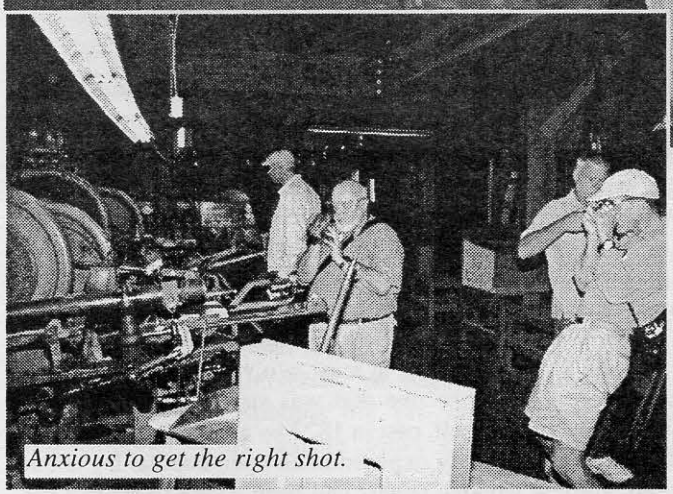
Lunch was at the nearby Mill Pond Diner. A great spot for an SIA lunch!

In the afternoon we reconvened at Independent Nail, a sister plant to Tremont in that they are both owned by Maze Nails. Independent originated in Bridgewater, Massachusetts in 1915, but is now located in an industrial park in Taunton.

This company makes specialty wire nails, starting both from wire of the correct diameter and by drawing rod into appropriately sized wire themselves. They make aluminum, stainless steel, copper, and painted



A worker loads new stock into a nail machine at Tremont Nail works



Anxious to get the right shot.

nails. Independent invented ring shank nails and also makes spiral nails. A wide variety of nail heads are made at this plant, from the cross-hatch head, now fairly common but once a unique brand mark of this company; to surveyor's nail heads; to nail heads with initials and names. They make custom nails as well. Want your initials on some nails? They'll do it for you.

The nail machines at Independent draw in wire from a coil, form a head, and cut the nail in a rapid series of operations. We were lucky enough to have an operator run a machine by hand so that we could see all the steps. The facility has 56 nail machines, and they each produce 800 to 900 nails per minute. Ring shanks and spirals are formed in the nails by machines that run each nail through a set of rotating dies.

One of the company's largest products years ago was colored paneling nails for interior paneling. This was obviously a large market in the 1970s, but with the change in decorating trends production of this item is now tiny. One of the company's largest products is painted nails to match vinyl and aluminum siding and they make several hundred colors of nails. Specialty nails of a wide variety of types are made at this facility.

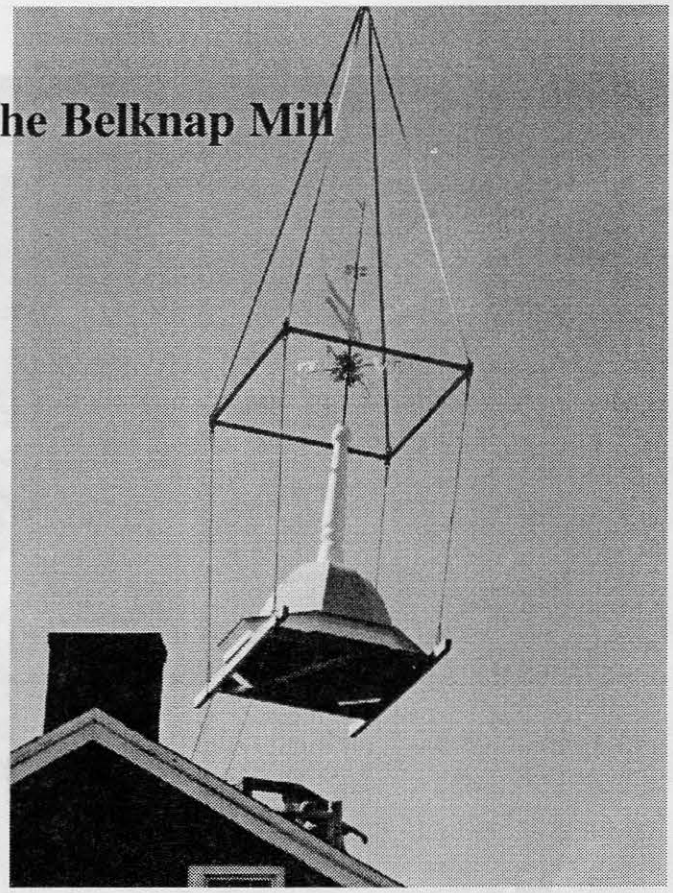
A bonus of the tour was the chance to see a new nail machine for the Tremont works under construction. Working with the nailers at Tremont the highly skilled machinists at Independent are creating a brand new cut nail machine. They had patterns made, parts cast (at the Perkins Foundry our group has previously visited), and are machining and assembling a new machine. This may be the first time such a machine has been built in over 100 years!

These were all great tours. We hope that those that participated enjoyed themselves and found the tours education. If you haven't been able to attend a tour, make an effort to do so. They are one of the highlights of our organization.

Greg Galer

1823 Bell and Cupola Return to the Belknap Mill

The Event Launches Capital Campaign for the Laconia, NH, Industrial Knitting Museum



After a month of repairs, the Belknap Mill's bell and cupola returned to their proper location on October 13. The event also marked the beginning of a three-year capital campaign for the Belknap Mill Society, which operates the building as an industrial knitting museum in Laconia, New Hampshire.

A "bell raising/ribbon cutting" ceremony was staged at 10 a.m. at the entrance to the mill. Mayor Matthew J. Lahey, Society president Marcia Cotter, building committee chair Walter Eshelman, capital campaign chair Dick Metz and executive director Mary Boswell cut the ribbon in front of the cupola, which had been placed at ground level at the entrance.

Immediately following the ceremony, the finial was fitted into the dome and the weathervane was placed on top of the finial. The bell, followed by the cupola, were then lifted by a crane to the top of the building. The project was completed by noon that day.

On July 4, 1996, lightning struck the bell tower, destroying the finial that held the weathervane.

To make the repairs, the Society selected contractor J. Paul Morin, a direct descendant of J. P. Morin, who owned the Mill for many decades when it operated as knitting factory.

James L. Garvin, state architectural historian for the New Hampshire Division of Historic Resources, approved the proposed methods and materials to repair the cupola. In 1975, the NHDHR became a partner with the Society in the mill's preservation. The office passed a federal preservation grant to the Society and acquired a preservation covenant on the building.

Richard M. Candee and Paul Mirski also served as consultants on the cupola project's design. In 1971, Dr. Candee wrote the nomination for the mill to be entered on the National Register of Historic Places. He has advised on the Society's growing collection of machines and in 1998, collaborated with the Society on a traveling exhibit on industrial knitting. Dr. Candee also arranged with the Smithsonian Institution the loan of several locally made patent models to the Society. He is working on a book on industrial knitting.

Mirski is an architect whose adaptive use design for the mill as a cultural center won an award from the National Trust for Historic Preservation in 1981. He contributed designs for the adjacent park and bandstand, which were completed in 1997 to expand the Society's outdoor programs and walking tours.

By 1998, the Society was prepared to make the necessary repairs to the cupola, but Morin was taken ill and had to be hospitalized. He returned to work on the project two years later.

During the summer of 2000, Morin oversaw the repair to the wooden frame that holds the bell and allows it to ring. On August 30, he had the upper portion of the cupola removed for repairs in his shop in Manchester, New Hampshire. He replaced wooden members within the dome that had deteriorated due to moisture and insect infestation. A coppersmith replaced the copper skin on the roof. In Laconia, woodworker Andrew J. Cutney III and his partner Lewis Sykes turned a new wooden finial that replicated the most recent version.

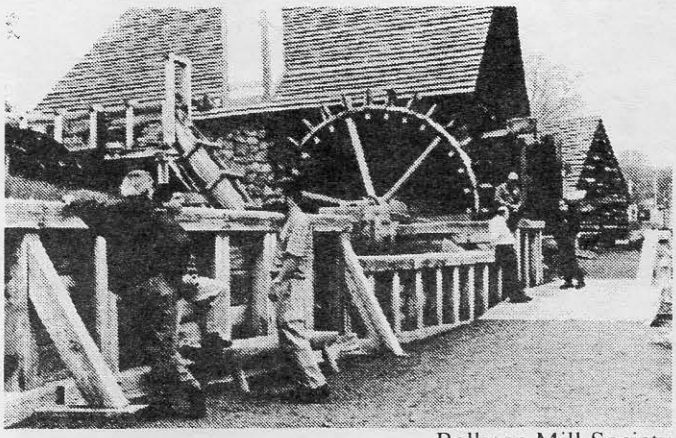
Early images of the Belknap Mill dating from about 1860 and 1880 show that at least two versions of the cupola existed prior to the one that was struck by lightning in 1996. The bronze bell, cast in 1823 by an apprentice to Paul Revere, was originally exposed in an open cupola. By about 1880, vertical wooden panels had been added to protect the bell from the elements.

