Pottery Analysis

People have made pottery vessels in southeastern Massachusetts since the Transitional Archaic. People, most likely men, were producing cooking bowls carved from large soapstone pieces from 6,000 to 3,000 years ago. Beginning approximately 3,000 years ago, most probably women, began producing clay pottery vessels which eventually replaced the soapstone pots. The earliest pots were straight-sided and with pointed bases, possibly resembling basket styles common in these earlier periods (Braun 1994:63). By the seventeenth century, clay pots were "almost in the form of an egg, the top taken off" (Gookin 1972:11). The pots had shoulders and some bore a decorative style along their rims known as castellations, which some archaeologists believe that New England native people borrowed from Iroquois, who may have used it earlier than the people of southern New England.

The seventeenth century descriptions of Wampanoag pottery are fairly plentiful in their noting of clay vessels used in cooking, but they are scarce in their descriptions of the pots themselves. The earliest European note of the presence of clay pots for our area was by Edward Winslow when he noted them in one of the houses discovered when exploring on Cape Cod in 1620 (Young 1974: 144). He also noted their use in 1623 when he was visiting the ailing Massasoit. Here, he noted, "They have earthen Pots of all sizes." (Young 1974: 35). Thomas Morton adds a little more detail to this by stating in 1637 that "They have earthen potts of diverse sizes from 1 quart to 3 gallons, very strong but thin." (Morton 1972:41).

By 1620, European metal kettles and pails, first acquired in the early seventeenth century, were beginning to become a more common place item in the average native home. Winslow noted two separate occurrences of European kettles or pails during the colonists explorations on Cape Cod in 1620 (Young 1974: 133, 144). Native people were initially interested in adding metal kettles to their inventory of utensils, but as the century progressed, European metal kettles replaced the traditional clay pot. William Wood, an English chronicler of New England, wrote in 1643 that the Natives whom he spoke with "(have) large kettles which they have traded for with the French long since, and still buy of the English as their needs require. Before this they had substantial earthen pots of their own making." (Wood 1971: 86) In the early years of contact, copper and brass kettles were initially traded for to be used as a raw material to be cut up to be made into items ranging from pendants to arrowheads to spoons. As the century progressed, the old kettles which had holes in them, continued to be cut up, but the main impetus for the acquisition of the kettles became as cooking pots.

This does not mean that all people gave up the use of clay pots, but by 1674 when Gookin wrote that "The pots they seeth their food in, which were heretofore, and yet are in use among some of them, are made of clay or earth, now they generally get kettles of brass, copper, or iron." (Gookin 1972:11) these people were clearly in the minority. The main reason that they did this was most likely that which Gookin felt it was, that a clay pot is more easily broken than a metal one, although he also felt that the clay used was becoming too difficult to find as well, perhaps because of the colonist's use of the clay for building daub (Gookin 1972:11).

No documentary or archaeological source in New England discusses how women cooked in a clay pot, but looking to our south, to the Natives of Virginia, De Bry drew their method of using a clay pot in 1588. De Bry shows a native cooking in a pot by placing the base of the pot in a depression in the ground, and then building the fire up around the lower portion of the pot (De Bry 1588: 60) (**Figure 1**).

Regional Ceramic Style Attribution

Pottery dates as far back as 3600 years BP in southeastern New England and 3300 to 3100 years BP in southern New Hampshire (Sassaman 1999: 75). Archaeologists have termed the ceramic style that was indigenous to southeastern New England the Windsor Tradition and dated it from approximately 3000 to 300 BP (Lizee n.d). The focus for this tradition was southern New England and Native populations such as the Niantic, Pequot, Narragansett, Massachusett, and most particularly for this study, the Wampanoag of southeastern Massachusetts practiced it. The changes that be seen in pottery styles throughout the period of use for Windsor Tradition ceramics reflect two separate but interrelated aspects of ceramic traditions: technological changes to create a longer lasting product that serves the specific, but changing, needs of a culture for pottery; a canvas for the expression of artistic and stylistic decorations and designs that reflect beliefs and socio-cognitive aspects of that culture. Functionality

Figure 1. De Bry engraving of North Carolina Natives cooking in clay pots

and cultural presentation are both reflected in the pottery used by a culture at a specific moment in time when people were using that pottery style (Lizee n.d.). The study of the technological and expressive aspects of Native pottery allows for an examination of changing needs for pottery and means of expression through this plastic medium. Pottery styles are very similar throughout much of the Eastern Woodlands for much of their existence. Similar forms, similar technology of manufacture

and similar decoration exist for Early to Middle to Late Woodland styles. This conservatism and widespread similarity in pottery styles and decoration is reflective of widespread physical or at least idea exchange across much of the area for much of the Woodland Period. Beginning in the Late Woodland period, regional diversity, which was present at earlier times but not as strongly expressed, becomes dramatically apparent in the archaeological record. The increased regional diversity is reflective of decreasing degrees of pan-woodland interaction which is also reflective is other aspects material culture, most especially exotic lithic material exchange. It can be assumed that with a breakdown of exchange in lithic raw materials and a development of very distinctive regional styles, an increased sense of territoriality and group uniqueness may have developed. It is as if there was a sense of isolationism that developed between groups that formerly closely shared close material culture, linguistic and presumably genetic affiliations.

Archaeologists have named the earliest ceramic identified in the Eastern Woodlands Vinette I. It is generally believed that at least the gross technological ideas of pottery production spread to the north from the south, possibly from the same general areas as steatite bowl production. Excavations recovered Vinette I pottery in Connecticut associated with Susquehanna points (Lavin 1984:15; McBride 1984:123; Pfeiffer 1984:79). The earliest pots, termed were straight sided with pointed, concoidal bases and some archaeologists believe that these resemble basket styles common in these earlier periods (Braun 1994:63). This type was first identified in New York State but it is not confined to there. Archaeologists have recovered Vinette I pottery from all of New England, New York and New Jersey. This type of pottery is identified by its thick, straight wall and the use of abundant grit and grit as a tempering medium. Walls of Vinette I pottery range from .6-1.1 cm (Luedtke 1985: 240). The exterior and interior of Transitional Archaic to Early Woodland ceramics were commonly cord marked, a possible decorative technique resulting from the patting of the vessel with a cord wrapped paddle to help bond the coils together. Some smooth surfaces may also occur in some vessels either intentionally or accidentally.

Artisans manufactured Vinette I pottery until late Early Woodland Period. They replaced it by 2,500 BP with Linear Dentate (ca. 2500-1800 years BP) decorated pottery (Lizee n.d.). Potters tempered this pottery with shell or grit, with shell-tempering being more common on the coast, with sherd thickness ranging between 7 and 12 mm. Morphologically, Linear Dentate decorated pots are concoidal in shape with relatively straight walls and rim diameters ranging from 22-30 cm. Potters smoothed or cord-marked the exterior surfaces of these vessels while smoothing or scraping the interiors. Potters decorated it with square to rectangular shaped horizontally, and rarely vertically, linear dentate stamping on the exterior near the rim. This ceramic type has also been called Vinette Dentate, Vinette Complex Dentate, Matinecock Point Stamped, and Clearview Stamped (Lavin 2002: 158). Linear Dentate pottery decoration forms one of two decorative style sin Lavin's “Dentate and Rocker-Stamped Ceramic Horizon” (Lavin 2002: 158).

The second decorative style of the “Dentate and Rocker-Stamped Ceramic Horizon” is Rocker Stamped, also called Rocker Dentate (2,000-1,400 BP) (Lizee n.d.). Rocker Dentate decorated pottery vessels are often found associated with Linear Dentate pottery. Technologically and morphologically Rocker Stamped vessels are the same as both Vinette I and Linear Dentate pottery with concoidal shaped bodies, straight to slightly everted rims and rim diameters averaging 26 cm. Temper occurrences and sherd thicknesses are also the same. The only difference is the us of the tool used to

decorate the vessel. In Rocker Stamped vessels the tool is held perpendicular to the rim of the vessel and is gently rocked back and forth around the vessel, creating a jagged encircling border. The exterior and interiors are the same as Linear Dentate vessels.

Two types of plain vessels lacking any decoration aside from cord marking or brushing also coexist with the dentate stamping in the Middle Woodland period. Windsor Cord Marked (2700-1400 BP) (Lizee n.d.). Potters cord marked the exteriors and smoothed or brushed the interiors. Dentate stamping occasionally occurs but is spatially limited to the lip. By 1,600 BP single horizontally oriented cord wrapped stick decoration occurred sparsely on some examples of this pottery type. Vessel shape remains the same as the other ceramic types- concoidal with generally a straight rim profile (later examples have slightly more developed shoulders, constricted necks and out-flaring rims. Researchers have recorded a variety of vessels sizes from 12 to 28 cm in diameter. This pottery type appears to represent the first occurrence of varying vessel sizes ranging from 12 to 28 cm in rim diameter, possibly indicating a wider role for pottery vessels within the household.

Archaeologists call the second type of sparsely decorated ware Windsor Brushed (1400-600 BP) (Lizee n.d.). This pottery type was in use into the Late Woodland period. The main characteristic of this ware is a brushed interior and exterior surface with the brushing being used to create decorated areas below the rim. Brushing decoration consists of parallel horizontal, vertical and oblique lines which are ancestral to the Late Woodland incised designs characterizing wares such as Niantic. Vessel morphology is another notable change between these wares and earlier varieties. Potters made the vessels in an elongated conical form with everted rims, constricted necks, with later forms being more globular with defined shoulders and constricted necks. These wares also bear the first traces of collars and rudimentary castellations. These wares are more common in Rhode Island and Connecticut, possibly indicating the beginning of a sub-regionalization in pottery styles. Archaeologists have theorized the introduction of collars, castellations and constriction as being adaptive changes related to changes in diet and processing, possibly associated with maize horticulture introduction. Temper type and distribution remain the same as earlier periods. Rim diameters vary widely from 20-32 cm and sherd thickness varies from six to ten millimeters

Sebonac Stamped (1,300-500 BP) wares represent the first use of shell stamping as a decorative technique (Lizee n.d.). Archaeologists consider it distinctive of the late Middle Woodland and especially of the Late Woodland period with a limited distribution in riverine and coastal zones. The shell stamp used is scallop with the stamp itself oriented vertically or obliquely and stamping occurring in parallel horizontal bands. Potters placed the stamping over cord-marked or brushed exterior surfaces while the interiors were brushed, cord-marked or fabric-marked. Vessel morphology hearkens back to earlier wares, being concoidal to elongated concoidal with straight to rarely out-flaring rims and constricted necks. Rim diameters are between 20 and 26 cm and the temper is exclusively shell. The vessel morphology may indicate that these vessels served a different purpose than the more globular shaped vessels with more constricted necks.

