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and cover a time extension of some 10,000 years.
THE EXCAVATION OF THE GLASS FURNACE IN QUINCY, MASSACHUSETTS

George R. Horner

INTRODUCTION

This report of the excavation of the site of the 1752-1755 Glassworks, in the (now) Germantown section of Quincy, formerly Old Braintree, Massachusetts, represents a cooperative effort of the Quincy Historical Society and Eastern Nazarene College in March, 1969. The report consists of a description of the materials retrieved and of their possible relation to the only two existing glass bottles known to have been made at Germantown, and the original window glass of King's Chapel, Boston, which was completed in 1754.

The glass furnace was located on a marsh bordering Town River, called Shed's Neck (Fig. 1). In 1750 one hundred acres of land was leased from Colonel John Quincy to a company consisting of John Franklin, (brother of Benjamin), Norton Quincy, Peter Etter and headed by a German immigrant, Joseph Crellius, the prime mover in all subsequent operations. Isaac Winslow joined the company later. In 1752 the company released the land to Joseph Palmer and Richard Cranch who began the construction of buildings which were to house such infant industries as a chocolate mill, spermaceti and glass works, stocking weaving, salt manufacturing, and a shipyard. The land was laid out in streets with such names as: Summer, Water, and Weymouth and into squares, following the European plan with such names as: Hanover, Zuric, Manheim (sic), and Bern, and finally into house lots in anticipation of the over three hundred workers who had already arrived in Boston as glass blowers (Pattee 1878:473-481). The glass factory began operations around November 27, 1752, only to be destroyed by lightning and subsequent fire on June 2, 1755, after only three years of operation. Most of this group migrated to Temple, New Hampshire to begin an unsuccessful operation there (McKearin & Wilson 1978:41). Others went to Waldoboro, Maine (Pattee 1878:481). In the 1760's another glass furnace was constructed at Germantown only to end operations in 1769 due to business failure (Wilson 1972:50-51). This paper describes what was found, with few exceptions, of the remains of the glass furnace of 1752-1755.

In the short span of two years the glass furnace produced, according to a newspaper ad of the period, "cyder" jugs, dark green in color, snuff bottles in various shades of yellow to amber, and window glass (McKearin & Wilson 1978:33 & Fig. 5).

THE CURIOUS, THE COLLECTORS, AND THE VANDALS

Over the years the location of the glass furnaces was never lost. In fact, people were drawn to the location if only to poke through the debris hoping to find a piece of treasured glass. It was reported by Stinson Lord of Weymouth that the grate of the 1760 furnace was in place until the early 1930's when it was carted off to be used as an anchor for a boat. By the mid-1930's, amateur collectors began digging for glass. Unfortunately, they did not take time to record their excavations or accurately describe the glass they had removed. Mrs. Lura Woodside Watkins, "a noted antiquarian" (Wilson 1972:47), spoke in the 1930's of watching people "carry glass away by the bushel basket" (Hill 1959). In 1957, Mr. Richard Muzzrole located not only the pilings of the glass-loading wharf but also the foundation sites of workmen's homes. Between 1968 and 1970, Mr. Richard Morcom had found and identified glass probably made at the second glassworks of two hundred years earlier because of the glass types not heretofore thought to have been produced in Germantown (Wilson 1972:41-49). All too often, after serious collectors would complete their work, vandals would swarm over the site, looting it, until today little remains save fingernail size glass fragments of cokebottle glass! Erosion due to both storms and the daily action of tides has destroyed much of the southwest corner of the site. Such was the background of the site before we began to dig at Germantown in 1969.
Figure 1. Map of Old Braintree, now Quincy, Massachusetts, and location of Glass Furnace on Philip's Head. *Inset*: Philip's Head in greater detail and location of Germantown, glass furnace site and Palmer's house.
OBJECTIVES OF THE EXCAVATION

There were two main objectives for the dig:
1. To locate with accuracy the glass furnace(s)
2. To retrieve glass fragments which would identify the types and varieties manufactured at Germantown.

METHOD

Surface refuse consisting of grass, sod and brick, collected over the years when the site was used as a disposal dump, had to be removed to ground level before a five-foot square archeological grid could be laid out and serious digging begin. Because the brick was of possible interest to us, three large piles of it were collected. These piles were (1) red brick, (2) fire-blackened brick and (3) green-glaze covered red brick. The two latter categories of brick were bricks irregularly made, longer than modern brick, often showing hand and finger markings suggesting their pre-Revolutionary manufacture. These could be used in both the workers' and the glass furnace structures. The glazed bricks were probably from the dome of the glass furnace, discolored from the condensation of the melt of glass in the furnace. Furnace slag, cinders and conglomerates of various sizes, which contained sand, glass fragments and cinders, were found and separated for further identification.

The work at the site was conducted with the cooperation of an archeology class from Eastern Nazarene College under the direction of my daughter, Mary-Jo Horner, who was the Dig Director. Digging began on the east-west line and moved from north to south toward Town River. After a few days all of our grid stakes were removed by vandals, so that all measurements had to be made from the remaining holes! A daily journal and colored photographs recorded the work at the site during its two weeks of excavation.

OBJECTS UNCOVERED AND RECOVERED

Two significant features were uncovered as digging moved southwest toward the river bank: the furnace walkway and the foundation of the 1752 furnace. The recovered objects, glass, clay and metal, will be described below.

FEATURES

Digging at the southwest corner of the site, near where the bank eroded onto the beach, six inches below the surface, we uncovered two parallel lines of granite blocks, the first significant feature to be found. There were (and are) eighteen such blocks. Each measured 12x12x18 inches (Fig. 2). There are nine in each line forming a walk nine feet long from the furnace to where the glass furnace wharf formerly stood. The second feature was the foundation remains of the 1752 kiln. At the point of juncture to the walkway begins a line of foundation bricks for the furnace (Fig. 3). All features above this were disturbed. Objects found include bricks, probably for the footing and wall of the furnace. These were black or grey in color intermixed with grey ash and red fire-baked earth. This mixture continued for approximately twenty feet in length and about six feet in width. Associated with this ash is debris, including glass, portions of melting pots, a hollow clay tube, slag, a balancer, and nails. This debris was found at the juncture of the third granite block. This line of debris continues on either side of the walk and consists of wood ash and many styles of bent, hand-wrought nails. This burnt debris suggested destruction of the kiln by fire, helping to demonstrate that this was the earlier kiln. It further supports the point that this was the glass furnace rather than another type of oven.

Chunks of broken clay crucibles or melting pots were also found concentrated in this kiln area, as well as glass-glazed balancers, upon which crucibles were leveled when
placed in the furnace. With the uncovering of the kiln, the formal excavation was completed.