According to Candee, the mill was built in 1823 and was in full operation by 1828. He believes that it is the only surviving example of a cotton mill in New England that preserves the original appearance of the first mill of the Boston Manufacturing Company at Waltham, Massachusetts. This Waltham mill "launched the Industrial Revolution in America." The Belknap Mill is the oldest unaltered brick textile mill building in the United States.

Repairs to the cupola were part of the Society's long-range plan. The organization launched a capital campaign on October 13 to raise $500,000 in three years to address the goals in the plan. Of immediate concern are the stone masonry at the foundation and the exterior brick masonry, which need repointing. Another goal is to make improvements to the exhibit in the 1918 hydroelectric power system.
For more information, call 524-8813.

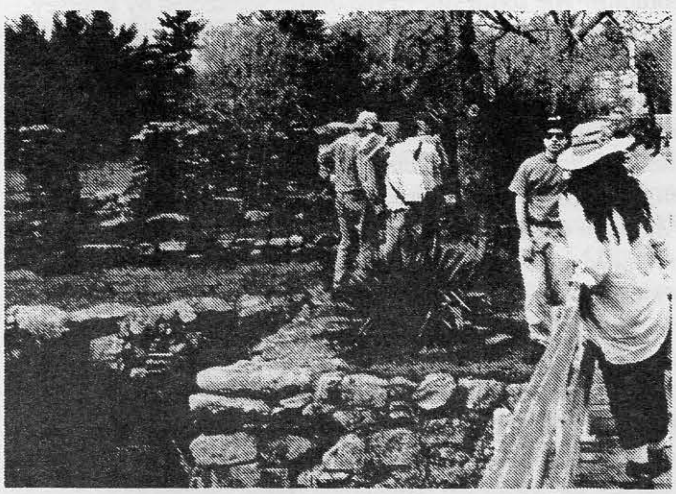
Mary Boswell,
Executive Director

The 2000 Ironmasters Conference



Belknap Mill Society

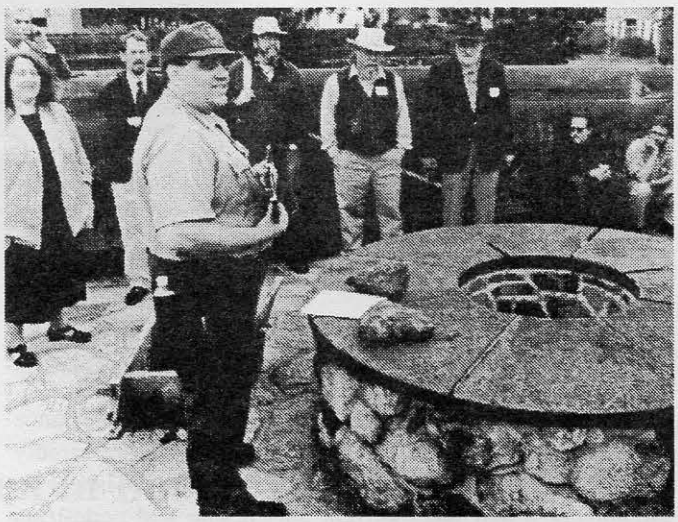
The Saugus Ironworks National Historic Site hosted the 2000 Ironmasters conference May 4—6. The Saugus site and eastern Massachusetts ironmaking region were an excellent place for this conference's theme, "Roots of Iron," which sought to explore the transfer of ironmaking technologies from place to place and from generation to generation. Friday's tour sites included the active Perkins Foundry and Bridgewater Iron Works archeological site in Bridgewater, Massachusetts, both places with early roots in the region and also previous SNEC field trip sites. A major theme running through the conference was the life and work of proto-industrial archeologist Roland Wells Robbins, who excavated and partially recreated many ironworks sites in the Northeast U.S., including the Saugus Iron Works, and Oliver Mill in Middleborough, another conference tour site. Donald Linebaugh of the University of Kentucky, author of an upcoming book on Robbins' life, provided valuable insight into Robbins' work during tours of the Saugus and



Conference attendees explore the reconstructed raceways at Oliver Mill in Middleborough, MA, site of a mid-eighteenth-century rolling and slitting mill.

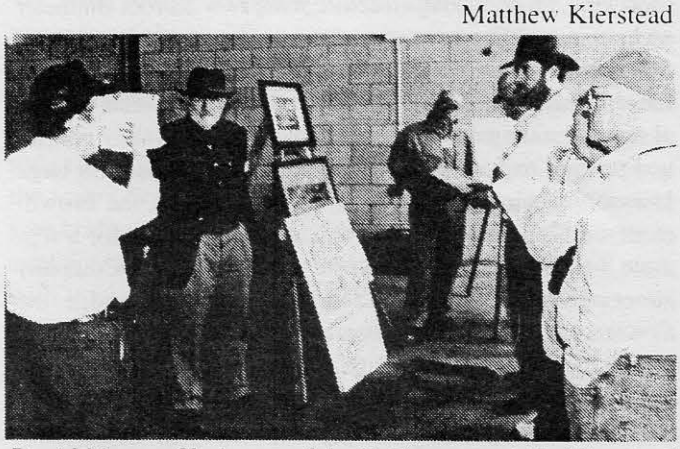
Conference-goers enjoy the Saugus Iron Works National Historic Site.

Saugus Iron Works Ranger and Conference Coordinator Curtis White, atop the Saugus blast furnace, explains the raw materials originally used at the site.



Middleborough sites. Saturday's papers session included presentations by chapter members Bob Gordon, who spoke about early steelmaking processes in America; Walter Landgraff's presentation on his ongoing research on Richard Smith's forge at Colebook, CT; Fred Warner's report of his excavations at the Beckley Furnace at Canaan, CT; and David Ingram's insights into the challenges to researching the region's early ironmaking history. Cassandra Michaud presented a paper on the intact seventeenth-century Rowley Village bloomery forge at Boxford, MA. This forge was operated by Henry Leonard, originally a worker at the Saugus Iron Works, and was the site of the group's Sunday tour.

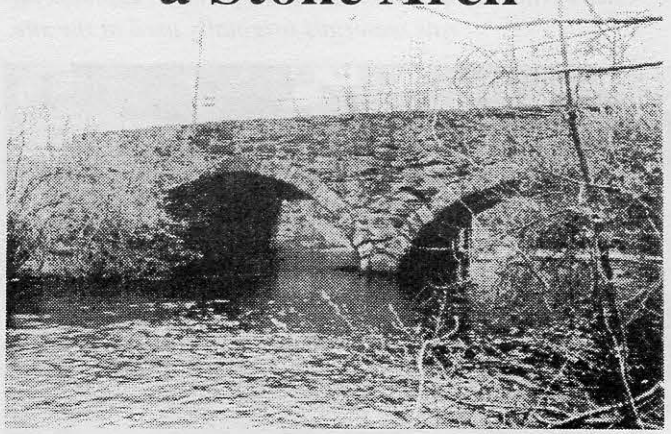
Matthew Kierstead

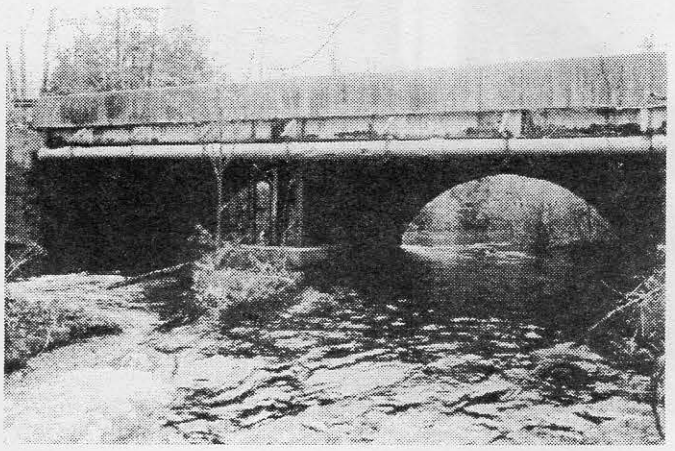


David Moore, Chairman of the Bridgewater, MA, Historical Commission and member of the Friends of Ironworks Park, explains the history of the Bridgewater Ironworks site.