Hollister Stamped (1,250-450 BP) is a late Middle Woodland to Late Woodland dentate stamped ware (Lizee n.d.). The dentate decoration consists of four to 12 horizontal rows of dentate stamping around the vessel with vertically oriented rows rarely occurring. Dentate shape is round to oval, distinctively

different from Linear and Rocker Dentate square dentates. Generally vessel surfaces are smooth. Vessel morphology is variable with shapes ranging from elongated to concoidal to globular, often paired with straight or everted crenelated rims. Rim diameters range from 22 to 32 cm and temper is mineral.

Seldon Island (1,200-800 BP) wares are another shell-stamped ware with a wider distribution than Sebonac Stamped wares, being found inland as well as on the coast and rivers (Lizee n.d.). Potters applied shell stamping using linear and rocker stamping techniques. Rocker stamping was done using the smooth edge of a quahog or oyster shell onto a smooth exterior. Potters smoothed or brushed the interior surfaces. Seldon Island wares are generally elongated concoidal with slight neck constrictions to straight-walled concoidal vessels, sometimes with low castellations. Vessel occur in a wide range of sizes with rim diameters ranging from 20 to 30 cm. Temper used was shell or medium to fine-grained grit with sherd thicknesses of five to eight mm.
Windsor Plain (1,200-450 BP) wares continue the simpler, less decorative tradition of wares such as Windsor cord marked and Windsor Brushed. Windsor Plain is a catch-all category that includes an earlier and later form (Lizee n.d.). Researchers believe both are more "utilitarian" due to their lack of decoration, although this is debatable (Lavin 1980). Potters smoothed the interior and exterior surfaces of vessels of this ware type and the vessel morphology is elongated concoidal in the earlier forms and globular in the later. Generally both forms lack shoulders and constricted necks although researchers have identified a few with sharply constricted necks and out-flaring rims. Surface colors may also vary between the earlier and later forms- earlier being brown to gray while the later are more tan to reddish (possibly representing different firing techniques). Rim diameters are slightly smaller than earlier vessels, averaging 15-26 cm with some miniature forms also being produced. Temper type is either shell or grit, but overall temper size is much finer than earlier wares. Sherd thickness ranges from four to 12 mm.

Shantok Cove Incised (1,100-850 BP) wares represent the earliest use of incised decoration in New England. The exterior of the vessels are cord marked and the interior is smoothed or brushed. Decoration consists of bands of vertical, horizontal or oblique incised lines often in criss-cross and rectangular forms in later examples. The vessel for in globular in shape with straight walls, rarely a crenulated lip and are shell-tempered. Sherd thickness is generally under 10 mm. This ware, as well as the following three, are part of what Lavin identifies as the "Collared-Incised Ceramic Horizon" (Lavin 2002:162). These styles share many similarities with pottery of Iroquoia to the west, but are less similar to pottery styles as one moves south.

By the late Late Woodland to Contact Periods (300-500 BP), archaeologist identified one final pan-regional pottery type, Niantic Stamped (450-300 BP). Researchers characterize these pots as having globular bodies, low relief collars and constricted necks with stamped punctate, stamp/ drag and incised decoration (Lizee n.d.). Decoration found on the pots consists of shell stamping and incised horizontal. vertical, and opposed oblique lines that often create a series of triangles on the collars. Castellations are rare or absent, temper is generally shell on the coast and grit in the interior while sherd thickness ranges between seven to 10 millimeters.

Evolving out of the Niantic tradition are the Hackney Pond (450-250 BP) and Shantok Castellated

(350-250 BP). Hackney Pond ceramics have all the characteristics of the preceding Niantic, except that they are not shell-tempered and their fine compact paste lacks even grit temper. They also have thin walls, averaging three to nine millimeters in thickness. They represent a refinement of local ceramic traditions. Shantok Castellated on the other hand are almost always shell-tempered and, as the name implies, bear castellations on their rims. The castellations are sometimes decorated with appliqués/ effigies in the form of corn ears and, to the south and west of the Wampanoag homeland, faces. Shantok pottery has only been recovered from Contact Period sites.

An additional ware not included in the published descriptions of Windsor Tradition ceramics is Point Peninsula Cord Wrapped Stick Stamped (1350-450 BP) ware. Lavin identified ware from New York where archaeologists attribute it to the Point Peninsula (versus the Windsor) tradition. This horizon (Lavin 2002:160) shows the utilization of a cord-wrapped stick or the edge of a cord-wrapped paddle and often punctates, to decorate the exterior of vessels. Decorative styles include parallel horizontal or vertical rows encircling the rims with opposing rows above or below, herringbone design, and parallel plats.

Pottery Analysis

Pottery analysis of the sherds from the Muttock-Pauwating site was a multi-variant attribute form of analysis similar to that proposed by Chilton (1999) and carried out by Bunker (2002). The analyst decided that attribute analysis would be used in conjunction with traditional decorative analysis due to Chilton's findings that the decorative analysis classification systems used in the past may in fact have little usefulness in New England ceramic research (Chilton 1999: 97-101). Analysis in the past has focused too much attention on attributes that easiest to identify, decoration and rim shape, but researchers have found are the very ones that vary too much through time and across distances. Past analysis has also focused too much attention on the presumption that New England ceramics "evolved" over time from thick, crude, undecorated vessels in the Terminal Archaic to Early Woodland, to thinner, finer and more highly decorated Contact Period examples (Chilton 1999: 98.). The goal of multi-variant attribute analysis is to look for both variation and covariation within and between objects, not to formulate typologies (Chilton 1999: 102). By identifying the attributes of vessels, research is freed of the rigid typologies of the past and may expand and feel free to investigate the utilitarian reasons behind the choices of temper, thickness and surface treatment in themselves and not as part of "type" of ware. The reasons for the production of pottery bearing specific use characteristics is thus related to the needs of the society in relation to their subsistence pattern and degree of mobility as well as availability of raw materials and degree of social interaction with other groups (Appendices E and F).

The analyst sorted the pottery remains from the site into vessel lots based on the surface treatment and decoration on both the interior and exterior of the vessel, the kind, size, and density of the temper and the color, texture, and hardness of paste. Analysis then proceeded in four different dimensions as outlined by Child (1981: 154). These include morphology- the diameter of the rim, the rim angles and the lip and rim profile; decoration- the location of decoration, technique of decoration, and motif used; technology- the interior and exterior surface treatment, technique of manufacture, temper inclusions, minimum and maximum temper size, density, paste, texture, wall thickness, and rim and lip thickness; and function- which is basically the identification of any carbon residue.

Research Questions

Research on the pottery from the Muttock-Pauwating site focused on the following questions:
Are the pottery fragments identified as vegetable tempered truly that or are they either shell-tempered with the shell having leached out leaving a cast that only looks like vegetable temper or pottery with accidental fiber inclusions?

- What are the similarities and differences between the vegetable-tempered and the grit-tempered pottery from the site? Do enough differences exist to show a differential uses or temporal distributions of the two types of pottery?
- What is the relationship of the pottery shards recovered from the radiocarbon-dated features to those recovered from the rest of the site? Does the distribution of fragments that are similar to the feature pottery support an interpretation of a small number of occupations at the site by a large number of people or multiple occupations by small groups?
- Is there evidence of pottery manufacture, as is suggested by the recovery of unfired clay balls from the site in that past?
- How does the type of pottery represented at the site reflect both the subsistence pattern suggested by the shellfish, faunal remains and lithics and the degree of mobility suggested by the lithic reduction analysis?
- Is there a continuity of decoration or production techniques across the project area, possibly reflecting simultaneous occupation of all areas of the project area at the same time by people sharing ideas and designs?

Excavation recovered 3082 fragments of Native pottery from across the project area (Table 1).
Table 1. Distribution of recovered pottery

Impact Area	**Grit-tempered***	**Shell-tempered***	**Total****
L1H	3/ 100%		3/ .1%
L1HN		49/ 100%	49/ 1.6%
L1S			0
L1SN	1/ 100%		1/ .03%
L1 FEATURE 2	1/ 100%		1/ .03%
L2H	495/ 55.9%	390/ 44.1%	885/ 28.7%
L2S			0
L4H	191/ 78.9%	51/ 21.1%	242/ 7.9%
L4S	409/ 63.2%	238/ 37.8%	647/ 20.1%
L5H	309/ 88.5%	40/ 11.5%	349/ 11.3%
L5S	2/ 100%		2/ .06%
L6H	181/ 30.7%	508/ 69.3%	589/ 19.1%
L6S	30/ 76.9%	9/ 23.1%	39/ 1.3%
L7H	30/ 57.7%	22/ 42.3%	52/ 1.7%
L7HN	3/ 60%	2/ 40%	5/ .15%
L7S		2/ 100%	2/ .06%

L7SN	57/ 77%	17/ 23%	74/ 2.4%
L8H			0
L8HN	10/ 76.9%	3/ 23.1%	13/ .4%
L8S	13/ 44.8%	16/ 55.2%	29/ .9%
Total	**1735/ 58.2%**	**1347/ 41.8%**	**3082**

*percentage shown is percentage of that ceramic type per impact area**percentage shown is percentage of overall total by impact

Archaeologists recovered most of the ceramics from the L2H, L4S, and L6H impact areas. Recovered ceramics were split between those with grit-temper and those with shell-temper. Testing recovered grit-tempered ceramics from across the project area while shell-tempered pottery found principally in the L2H, L4, and especially the L6H impact areas (Table 1). The highest concentration of hell-tempered pottery (not withstanding the lots with only a minimal number of sherds) was in L6H. This lot was also the location of the several large storage pits. The recovery of the shell-tempered pottery from these pits supports a Late Woodland date for them.

Vessel Lots

Analysis compared ceramic sherds within impact areas to create vessel lots based on temper, surface treatment, color, thickness, rim and body diameter, and decoration. Analysis identified 110 vessel lots (Table 2). Appendix F presents full descriptions of each vessel lot.