RECOVERED GLASS. In comparison with later and better known glassworks, the Germantown operation produced a relatively small amount of glass. From the excavation we found and distinguished at least three major glass types and a number of variations related to them:

1. Jugs. Black-green to green, round, "kicked-up" or "push-up" bases.
2. Snuff bottles. Amber to yellow, rectangular bottoms extending to shoulders.
3. Window glass. Green-white, a thin, flat glass.
Including the window glass, all of the above types were blown and shaped according to the ability of the individual blower, the constraints of the materials and the force of custom. These combinations resulted in slight variations of the finished products. Since we found no complete bottles, descriptions of the products are based upon the parts recovered. Later these will be compared with the only two finished bottles known to have been made at Germantown.

Of the innumerable pieces of glass found, and these amounted to more than five three-pound bags, only a relatively few were large enough for accurate classification by bottle types and parts (Fig. 4). We have described these as (1) rim tops and necks, (2) bottle shoulders and sides, (3) bottoms, and (4) window glass.

RIMS AND NECKS. Four major rim types were found and two major neck types. Rim Type 1 exhibits a crude finish; to form the rim the glassblower wound a one-eighth inch wide thread of glass about the top of the neck, severing it with shears (Type 1, Fig. 4). The rim top illustrated is of a cider jug and measures 7/8 inch across the mouth, overall 1 3/8 inches. Type 2 has a "stepped" finish. A narrow top, perhaps associated with a long-necked bottle (Wilson 1972:48, Fig. 4), wherein the glass threads on the bottle's top gave a "stepped" appearance (Type 2, Fig. 4). Of the more than twenty specimens of Type 2 found, none measured more than 1 1/2 inches across the outside top and none less than 1/2 inch, suggesting that these were tops of small containers. All were amber to yellow to yellow-green in color. Just a few, less than six with "turned" lips, were found. The tops of these rims were turned into the bottle opening, resulting, on the outside, in a merging and flattening from the rim top to the shoulder, leaving the bottle "neckless" (Type 3, Fig. 4). The major difference in Type 4, Fig. 4, is that a rectangular shoulder is formed directly from the round neck and continues without change to the base.

BOTTOMS. Three identifiable bottoms were recovered: (1) round, (2) a round "kick-up" or "push-up" type and (3) a flat, rectangular shape. Because of the nature of glass-blowing, most of the round based bottles were slightly concave at the underside of the bottom. Only the cider jugs had a definite "push-up" appearance and these were deliberately so shaped (Fig 5, Fig. 6). Of the few found, one measured 4 7/8 inches in width; the measurement for the bottom was 4 inches; the height of the push-up bottom was 1 1/2 inches. The bottom of a snuff bottle is rectangular in shape and flat, measuring 2 1/2 inches x 1 7/8 inches (Type 4, Fig. 4; Wilson 1972:Fig. 100)

WINDOW GLASS. Germantown window glass is clear, green-white in color. It was blown (Wilson 1972:46, Fig. 4) into a cylinder which was then split and flattened, opening into a sheet. Some fused sheets were found. One in particular showed five layers of glass fused together, a probable result of the fateful fire of June, 1755.

Other glass recoveries. "Moiles" are the accumulation of glass at the end of the blowing pipe which is knocked off and recycled as cullet. More than one hundred of these were found in differing shapes and colors. "Threads" are wound around a bottle top and were made by a long rod of solid iron which drew the glass into thin filaments which were cut off with shears. The remaining threads are of varied sizes and colors. A great many were found throughout the area. There were no "whimsies" found; these are small animal forms made from threads by the blower just for fun.
Figure 4. Type 1: rim of a "cyder" bottle neck. Type 2: a-d, "stepped" finish of a bottle neck. Type 3: a "turned" lip on a bottle. Type 4: the shoulder of the bottle is formed directly from the rim top. This is either a decanter or a snuff bottle.
MELTING POTS. The pots into which glass-making materials are reduced to a "liquid melt" are made of clay. Their shapes varied from square to round (Sauzay p. 49), although only the latter were found at Germantown. Heights varied from 18 inches to three feet. No whole pots were found at Germantown. The sherds which were recovered are uniformly 3/4 inch thick. They had a multi-colored brown, yellow, grey slip glaze. Since they were constantly heated toward 2300 degrees F. their life expectancy was rarely more than three months (Sauzay p. 50). The resident potter at Germantown was Joseph H. Benner, also an immigrant from Germany (LeDoux 1970). After the fire in 1755, Benner migrated to Abington, Massachusetts, where he established a pottery kiln and made stoneware pottery until his death in 1796. His home at Germantown is worthy of note. Just after Joseph Palmer's new house was completed an angry young man set it afire, completely destroying it (Pattee 1878:487). In a letter to a Thomas Flucker dated December 28, 1767, Palmer considered "...fixing up J.H. Benner's house for his family..." (Knox 1960); the house had been unoccupied for some time.

FRIT. It is possible that the word frit is an English derivation from the French noun, la fritte (v. fritter: to fuse or fry). Fritting is a process to remove gasses and consume combustible substances to begin the fusion into glass. Frit is a carefully proportioned composition of silica, lime, soda and lesser proportions of other chemicals, depending upon the color desired. With the addition of glass sherds, this mixture, the "batch", is put into a pot and heated to about 2300 degrees F. When fire destroyed the glass furnace, the fusion process was halted. Several large chunks of partially fused batch were recovered (Fig. 7).

UNIDENTIFIABLE CLAY MATERIALS. A large number of porous, very light-weight objects, having the texture of baked clay and covered with a green glassy glaze, assumedly from spillage, have been found near and throughout the area of the kiln. Each measured roughly 2x5x3 inches. It has been suggested that these represent balancers upon which the filled melting pots were leveled prior to firing (Diderot 1959: Pl. 215h). Their function is not certain. A hollow tube, one inch in length and about 1/2 inch in width, was found. It might have been put to the "working hole" through which one might look inside the furnace to observe the melting process or watch for fractured pots.

Figure 5. The method by which the bottoms of cider bottles were shaped, and the body rolled and smoothed on a marver (Diderot 1959:Pl.231).
STONE OBJECTS. In addition to the stone walk there were other stone objects found at the site. Notable was a flat stone (marver) (Diderot 1959:Pl.230) with boundaries cut into the stone to guide the glass-blower as he rolled his bottle back and forth while shaping it. Others included a whet-stone, a pestle of possible Indian origin, used to crush broken glass and chemicals in preparation for the glass mixture, and an arch shaped object four inches wide at its base. The arch fits into the palm and index finger and was probably used to push broken glass off a table (Diderot 1956: Pl.IV,4c;Fig.8a,b). A small asbestos stone was recovered. Its probable use was in the construction of the second glass furnace; it was referred to in correspondence of John Adams (Appendix B).

METAL OBJECTS. Three types of metal objects were recovered. The largest was the remains of a fore-section, including part of the head, of an implement resembling a furnace rake. If it is a rake, its use was to pull a destroyed pot from the furnace. The one found is 12 3/4 inches long and 1 inch thick and made of iron (Fig.9a,b). A drawer pull and large numbers of nails complete the inventory. The latter fit into the following size categories: 7/8d. 2d,3d,4d,6d,7d, and 8d. All were of hand-wrought iron, rectangular in shape, with square tops. The majority of nails were 3d, a roofing nail, 6d, an all-purpose nail, and 8d, probably used to join beams and/or planks together.