Bridge Research

Stretching a Stone Arch





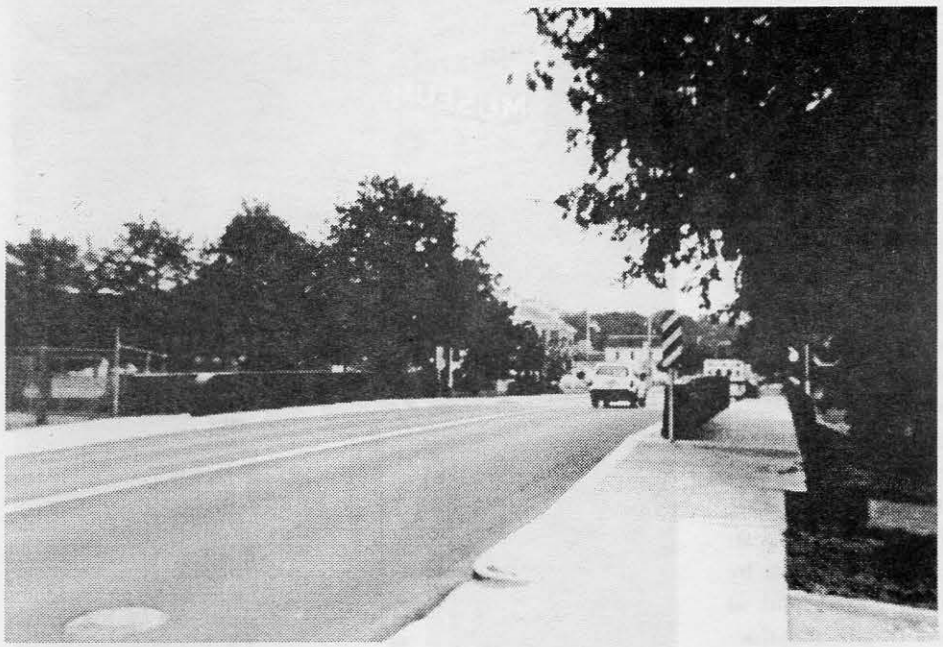
Left photo: view southeast of north side of original structure.
Photo above: view northwest of steel addition in 1998.

Connecticut's town-built stone arch bridges were once prominent features of the state's landscape, but are rapidly disappearing in the face of demands for wider crossings on alignments which meet current automobile and pedestrian traffic standards. Most of these structures were built in the 19th century, frequently in response to flood events which destroyed older timber bridges before the widespread availability of iron trusses. The expense of building stone arch crossings was offset by their durability, and many have lasted over a century. The North Main Street Bridge over the Hockanum River in Manchester, Connecticut, is an unusual example of a growing town getting a few extra generations of use from a stone arch bridge by adding an external structure to widen the roadway.

Built after an 1869 flood which washed out bridges throughout the state, the North Main Street Bridge was one of the larger town-built arched structures of the period: a 20-foot-wide, 66-foot-long structure with, two 28-foot-diameter arches supporting two asymmetrical spans (26.75 and 29 feet), with spandrels of large, irregularly-shaped, rough-faced brownstone blocks, and arch stones of similar material approximating an ashlar. The spandrels originally continued upward to form 5-foot-high parapets capped with large brownstone blocks. Early in the 20th century, the brownstone rubble abutments were widened to the south for a separate 8-foot-wide bridge built for the Connecticut Company street railway. Built 3.5 to 7 feet from the arched bridge, the Connecticut Company bridge included a timber deck supported by I-beam stringers and timber bents. By the time the street railway closed in the late 1920s, the Town of Manchester sought a wider highway crossing, and considered extending the arched bridge to the north in 1926. After acquiring the street railway right-of-way, the town instead widened the bridge downstream (south) to its present width of 31-35 feet in 1932. Widening included removing the original south bridge parapet, building a concrete footing and column adjacent to the original bridge center, running I-beam stringers from the abutments to the new column, and creating a new, 11 -to-1 4-foot-wide tarred timber deck on Connecticut Company bridge ties plus new I-beams and timbers. The town replaced the extension in 1947 with a two-span concrete slab supported by I-beams, and a central bent consisting of a 24-inch I beam resting on two I-beam columns and the 1932 concrete column. The 1947 vertical supports sat on a 3-foot-wide, 8.5-foot-long concrete footing. The central bent was strengthened cl 987 with two rows of additional I-beam columns flanking the 1947 work, resting on sacked concrete beneath a new 8-foot-wide, 2-foot-high concrete cap encasing the bases of all eight steel columns. The south side of the bridge, protected by a Jersey-barrier type guardrail, also now carries a large sewer pipe.

The bridge widenings affected the original structure's integrity, removing the south parapet and obscuring the arched elevation on that side. Nevertheless, most of the original structure survived until recently, and was determined eligible for the National Register of Historic Places. Although somewhat deteriorated, the stone arch structure remained in better condition than its metal Siamese twin, which by the mid 1990s was heavily rusted and losing fabric. The bridge will soon be replaced by a pre-cast two- arch concrete structure, with form-liner replication of traditional rubble masonry. The Connecticut Department of Transportation funded a limited documentation of the bridge in 1998.

Michael S. Raber
Raber Associates
South Glastonbury, CT



Ca. 1936 Bethlehem Steel Company's North Street steel plate bridge after being repaired. Non steel components of the bridge was gutted and the steel frame and plates were sandblasted , and repainted all in a record 61 days while allowing traffic to move northward. It is one of only two such bridges in Vermont that serve vehicular traffic (Rolando photo).

Historic Bridges Reopen in Bennington, VT

Two historic bridges recently reopened in Bennington, Vermont. One, a covered bridge, had been closed for years while the principals decided what to do about it; the other remained open during repairs.

The covered bridge (Bridge #31), called the Paper Mill Bridge, was originally built by Charles F. Sears in 1889, of Town lattice design. The 125 foot long bridge carried traffic across the Walloomsac River about a mile west of Bennington Village. The sagging bridge, which suffered from rot and warped timbers, was closed to traffic about ten years ago and was bypassed by a temporary "Bailey" type bridge. In the meantime, it became the target of vandals.

Part of the controversy revolved around the degree to which the repair would effect the historic character of the bridge. The new bridge had to strong enough to allow emergency vehicles and fuel trucks to pass, and one of the initial solutions to this was to built a new, modern bridge adjacent to it. When work finally commenced on the bridge, about 90 95% of the bridge was new. The project cost about $450,000, covered 95% by state and federal funds. The new bridge looks like the old one except for its sheet metal roof.

The other bridge (Bridge #10), known as the North Street Bridge, a steel plate truss bridge, carries North Street (Route 7) across the Walloomsac River about a block north of Bennington's main 4 corner intersection. Is built in 1936 by the Bethlehem Steel Company, replacing an earlier bridge. According to a 1935 newspaper account, the earlier bridge, known as the Putnam Bridge, had been built with a high, arched center to allow still traffic across when the river was high. The bridge was also notorious for its "noisiness," from the planks laid width wise that rattled when vehicles crossed.

Work on the bridge involved completely removing the roadbed and sandblasting all remaining steel parts. Work progressed one lane at a time, allowing north bound traffic while detouring south bound traffic. From initial planning to final repairs, the North Street bridge project took roughly 18 months, far less than similar projects; physical repairs to the crumbling bridge were finished in a record 61 days. The project cost about $300,000 (compared to the $12,000 it cost new in 1936).