Table 2. Vessel lots

Vessel #	IA	Temper	Thickness	Interior	Exterior	Diameter	Dec.	Notes	Period	Windsor
1	L1HN	Grit	.3-.5 cm	Sm	Sm	7 cm Body			M-LW	WP
2	L1HN	Shell	.6-.7 cm	Sm	Cm				MW	WCM
3	L1H	Shell	.5-.8 cm	Sm	Sm	16 cm Bdy	I		LW	HP
4	L2H	Grit	.6-.7 cm	Sm	Cm	24 cm Bdy			MW	WCM
5	L2H	Grit	.7-1.1 cm	Cm	Cm	16-22 cm			EW	V1
6	L2H	Grit	.5-.9 cm	Sm	Sm	18 cm rim 26-28 cm Bdy	DS		M-LW	HS
7	L2H	Grit	.5-1.1 cm	Sm	Sm	22-26 cm Bdy	F		LW	
8	L2H	Grit	.35-1 cm	Sm	Sm	24 cm Bdy	S		LW	NS
9	L2H	Grit	.3-.8 cm	Sm	Sm	14 cm Bdy		Bowl	M-LW	WP
10	L2H	Shell	.7 cm	Sm	Sm				M-LW	WP
11	L2H	Shell	.8 cm	Sm	Cm				MW	WCM
12	L2H	Shell		Sm					M-LW	WP
13	L2H	Grit	.4-.8 cm	Sm	Sm	22-26 cm Bdy	R/ I		M-LW	WP
14	L4H	Grit	.7-1 cm	Sm	Cm	22 cm Bdy			MW	WCM
15	L4H	Grit	.6-1.1 cm	Cm	Cm	16-20 cm Bdy			EW	V1
16	L4H	Grit	.5-1 cm	Sm	Sm	22-26 cm Bdy	CWS		LW	
17	L4H	Grit	.5-.8 cm	Sm	Sm	26-28 cm Bdy	D		M-LW	HS

18	L4H	Grit	.5-1 cm	Sm	Sm		I		LW	HP
19	L4H	Grit	.6 cm	Sm	Sm				M-LW	WP
20	L4H	Shell			Sm			Pipe stem	LW	
21	L4H	Shell	.7-1 cm	Sm	Sm	22 cm Bdy	I		LW	HP
22	L4H	Shell			Sm		S		M-LW	SI
23	L4H	Shell	.5-.7 cm	Sm	Cm				MW	WCM
24	L4S	Grit	.2 cm	Sm	Sm	2 cm Rim	I	Pipe Bowl	LW	
25	L4S	Grit	.4 cm	Sm	Sm	10 cm Bdy		Miniature	M-LW	WP
26	L4S	Grit	.5-1 cm	Sm	Sm	18 cm rim 26 cm Bdy	CWS		LW	
27	L4S	Grit	.65 cm	Sm	Sm	9 cm Bdy	D	Miniature	M-LW	HS
28	L4S	Grit	.65-.9 cm	Sc	Sm	22 cm Rim/ Bdy	D/ P		M-LW	HS
29	L4S	Grit	.7-1 cm	Sm	Sm	22-24 cm Bdy	F		MW	
30	L4S	Grit	.6-1 cm	Sm	Sm		S	½ Moon shaped imprsns	LW	
31	L4S	Grit	1.3 cm	Sm	Sm	28 cm rim 18-28 cm Bdy	CWS		MW	
32	L4S	Grit	.7-1.15 cm	Sm	Sm	18 cm rim/ Bdy	I	Bowl	LW	HP
33	L4S	Grit	.5-.9 cm	Sm	Sm	24 cm Bdy	I		LW	HP
34	L4S	Grit	.5-1 cm	Sm	Sm	26 cm Bdy	D	Bowl	M-LW	HS
35	L4S	Grit	.8-1 cm	Cm	Cm	20-26 cm Bdy			EW	V1
36	L4S	Grit	.7-1.1 cm	Sm	Cm	18 cm rim			MW	WCM
37	L4S	Grit	.5-.8 cm	Sm	Sm	26 cm Bdy			M-LW	WP
38	L4S	Grit	.5-.8 cm	Sm	Sm	10 cm rim 11 cm Bdy		Miniature	M-LW	WP
39	L4S	Shell	.5-.9 cm	Sm	Cm				LW	
40	L4S	Shell	.5-.6 cm	Sc	Cm	22-26 cm Bdy			M-LW	WB
41	L4S	Shell	.5-.7 cm	Sc	Sm	10 cm rim		Miniature	M-LW	WB
42	L4S	Shell	.5-.8 cm	Sm	Sm	26 cm Bdy			M-LW	WP
43	L4S	Shell	.5-.9 cm	Sm	Sm	10 cm rim	S	1/2-Moon shaped imprsns	LW	
44	L4S	Shell	.6-1 cm	Sm	Sm	16-20 cm Bdy	I		LW	HP
45	L4S	Shell	.6-.8 cm	Sm	Sm	22 cm rim			M-LW	WP
46	L5H	Grit	.7-.9 cm	Cm	Cm	18 cm rim 20 cm Bdy			EW	V1
47	L5H	Grit	.7-1.1 cm	Cm	Cm	22-28 cm Bdy			EW	V1

48	L5H	Grit		Cm					EW	V1
49	L5H	Grit	.6-1 cm	Sm	Cm	18-28 cm Bdy			MW	WCM
50	L5H	Grit	.6-.8 cm	Sc	Sm	20-26 cm Bdy	CWS		LW	
51	L5H	Grit	.6-1 cm	Sm	Sm	20-28 cm Bdy	I/ D		M-LW	HS
52	L5H	Grit	.5-.7 cm	Sm	Sm	14 cm rim 14-22 cm Bdy	D		LW	NS
53	L5H	Grit	.6-1 cm	Sm	Sm	22-26 cm Bdy	I		LW	HP
54	L5H	Grit	.7-.8 cm	Sm	Sm	22-26 cm Bdy	I		LW	HP
55	L5H	Shell		Sm	Sm		I		LW	HP
56	L5H	Shell		Sm	Cm				MW	WCM
57	L5H	Shell		Sm					LW	
58	L5H	Grit	.6-.85 cm	Sm	Sm	28 cm Bdy	R		MW	
59	L6H	Grit	.7-1.1 cm	Cm	Cm	18-24 cm rim 18-26 cm Bdy			EW	V1
60	L6H	Grit	.5-1 cm	Sm	Cm	24 cm Bdy			MW	WCM
61	L6H	Grit	.6-1 cm	Sm	Sm	18 cm rim 18-26 cm Bdy			M-LW	WP
62	L6H	Grit	.6-.9 cm	Sm	Sm	16-24 cm	D		M-LW	HS
63	L6H	Grit	.5-1 cm	Sm	Sm	20 cm Bdy	CWS		LW	
64	L6H	Grit	.6-1 cm	Sm	Sm	26 cm Bdy	I		LW	HP
65	L6H	Grit	.5 cm	Sm	Sm			Notched Shoulder	LW	HP
66	L6H	Grit	.6-.9 cm	Sm	Sm	20-24 cm Bdy	S		M-LW	SI
67	L6H	Grit	.4 cm			4 cm		Miniature		
68	L6H	Shell	.6-.7 cm	Sm	Cm	22 cm Bdy			MW	WCM
69	L6H	Shell	.5 cm	Sm	Sm	23 cm Bdy	CWS		LW	
70	L6H	Shell	.5-.9 cm	Sm	Sm	18-26 cm Bdy	I		LW	HP
71	L6H	Shell	.4-.5 cm	Sm	Sm		S		M-LW	SI
72	L6H	Shell	.5 cm	Sm	Sm			Notched Shoulder	LW	HP
73	L6H	Shell	.8 cm	Sc	Sm	26 cm Bdy		Misfired	M-LW	WB
74	L6H	Shell	.5 cm	Sm	Cm	7 cm Bdy		Miniature	MW	WCM
75	L6H	Shell	.7 cm	Sm	Sm				M-LW	WP
76	L6H	Shell		Sm					LW	
77	L6H	Shell		Sc	Sm				M-LW	WB

78	L6S	Grit	.5-.7 cm	Sm	Sm	16 cm rim	F		MW	
79	L6S	Grit	.6-.8 cm	Sm	Sm	24 cm Bdy	I		LW	HP
80	L6S	Grit	.6 cm	Sm	Sm	22 cm Bdy	S		M-LW	SI
81	L6S	Grit	.5-.6 cm	Sm	Sm	12 cm neck	R	Miniature	LW	
82	L6S	Grit	.7-.8 cm	Cm	Cm	22-28 cm Bdy			EW	V1
83	L6S	Shell	.6 cm	B	Cm				M-LW	WB
84	L6S	Shell	.7 cm	Sm	Cm	28 cm Bdy			MW	WCM
85	L6S	Shell	.4 cm	B	Sm				M-LW	WB
86	L6S	Shell	.5 cm	Sm	Sm				M-LW	WP
87	L7H	Shell	.6 cm	Sc	Cm				M-LW	WB
88	L7H	Grit	.8 cm	Sm	Cm				MW	WCM
89	L7H	Shell	.5-.6 cm	Sm	Cm				MW	WCM
90	L7H	Grit	.6-.9 cm	Cm	Cm				EW	V1
91	L7H	Grit	.7 cm	Sm	Sm			Small	M-LW	WP
92	L7H	Grit	.7 cm	Sm	Sm		I	Miniature	LW	HP
93	L7H	Shell	.7 cm	Sm	Sm		I		LW	HP
94	L7S	Shell		Sm					LW	
95	L7S	Shell	.8 cm	Sc	Sm	24 cm Bdy			M-LW	WB
96	L7SN	Grit	.4 cm	Sm	Sm	10 cm Bdy		Miniature	M-LW	WP
97	L7SN	Grit	.5-1 cm	Cm	Cm	16 cm rim 18 cm Bdy			EW	V1
98	L7SN	Grit	.7 cm	Sm	Cm		I		LW	HP
99	L7SN	Grit	.7-1 cm	Sm	Sm				M-LW	WP
100	L7SN	Grit	.7 cm	Sm	Sm		I		LW	HP
101	L7SN	Grit	.5 cm	Sm	Sm		D		LW	NS
102	L7SN	Shell	.5-.6 cm	Sm	Cm				MW	WCM
103	L7SN	Shell	.8 cm	Sc	Cm	22 cm Bdy			M-LW	WB
104	L7SN	Shell	.5-.7 cm	Sm	Sm				M-LW	WP
105	L8HN	Grit	.8-1 cm	Sm	Sm				M-LW	WP
106	L8S	Grit	.7 cm	Sm	Sm				M-LW	WP
107	L8S	Grit	.8 cm	Sm	Cm				MW	WCM
108	L8S	Grit	.7-1 cm	Sm	Sm		D		M-LW	HS
109	L8S	Shell	.7-1 cm	Sm	Sm		S		M-LW	HS
110	L8S	Shell		Sm						