PERSONAL OBJECTS. Two types of personal objects were found - white clay pipe stems and bowls, and chinaware. There were three pipebowl found, one of which bears "TD" on the lower bowl and a "d" on the heel. Ian Walker dated this bowl as early 1760's (Walker 1971). As such, it is evidence of the operation of the second glassworks. Three pieces of recovered pottery were too small for accurate identification.

CONCLUSIONS

Although the location of the glass-loading wharf was reaffirmed (Hill 1959), it was disappointing that our work did not again shed light on the workers' homes (Hill 1959) found by Muzzrole in 1957 (Fig. 1). We felt a sense of accomplishment in uncovering the granite walk incline into the furnace. From it we gathered a rough idea of its construction and
expenditures and receipts from before 1750 to the detailed coverage of debits and gifts relative to 1752 and June 1754 when it opened.

Figure 8. a. A scraper illustrated in Diderot, used to scrape glass fragments from a table into a pot for "batch" (Diderot 1959:Pl.232). b. A scraper recovered at Germantown.

comparisons and discussion

Two existing pieces. A complete cider bottle and a spirit and/or snuff bottle or decanter were given to the Quincy Historical Society by Josiah Fenno on September 25, 1895. Mr. Fenno was the grandson of the granddaughter of Frederick Hardwick (or Hardwig, Hartwick, Hartwigg), one of the original glass-blowers from the Palatine (Pattee 1878:479). In an accompanying letter to the Society (Appendix C), Mr. Fenno explained that both bottles have been in the family as treasured heirlooms from the first glass furnace manufacture and Mr. John Hardwick. They were passed down from generation to generation until Mr. Fenno donated them to the Society. These are the only known complete examples of Germantown glassware (Fig. 6 and 4, type 4).

The original glass in King’s Chapel, Boston. A letter from John Franklin implies the distinct possibility that the window glass installed in the windows of King’s Chapel (Boston 1754), was manufactured in Germantown rather than in England. This idea prompted further research in both the Annals, published by King’s Chapel in 1871, and the more primary source, the Ledgers of the Church, which show American Revolution 1775, with a
It was important to the Chapel building committee, as recorded in the *Annals* (King's Chapel 1871:97), to encourage the use of locally produced materials in the construction of the building and native-born craftsmen in its execution. One notes, for example, that the granite building stones were supplied by both Hayward and Hunt of Braintree, with rock coming from both the North and South Commons, now Quincy. A Mr. William Godner was hired as a stonemason, while Germans were paid for "hammering stones" in the street in front of the building (King's Chapel 1753). It is equally important to note that the committee turned down an offer by a Mr. Allen of Bristol, England who offered to supply not only English granite but to send along English workers to construct the church as a gift on his part. A letter to Mr. Allen described in full in the *Annals* thanked him for his offer and pointed out the committee's intention of supporting the growing local industries (King's Chapel 1871).

With this in mind, we approach the problem of the origin of the window glass for the "New Church". First, note the date of John Franklin's letter to Benjamin Franklin describing the ill-fitting glass already shipped from England. The letter is dated November 26, 1753 (Appendix A). The building was to have opened its doors in June, 1754, just seven months after receipt of the wrongly cut glass. The Committee had little choice but to place an order with the Germantown Glass Works. By February 15, 1754 (three months after John Franklin's letter to his brother) Gershom Flagg was paid for the work he had already completed - the installation of the glass windows (King's Chapel 1754).

To go back a little in time, it seems unlikely that British glass was reordered, for several reasons. In the first place, finding cargo space for an early shipment of glass was unlikely since cargo space was at a premium. Ships did not run on a regular trans-Atlantic schedule, causing probable shipment delay, and a ship in an east to west winter crossing, sailing against the prevailing westerlies, could not have possibly arrived at Boston before April 1754, one month after Flagg had installed the windows. Finally, the *Boston Gazette* mentions no Boston sailing, either to or from England, between December, 1753, and March, 1754 (Holly 1977).

John Franklin pressured the Committee to use local glass for the windows, and since the Committee had established the precedent in using local granite (Braintree-Quincy) for the building, and since there was no other local source for glass, Germantown glass was most probably used. In addition, not only do we have record of payment to Flagg for the installation of the glass, but there is also a payment record to I. Lindsay for building the wooden casements (frames) for the glass, March, 1754 (King's Chapel 1754). Most significantly, there is recorded a payment of 86.15.10 (Old Tenor) to Mr. Charles Apthorp for glass for the church on June 6, 1754 (King's Chapel 1754). A further notation dated June 20, 1754, reads "Mr. Charles Apthorp's present of the glass" to the church: this makes the glass a gift from him (King's Chapel 1754). This large amount of money for glass leaves little doubt but that it is glass for the windows rather than for communion glass, which is often mentioned separately in both the *Annals* and the *Ledgers*.

Apthorp was a well-known entrepreneur in both Boston and Old Braintree. He invested and sold real estate in both towns. Further, he was on the Building Committee of the New Church and would press for the support of this and other local industries.

All indications and implications point to the conclusion that glass made at Germantown was used in the original windows of King's Chapel; some may still remain. During the American Revolution, both the British and Tories worshipped there since, at that time, it belonged to the Church of England. It was not used as a stable or vandalized as were other Boston churches which supported the Revolution, thereby protecting the glass and church.

It would therefore appear that King's Chapel is the first (known) public building in
America to use locally made window glass.

ACKNOWLEDGEMENTS

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Special thanks are due to Dena Dincauze, the Editor, for her very helpful suggestions during the editing process, and to Dr. David Starbuck of Boston University for technical guidance on the manuscript. None of my helpers, of course, shares any responsibility for

Figure 9. a. An iron implement, either a mixing rod or an oven rake, recovered at Germantown; 12 inches long. b. Various tools illustrated in Diderot (1959, Pl.252); Fig. 17 most closely resembles the Germantown piece.
the content of the manuscript; that is, as ever, reserved for the author. Permission has been granted by the Quincy Historical Society for the use of objects in its collection for study and illustration, and by the Dover Publishing Company for photographing and reproducing Plates 231, 232, and 252 from A Pictorial Encyclopedia of Trades and Industry by Denis Diderot, 1763, English edition, edited by C. Gillispie, New York, 1959.

APPENDIX

A. Excerpt from a letter sent to Benjamin Franklin by his brother, John.

"Boston, Nov. 26, 1753

Dear Brother,

I'm glad the Clay is so forward and hope the quantity we expect from Philadelphia will be sufficient to Repair the (glass) work in the spring. Our furnice stands well at present and ther Glassmen fulley Employed in making Window Glass and Bottles. The former made of our own Materials is Light and Cleere beyond our Expectation so that we Expect it will be thought Good Enough to Glaize the New Church. [King's Chapel, Boston, completed in 1754] I'm told the Committee have sent for a sample of it that the sample they have from London being a Mistake Cutt to a wrong size..." (LaBarre 1962:118).