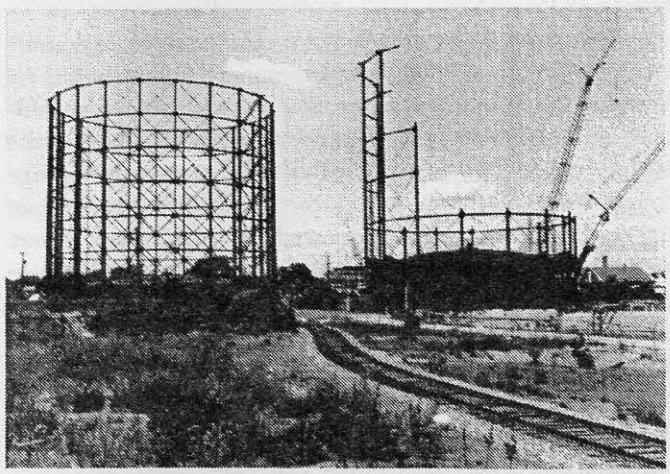
Both bridge reopenings were celebrated on the same afternoon, July 13, 2000, with appropriate ribbon cutting by Vermont Gov. Dean, accompanied by town and state officials and the public. Following the reopening of the covered bridge, onlookers were treated to a horse drawn carriage rode through the bridge. Work on both bridges was part of the state's "fast track" program, which helps towns restore area bridges. The program, begun in 1998, allows the state to contract with the Vermont Local Roads Program to work with towns on large road projects. The goal of the program is to complete projects, which might otherwise languish in state schedules, in 18 months or less. Vermont Local Roads is an educational group that instructs small towns on how to maintain and build roads, bridges, and sidewalks.

Victor Rolando
Bennington, VT

Providence Gasholder Frames Demolished

The two gasholder frames at the Providence Gas Company's Sassafras Point facility in Providence's sprawling Allens Avenue industrial district were demolished over the Summer. Gasholder 18, built in 1911, was 216 feet high, 220 feet in diameter, and had a capacity of 6 million cubic feet. Gasholder 21, built in 1947, was 160 feet high, 163 feet in diameter, and had a capacity of 3 million cubic feet. The gasholders consisted of several vertically-telescoping steel drums seated in a water-filled pit that acted as a seal so that gas could be pumped into the vertically-expanding tank, which was guided by rollers on the supporting frame. These structures were prominent local landmarks and marked the southern entrance to the industrial port of Providence.

The Sassafras Point facility was developed in 1910—1910 by the Providence Gas Company, founded in 1847. PGC built the Sassafras Point plant to meet increasing demands for gas that could not be met by their small, scattered nineteenth-century facilities. The plant was built by the Bartlett-Hayward Company of Baltimore, Maryland, at one time the largest supplier and fabricator of gas manufacturing equipment and plants in the U.S. The Sassafras Point plant utilized coal producer gas at first, and added carburetted water gas in 1916. In 1917 PGC contracted with the Koppers Company of Pittsburg to build a 40-oven coke battery and chemical byproduct plant. In 1930 25 more coke ovens were added. In 1953 PGC began to sell natural gas delivered by pipeline from New Jersey, and the coke ovens were shut down and demolished. A number of surviving ancillary buildings have been converted for handling natural gas. The gasholders recently became redundant and were considered by some to be eyesores, hence their demolition. The Allens Avenue industrial district, which includes numerous historic industrial resources, is slated for redevelopment as "Narragansett Landing" a new neighborhood envisioned as part of the City of Providence's "New Cities" Initiative.



Providence's Sassafras Point gasholder frames undergoing demolition. Gasholder 18 is at left, and Gasholder 21 is at right

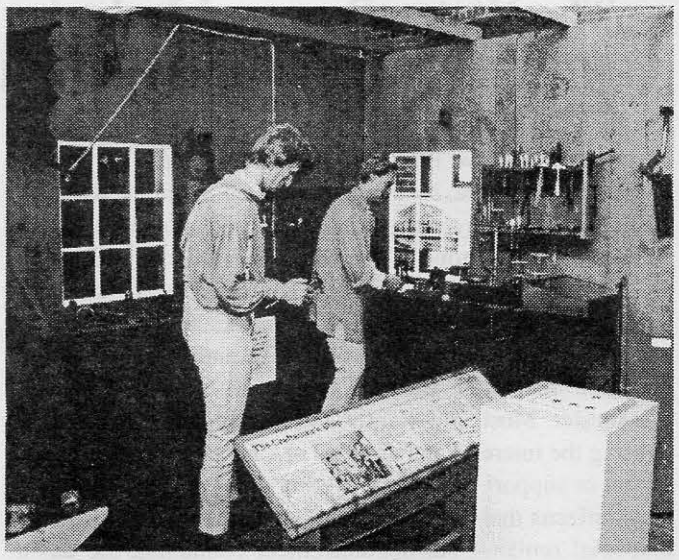
Attleboro Area Industrial Museum

The Attleboro Area Industrial Museum was founded in 1976 as Attleboro's "Lasting Memento Project" to celebrate the American bicentennial. It is located in the buildings of the former Attleboro Refining Company, a metal foundry associated with the city's jewelry industry that was originally operated by the Baker Family, and sold to the museum by Handy & Harman in 1976. The museum's goal is to become central repository for historical data and artifacts relating to area companies, families and the industrial era, and to preserve the history of area business and present so that school children, former area industrial employees and the public at large can better appreciate the tremendous achievements and enormous contributions that industry has made to the community. Since 1986, a visit to the museum has been a regular part of the Attleboro Public School System's fourth grade curriculum.

The museum includes displays associated with Attleboro's jewelry industry, including machinery, and recreations of actual worker's shops and offices. An extensive display of examples of the work of the Balfour Company

include the world's largest ring, a size 19-1/2 made for a football player's superbowl victory ring. The collection includes an extensive collection of historic photographs of Attleboro scenes. The museum operates a jewelry making program, and is developing an area for a research facility on area industrial history. Future plans include a documentation program to gather photographs, video, and products of modern area industry. The museum is easily accessible form Interstate 95.

Attleboro Area Industrial Museum
42 Union Street
Attleboro, MA 02703
Tuesday-Saturday, 10:00 a.m.-4:00 p.m.
Admission: Free
(508) 222-3918



Recreation of early jewelry craftsman's shop with mannequins at the Attleboro Industrial Museum.

Calls for Papers

Ironmasters 2001

On April 28-30, 2001, Hugh Moore Historical Park and Museums will host the Ironmasters Conference 2001. We are looking for papers related to all aspects of iron and steel making that will pique the interest of historians, arc eologists, and preservationists. Although all papers will be considered, this year we encourage (but do not require) papers that probe the question: How did the production of iron and steel contribute to inception and evolution of The American Industrial Revolution?

In the period between 1840 and 1880, for example, areas such as the Lehigh Valley region of Pennsylvania, led the way in the use of anthracite to replace charcoal as a blast furnace fuel. This technological evolution led to the development of large iron furnaces in urban environments as opposed to the earlier charcoalfueled furnaces built in rural areas. This technological development resulted in a great increase in America's annual iron production and served as a catalyst for other innovations such as the "three high" rolling mill and the pneumatic steel making process which greatly advanced the use of ferrous metals.

Papers should be twenty minutes in length and may be accompanied by slides, overheads, or other media. Submissions should include a title for the paper, an abstract of 200 words or less, a brief biography of the author, and complete contact information. They should be sent to Lance E. Metz at the National Canal Museum-30 Centre Square, Easton, PA 18042. Papers should be submitted by December 1, 2000. A notice to confirm acceptance will be sent by January 5. 2001.

Canal History and Technology Symposium

The 20th annual Canal History and Technology Symposium will be held at the William E. Simon Center for Economics and Business Administration at Lafayette College on Saturday, March 17, 2001. Sponsored by the National Canal Museum and Lafayette College, this event features the presentation of research papers on topics of transportation and industrial history. We are looking for submission of papers related to these topics for future symposiums.

The. complete text of presented papers, including illustrations, are published "in the Canal History and Technology Proceedings, which is a part of the registration package. Individual copies of the Proceedings can be purchased after the Symposium for $19.50.

If you are interested in submitting a paper for the Symposium, please contact Lance E. Metz. Historian. National Canal Museum. 30 Centre Square, Easton. PA 18042 or by phone at 610-559-6626.