This represents a minimum of 110 vessels that were in use at the site. Sixty-seven of these vessels were grit-tempered and 43 were shell-tempered. Included in this vessel lot are two ceramic tobacco pipes (Vessel lots 20 and 24). Analysis identified 10 Early Woodland Vinette I vessels (Vessel lots 5, 15, 35, 46-48, 59, 82, 90, and 97) by their cord-marked interior and exterior surfaces and sherd thickness. Excavation had recovered these vessels from across the project area in all lots except Lot 1 and 8 (Table 3). Analysis identified three vessel lots in Lot 5H, which was the highest concentration, all the

Table 3. Distribution of vessel lots by Windsor type

	VI	WCM	WB	HS	SI	WP	NS	HP	CWS	F	R	½ moon
L1H								1				
L1HN		1				1						
L2H	1	2		1		3	1			1	1	
L4H	1	2		1	1	1		2	1			
L4S	1	2	2	3		5		3	2	1		2
L5H	3	2		1			1	3	1		1	
L6H	1	3	2	1	2	2		4	2			
L6S	1	1	2		1	1		1		1	1	
L7H	1	2	1			1		2				
L7HN												
L7S			1									
L7SN	1	1	1			3	1	2				
L8HN						1						
L8S		1		2		1						
Totals	**10**	**17**	**9**	**9**	**4**	**19**	**3**	**18**	**6**	**3**	**3**	**2**

VI- Vinette I WCM- Windsor Cord-Marked WB- Windsor Brushed HS- Hollister Stamped SI- Seldon Island WP-Windsor Plain NS- Niantic Stamped HP- Hackney Pond CWS- Cord Wrapped Stick F- Fabric Impressed R- Rocker Stamped !/2 Moon- Half moon stamped around rim

other impact areas had a minimum of one vessel present. The distribution of Early Woodland vessels supports the idea that the Rossville, Lagoon, Small Stemmed, and Squibnocket Triangle points represent a separate occupation of the project area and do not coexist with the Middle and Late Woodland occupation.

Most of the Windsor ceramic types analysis identified dated from the Middle to Late Woodland periods with the most recent being the Hackney Pond (HP), which has a temporal range of 450 to 250 BP, and the Niantic Stamped (NS) with a temporal range of 450-300 BP (Table 4). Early

Table 4. Chronological distribution of Windsor ceramic types

	VI 3000-2500	WCM 2700-1200	WB 1400-600	HS 1250-450	SI 1200-800	WP 1200-450	NS 450-300	HP 450-250	Total
L1H								100.0%	**1**
L1HN		50.0%				50.0%			**2**
L2H	12.5%	25.0%		12.5%		37.5%	12.5%		**8**
L4H	12.5%	25.0%		12.5%	12.5%	12.5%		25.0%	**8**
L4S	6.3%	12.5%	12.5%	18.8%		31.3%		18.8%	**16**
L5H	30.0%	20.0%		10.0%			10.0%	30.0%	**10**
L6H	6.7%	20.0%	13.3%	6.7%	13.3%	13.3%		26.6%	**15**
L6S	14.3%	14.3%	28.6%		14.3%	14.3%		14.3%	**7**
L7H	14.3%	28.6%	14.3%			14.3%		28.6%	**7**
L7S			100.0%						**1**
L7SN	11.1%	11.1%	11.1%			33.3%	11.1%	22.2%	**9**
L8HN						100.0%			**1**
L8S		25.0%		50.0%		25.0%			**4**
Totals	**10**	**17**	**9**	**9**	**4**	**19**	**3**	**18**	

Woodland vessels were most common in L5H, Middle Woodland vessels (Windsor Cord-Marked) were most common in the L1HN and L7H impact areas, Middle to Late Woodland vessels (Windsor Brushed, Hollister Stamped, Seldon Island, and Windsor Plain) were common across the project area, while Late Woodland vessels (Niantic Stamped and Hackney Pond) were most common in L1H, L2H, L5H, and L7H. Overall it appears that occupation spanned Woodland period with a probable emphasis on the late Middle Woodland to Late Woodland.

Temper

Analysis investigated the temper used in the pots by looking at the type of temper, its coarseness and particle size, and the proportion clay to temper. The analyst used a 10 power magnifying glass to determine if the temper was mainly of quartz or not. Analysis identified temper as fine or coarse using Bronitsky and Hamer's definitions of fine (<.5 mm) and coarse (>1 mm) with the category of medium >.5mm to 1 mm being added (Bronitsky and Hamer 1985:90). Bronitsky and Hamer's study of tempering materials found that pottery tempered with a variety of temper types withstood various types of stresses to varying degrees. Burned shell tempered pottery was more resilient to general breaking that sand or unburned shell tempered pottery. It was also more resilient to crack initiation from thermal shock, more shatter resistant and more resistant to stress caused by initial cracking than either of the others (Bronitsky and Hamer 1985:94). Fine sand tempered pottery was found more impact resistant than coarse tempered pottery as well as being more resistant to thermal shock (Bronitsky and Hamer 1985:96). In general shell-tempered pottered pottery was better for cooking in as the use of shell appears to have made pottery more resistant to overall to cracking and especially to cracking caused by the use of the pottery on a fire for boiling.

Chilton showed that many of these attributes relate to how well a vessel works for specific tasks and

they reveal production and use evidence. For example, she found that the optimal inclusion types in the temper are such that during firing and use, it expands at the same rate or less than the clay itself. These types of tempers include grog (old pottery ground up), calcite, crushed or burned shell, feldspar and hornblende. Pottery tempered with these inclusions is better suited for cooking than ones tempered with quartz. This is due to quartz's tendency to expand quicker than the surrounding clay. A vessel tempered with quartz is not well suited for cooking as it has a low resistance to thermal shock, but would work better for storage or transport due to its high resistance to mechanical stress (Chilton 1999:110).

Sites with assemblages of thick quartz tempered pottery probably bear witness to the use of that pottery for a task other than the traditional assumed use of cooking. Surface treatment also affects the performance making vessels more resistant to thermal shock or more water-resistant. Chilton found that Iroquoian and Algonquin pottery differed in a number of technological characterizes that were probably the result of their use for differing tasks. Thin-walled Iroquoian pottery that was not tempered with quartz served better for cooking while the often thick-walled quartz tempered Algonquian pottery was better for storage and transport. Different temper types also would show if people used these vessels for different purposes. The hypothesis that people used grit-tempered pottery and the shell-tempered pottery for different purposes is one of the areas that the analysis examined.

The likelihood of thermal shock is reduced by changing the clay composition, the wall thickness, the vessel size and shape, the firing temperatures and the surface treatment. If shell-tempered pottery was a technological improvement on grit tempered pottery and not just the result of the available raw materials, then the use of shell temper may be associated with a decrease in wall thickness, a change in vessel size, differential use of surface treatment and possibly different firing temperatures. Analysis examined all of these variables through attribute analysis of the assemblage from the site. Analysis measured wall thickness using standard metric calipers with the probable original location of the fragment on the vessel being identified when possible. Analysis measured vessel size using a standard circumference chart to determine the diameter.

Luedtke's analysis of ceramics from Calf island in Boston Harbor found an increasing use of shell for temper by the Late Woodland Period. Dincauze (1975) noted the use of shell during the later Woodland Period elsewhere in New England, possibly indicating an increased use of the coast during pottery production seasons. It may also represent trade between people on the coast and people further inland. The use of shell versus the use of grit represent tempers with very different properties when heated and may indicate specialist production or the production of one type of tempered pottery versus the other by potters, especially the possibility noted by Luedtke that salt or the use of salt water or marine clays was an important step in the production of pottery with shell temper. This is due to the shell's mechanical disadvantages (Luedtke 1985: 233). Shell-tempered pottery may have also been more commonly used for cooking vessels and heavy grit tempered pottery being used more for storage vessels. The greater use of shell-tempered pottery during the Late Woodland Period may relate to a greater reliance on maize and a need to cook dried, stored maize to make it softer for consumption for adults and children.

Table 5. Grit and shell temper occurrences

Impact Area	Grit-tempered	Shell-tempered	Total
L1H	3/ 100%		3/ .1%
L1HN		49/ 100%	49/ 1.6%
L1S			0
L1SN	1/ 100%		1/ .03%
L1 FEATURE 2	1/ 100%		1/ .03%
L2H	495/ 55.9%	390/ 44.1%	885/ 28.7%
L2S			0
L4H	191/ 78.9%	51/ 21.1%	242/ 7.9%
L4S	409/ 63.2%	238/ 37.8%	647/ 20.1%
L5H	309/ 88.5%	40/ 11.5%	349/ 11.3%
L5S	2/ 100%		2/ .06%
L6H	181/ 30.7%	508/ 69.3%	589/ 19.1%
L6S	30/ 76.9%	9/ 23.1%	39/ 1.3%
L7H	30/ 57.7%	22/ 42.3%	52/ 1.7%
L7HN	3/ 60%	2/ 40%	5/ .15%
L7S		2/ 100%	2/ .06%
L7SN	57/ 77%	17/ 23%	74/ 2.4%
L8H			0
L8HN	10/ 76.9%	3/ 23.1%	13/ .4%
L8S	13/ 44.8%	16/ 55.2%	29/ /9%
Total	**1735/ 58.2%**	**1347/ 41.8%**	**3082**

Analysis found that grit temper was burned feldspar and quartz, making up 58.2% of the pottery assemblage (Table 5). Shell-temper appeared was burned clam shell, making up 41.8% of the pottery assemblage. Overall grit tempered ceramic sherds were more common, except in L6H and L8S, than shell-tempered sherds. Grit temper ranged from fine to coarse in size with fine to medium size being most common (Table 6). Generally it has been found that

Table 6. Temper size distribution

Location	Temper Size	Count*	% of Total Grit-Tempered for Location
L1F2	Fine	1/ 100%	100%
L2H	Fine	30/ 24.5%	5.5%
L4H	Fine	27/ 22.1%	16%
L4S	Fine	14/ 11.5%	3.6%
L5H	Fine	16/ 13.1%	9.8%
L6H	Fine	18/ 14.8%	10.6%