B. Excerpt from the Diary of John Adams, noted June 20, 1760.

"The Deacon Palmer showed us a sort of stone that the old glass house brought from Connecticut to use instead of grindstone for the furnace. He called it stone of the asbestos kind. Dr. Eliot used it in his... and never found the fire made any impression on it. But the glass men found it dissolved in about four months. They call it cotton stone. It seems to have no grit at all. It feels as soft as soap. It costs the company about... or nine hundred pounds" (Butterfield 1961:140).

C. Letter of donation of Germantown bottles.

"Quincy, Sept. 25th, 1895

Mr. Wm. G. Spear:
Curator of the Quincy Historical Society

Dear Sir

I send you as requested, two glass bottles made at the works established by Gen. Joseph Palmer and Mr. Richard Cranuch at Germantown, in 1752-56. These were in the possession of my grandmother, Mrs. Josiah Adams, a granddaughter of Frederick Hardwick, one of the Germantown colony. They were given to me when my grandparents removed in 1878 to Quincy Neck from their house that stood on the site now occupied by Durgin & Merrils Block. I have been told by my grandmother that they were made at Germantown. My mother remembers them for seventy-years, the one with flat sides being then broken and mended as it is now. They correspond to the description of the ware made at the works, and altho such crude specimens, they have been preserved and mended when broken for some other reason than their value simply as bottles, and also they have been for many years in the hands of the descendants of the German settlers, probably ever since they were made, altho I do not know in whose possession they were previous to Sarah P. Adams becoming their owner but in consideration of the facts as presented. I have not the least doubt that they are genuine specimens of this early attempt to establish manufacturers in the town of Braintree.

Yours truly,
Josiah A. Fenno

Frederick Hartwick and Elizabeth Mears, both of Braintree, were married Sept. 11, 1760.

Charles (5th) son of Frederick Hartwick of Braintree by Mary Elizabeth his wife was baptized in the church, on Sunday, April 7th, 1771.
Charles, son of Frederick and Elizabeth Hardwick married Sarah, Daughter of Capt. & Sarah Peck 1790.

Josiah son of Deacon Josiah & Esther Adams married Sarah P. Daughter of Charles & Sarah Hardwick Jan 15, 1818

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THE WILLS HILL SITE: A MIDDLE WOODLAND HUNTING-GATHERING CAMP

Peter A. Thomas

The Wills Hill site is a single component, Middle Woodland, hunting-gathering site. The lack of carbon samples from a cultural feature makes a specific age estimate for this camp somewhat tenuous. On the basis of the artifact complex, a Middle Woodland period occupation is indisputable (Funk, Weinman and Weinman1966:1-20; Funk 1968:1-7; Hesse 1968:27-32; Kaeser 1968:8-26). The Middle Woodland time range, ca. 200 to 1000 A.D., is
certainly too broad for comparative purposes. The cultural sequence developed by William A. Ritchie and Robert E. Funk (1973:117-153) for the Hudson Valley on the basis of point and ceramic characteristics suggests that the Wills Hill site dates from an approximate mid-point in the Middle Woodland period--600-700 A.D. Although I believe the estimate to be reasonable, until better comparative data for the period can be developed in both the Connecticut and Hudson River systems, this date must remain hypothetical.

As will be argued below, this site is viewed as a late summer camp occupied by one, or perhaps two, family units. A short and possibly unrepeated occupation also seems likely. The Wills Hill site is atypical in that its limited occupation allows one to define individual activities which took place within the camp. Such data have rarely been recovered in New England prehistoric sites. Information from this site also contributes data for the development of annual subsistence and settlement pattern models for the Middle Woodland Period; such models are crucial for the understanding of cultural development in the Northeast.

GEOGRAPHY

The Wills Hill site (19-Fr-37) is located on the southern flank of Wills Hill in Montague, Massachusetts. It lies at an elevation of approximately 366 feet above sea level and about 25 feet above an extensive, pine-barren plain (Strauss 1976:23). This hunting-gathering camp spreads over a relatively level (1:10 slope) portion of a ridge formed by the erosion of the hillside. The northern edge of the site was destroyed by a 20-foot-wide bulldozer cut made during a geological survey. Test excavations higher on the ridge indicated that the site did not extend beyond this recent disturbance, nor were adjacent ridges occupied. Extensive arkose (sandstone) outcrops along the eastern margin of the ridge, as well as a steep slope, limited habitation potential in that direction. Test trenching produced only several flakes in that area, with none at the very margin. Excavation on the southern edge yielded much the same results--minimal recovery of artifacts as bedrock and ledge were approached. The western margin of the site is reached as the slope of the hill becomes steeper (Fig. 10).

In terms of current vegetation, the site is on the margin of a mixed, upland, hardwood forest dominated by red oak. White oak, scarlet oak, pin oak, black oak, aspen, red maple, sugar maple, bitternut hickory and shagbark hickory are commonly encountered in the vicinity. Young saplings of American chestnut indicate that this area once supported an oak-chestnut climax association. Sassafras, flowering dogwood, witch hazel, viburnum, blueberry and wintergreen are typical understory and shrub species. Two hundred feet to the south of the site is the approximate margin of the Montague Plains proper, characterized by sandy, well-drained soils and a plant community dominated by pitch pine. A small brook 225 feet to the west runs intermittently and drains a swampy area on the top of Wills Hill. This stream is the only immediately available source of water. The nearest permanent bodies of water are Lake Pleasant and Green Pond, one mile to the east, and the Connecticut River, 1.8 miles to the west. Neither the vegetation patterns nor drainage conditions should have been greatly different at the time of site occupation some 1200 years ago.

EXCAVATION

A grid system was laid out on an approximate N-S axis (6-186, magnetic) which follows the slope of the ridge. The basic excavation unit measured five-by-five feet. In those squares with a relatively low artifact density (under 100 items), each item was recorded as to its exact provenience. In those sections with heavy flaking debris, locations of finished artifacts were accurately recorded, but specific flakes were not marked. Rather, the quantity of flaking detritus was recorded as it was recovered from 12-by-12 inch (horizontal) by 3 inch (vertical) units (25 per larger square) according to the type of raw material--quartz, flint, dolomitic mudstone (Strauss 1976), or igneous rock. In this case, where the presence of a single cultural component had been predetermined by
finer control in several test pits, such subunits proved sufficient for stratigraphic control. In total, 34 complete and 6 partial 5-by-5 foot units were excavated, equaling 906 square feet.

Soil depth at the site varies from 7 to 12 inches before one encounters unconsolidated glacial gravels. In some instances, however, bedrock (arkose) is present at, or just

Figure 10. Contour map of the Wills Hill site in Montague, showing the relationship of topography to the excavated area and the artifact concentration.
below, the surface. A typical soil profile is as follows: surface-2 in., duff and root mat (fine, ash grey lens at base); 2 in.-5 in., grey-brown A2 horizon; 5 in.-12 in., medium brown B horizon; 12 in. plus, light brown glaciated gravel. Based on test sampling by one inch levels, the major artifact density in the vertical profile clustered at approximately 4 to 5 inches, but considerable vertical drift has occurred. In some cases, portions of items which fit together were found separated vertically by as much as four inches. Heavy root action by shrub and ground cover plants and various soil phenomena appear to have been the primary causes of such movement.