The Water-Powered Industry of New Hampshire's Ashuelot River to be the Focus of the NNEC Spring Meeting

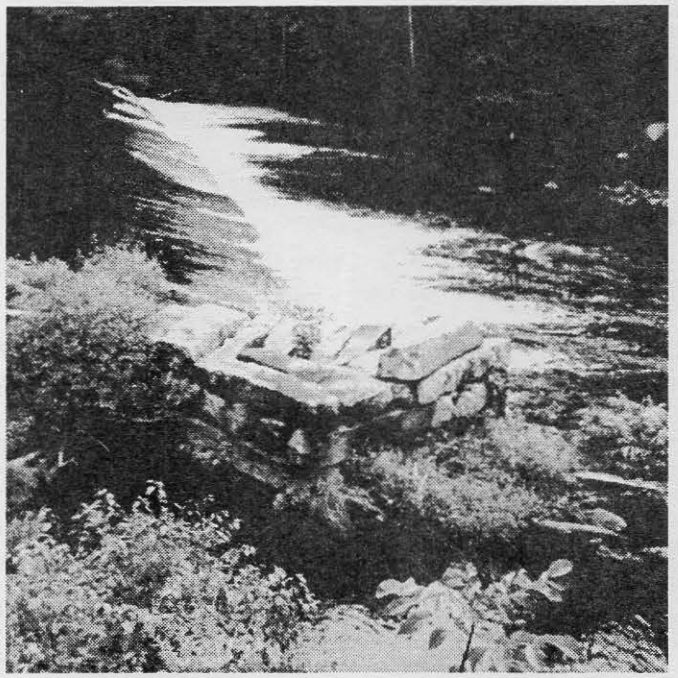
The Northern New England Chapter will hold its spring meeting in Hinsdale, New Hampshire, on Saturday, May 12, 2001. While the day's program is under development, it will include a process tour of the McGoldrick Paper Company mill (one of three on the Ashuelot River producing specialty tissue papers) and a walking tour of an extant dam and canal water-power system dating from 1828, and tours of several upstream industrial sites in the towns of Ashuelot and Winchester. Most importantly, the meeting site was chosen to bring the interests and abilities of Chapter members to the region in support of historic preservation, and to encourage local citizens that there is interest in their important historic industrial remains. An announcement containing the day's detail will be mailed in the spring. This article provides background.

When Historic Preservationists and Wildlife Conservationists Clash

Since 1995 the Inland Fisheries Division of the New Hampshire Fish and Game Department has been stocking the Ashuelot River, a tributary of the Connecticut River in southwestern New Hampshire, with Atlantic salmon fry. Over 25 miles of Ashuelot stream habitat has been assessed by Fish and Game officials, who estimated that annual Ashuelot River salmon runs would have historically ranged in the hundreds. But salmon reclamation success has been marginal. In 1998, the effort expanded to include the restoration of migratory American shad and blue-back herring. It is expected that the run size for shad will range from 10,000 to 20,000 and could produce a recreational fishery of regional importance.

Fish and Game researchers have determined that habitat for juvenile salmon have a specific range of characteristics which are not supported in sections of the river with extant historic dams. The dams create reservoirs which once provided the latent energy to power industry, but which are not salmon habitat. While many of these reservoirs no longer provide industrial power, the dams that crate them often represent the oldest and most massive engineering projects of the eighteenth and nineteenth centuries. Industrial preservationists view these dams and associated systems of canals as not only the most technically sophisticated engineering works of their time, but also monuments to New Hampshire's industrial legacy that transformed the state and its people and which are inseparable from its identity as a society.

Two historic dams on the Ashuelot, in Hinsdale and Winchester, are slated for demolition by the Fish and Game Department in order to restore stream habitat and remove

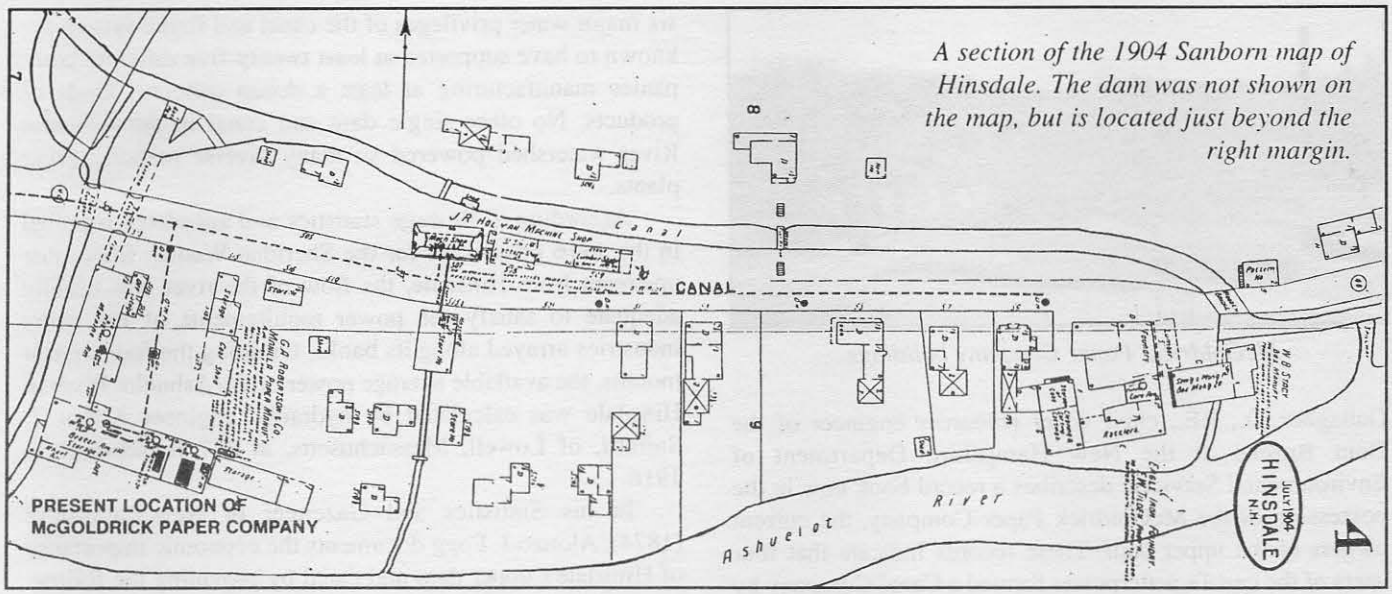


The ca. 1828 McGoldrick dam in Hinsdale, NH. The power canal is in the foreground.

barriers to migratory riverine fishes. The Upper Hinsdale Dam (known as the McGoldrick Dam) was to be removed in the fall of 2000, when water levels permitted (to date water levels have been too high and the dam remains in place). Further up stream, the Winchester dam will be removed as soon as feasible. The New Hampshire Division for Historic Preservation had determined that Hinsdale dam and canal was significant under the National Register Criterion "A."

On August 24, 2000, the Rivers Restoration Task Force, which included the New Hampshire Fish and Game Department, the New Hampshire Department of Environmental Services, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the National Resource Conservation Service, several non-profit environmental organizations and the NH Division for Historic Resources, presented a proposal to remove the Hinsdale dam at a public input session held in the Hinsdale town hall.

The great majority of the people present represented wildlife conservation interests, out-numbering historic preservationists by at least 6 to 1. Testimony of the importance of historic industrial structures and remains was provided by Division of Historic Preservation representatives, and the only non-government input was from the representative from the NNEC of the Society for Industrial Archeology, who questioned several details of the plan,



A section of the 1904 Sanborn map of Hinsdale. The dam was not shown on the map, but is located just beyond the right margin.

which provided for no recording or preservation effort.

On December 1, 2000, the Rivers Task Force and the IA representative toured the threatened dams in Winchester and Hinsdale, discussing various aspects of the dams' histories and characteristics. It was revealed that the initial removal plan for the Hinsdale dam will be modified and efforts will be made to preserve and exhibit some of water power system remains. It appears that input from citizens concerned with industrial history and preservation has influenced the dam removal process.

Historical Background and the Role of Hinsdale's Development in Industrial History

The Upper Dam and power canal were constructed in 1828. The undertaking transformed Hinsdale from a quiet agricultural town into a small but characteristic New Hampshire manufacturing village, one of the busiest in the Ashuelot River watershed.

Eliphalet and Phinehas Merrill's Gazetteer of the State of New-Hampshire, published in 1817, before the dam and canal were constructed, described Hinsdale as a township of 740 inhabitants with a baptist and a congregational meeting-house, several mills. and a few stores."

As described in 1855 by Edwin Charlton in New Hampshire As It Is, after the canal was in full operation and the railroad had arrived in town, Hinsdale's population had grown to over 1900. The town then supported "two hotels, four stores, . . . two woollen [sic] factories, both of which manufacture cashmeretts, . . . two machine shops, . . . one paper mill, . . . one foundery [sic], . . . one edge tool manufactory," and a number of other industries. With the exception of one woolen mill, all of these industrial enterprises were located along the canal and were supplied with power from the upper dam.