Table 6. (Con

Location	Temper Size	Count*	% of Total Grit-Tempered for Location
L6S	Fine	4/ 3.3%	15.3%
L7H	Fine	5/ 4.1%	18.5%
L7HN	Fine	1/ .8%	50%
L7SN	Fine	4/ 3.3%	9.1%
L8S	Fine	2/ 1.6%	14.2%
Total	**Fine**	**122/ 7.6%**	
L1H	Fine to Medium	3/ 2.4%	100%
L2H	Fine to Medium	329/ 34.2%	59.8%
L4H	Fine to Medium	83/ 8.6%	49%
L4S	Fine to Medium	254/ 26.4%	66.1%
L5H	Fine to Medium	122/ 12.7%	74.8%
L5S	Fine to Medium	2/ .2%	100%
L6H	Fine to Medium	108/ 11.2%	63.9%
L6S	Fine to Medium	9/ .9%	34.6%
L7H	Fine to Medium	16/ 1.7%	59.3%
L7HN	Fine to Medium	1/ .1%	50%
L7SN	Fine to Medium	25/ 2.6%	56.8%
L8HN	Fine to Medium	1/ .1%	16.7%
L8S	Fine to Medium	8/ .8%	57.1%
Total	**Fine to Medium**	**961/ 60.2%**	
L2H	Medium	12/ 23.5%	2.%
L4H	Medium	2/ 3.9%	1.2%
L4S	Medium	2/ 3.9%	.5%
L5H	Medium	14/ 27.5%	8.5%
L6H	Medium	4/ 7.8%	15.3%
L7H	Medium	2/ 3.9%	7.4%
L7SN	Medium	7/ 13.7%	15.9%
L8HN	Medium	5/ 9.8%	83.3%
L8S	Medium	3/ 5.6%	21.4%
Total	**Medium**	**51/ 3.1%**	
L2H	Medium to Coarse	96/ 20.7%	17.4%
L4H	Medium to Coarse	57/ 12.3%	33.7%
L4S	Medium to Coarse	114/ 24.6%	29.7%
L5H	Medium to Coarse	131/ 28.3%	80.3%

Table 6. (Cont.)

Location	Temper Size	Count*	% of Total Grit-Tempered for Location
L6H	Medium to Coarse	38/ 8.2%	22.5%
L6S	Medium to Coarse	13/ 2.8%	50%
L7H	Medium to Coarse	4/ .9%	14.8%
L7SN	Medium to Coarse	8/ 1.8%	18.2%
L8S	Medium to Coarse	1/ .2%	16.7%
Total	**Medium to Coarse**	**462/ 29%**	
L6H	Coarse	1/ 100%	.6%

*percentage of total for temper size class

temper size decreased throughout the Woodland period. The predominance of fine to medium and medium to coarse temper may either a greater emphasis of occupation during the Early Woodland to early late Woodland periods or it may indicate that temper of this size was most commonly used throughout the Woodland Period. The distribution of grit and shell-tempered pottery within anomaly contexts closely mirrored the overall occurrence (Table 7). Shell-tempered pottery, commonly considered diagnostic of the

Table 7. Temper type anomaly occurrence

Location	Grit-Tempered	Shell-Tempered	Total
L1F2	1/ .08%		1/ .05%
L1H	3/ .3%		3/ .1%
L1HN		49/ 5.2%	49/ 2.3%
L2H	493/ 41.9%	166/ 6.9%	659/ 31%
L4H	43/ 3.7%	8/ .8%	51/ 2.4%
L4S	177/ 15%	154/ 16.2%	331/ 15.5%
L5H	195/ 16.6%	16/ 1.7%	211/ 9.9%
L6H	155/ 13.1%	492/ 51.7%	647/ 30.4%
L6S	12/ 1%	7/ .7%	19/ .9%
L7H	24/ 2%	22/ 2.3%	46/ 2.2%
L7HN	2/ .2%	2/ .2%	4/ .2%
L7SN	54/ 4.6%	15/ 1.6%	69/ 3.2%
L8HN	7/ .6%	3/ .3%	10/ .5%
L8S	12/ 1%	17/ 1.8%	29/ 1.4%
Total	**1178/ 55.3%**	**951/ 44.7%**	**2129/ 100%**

later Middle Woodland and Late Woodland periods, was found in many of the impact areas with the highest occurrences in L6H and L4S.

Manufacture

Analysis looked at differences in firing techniques and production techniques used by the potters at the site by looking at the color of the shards and any evidence of mis-firing evident on the pieces. Analysis recorded the color of the interior, exterior and center of the pottery sherds using the Munsell color charts. Sherds that are buff, light red, yellow or brown were the result of firing under oxidizing conditions in an open fire while potters fired those that are gray to black under reducing conditions either in a pit or under some sort of covering such as a bark or piled grasses (Luedtke 1985:245). The type and degree of firing will also be observable in the cross-sections or firing cores of the pottery shards as reported by Rye (1981). Rye stated that pottery cores will show the following range:

1) Vessels fired under fully oxidizing conditions will have a uniform cross-section
2) When fired in an oxidizing atmosphere but there is organic material present in the clay the vessel will have a gray to black core
3) When fired in a reducing or neutral atmosphere and there are no organics present the result is pottery that is black on the exterior and interior but with a core that is reddish
4) when fired under a reducing atmosphere and organic material is present the resulting pieces are gray to black throughout although the core may be lighter gray (Rye1981:115). It is generally believed that New England pottery was never fired under reducing atmosphere conditions due to the high temperatures, in excess of 900° C, needed to create such a situation (Child 1981: 182).

Production techniques were also investigated by examining the surfaces of the vessels for cracks that occurred during the course of firing. Rye determined that four different types of cracks could occur as a result of heating and cooling: fire cracks, which are a network of fine cracks that occur when a potter heated a vessel too rapidly and star-shaped cracks that radiate from common center. These cracks seldom exceed 1 cm in length and occur mainly on the exterior with a piece of quartz in the center. They result from quartz's tendency to expand quicker than the clay. Spalling, occurs when a potter heated the vessel too quickly and the moisture in walls expands and causes cracks. Finally, dunting cracks occur when the vessel cooled very rapidly, and the heat is lost mostly from the rim. Dunting causes a series of concentric checks around vessel (Rye 1981: 111). The occurrence of these different types of cracks shows the level of skill of the potter and conditions that they fired the vessels under.

Analysis failed to identify any evidence o f cracking, spalling or dunting on the fragments from the Muttock-Pauwating site. It is possible that pottery manufacture was not an activity carried out at this site.

Luedtke noted that Early Woodland Period potters fired their pots in an oxidizing atmosphere, resulting in lighter colored exterior surfaces. She noted that the later vessels all had darker exteriors, indicating that potters fired them in a reducing atmosphere (Luedtke 1985: 245). She postulated that the change in pottery firing represented a change in technique. An oxidizing atmosphere on the interior and exterior would be created if the potter fired the pot in a rim upright position with the fire located around it. A potter could achieve an overall reducing atmosphere if they fired the pot rim down and buried under coals and possibly bark and ash. A pot with a reduced interior and oxidized exterior would be a result of firing a pot rim side down in an open fire. A reduced exterior and oxidized interior would result if a potter fired the pot rim up but buried it up to the rim in hot ash and coals.
Pots from the Muttock-Pauwating site showed a predominance of being fired either rim side down in

an open fire (oxidized exterior and reduced interior) or being fired rim side up in an open fire (oxidized inside and outside) (Table 8). There did not appear to be any significant difference between grit-tempered and shell-tempered pots in this respect.

Table 8. Interior and exterior surface colors of pot sherds from the Muttock-Pauwating site

Color	Grit-Tempered	Shell-Tempered	Totals
Oxidized Exterior Reduced Interior	35.40%	39.30%	**519**
Oxidized Exterior Oxidized Interior	56.80%	49.90%	**784**
Reduced Exterior Reduced Interior	7.60%	10.00%	**117**
Reduced Exterior Oxidized Interior	0.30%	0.80%	**6**
Totals	**1057**	**369**	**1426**

Analysis found 27 vessel lots that had oxidized interior and exterior surfaces, indicating that they had probably been fired upright in an oxidizing atmosphere (Table 9). Nine of these vessels

Table 9. Oxidized interior and exterior and reduced interior and exterior firing conditions of vessel lots

Vessel #	IA	Temper	Firing*	Interior	Exterior	Diameter	Dec.	Notes	Period	Windsor
1	L1HN	Grit	O/O	Sm	Sm	7 cm Bdy			M-LW	WP
3	L1H	Shell	R/R	Sm	Sm	16 cm Bdy	I		LW	HP
8	L2H	Grit	O/O	Sm	Sm	24 cm Bdy	S		LW	NS
14	L4H	Grit	O/O	Sm	Cm	22 cm Bdy			MW	WCM
24	L4S	Grit	O/O	Sm	Sm	2 cm Rim	I	Pipe Bowl	LW	
25	L4S	Grit	R/R	Sm	Sm	10 cm Bdy		Miniature	M-LW	WP
27	L4S	Grit	R/R	Sm	Sm	9 cm Bdy	D	Miniature	M-LW	HS
28	L4S	Grit	R/R	Sc	Sm	22 cm Rim/ Bdy	D/ P		M-LW	HS
29	L4S	Grit	O/O	Sm	Sm	22-24 cm Bdy	F		MW	
30	L4S	Grit	O/O	Sm	Sm		S	Half-Moon shaped	LW	
31	L4S	Grit	O/O	Sm	Sm	28 c18-28 cm bod	CWS		LW	
32	L4S	Grit	O/O	Sm	Sm	18 cm rim/ Bdy	I	Bowl	LW	HP
33	L4S	Grit	O/O	Sm	Sm	24 cm Bdy	I		LW	HP
34	L4S	Grit	O/O	Sm	Sm	26 cm Bdy	D	Bowl	M-LW	HS
36	L4S	Grit	R/R	Sm	Cm	18 cm rim			MW	WCM
37	L4S	Grit	O/O	Sm	Sm	26 cm Bdy			M-LW	WP

Table 9. (Cont.)