RESULTS AND INTERPRETATION

Artifacts recovered consist of 31 whole or partial bifaces, 2 biface blanks, portions of 2 drills, a modified adze, one piece of worked bone, one utilized flake, and 375 fragments from at least 3 ceramic vessels. (Most artifacts appear in the photographs). Three hammerstones which show pecked edges and 12 hand-sized cobblestones which show no wear were also located. The vast majority of items recovered represent unmodified flaking debris or cooking refuse—dolomitic mudstone (4386), flint or indurated shale (639), quartz (461), and igneous (210) flakes, as well as fragments of calcined (burned) bone. No hearths or pits were located, although the presence of burned bone strongly suggests that one or more hearths once existed. On the basis of bone distribution, at least one such hearth was probably situated within the bulldozed area. No post molds were evident, but the location of a possible shelter is discussed below.

Figure 11. Excavated area, Wills Hill site, showing artifact distributions and activity area. See text for explanation of contour lines and Roman numerals (activity areas). Letters and Arabic numerals refer to artifact illustrations in Figs. 12-16.
Within the excavated portion of the site, there are two areas which contain extensive evidence of stone tool manufacturing or reworking of older items. For ease of presentation, a site plan which depicts artifact distribution and activity areas has been prepared (Fig. 11). This illustration also shows the major clusterings of flake debitage by using density contour lines for various raw materials. Density contours are read like a topographic contour map except that the numbers represent quantities of flakes, rather than feet above sea level. For example, in 4N1E and 4N2E, where the greatest concentration of mudstone flakes existed, the lines marked 20 and 30 indicate that between these lines 20 to 30 flakes were recovered. Within the innermost line, 145 flakes were found. The contour lines for dolomitic mudstone flakes, bone, and pottery are given in multiples of five. Flint, indurated shale, and andesite flaking debris is quantitatively less dense. Therefore, contour intervals are given in frequencies of 2.5 and 5 flakes. Individual artifacts are marked by either a letter or number and activity areas are keyed by Roman numerals. Less well-defined activities will be considered within the text of this report. The discussion which follows refers frequently to this site plan, thus the reader should skim this map (Fig. 11) before proceeding.

**Stone Workshops.** By far, the major activity reflected at the site is the manufacturing and retouching of projectile points, large bifaces and other stone tools. Of 4386 dolomitic mudstone flakes (termed argillite on the map), all but 119 are concentrated in a 225 square foot area centered in 4N2E. The "density contour map" illustrates the configuration of the flake dispersal. Aside from the major concentration of debitage in 4N2E, three minor clusters appear with centers in 6N2E-5N2E, 4N1E, and 3N2E. Taken as a whole, such dense flaking debris represents a workshop in which various sized mudstone bifaces were manufactured.

The lack of large, chunky blocks of mudstone suggests that this raw material was transported to the site in some partially worked form. Such a practice seems reasonable since the nearest source of this rock is 1.8 miles to the west along the Connecticut River. Two quarry blanks (Fig. 12 T and adjacent blank) were retrieved from the workshop area. It is assumed that such blanks represent the form from which finished items were manufactured. From an analysis using quantity/weight ratios for flakes, points and blanks in the workshop area, it was estimated that roughly 55 blanks were once present and that 80 flakes plus one point were extracted from one blank. Such an estimated amount of mudstone represents approximately 7656 grams of raw material (Strauss 1976:26-28).

Flake scars on finished artifacts and a portion of the flakes themselves indicate that a soft hammer technique was employed in part of the reduction process, particularly the final steps. Since cobblestones are present within the workshop area, it is likely that some hard hammer processing also occurred, perhaps in the initial stages. Some of the blade edges may have been sharpened by pressure flaking, but in most cases, thin, soft-hammer flakes were removed to achieve sharp cutting edges.

The finished mudstone items which were recovered are all broad-based bifaces (Fig. 13, J,K,L). Smaller mudstone points are not represented. The presence of small points manufactured from harder raw materials, such as indurated shales, flint, and quartz, as well as such flaking debris may actually reflect two artifact categories based on artifact function and raw material selected.

Mudstone weathers rather badly, but from what can be seen, show no signs of wear. The artifacts appear, therefore, to have been broken during manufacture. Given the ease with which a mudstone blade edge can be dulled, it is possible that such items were not employed as cutting tools. Rather, they may have been hafted to spears and used for thrusting. The breakage pattern of two items (Fig. 13, J and L) may reflect such a function.

Within the general workshop area, there are 374 flakes derived from at least eight varieties of flint or indurated shale. Such differentiation is based on color, graining characteristics, and the presence of micro-inclusions. Figure 11 depicts two areas of...
Figure 12. Mudstone blanks (top) and 3/4-grooved adze of andesite.
Figure 13. Chipped bifaces. J-L, broken or unfinished pieces of mudstone; M-O, crude quartzite bifaces; P, R, quartz points; Q, mudstone stemmed point; U, biface tip of rhyolite.
Figure 14. Chipped bifaces. V, Z, 1, 2, mudstone biface fragments; W, 3, 5, tip fragment, triangular biface, and biface fragment of shale; X, Y, small knife and biface tip of flints; 4, biface of mica schist.
Figure 15. Artifacts and utilized flakes. Untyped projectile points, A, B, D, E; C, reworked biface; F, Brewerton Eared-Notched point; G, utilized flake; H, I, drill fragments. A, C, D, shales; B, E-I, various flints/cherts.
debitage concentration, one centered in 6N2E-5N2E (activity VIII) and the other in 5N1W-5N1E. The remainder of the flakes are randomly scattered throughout this zone. Flakes (33) within the 6N2E-5N2E cluster (VIII) are of a dark, blue-grey flint and probably represent the manufacture of but one item. The second cluster in 5N1W-5N1E is partially comprised of mottled, grey-brown, indurated shale flakes (15) which are identical to a biface base recovered in 5N1E (Fig. 14, W). Two other varieties of indurated shale appear to match two damaged points (Fig. 15, B and D), although the debitage is widely scattered. Neither of these points show any wear and it is possible that they were broken during manufacture. No other correlation between flakes and points (Fig. 15, A, E; Fig. 13, P, Q, R; Fig. 14, V) could be determined. As with the mudstone blanks or preforms may have been brought to the camp site for processing. In such a case, preforms were probably smaller than the mudstone blanks, since no more than 33 flakes can be accounted for which derive from an individual source of raw material. Furthermore, deposits of flint and indurated shale are not locally available. As an alternative possibility, worn points may have been retouched. Such a process could certainly account for the apparent small number of flakes per variety of flint or shale.

A quartz point (Fig. 13, P) was recovered in 4N1W. It bears some resemblance to the Greene point as defined by Funk (Ritchie 1971 rev.; 122) and a Middle Woodland period of manufacture is assumed. Since clear quartz debitage does not occur at the site, the point was probably manufactured elsewhere. The edges show no signs of wear or breakage, thus it may have been discarded inadvertently.