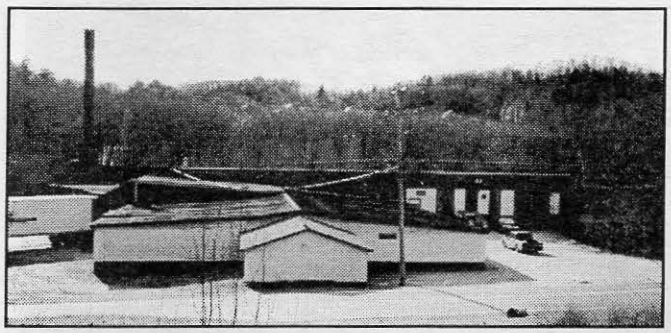
Effect of construction of the dam and canal: This transformation of the village may be linked directly to the building of the darn and canal.. In his Some Early Recollections of Hinsdale, N.H., of 1903, Warren B. Spencer noted that General Arad Hunt, who had purchased and retained land titles to nearly two-thirds of the township of Hinsdale, died in 1825. Hunt's death placed large tracts of land on the market, giving entrepreneurs the first opportunity to develop the town's resources.

Spencer recalled that the present-day Canal Street was a rye field and later a pasture during his boyhood, with two farms occupying most of the area where the town center later developed. In 1824, a highway was opened between Hinsdale and the manufacturing village of Ashuelot, about four miles to the east on the Ashuelot River in Winchester. In 1828, the canal was built parallel to the road to Ashuelot, which became Canal Street, opening up opportunitie's for manufacturing.

The first enterprise to use the power of the canal was the forge and trip hammer shop of Pliny Merrill, which stood at the westernmost branch of the main canal, farthest downstream from the dam, where the hydrostatic head was greatest. Merrill opened his shop for the production of edge tools, especially chisels, in 1832. The same business later moved to another shop standing on the canal's main upper channel. This business closed by 1904, but the shop building remains on the site, next to the filled channel of the canal.

A number of other enterprises followed the establishment of Merrill's edge tool shop. By 1900, the canal supplied power to W. B. Stacy's box factory, closest to the dam; to F. W. Tilden's Eagle Iron Foundry; to the J. R. Holman Machine Shop; to the G. A. Robertson & Company manila paper mill; to C. J. Amidon & Sons' Hinsdale Woolen Mill; to the Jennings & Griffin chisel shop; and to the Granite State Mowing Machine Company, successors to the Newhall & Stebbins Machine Shop.

The Canal Company: Information supplied by James W.



McGoldrick Paper Company buildings.

Gallagher, Jr., P.E., chief water resources engineer of the Dam Bureau at the New Hampshire Department of Environmental Services, describes a record book now in the possession of the McGoldrick Paper Company, the current owners of the upper dam. These records indicate that four users of the canal's waterpower formed a Canal Company by 1869 to manage the water resources that were necessary for their livelihoods.

The four businesses that constituted the Canal Company at that time were the F. W. Tilden Iron Foundry (later the Eagle Iron Foundry) at the easternmost flume of the canal; the J. R. Holman Machine Shop, which is located directly on the main channel of the canal, but has a deep wheel pit beneath the building, providing the hydrostatic head necessary to power the shop; the G. A. Robertson Company, manufacturers of manila papers, located on the second major lateral flume from the main canal; and the C. J. Amidon & Sons woolen mill, which had two long penstocks leading from the canal to the textile factory on the bank of the Ashuelot River.

In 1931, the Granite State Mowing Machine Company, which occupied the site of the earliest water privilege to be served by the canal and had long drawn power from the canal, officially joined the Canal Company, which was renamed the Hinsdale Canal Company.

It appears that the Canal Company was an unincorporated consortium of the canal's users. No record of the incorporation of the company can be located in the New Hampshire laws passed before 1883.

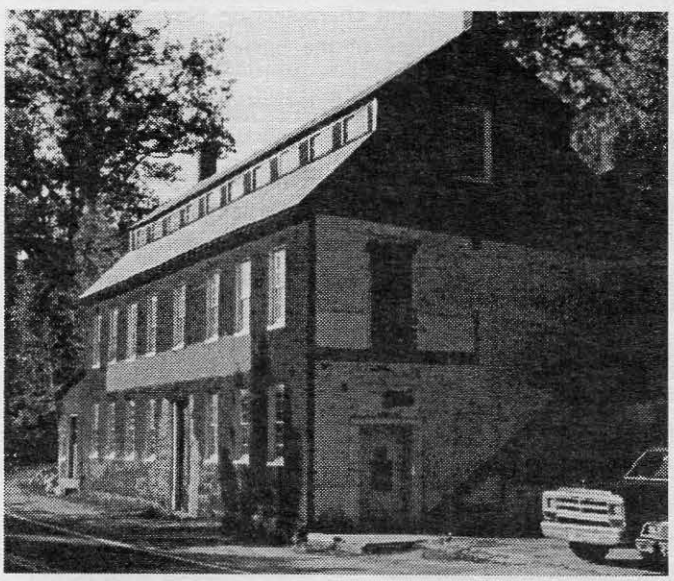
Significance and Comparative Evaluation

The Upper (McGoldrick) Dam and power canal are significant as a still-intact water power system dating from the beginnings of complex hydraulic engineering projects in New Hampshire in the 1820s. This engineering enterprise was one of the earliest power canals in the watershed to seek to impound a portion of the main stem of the river near the mouth of the stream and to employ the power of the river to establish industry where there had been none.

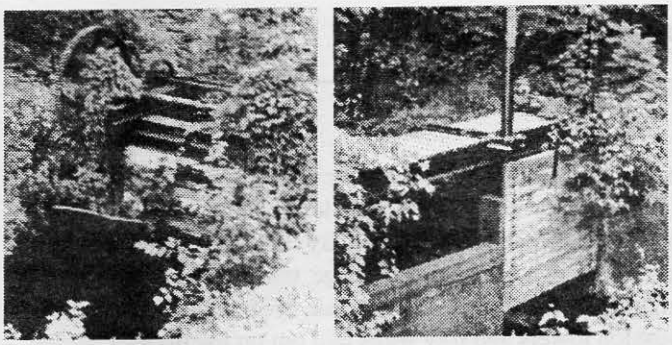
The dam and canal are unique within the watershed of the Ashuelot River in providing power for as many as eight different manufacturing technologies at a single time. Over the years following the excavation of the canal in 1828, the six major water privileges of the canal and flume system are known to have supported at least twenty-five different companies manufacturing at least a dozen different kinds of products. No other single dam and canal in the Ashuelot River watershed powered so many diverse manufacturing plants.

According to flowage statistics and anecdotes supplied in the 1916 prospectus for the Sheridan Woolen Mills, just upstream from Hinsdale, the flow of the river was usually adequate to satisfy the power requirements of the many industries arrayed along its banks. Omitting the four wettest months, the available average power of the Ashuelot River at Hinsdale was calculated by hydraulic engineer Arthur T. Safford, of Lowell, Massachusetts, at 377 horsepower in 1916.

In his Statistics and Gazetteer of New-Bampshire (1874), Alonzo J. Fogg documents the economic importance of Hinsdale's upper dam and canal by providing the following statistics of employment and production for the manufactories that were ranged along the canal in 1875: Boydon and Amadon's Hinsdale Woolen Mill employed 23 males and 20 females with an annual payroll of $15,800 and an annual production of 230,000 yards of cashmerett valued at $110,000; Wilder & Hopkins annually produced chisels and spoke shaves valued at $18,500; Newhall & Stebbins annually produced mowing machines valued at $52,000; the box factory annually produced products worth $10,000; the iron foundry annually produced castings valued at $14,000; the machine shop annually produced $75,000 worth of products. The annual production of Hinsdale's paper mills was worth $60,000, but by 1875 the majority of the town's paper was produced downstream at another site. In 1875, the aggregate production of Hinsdale's water privileges, most of them arrayed along the canal, made Hinsdale "the third town in the county in the amout annually paid for mechanical labor, and



This building once housed the Holman & Merriman Machine Shop and contains the remains of the water turbine box.



Extant gates on the Hinsdale water system.

the fourth in the value of its manufactured productions."

Comparable development elsewhere along the Ashuelot River: During the nineteenth century, the Ashuelot River became one of the most heavily industrialized small rivers in New England. Fogg's The Statistics and Gazetteer of New-Hampshire states that the Ashuelot "is one of the most important streams, of its size, in the State, in point of improved water power." Fogg notes that the sources of the river "are from ponds which have been dammed, thus producing large reservoirs and affording constant water power to the manufactories on the streams below. The length of the river is about forty miles, and it drains a basin of 240,000 acres, or 375 square miles. Its improved horse water power is about 3,600, with much still unimproved. From its source to the Connecticut it has a fall of nearly 1,000 feet."