Vessel #	IA	Temper	Firing*	Interior	Exterior	Diameter	Dec.	Notes	Period	Windsor
43	L4S	Shell	O/O	Sm	Sm	10 cm rim	S	½ Moon shaped	LW	
46	L5H	Grit	O/O	Cm	Cm	18 cm rim 20 cm Bdy			EW	V1
67	L6H	Grit	R/R			4 cm		Miniature		
69	L6H	Shell	R/R	Sm	Sm	23 cm Bdy	CWS		LW	
73	L6H	Shell	O/O	Sc	Sm	26 cm Bdy		Misfired	M-LW	WB
77	L6H	Shell	O/O	Sc	Sm				M-LW	WB
83	L6S	Shell	O/O	B	Cm				M-LW	WB
84	L6S	Shell	O/O	Sm	Cm	28 cm Bdy			MW	WCM
86	L6S	Shell	R/R	Sm	Sm				M-LW	WP
87	L7H	Shell	O/O	Sc	Cm				M-LW	WB
89	L7H	Shell	O/O	Sm	Cm				MW	WCM
90	L7H	Grit	O/O	Cm	Cm				EW	V1
91	L7H	Grit	O/O	Sm	Sm			Small	M-LW	WP
92	L7H	Grit	O/O	Sm	Sm		I	Miniature	LW	HP
101	L7SN	Grit	O/O	Sm	Sm		D		LW	NS
103	L7SN	Shell	O/O	Sc	Cm	22 cm bdy			M-LW	WB
104	L7SN	Shell	O/O	Sm	Sm				M-LW	WP
106	L8S	Grit	O/O	Sm	Sm				M-LW	WP
107	L8S	Grit	O/O	Sm	Cm				MW	WCM

O/O- Oxidized interior and exterior R/R reduced interior and exterior remaining vessels are oxidized exterior reduced interior

were shell-tempered and 18 were grit-tempered. Included among these 27 vessels were two Vinette I pots, two Windsor Cord-Marked pots, one Hollister Stamped, four Windsor Plain pots, two Niantic Stamped pots, and three Hackney Pond pots, as well as tobacco pipes, and pots that did not correspond to any of the Windsor series. The distribution indicates that potters fired Vinette I pots upright in an open fire, as were some Middle Woodland pots, many Middle to Late Woodland pots, and Late Woodland pots.

Analysis found that eight pots with reduced interiors and exteriors, indicating that they had probably been fired buried in coals, ash, and possibly bark in a reducing atmosphere. Three of these vessels were shell-tempered and five were grit-tempered. Included among these eight vessels were one Windsor Cord-Marked pot, two Hollister Stamped pots, two Windsor Plain pots, and four Hackney Pond pots. The distribution indicates that some Middle Woodland pots, many Middle to Late Woodland pots, and Late Woodland pots were possibly fired in a reducing atmosphere. Included among these eight vessels were three miniature vessels. It s easy to see how miniature vessels could be buried in the ashes of a pottery fire or even contained within a larger pot being fired so that as a result it would be reduced on the interior and exterior. Analysis found the remaining pots oxidized on the exterior and reduced on the

interior, indicating that they were probably fired inverted on an open fire resulting in the inside being reduced and the exterior being oxidized.

The distribution of the firing conditions shell-tempered and grit-tempered pots (Table 10) shows

Table 10. Firing conditions shell-tempered and grit-tempered pots

Firing	Grit-Tempered	Shell-Tempered
O/O	18/ 26.8%	9/ 20.9%
R/R	5/ 7.4%	3/ 7%
O/R	44/ 65.7%	31/ 72.1%
Total	**67**	**43**

O/O- Oxidized interior and exterior R/R reduced interior and exterior O/R oxidized exterior reduced interior

that both types of tempered vessels received approximately the same firing treatments with slightly more of the grit-tempered vessels being fired under complete reducing conditions and slightly more of the shell-tempered vessels being fired under exterior oxidizing interior reducing conditions.

Surface Treatment

The surface treatment found on the shards was also examined to see if differences existed between shell-tempered and grit-tempered wares. It has been found that vessels with textured exteriors did not spall as often as smooth exterior vessels (Schiffer et al. 1994:209). This is due to the amount of heated surface area, the amount of heat, and the speed at which that heat reaches the water inside the walls of the pot. Interior smoothing or texturing did not seem to have any effect on the degree of spalling or cracking of these vessels. Analysis of the pottery from the site looked for evidence of differences in interior and exterior surfaces between the shell and grit tempered vessels.

It was found that cord-marked interior and exterior surfaces, diagnostic of Early Woodland Vinette I ceramics, only occurred on grit-tempered sherds with most bearing evidence of having been fired under completely oxidizing conditions (Table 11). Most of the sherds of both the grit-

Table 11. Distribution of surface treatments associated with firing conditions

	Interior	Exterior	Grit-Tempered	Shell-Tempered
Oxidized Exterior Reduced Interior	Cord-Marked	Cord-Marked	7.00%	
	Cord-Marked	Smooth	4.80%	15.80%
	Cord-Marked	Scraped		0.70%
	Smooth	Brushed	0.50%	3.60%
	Smooth	Scraped	2.10%	2.90%
	Smooth	Smooth	85.60%	77.00%

Table 11. (Cont.)

	Interior	Exterior	Grit-Tempered	Shell-Tempered
Totals			374	139
Oxidized Exterior Oxidized Interior	Cord-Marked	Cord-Marked	11.10%	
	Cord-Marked	Smooth	9.00%	68.00%
	Cord-Marked	Scraped	0.70%	4.70%
	Cord-Marked	Brushed		0.60%
	Smooth	Scraped		8.10%
	Smooth	Smooth	79.20%	18.60%
Total			578	172
Reduced Exterior Reduced Interior	Cord-Marked	Cord-Marked	7.50%	
	Cord-Marked	Smooth	18.80%	33.30%
	Smooth	Scraped	1.30%	2.60%
	Smooth	Smooth	72.50%	64.10%
Total			80	39
Reduced Exterior Oxidized Interior	Cord-Marked	Smooth		33.30%
	Smooth	Smooth	100.00%	66.60%
Total			**2**	**3**

tempered and the shell-tempered wares bore smooth exterior and interior surfaces, a trait most consistent with Late Woodland pottery. A significant portion of the shell-tempered sherds were also cord-marked on the exterior and smooth on the interior while this was slightly less common among the grit-tempered pottery. Interior scraping and brushing was more common on shell-tempered sherds than grit-tempered ones.

Decoration

Native potters, presumably women, operated within the bounds of a conservative manufacturing tradition with spatial and temporal variability being relatively subtle (Luedtke 1985: 217). Thick ceramics with cord marking on the interior and exterior surfaces and which very rarely bear any surficial decoration, except occasionally in the form of incised lines and geometric shapes (Chartier 2007), are dateable to the Early Woodland period, identified as Fowler's Stage I pottery, comparable to Ritchie's Vinette I pottery type (Fowler 1966; Ritchie 1980). Rocker decorated and dentate stamp decorated pottery is dateable to the Middle Woodland period (Barber 1982) and corresponds to Fowler's Stage 2 ceramics (Fowler 1966). By the Late Woodland, ceramics were more often decorated with cord wrapped stick, linear stamping and incising (Luedtke 1980) and corresponds to Fowler's Stage 3 (Fowler 1966). Fowler's Stage 4 ceramics are globular vessels dating to the Contact Period (Fowler 1966).

Decorative techniques used on pottery have been extensively cited as a way to identify the period of manufacture for that piece. Following Chilton's lead, decorative technique had less weight in our analysis that other attributes of the pieces, but analysis recorded the decoration and compared them

with trends in pottery decoration. These trends include the use of exterior and interior cord-marking, incised decoration and dentate stamping towards the end of the Early Woodland Period (Fowler 1966:53). The use of a wide variety of decorative techniques in the Middle Woodland Period including linear dentate stamping, rocker dentate, punctate, cord wrapped stick and incising as was thick grit tempered vessels with smooth interiors and exteriors and punctates (Luedtke 1986: 125). Lavin does not see the co-occurrence of interior and exterior cord marked vessels with dentate stamped vessels, indicating either contamination of Middle Woodland deposits with earlier shards or the coexistence of the two types (Lavin 1986:7). Researchers associate dentate and Rocker stamping with the Middle Woodland, while scallop decorated, incised, and linear stamped (a.k.a. linear dentate) are Late Woodland. For shell-tempered vessels, which Luedtke states was a temper first used in the later Middle Woodland to early Late Woodland periods, the earliest vessels were thicker and decorated with cord-wrapped sticks and cord or net impressed, later thinner vessels were cord marked all over while potters of even later vessels smoothed and decorated them with linear stamping, incising and reed decoration (Luedtke 1986: 126). Other trends noted by Luedtke were that at Shattuck Farm, all the incised vessels were shell-tempered, but on Nantucket they were grit-tempered, and there is also a decrease in variety of decorative elements from north to south. Overall, decorative techniques were similar between all areas, possibly indicating that pottery designs were not used as emblematic types to show cultural micro-regional identity but were part of a larger Northeastern (Algonquian?) cultural tradition that was not used to express community identity in any archaeologically visible manner. Vinette I pottery is the only component of what Lavin has named the "Cord-Marked Interior Ceramic Horizon" (Lavin 2002:158).

Fowler identified a general pattern for ceramic decorative element occurrence in an article published in 1946. Looking at ceramic collections from three main and two minor locations in Massachusetts, Fowler identified the following trends. In the Connecticut River Valley of western Massachusetts cord-wrapped stick decorated wares were scarce, punctate decoration was occasional, dentate decoration was frequent, and incised decoration was common (Fowler 1946: 1). On the coast in the Plymouth area, cord-wrapped stick decoration was absent, punctate decoration was scarce, dentate decoration was frequent and incised decoration was frequent (Fowler 1946: 2). Fowler also noted rocker stamped and scallop-shell stamped design elements in Plymouth (Fowler 1926: 2). Cape Cod ceramics showed a frequent occurrence of cord wrapped stick decoration, scarce occurrence of punctate decoration, frequent occurrence of dentate decoration and occasional occurrence of incised decoration (Fowler 1946: 2).

Luedtke found among the ceramics from the Shattuck Farm site that the Early Woodland vessels did not have any decoration while those with grit temper and dated stylistically to the Middle Woodland period. Vessels attributed to the Late Woodland period, those decorated with cord wrapped stick, incised designs and linear stamping, had fine grit and shell temper and have been radiocarbon dated to c. 1350 (Luedtke 1986: 125) (Table 12).