Three points found within the workshop (Fig. 15, E; Fig. 13, Q, R) appear to be out of context in a Middle Woodland setting. These items probably date from the Late Archaic period, but there is nothing at the Wills Hill site which suggests an occupation some 2500 years earlier. There is no stratigraphic differentiation. Item Q, for example, was found above the Middle Woodland camp debris. A Brewerton Eared-Notched point (Fig. 15, F) from 3S3W also falls into this category. No flakes even remotely resembling the materials from which items E, F, Q, and R were made were recovered at Wills Hill. Furthermore, the fact that all these points occur in exactly those areas of the site where the greatest density of Middle Woodland flaking debris and point fragments also occurs appreciably lowers the probability of an earlier, Late Archaic occupation. The likelihood that these ancient points were picked up at another site, used, then discarded at Wills Hill where new points were manufactured must be given serious consideration.

One utilized flint flake (Fig. 15, G) from 4N1W -- the only one recovered from the site -- a drill tip (Fig. 15, I), and a steep-edged cutting tool (Fig. 14, X) whose tip was found in 4N1E complete the stone tool inventory for the workshop. The wear pattern on the flake suggests a cutting action rather than scraping. The drill tip is unworn. The narrow, round-tipped cutting tool shows considerable wear along one edge. These three items may have been employed if the blades or points were hafted subsequent to manufacture or retouch. Use by a right-handed individual is likely.

A greatly modified, Archaic, 3/4-grooved adze (Fig. 12, S) was recovered in 5N1W. The former, polished, cutting edge has been heavily flaked to the extent that, if hafted, balance would be greatly impaired. Its close proximity to the major mudstone clusters of flakes suggests that it functioned as an easily-managed hammerstone, rather than as a cutting tool for woodworking. It shows no wear pattern characteristic of the latter function.

In summary, the workshop debris reflects the production of approximately 55 dolomitic mudstone bifaces, with all steps from quarry blanks to finished items being represented. Broken portions of bifaces, particularly tips (Fig. 14, V), suggest that perhaps 15% of the blanks which were started never produced completed artifacts. The approximate spots at which individuals sat to hammer out these finished blades can be seen from the density contour lines for mudstone flakes (Fig. 11). At least one major and three minor locations are obvious. Smaller points appear to have been made from harder indurated shales or flint.
These artifacts may have been manufactured from preforms at the site or by considerable retouching of previously formed points. Perhaps a combination of both activities reflects reality. Again, density contour lines for flint indicate several spots where points were made or retouched. Hammerstones (and perhaps the modified adze), a flake used for cutting, a narrow, thick, single-edged cutting tool, and a drill tip suggest that both artifact production and hafting took place.

Stone tools were either manufactured or retouched, as well, in the southern portion of the camp site. Activity I (3S1E) on the site plan represents the retouching of a single rhyolite biface, evidenced by six flakes and the blade tip (Fig. 13, U). A soft hammer may have been employed to strike the piece as it rested on the adjacent rock (anvil). As is apparent, the biface broke in the process of being worked. Activity V (2S2W) marks a cluster of 8 rhyolite flakes which are very irregular and angular. They may represent the retouching of some tool, although their shape does not indicate the refinement of a cutting edge. As a raw material, rhyolite represents only a tiny fraction of the flaking debris at the site and all of it is scattered in this southern portion. Its ultimate source is probably in southeastern Vermont or southwestern New Hampshire, some 40 miles to the north. It is possible that these areas are within the annual exploitation territory of the group at Wills Hill and that the rhyolite biface was brought from such a locale.

Activities II, III and IV, which are centered in 2S3W and 3S3W, reflect a workshop area in which indurated shale or flint, quartz and andesite (an igneous rock) were employed as raw materials. Due to the lack of a cortex on any flake and the relatively small number of flakes (206), it is likely that preforms or completed items were brought to the site where they were finished or retouched. Two such artifacts (Fig. 15, C and Fig. 14, 5) reflect such modification. For example, the outline of item C (3S3W) indicates that it was once broader, while the edges of both the sides and the tip further evidence breakage during an attempted retouching. Additionally, thirty-three flakes and several blade fragments derived from item 5 (3S2W) are indicative of artifact reduction. Eight flakes of a distinctive, translucent, beige flint from 15W-25W also demonstrate the pressure flake retouch of an additional item. The remaining flakes cannot be associated with broken artifacts which suggests that resharpened bifaces and points were successfully made and carried away.

Within the area of flint debitage (2S3W-3S3W), 117 large flakes of porphyritic andesite were recovered—the only location at which they occurred. Based on a microscopic analysis of crystalline structure and composition, it is unlikely that more than two rocks are represented. Andesite is a rather coarse-grained volcanic, in this case, with a high feldspar content. Such a material is a poor source from which to make small cutting tools, but, by polishing, it can be modified to produce a heavy axe or adze for woodworking. The initial shaping of such a tool is frequently accomplished by flaking and such a process may have occurred here. (The possibility that the modified 3/4-grooved adze (Fig. 12, S) from 5N1E was reworked at this location was considered, but eliminated, due to the non-match of element percentages within the rocks.)

Sixty-five chunky quartz flakes and some larger rock fragments (Activity III) were scattered about this southern portion of the site. No rock fragment or flake has a cortex typical of a cobblestone, thus such raw material may have been initially prepared elsewhere before being transported to the site for further reduction. The occurrence of both blocky chunks and small, thin flakes of quartz in 2S2W-2S3W (Activity VI) supports such a conclusion. One quartz cobble was also worked down in an adjacent area (Activity VII). In both locations, no finished quartz artifacts were recovered and no quartz fragments show signs of wear or additional modification. This debris indicates that the manufacture of some items took place, but, from the evidence, the exact product of such processing cannot be determined.

As in the other workshop, a portion of a square-based drill (Fig. 15, H) was recovered
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(2S2E) in close proximity to the flaking debris. The tip is missing and the body shows no sign of wear. No flakes of this good-quality flint were retrieved from Wills Hill, so its manufacture probably was completed elsewhere.

Surrounding the area of densest flint and andesite detritus, six small, crude, triangular-to ovoid blades were recovered (Fig 13, M, N, 0 and Fig. 2, 3, 4). None of these artifacts have points sufficient for piercing tough hides or wood and the sides would not provide sharp or durable cutting edges. No scrapers, and only one utilized flake, were recovered from the camp site. It is thus assumed that hide processing was not taking place and that these blades are, therefore, not related to such an activity. The lack of flakes from such materials (quartzite, shale and schist) in this portion of the site also suggests that they did not derive from a partially used cache of preforms. The nature of the stones makes an accurate determination of wear patterns virtually impossible, but slight rounding of high spots along the edges of M, N, 0 and 3 may attest to use. If so, their employment during the processing of pliable plant materials for basket making or shelter construction is, at least, an alternative worth considering. The broken drill (Fig. 15, H) and a small, cylindrical piece of burned bone from 2S3W (not pictured) may also represent part of an assemblage for processing plant materials.