A 1916 prospectus for the sale of the Sheridan Woolen Mills, a few miles upstream in Ashuelot Upper Village, lists the following sequence of manufactories from the head of the Ashuelot River to its confluence with the Connecticut River: a small woolen mill in Gilsum; the Faulkner & Colony woolen mills in Keene; Homestead Woolen Mills in West Swanzey; Rockwell & Sons pail factory in Westport; Sheridan Woolen Mills in Ashuelot Village, Winchester; W. F. Robertson & Company paper mill at Ashuelot: E. C. Robertson paper mill in Ashuelot; Robertson Brothers paper mill in Ashuelot; Paper Service Company mill in Ashuelot; New En land Box Company mill in Ashuelot: Ashuelot Paper Company in Ashuelot; Eagle Iron Foundry in Hinsdale; J. R. Holman Machine Shop and Woodworking Machinery in Hinsdale; G. A. Robertson & Company paper mill in Hinsdale; Hinsdale Woolen Mills in Hinsdale; Granite State Mowing Machine Company in Hinsdale; White-Washburn Paper Company in Hinsdale; Nutter & Barnes metal working machinery company in Hinsdale; Brightwood Mills paper Mill in Hinsdale; 0. C. Robertson Paper Company in Hinsdale; and M. S. Leach wagon and automobile body shop in Hinsdale.

Although the entire Ashuelot River was heavily industrialized, the upper dam and canal in Hinsdale are unusual not only for the early date (1828) at which the dam and canal were put into operation, but also for the number and diversity of enterprises powered by a single impoundment. No other site along the Ashuelot River powered so many differing enterprises from a single dam. The next highest concentration of industries on the river was at Ashuelot Lower Village, about 1.5 miles upstream (east) in the township of Winchester. Here, by the early 1900s, were located four paper-making

'plants operated by W. F. Robertson & Company, E. C. Robertson, Robertson Brothers, and the Paper Service Company, as well as the Ashuelot branch of the New England Box Company. This concentration of five plants was powered by several dams, each supplying power to up to two plants, rather than by a single dam.

In summary, the upper (McGoldrick) dam and canal in Hinsdale represent a rare survival of an early attempt to harness water power on a moderately large scale. This engineering enterprise transformed Hinsdale, one of the smallest townships in New Hampshire in its land area, from a quiet farming community into one of the most active manufacturing centers in Cheshire County.

Bibliography

Child, Hamilton, Gazetteer of Cheshire County, N.H., 1736-1885 (Syracuse, N.Y.: Journal Office, 1885); Conant, J. E. and Company, auctioneers, Prospectus for the sale of the Sheridan Woolen Mills, Ashuelot Upper Village, Winchester., New Hampshire, on September 14, 1916 [untitled]; Fogg, Alonzo J., The Statistics and Gazetteer of New-Hampshire (Concord, N.H.: D. L. Guernsey, 1874); Gallagher, James W., letter to Nancy C. Dutton re: McGoldrick Dam, Hinsdale, New Hampshire, July 31, 2000; Hinsdale American Revolution Bicentennial Committee, Hinsdale, N.H. (1976); Hurd, D. Hamilton, History of Cheshire and Sullivan Counties, New Hampshire (Philadelphia: J. W. Lewis & Co., 1886); Spencer, Warren B., Some Early Recollections of Hinsdale, N.H. (Brattleboro, Vt.: E. L. Hildreth & Co., 1903); The Town Register: Hinsdale, Walpole, Westmoreland, Winchester and Chesterfield (Augusta, Me.: Mitchell Publishing Company,1909); Walbridge, J. H., Historic Hinsdale (supplement to Windham County Reformer) (Reformer Publishing Co., 1900). Maps: Fagan, L., Map of Cheshire County, New Hampshire. Philadelphia: Smith & Morley, 1858; Hurd, D. H. & Co., Town and City Atlas of New Hampshire. Boston, 1892; Rockwell, C. H., Atlas of Cheshire County, New Hampshire. Philadelphia, 1877; Sanborn Fire Insurance Maps, Hinsdale, N.H., 1884, 1892, 1904, 1910, 1924, 1946; and Winchester, N.H., 1902, 1913 (microfilm, New Hampshire Historical Society, Concord, N.H.).

Dennis Howe and
James Garvin
Concord, NH

Book Reviews

Transformers at Pittsfield: A History of the General Electric Large Power Transformer Plant at Pittsfield, Massachusetts

by Thomas J. Blalock

Gateway Press, Inc., Baltimore, MD, 1998,
337 pages, $35 (paper)

An interesting book came my way during July. A few days after Thomas Blalock attended one of my weekend tours of the Copake Ironworks at the Taconic State Park, he mailed a copy of his book to me in appreciation for my volunteer effort. Besides, we might have known each other many years ago when we both worked at the GE Power Transformer Department in Pittsfield.

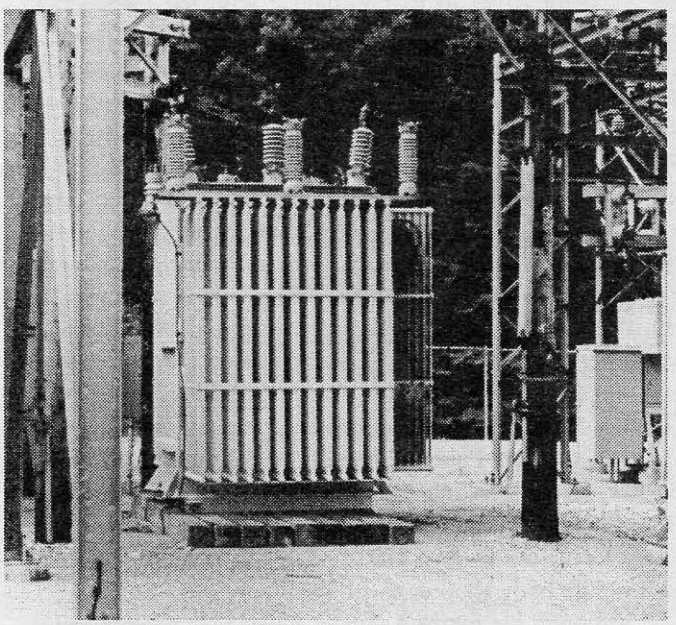
Blalock traces the history of the transformer business in Pittsfield from the founding of the Stanley Laboratory Company in 1890 and the Stanley Electric Manufacturing Company in 1891 to the closing of the GE transformer department 96 years later. The first transformer left the shop in 1891; the last in October 1987.

What is a power transformer? Unlike the small tank type distribution transformer that hang from poles throughout city streets, power transformers are large freight car size steel tanks with long ceramic insulators (usually in groups of three). They sit in the middle of substations at hydropower stations, at the edges of cities, or near major factories. At hydropower stations they step up voltages from generated levels to thousands of volts for long distance transmission (high voltage alternating current transmission results in lower line losses than lower voltage transmission); at the local substation the voltage is stepped down to local distribution levels. It's more complicated than that. Things like liquid and solid insulation systems come into play; transformers must be kept from overheating (and exploding); transformer design and testing must anticipate such system stresses as lightening strikes, switching surges, and microsecond grounding faults (my first four years at GE were at the High Voltage Research Lab. in Pittsfield). Complicating this was the utilities' habit of operating transformers at, or in excess of, 100% capacity (we usually tested insulation at 110% design level).

"Open House" at the High Voltage Lab was an experience the public rarely missed and never forgotten. "Man made lightning" sparked 100 feet across the huge, dark, hanger like building in blinding flashes and loud bangs. The first strike always caught the new comers off guard and many children had instant "accidents." The lab made the 1940 Worlds Fair and GE's leadership in high voltage research became world known. By the 1960s, GE was experimenting with ultra high voltage transmission lines in the high Rockies, designed after small, model railroad size transmission towers and tiny wires laid out on the floor of the lab.

The transformer plant was like a spider web of pieces and parts originating from outlying buildings – wire winding in one building, core assembly in another, and steel plates welded into giant tanks in yet another building, slowly working their way toward a central assembly building as windings were dropped over the cores, and the whole dropped into empty tanks. Cables were attached to insulator bushings, the tanks filled with special insulating oil, and covered, tested, and trucked off to the nearby loading dock to be shipped away on special flatcars, a Schnabel car, that allowed the transformer to slip under low bridges. That too is an over simplification. But Blalock's book is not an over simplification.