Table 12. Shattuck Farm decoration by temper (Luedtke 1985: 231)

Decoration	Coarse Grit	Medium Grit	Shell	Fine Grit	Total
I/E cord marked	6 (100%)				6
Rocker stamped		5 (16%)			5
Comb Impressed		6 (19%)			6
Noded		1 (3%)			1
Net Impressed		1 (3%)			1
Dentate Stamped		14 (45%)	1 (3%)		15
Scallop Impressed		1 (3%)	2 (7%)		3
Reed Impressed		1 (3%)	4 (14%)		5
Linear Stamped		1 (3%)	4 (14%)	1 (14%)	6
Incised		1 (3%)	7 (24%)	1 (14%)	9
Cord wrapped stick impressed			7 (24%)	2 (29%)	9
Cord impressed			2 (7%)	1 (14%)	3
Fine cord marked			2 (7%)	2 (29%)	4
Total	**6**	**31**	**29**	**7**	**73**

Luedtke (1986) examined regional variation in Massachusetts ceramics, using data from three sites/ areas -Shattuck Farm in Andover, the Boston Harbor Islands, and sites on Nantucket . Her project attempted to fill in some of the gaps and better round out the research in New England ceramic studies, a situation which really has not changes a great deal since her publication. Luedtke noted that few ceramic types are defined for the state and no researcher appears able to agree on the spatial/ temporal implications of the technological and stylistic attributes recorded for ceramic assemblages, which Luedtke attributes to relative lack of research and the predominance of multi-component sites (Luedtke 1986:113). Luedtke found that certain ceramic attributes such as thickness, temper type, temper particle size, and major decorative elements changed over time in eastern Massachusetts (Luedtke 1986:132). She also found that coastal Massachusetts appeared to have relatively stable micro-traditions which may relate to the occurrence of linguistic variations along the coast during the Contact Period. These variations may reflect assertive styles versus emblematic ones, personal choice which do not symbolize group identity (see the discussion of assertive versus emblematic styles below in the cordage twist discussion).

Luedtke found that sherd thickness and temper size decreased over time and that there was a general decline in vessel thickness from north to south across temper types and sizes (Luedtke 1986:121). Generally, ceramics in the north were thinner than those to the south throughout the Woodland period. An association between certain decorative elements and temper types also appeared (Table 13). Thick interior and exterior cordmarked. Those bearing specific design

Table 13. Decorative elements by temper type (Luedtke 1986: 125)

Decorative element	N	Grit (%)	Shell (%)
Interior/ exterior cordmarked	22	100	0
Dentate Stamped	28	100	0
Rocker Stamped	8	100	0
Smooth	22	73	27
Smooth and punctate	7	71	29
Scallop decorated	10	60	40
Fine cordmarked	12	50	50
Incised	23	35	65
Cord/ net impressed	6	17	83
Linear Stamped	12	17	83
Cord wrapped stick impressed	31	13	87
Cordmarked	15	7	93

elements or surface treatment dateable by period: cord marked interior and exterior for Early Woodland; dentate, fabric and rocker stamped for Middle Woodland, linear incised and cord wrapped stick and scraped interiors, and smoothed exteriors and interiors for Late Woodland. The greatest difference in thicknesses was between Early Woodland and later Woodland period pots. The thicknesses for the Middle to Late Woodland pots showed much less variability with th most noticeable being a slight decrease in the thickness of shell tempered vessels between the Middle and Late Woodland periods. It is possible that the pottery styles commonly identified as Middle Versus Late Woodland have more temporal overlap than previous researchers have given them. It is also possible that the site had a greater late Middle Woodland to early Late Woodland focus than other periods, a period where the pottery styles would be expected to overlap. Radiocarbon dating of features and associating those dates with pottery types may help to resolve the issue.

The findings from the Muttock-Pauwating site were similar in some ways to Luedtke's (Table 14).

Table 14. Decorative elements present on vessel lots from Muttock Pauwating Site

Element	Grit	Shell
Dentate	26%	0
Rocker Stamped	5.7%	0
½ moon impressions	2.9%	8.3%
Cord wrapped stick	14.3%	8.3%
Fabric impressed	8.6%	0
Scallop impressed	8.6%	25%
Incised	31.4%	50%
Notched	2.9%	8.3%
Total	**35**	**12**

Dentate and rocker stamping was found only on grit-tempered vessels and incising was more common on shell-tempered vessels. Cord-wrapped stick impressions were more common on grit-tempered vessels at the Muttock-Pauwating site and scallop impressing was a more common technique on shell-tempered vessels as well.

Incising was the most common decorative technique represented at the site, making up 23.6% of the total decorated sherd assemblage (Table 15). Incising took two forms, wide and fine. Potters

Table 15. Distribution of decorative element by fragment count.

Decoration	L1HN	L2H	L4H	L4S	L5H	L6H	L6S	L7H	L7SN	L8HN	L8S	Total
I	100%	7.1%	29.2%	12.5%	37.3%	76.3%	50.0%	100%	33.3%	100%		**23.6%**
F		37.4%		26.9%					11.1%			**21.7%**
CWS		8.4%	54.2%	36.5%	11.8%	3.4%	10.0%		22.2%			**17.5%**
R		40.0%			2.0%	3.4%	30.0%					**17.3%**
D		8.0%	14.6%	2.9%	37.3%	3.4%			33.3%		100%	**9.9%**
S		0.8%	2.0%	12.5%	2.0%	3.4%	10.0%					**3.7%**
ID				7.7%	3.9%	1.7%						**2.0%**
P				1.0%	5.9%	9.8%						**1.7%**
RF		0.8%										**0.4%**
RD		0.4%										**0.2%**
Totals	**14**	**238**	**48**	**104**	**51**	**59**	**10**	**7**	**9**	**1**	**1**	**542**

CWS- Cord-Wrapped Stick D-Dentate F- Fabric Stamping I-Incised ID- Incised and Dentate P- Punctate R- Rocker Stamped RD- Rocker Stamped and Dentate RF- Rocker Stamped and Fabric Impressed S- Shell Impressed

used wide incising for complex decorations while using fine incising for less formal designs **(Figure 2).** Incising took the form of horizontal, vertical and oblique lines, checkerboard, herringbone, cross-hatching, and triangles. Complex incising is a Late Woodland decorative technique while the simpler incising is found on earlier vessels. Analysis found Windsor traditions limited to Hackney pond Late Woodland to Contact Period incised oblique triangular decoration. Incising also occurred associated with dentate stamping. This was present on 2% of the decorated sherds. Incising was most common in the L1HN, L7H, L8HN, and was least common in L2H and L4S.

Fabric impressed ceramics were the next most common ceramic recovered **(Figure 3).** This decorative technique consisted of a section of finger-woven fabric, possibly the side of a soft bag or basket, that a potter pressed into the soft clay. This technique was present only in the L2H, L4S and L7SN impact areas and occurred associated with rocker stamping in L2H. This decorative technique does not have a corresponding type in the Windsor ceramic series and may be a more eastern and northern decorative technique. The present study determined that this technique dates to the Late Woodland period but predates incising and is contemporaneous with rocker stamping, dentate impressing, shell impressing and possibly cord-wrapped stick impressing.

Figure 2. Incised decorated pottery

Figure 2. (Cont.)
Row 1 Left to Right: L1HN-A N300.8 E183.9 30-35 cm, L2H-Block N269.5 E215 30-37 cm, L2H-A N268.1 E214.25 45-50 cm, L4H-PZ N146 E124 0-38 cm
Row 2 Left to Right: L4H-C N145.5 E120 0-35 cm, L4H-A N146 E145.3 35-40 cm N1/2, L4H-CN152 E127 0-32 cm, L4H-C N140 E127 0-32 cm, L4S-C N145 E144 0-34 cm, L4S-C N146 E145 0-40 cm
Row 3 Left to Right: L4S-C N146.5 E142 0-28 cm, L4S-A N147.55 E140.4 30-35 cm Stain A W1/2, L5H-A N131.3 E104.5 40-45 cm W1/2, L5H-A N131.3 E184.5 45-50 cm W1/2, L5H-A N135.5 E178.4 45-50 cm N1/2, L5H-A N135.5 E178.5 45-50 cm
Row 4 Left to Right: L5H-C N174 E180 38-55 cm, L5H-C N130.5 E180 30-65 cm, L5H-C N131 E192 30-60 cm, L5H-C N134 E190.5 30-35 cm, L5H-C N135 E176 0-40 cm
Row 5 Left to Right: L5H-Stripping 4m E 90cm S, L5H-Stripping, L5H-Stripping, L5H-Stripping NW, L6H-A N100.6 E244 40-45 cm W1/2, L6H-A N102.5 E235 50-55 cm N1/2
Row 6 Left to Right: L6H-A N103.8 E244 75-80 cm S1/2, L6H-A N108.8 E235.7 40-45 cm SW1/2 C. Stain, L6H-A N111.2 E228.2 55-60 cm E1/2 C. Stain, L6H-C N102 E235.5 0-40 cm,L6S-B1 N116.9 E243.35 35 cm, L6S-C N111.5 E252 0-30 cm
Row 7 Left to Right: L6S-EU N113 E234 40 cm SE, L6S-EU N115 E254 36-40 cm SW, L7HE1/2 N68.9 E244.8 30-35 cm N1/2, L7HE1/2 N68.9 E262.830-35 cm E1/2, L7HE1/2 N71 E261 30-35 cm S1/2, L7SN-A N70 E255 30-35 cm E1/2
Row 8 Left to Right: L7SN-Stripping 3.2m W 90cm S, L8S-A N92 E321.1 45-50 cm S1/2

Figure 3. Fabric and cord wrapped stick decorated pottery

Figure 3. (Cont.)
Row 1 Left to Right:L2H-Block N268-N270 E214-E216 40cm, L2H-B1 N271 E215 45-50cm, L2H-PZ N278 E212 0-41cm, L2H-A 90cm W 5.6m N of N268 E216.5, L2H-A N268.1 E214.25 50-55cm N1/2, L2H-A N268.85 E215.25 40-45cm
Row 2 Left to Right: L2H-A N269.5 E215.4 40-45cm, L2H-A N268.5 E216 30-40 cm, L2H-A N282 E204 45-50cm
Row 3 Left to Right: L4H-C N152 E130.5 0-33cm, L2H-A N267.8 E214.8 45-50 cm, L4H-PZ N154 E132 0-38cm, L4H-PZ N144 E126 0-32cm, L2H-A N270 E215 50-55 cm, L4S-A N149.1 E144.7 35-40 cm W1/2
Row 4 Left to Right: L4H-Backdirt, L4H-Stripping N154 E132 E1/2, L4H-A N155.7 E127.6 40-45cm S1/2, L4S-C N145.5 E146 0-34cm, L4S-C N1476.5 E142 0-28 cm, L4S-C N144 E144.5 E1/2
Row 5 Left to Right: L4S-C N146 E145 0-40cm, L4S-C N146 E146.5 0-38cm, L4S-A N146 E145.3 30-35 cm S1/2,
Row 6 Left to Right: L5H-C N132 E183.5 30-50cm, L5H-Stripping NW, L6H-A N104.5 E242.45 45-50 cm S1/2, L6S-A N116 E255.3 50-55 cm W1/2
Row 7: L7SN-Stripping 3.2m W 90cm S

Cord-wrapped stick decoration, which is when potter wrapped a single cord around a thin stick and then impressed it into the soft clay of the vessel prior to hardening, is hypothesized to have been a Late Woodland decorative technique often used on grit-tempered vessels **(Figure 3).** This technique creates a decoration that consists of single horizontal or oblique lines concentrated around the neck of vessels and is well represented in impact areas L4H, L4S, L7SN and L5H where it made up between 11.8% and 54.2% of the decorated sherds. It does not have a corresponding type in the Windsor ceramic series and may be a more eastern and northern phenomenon. This technique dates to the Late Woodland period but predates incising. Cord wrapped stick impressing may be the direct precursor to it as they both use oblique linear decoration and encirclement of the outside of the rim. It also may be contemporaneous with with rocker stamping, dentate impressing and shell impressing.