Pottery. Excavation at the site produced 375 ceramic sherds which probably represent three vessels. Rim and body sherds were found from two pots (Fig. 16), the remains of which clustered in two areas as depicted on Figure 11 (#6 and 7).

The first vessel (top items in Fig. 16) measured approximately 10 inches in diameter at the rim, but its height is unknown. From a partial reconstruction, it was probably globular in form with a slightly rounded base. Coil construction is evident. The vessel has an evenly fired, reddish-brown color, while the grit temper is medium to large in size--some pieces of feldspar measuring up to 3/16 inches. A chevron (rim and body) and a linear (body) design produced by either impressing or dragging a cord-wrapped stick decorates the exterior. The lip is flat and notched on the interior, possibly with a blunted, thin object. The interior has been smoothed.

The second pot (Fig. 16, lower) measured roughly ten inches at the rim, but its height could not be approximated. Only a few body sherds and no base were recovered. The vessel is unevenly fired with a tan exterior and a grey interior. A fine to medium grit temper was used, although occasional large pieces of grog occur. Based on the recovered pieces, the vessel probably had a smooth, undecorated exterior. The interior was also wiped smooth, probably with a cord-wrapped stick. The rim is excurvate, the lip slightly rounded and notched on the interior surface.

Little can be said about the third vessel (item 7 on Fig. 11). No rim and only small body sherds (94) were recovered. Fragments reflect the fairly even firing of a coarse, grit-tempered clay body. The exterior seems not to have been decorated.

Faunal Remains and Diet. The amount of bone recovered from the Wills Hill site is small. In two cases, this bone refuse tends to cluster within, or adjacent to, a stone workshop area. The most obvious instance is the concentration of 121 fragments in the spot of heaviest flint and andesite flaking debris in 2S3W-3S3W. Since this bone may represent the only preserved portion of former garbage deposits, camp refuse may have been thrown into locations already covered with stone debitage. High phosphate readings in these zones suggest the discarding of organic refuse (Eidt 1973). The presence of part of a broken pot (item 7) also may reflect concentrated dumping. The only remaining pattern of bone fragments is a straight-line (NE-SW) distribution of 18 fragments across 2N1E and 3N2E which strongly suggests that one collection of refuse was thrown in this direction. This axis also runs directly through the heaviest concentration of sherds in 1N1E. Since sherds from both pots described earlier (item 6) do not represent complete vessels, it is also possible that large portions of two broken pots were discarded in this same action (and subsequently further dispersed).
As may be apparent, dietary information is rather limited. Of the 304 fragments recovered, all have been burned. The vast majority (186) are small fragments of long-bone shafts from fairly large mammals. The size range of deer bone compares favorably, but no identification is possible. Eighty-one bone fragments have no comparative value. Twelve pieces of bone appear to be from small game, 3 perhaps from a bird. From the remaining bone samples, one deer, a lynx, a possible skunk, and two turtles can be identified. All these are edible species which together might total about 130 pounds of dressed meat.

Since hearths or refuse pits were not discovered, no floral remains were obtained. On the basis of our paleoenvironmental reconstruction, however, a late summer utilization of this site would have allowed the exploitation of berries and other plant foods from Figure 16. Rim sherds from two ceramic vessels. See discussion in text.
the pine barrens and from the oak-chestnut woodland. Taken together these plant and animal resources are not abundant, but are certainly sufficient for the support of a small band of 5-10 people over a limited time period.

Temporary Shelter. The area directly between the two workshops was devoid of finished artifacts, and nearly so of flakes. In some spots, a large number of sandstone slabs were encountered, with smaller pieces of arkose also present. The location of these sandstone slabs is illustrated on Fig. 11. Except for two such rocks, the area within LN1W, LN2W, 2N1W, and portion of 1S2W and 2N1E was clear of such items. Within approximately 120 square feet of surface only 22 flakes and 1 sherd were recovered in a totally random distribution. Given the high density of such flaking debris to the northeast and this clear area's downhill position on the hill's slope, this light scattering may have resulted from erosion after occupation. The area is also one of the flattest portions of the ridge top, with no large bedrock outcrops.

It is hypothesized that this 8 by 15 foot area was used as the location for a shelter. The apparent transient nature of the Wills Hill camp would also suggest that such a shelter would not have been a permanent one, and, therefore, may exhibit no post holes. A sleeping surface would, however, have been cleared. The orientation and depth of the sandstone slabs suggests that they have been moved. The base of most rocks lies at 4-5 inches—the depth of maximum flaking debris. The distribution of rocks also appears to define three edges of the cleared area—the NE, NW and SW sides. If someone had removed arkose slabs from a former living surface, such a pattern could easily have been produced. Lack of sandstone slabs in LN1E and 1S1W may reflects a lean-to with a front open to the southeast. Such an arrangement would have provided warmth from sunlight, yet shelter from prevailing westerly or southwesterly winds.

The lack of stone flaking debris may reflect intentional clearing or cleaning. Phosphate tests were also run across the grid layout of the site. It is believed that high phosphate readings indicate areas with higher amounts of organic remains. Using Eidt's quick P test (Eidt 1973:206-210), no measurable quantity of phosphate was recovered from the hypothetical shelter locale, yet moderate to high readings were obtained in immediately adjacent areas. Such results may point to spots where organic camp refuse was intentionally dumped and where it was not. It seems improbable that garbage would have been discarded within a sleeping area.

If the data outlined above do define the location of a shelter, then certain implications follow. Assuming that an individual would require 15-25 square feet of space for storage and sleeping, the lean-to could accommodate 5 to 8 individuals. Such a figure seems reasonable for a family unit on a hunting-gathering expedition. Whether or not another shelter was constructed at the site, thus implying a larger exploitation force, is unknown. The topographic configuration of the unexcavated portions of the ridge—large bedrock outcrops and steeper slopes—greatly limit this possibility. This factor has lead to the belief, therefore, that a small exploitation group is more likely, based on the archaeological data.

Seasonality. During what season was the site occupied? On the basis of microenvironmental factors, late summer utilization would offer the most in terms of food resources in contrast to other seasons. The presence of turtle and skunk virtually eliminates a winter settlement (mid-November—April) since these animals are then hibernating. Heavy shad and salmon spawning runs between April and June could be easily exploited on the Connecticut River. A major fishing station which exhibits a Middle Archaic (5800 B.C.) to Middle Woodland culture sequence is located only 2.5 miles to the northwest of the site. Given this alternative resource base, exploitation of the Wills Hill environment during the spring seems highly unlikely (although not impossible). We are thus left with a period from June through mid-November during which time the camp may have been operative. No specific faunal or floral evidence, particularly given the lack of features, was recovered from the site which could further refine this question.
If the inferences made earlier are warranted, however, further definition of seasonality is possible. A shelter with an open side and lacking a fire hearth suggests that warmth was not a critical factor during the occupation. Large mammals (deer and lynx) were hunted, yet the lack of scrapers at the site indicates that hide processing was not undertaken. By implication, there may have been no need for additional pelts. If the crude blades and drill from the southern workshop were employed in the preparation of plant materials, then pliable, green vegetation was probably also available. These three factors suggest a site occupation sometime during July, August or early September—the warmest period of the year, the season during which hides are in the poorest condition, and the time when the greatest diversity of plant resources are available.