Transformers at Pittsfield isn't about the architecture of the factory buildings, but about the transformer manufacturing and testing process. It delves into the early engineers that made the department work Guglielmo Camilli, Cummings Chesney, Giuseppi Faccioli, Allan Hendricks, Jr., and Dr. Karl McEachron, to name a few. It follows the evolution of the process from the early 1900s to modern days. During

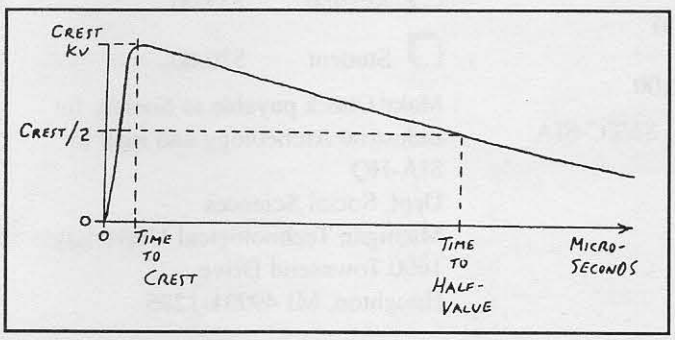


General Electric medium power transformer at the Warm Brook Substation in Arlington, Vt. The transformer is cooled by circulating insulating oil through multiple panels of radiator pipes, seen here partially surrounding the transformer (Rolando photo).

WW II copper was so scarce that 12 transformers were built with silver wires. "Seventy five tons of silver, valued at almost one million dollars in 1942 currency, were used." The silver was delivered to Pittsfield in railroads cars escorted by US Treasury guards armed with machine guns (don't get excited the silver was later reclaimed). A year by year chronology traces high points in the business, ending with 1986 when 1,000 workers lost their jobs with the close of the transformer business and 1989 when the regulator and inductive products were relocated from Pittsfield and another 700 people were laid off.

Details of transformer and insulation testing are described as are types of test equipment – some unique to high voltage testing. Techniques of test measurements and calculations are illustrated; high voltage theory and characteristics are discussed. What were industrial secrets during GE's race with Westinghouse for a major share of the business are now disclosed to anybody who might like to set up their own transformer manufacturing and testing facility. Reading about the High Voltage Lab reminded me of one of the technicians who worked there and received an accidental shock one day from a piece of test equipment. He was all right until his curiosity got the best of him and he decided to find how much voltage hit him. He recharged the circuit and measured something like 60,000 volts (static electricity – high voltage but low current). Seeing what the voltmeter read turned him white, and the more he pondered 60,000 volts, the weaker he got. He ended up having to go to the hospital for observation, but he was back at work the next morning, none the worse for his shocking experience.

What closed the transformer business in Pittsfield? Blalock doesn't get into the politics of GE, Pittsfield, and the world market. The excuse given by the company was stiff competition and economic losses to the company. But rumor had it that it wasn't losses, but lack of measuring up to most of the company's other stellar departments – GE Capital, GE Plastics, GE Aerospace, etc. – that the transformer business was "pulling down" the profit levels of the company as a whole. Word on the street was that the transformer business brought in about 3% profit and the CEO said he could make more putting the money in a bank. Thus, a whole department was closed, even though it was still making a profit – but not enough – and some 2,000 families lost their incomes. Such are modern economics.



Anatomy of man-made lightening – a typical high voltage test wave that evaluated power transformer insulation systems. Called a "1.2 by 50 wave," it rose to maximum voltage (thousands of volts) in 1.2 microseconds and decayed 50% in 50 microseconds. It was an industry standard and was developed at the GE High Voltage Lab in Pittsfield, Mass. (Blalock 1998:163).

Blalock's book makes an important contribution by documenting an important modern industrial process. In a day when we are still working at defining 18th- and 19th-century industrial processes, we shouldn't forget that today's industries will soon be yesterday's. Now is when we should be documenting what is, not "when was." *Transformers at Pittsfield* contains numerous b+w photos, line drawings, factory floor plans, and mathematical–
formulas; a bibliography and index, and a brief biography of the author. Order from the author at 113 East Housatonic St., Pittsfield, MA, 01201; phone (413) 499-3342.

Victor Rolando
Bennington, VT

A Guidebook to Mining in America

by John R. Park

Stonerose Publishing Company, April 2000, 623 pages, $35.00 + S&H (paper)

Having received my share of unsolicited items through the mail down through the years, I am suspicious of packages from stores and publishing companies that I have neither ordered from nor heard of. So when I received a package from an unknown Florida publisher in mid May, I questioned whether to open it or tell the post office to please return it as "unsolicited mail"? Throwing all caution to the wind (feels good to live on the edge!), I opened the package and found it to be something that I had waited for such a long time that I'd forgotten all about it – *Guidebook to Mining in America* by fellow research associate John Park.

The title is somewhat misleading. What appears to be a guide to just mines is also a guide to mining related sites and structures. Coke ovens, mining camps, furnace communities, the Denver mint, and historic homes are included, as are museums, foundries, railroad stations, canals, John L. Lewis and the UMW, African American miners, and even nature centers and the categories continue on.

Following an introduction and comprehensive guide to entries, recommendations, and information sources, the book presents sites in state sequence. Volume 1 is western states, Alaska through Wyoming; volume 2 is eastern states, Alabama through Wisconsin including D.C. and Puerto

Rico. No, I don't know why John organized the book west to east (the earth rotates west to east why not a book?). Each state is introduced with a substantial history of its mining activity. The entries are also accompanied by boxed historical text inserts, such as the origin of "Pikes Peak or Bust" and an explanation of the Comstock Lode. That gives us the clue that we aren't talking only about coal and iron here, but all minerals (gold, uranium, marble, sulfur, helium, petroleum, etc.) Many entries are archeological sites. Each entry is accompanied by a symbol which explained at the rear; Zuni Salt Lake is accompanied by a salt shaker symbol, which is defined as "Brine or sea-salt works, including artificial brines and salts other than NaCl. " Each entry includes street and/or mailing addresses, phone numbers, driving directions from a nearest major highway, opening days/hours, fee if any, and even coordinates (were You aware that the coordinates of the Missisquoi Valley Historical Society of North Troy, Vt., are N44 55 4 W72 2') 48'?). Suggested further reading materials are also listed.

Vermont has 29 entries (includes industrialist Ira Allen's statue at UVM) plus descriptions of Vermont iron, potash, and copper. Hawaii's nine entries include volcanos. Pennsylvania probably leads with 131 entries. One of the District of Columbia's seven entries is the site of a prehistoric steatite quarry; there is also a list of where dimensional stone came from for various D.C. buildings and monuments.

The two 8 1/2-by-11-inch volumes contain 1,764 entries, 130 text inserts., 556 b+w, photos, 48 maps, and 133 other graphics; 579 terms are defined in a comprehensive 28 -page glossary. An alphabetical list of entries cross-references them to a site identification number (e.g., Barre Museum is VT- 19, the 19th entry for Vermont); each volume contains its own subject index. An Information Submission Form is provided for readers to input anything they feel might have been forgotten or overlooked (hinting of a second edition?). No ISBN number has been assigned. If your local bookstore doesn't have it, order from Stonerose Publishing Company, 774.1 S.W. 59th Ct., South Miami FL, 33143-5112. For information, email John at stonerosepub @worldnet.att.net, fax (801) 912-1139, or log on website http://stonerosepub. honic.att.iiet/index.html.

Victor Rolando
Bennington, VT

New Members Sought

The Society for Industrial Archeology promotes the identification, interpretation, preservation, and re-use of historic industrial and engineering sites, structures and equipment.

Northern New England Chapter
(Vermont, New Hampshire, Maine.) Does not include membership to national SIA.

❒ Regular $10.00

❒ Student $ 3.00

Make checks payable to NNEC-SIA and mail to:
Herman C. Brown
Treasurer, NNEC-SIA
250 West Shore Road
Grand Isle, VT 05458-2104

Southern New England Chapter
(Massachusetts, Rhode Island, Connecticut.) Does not include membership to national SIA.

☐ **Regular** **$15.00**
☐ **Student** **$10.00**
☐ **Lifetime** **$150.00**

Make check payable to SNEC-SIA

and mail to:
Rick Greenwood
Treasurer SNEC-SIA
549 Maple Avenue
Barrington, RI 02806

Chapter members are encouraged to also join the national Society for Industrial Archeology (although it is not mandatory for chapter membership).

❒ Regular $35.00

❒ Student $20.00

Make Check payable to Society for Industrial Archeology and mail to:
SIA-HQ
Dept. Social Sciences
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295

Name:_____

Address:_____

_____

Phone:_____ Email:_____