SUMMARY

As a whole, the recovered archaeological data reflect a transient, late summer, hunting-gathering camp, occupied by 5 to 8 individuals. The stone workshops and hunting tools imply the presence of males. Plant processing and ceramic vessels suggest female activities. It is assumed that this site was employed as a hunting station from which both the pine-barren plains and the hilly hardwood areas were exploited. Heavy use of plant foods probably took place as well, although direct remains of such exploitation are not evident.

It seems certain that a hunting-gathering mode of resource acquisition was related to the selection of, and activities within, the Wills Hill camp site and that such an exploitation pattern provided the means for acquiring food, at least seasonally. Similar camp sites may exist in considerable numbers throughout the Connecticut Valley and adjacent uplands. These sites will be difficult to locate, however, since they are small, have a low artifact density, and may not be situated in the more easily surveyed, plowed, bottom lands. The development of subsistence and settlement pattern models in the Connecticut Valley must, however, integrate such sites if a reasonable picture is to be presented of prehistoric ways of life.

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The Wills Hill site was discovered and excavated during impact assessment and mitigation studies conducted in 1974 and 1975 under contract with Northeast Utilities Corporation at the proposed site of the Montague Nuclear Power Station in Montague, Massachusetts. This article is a revised version of the site report submitted to NEU and published for limited circulation in 1976. The full support of Northeast Utilities is gratefully acknowledged. The field crew consisted of myself, Alan Strauss, Mary Ann Skrzypek, Mary Lou Curran and the dedicated members of the Norwottuck Chapter of the Massachusetts Archaeological Society. The artifacts are deposited at the Department of Anthropology, University of Massachusetts, Amherst.

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Archaeology in this state and country has undergone considerable change in the last 10 years, due to the proliferation of new procedures and techniques, an explosion of new books and articles about archaeology, and many new laws requiring and regulating archaeology. Professionals and avocationals alike are reeling from this impact, but there seems to be special anxiety on the part of many avocationals, who are asking, "What role will we play in Massachusetts archaeology during the next 10 years?" and especially, "Can we become involved in contract archaeology?". I'd suggest that the answer to both questions is dependent on another question: "How much of a commitment to archaeology can you make?" Commitment here does not mean interest and enthusiasm, but rather time, and the willingness to do the 'chores that are not much fun. I speak here as a professional archaeologist who has done contract work in the past but who does almost none now. I found that I could not make the commitment necessary to do a good job on contracts, and still meet my obligations to my job and to the rest of my life.

I would like to differentiate three levels of commitment for purposes of this discussion. Level 1 would be the level typical of most MAS members, who attend chapter meetings and the semi-annual meetings, read about archaeology and attend lectures, and participate more or less regularly in chapter surveys and excavations. People with this level of commitment make a very positive contribution to archaeology through their field work and by communicating their interest to the general public. However, they cannot afford to give more time because they have full-time jobs, families, and other obligations that take precedence over archaeology for them.

Commitment level 2 includes people who are able and willing to give more time to the MAS and to archaeology in general. These people are chapter and state MAS officers, they plan and carry out semi-annual meetings, and they do much of the analysis and write-up of chapter survey and excavation results. They are the backbone of the MAS, and can take credit for much of the MAS's considerable contribution to Massachusetts archaeology. They also have jobs and families, however, and are able to make this commitment primarily because of their diligence, determination, and high energy levels.

Participation in contract archaeology requires a third level of commitment, and it is one that many avocational and professional archaeologists cannot make. Contract work does require skills and knowledge of laws and procedures beyond that required for ordinary field work, and it takes time to learn these. For example, contracting archaeologists must be able to deal with construction diagrams and maps, must be able to use transits and other survey equipment, must be thoroughly familiar with statistical sampling techniques, etc. They must also be able to evaluate and deal with historic sites, both
above and below ground. There are many laws governing the work done by contract archaeologists, and all must be understood and remembered.

The work itself is also time consuming. Combining time estimates used by the Arkansas Archaeological Survey and the Institute for Conservation Archaeology at Harvard University, I've calculated that a fairly simple survey with test pits every 20 meters for a 1 kilometer sewer line would require up to about 7 man days of background research, 10 man days of field work, 10 man days of laboratory analysis, and 9 man days of writing on the report. Preliminary negotiations and proposal writing would take several more days. These estimates would be multiplied many times over for larger projects and more intensive field work.

Furthermore, the time commitments are not very predictable or evenly spaced. Negotiation on a contract may drag on for months, and then suddenly the contract is signed and work must be completed within two weeks. People involved in contract work must be prepared to drop everything else in their lives in order to meet deadlines imposed on them by the contracting agencies, who do not consider bad weather or personal crises as acceptable reasons for not completing reports on time.

There are other considerations as well for those interested in contract archaeology. First, this type of work includes legal obligations. People involved in it must know the relevant laws thoroughly, and should be prepared to defend their work and recommendations in court if need be. Major construction projects often involve millions of dollars in tax money and hundreds of jobs, and archaeologists can be under intense pressure not to hold up the project in any way. Insurance and taxes must also be considered for workers on contracts, and these are often difficult to handle outside of an institutional framework. Equipment, laboratory facilities, and storage space can also be a problem outside of institutions.

Chapters considering doing contract archaeology should ask themselves several questions. First, how much time is really available from chapter members? Do you have any problems finding people to volunteer for chapter offices and chores? Is all chapter laboratory work and report writing up to date so far? Do a few "human dynamos" do most of the work in the chapter? Even if a few people are willing to put in a majority of the time and effort needed, you will still need many "level 2" people to make a success of contract work. Finally, are you willing and able to handle all the problems mentioned above, and are people's work schedules flexible enough to allow intense spurts of work when necessary?

I believe that some avocational archaeologists can and will become involved in contract work, but I suspect it should be as individuals working within institutional frameworks, and not as chapters. Basically, contract archaeology is not "Doing what we've always done, but getting paid for it." It is a lot more, and it is a tough way to make a living. Most of us, if we are honest with ourselves, will admit that we are not willing to make the necessary commitment.

Avocational archaeologists will always have a role in this state, and many important and worthwhile activities can be accomplished with the levels of commitment available in any chapter. For example, field skills can be upgraded, chapters can attempt more surveys, along with the more traditional excavations, and excavations can focus on endangered sites, especially those on private land that are not protected by any laws. Chapters can also resolve to write up and publish the results of their field work, or might even tackle long-neglected collections from sites excavated in the past. These activities will result in solid contributions to the preservation of our prehistoric heritage and to our understanding of the past, and these are the concerns of all of us, avocational, professional, and contract archaeologist alike.

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