Rocker stamping consisted of the impression of a curved smooth-edged instrument, possibly a quahog shell, in a rocking motion, held vertically, and applied around the perimeter of a vessel. This technique was common in the L2H and L6S impact areas but also was found in the L5H and L6H impact areas **(Figure 4).** This decorative technique does not have a corresponding type in the Windsor ceramic series and may be a more eastern and northern technique. It is believed that this technique dates to the Late Woodland period but predates incising and is contemporaneous with dentate impressing, shell impressing, and possibly cord wrapped stick impressing. This decorative technique co-occurs with fabric impressing and dentate stamping.

Dentate stamped pottery consisted of multiple rows of square dentates encircling the body of the vessel. This technique was well represented in the L4H, L5H, L7SN, and L8S impact areas where it made up between 37.3% and 100% of the decorated sherd assemblages **(Figure 5).** Sherds were also present in lower occurrences in the L2H, L4S, and L6H impact areas. This technique is represented in the Windsor Tradition as Hollister Stamper pottery dating from the Middle to Late Woodland period. It is believed that this technique dates to the Late Woodland period but predates incising and is contemporaneous with rocker stamping, shell impressing, and possibly cord wrapped stick impressing.

Shell impressed pottery was common in the L4S and L6S impact areas where it made up between 10 and 12.5% of the decorated sherd assemblage **(Figure 6)**. It is believed that both Seldon Island (Middle Woodland to Late Woodland) and Niantic Stamped (Late Woodland to Contact period) pottery of the Windsor Tradition are present. This technique dates to the Late Woodland period but predates incising and is contemporaneous with rocker stamping, dentate impressing and possibly cord wrapped stick impressing.

Punctate decorating was present in the L4S, L5H and L6H impact areas where it made up 1-9.8% of the decorated sherd assemblages. Punctate decoration consists of impressed circles in the exterior of the pots, either on top of the rim or at the neck to body juncture. It is believed that this technique dates to the Late Woodland period but predates incising and is contemporaneous with rocker stamping, dentate impressing, and shell impressing. There is no corresponding

Figure 4. Rocker stamped pottery

Row 1 Left to Right:L2H-A N267.8 E214.8 45-50 cm, L2H-Block N269 E214.5 30-40 cm, L2H-Block N268-270 E214-216 40cm, L2H-Backdirt SE
Row 2 Left to Right: L2H-A N268 E217 55cm, L2H-A N267.8 E214.8 45-50 cm, L2H-A N268.8 E214.8 40cm, L2H-A N270.5 E217.5 45-50cm
Row 3 Left to Right: L2H-C N270.5 E214 0-35cm, L2H-A N270 E214 40-45cm, L2H-A N270.4 E215.1 50-55cm, L2H-A N270 E210 40-45cm, L2H-B1 N271 E215 50-55cm, L5H-A N132 E177.75 42-45cm S1/2
Row 4 Left to Right: L5H-A N135.5 E178.4 45-50 cm N1/2, L7S-PZ N84 E248 0-40 cm, L8S-A N92 E321.1 40-45cm N1/2

Figure 5. Dentate stamped pottery
Row 1 Left to Right: L2H-A N271 E217 40-45cm, L2H-B1 N272 E214 45-50 cm, L2H-Block N272 E217 0-35cm, L4H-PZ N142 E128 0-35cm
Row 2 Left to Right: L4H-Stripping 4-8malong S1/2, L4S-C N144 E145 0-30 cm, L4S-A N145 E144 30-35cm S1/2, L5H-C N131.5 E184 30-50cm
Row 3 Left to Right: L5H-A N132.2 E180.1 40-45cm E1/2, L6H-A N103.8 E244 95-100cm S1/2, L7SN-A N75.6 E256 30-35cm S1/2
Row 4 Left to Right: L5H-PZ N130 E180 30-65cm

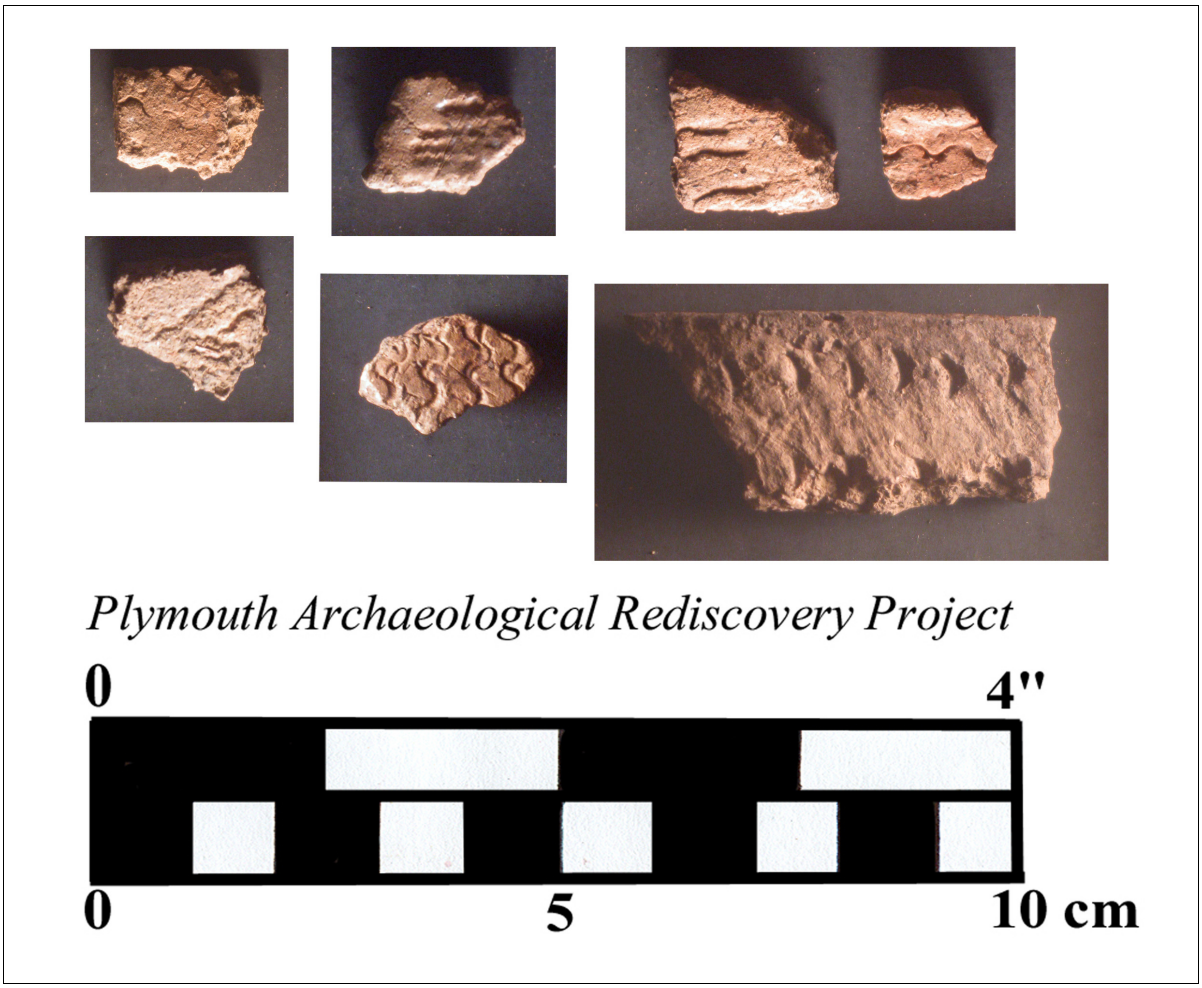

Figure 6. Shell-impressed pottery

Row 1 Left to Right:L2H-A N272 E218 40-45 cm, L2H-A N271 E216 40-45 cm, L4S-C N145.5 E146 0-34 cm
Row 2 Left to Right: L4H-A N155.7 E127.6 40-45 cm S ½, L4S-C N146 E144.5 0-40 cm, L4S-A N146 E145.3 30-35 cm S1/2

Windsor Tradition pottery type. It is believed that this technique was used in conjunction with other decorative techniques.

Comparing the pottery assemblage from the Muttock-Pauwating site to Fowler's 1946 findings, it this site appears to be a combination of Plymouth and Cape Cod traits. Cord-wrapped stick decoration was common, just as it was on Cape Cod and incised decoration was frequent, just as it was in Plymouth. Dentate decoration was frequent, as it was in both locations, and punctate decoration was scarce, as it was in both. It is possible that the assemblage from the Muttock-Pauwating site is a combination of ceramics manufactured locally and those traded from coastal communities in Plymouth or Cape Cod or even to the southwest.

Vessel Diameter

At the Shattuck Farm site, Luedtke found that maximum vessel diameter was equal to vessel height and that vessel size remained consistent from the Early Woodland to Contact period (Luedtke 1985: 221). the only change in vessel size was the inclusion of small vessels under 20 cm in height during the Contact period and larger vessels over 30 cm in height during the Late Woodland to Contact periods (Luedtke 1985: 221). Luedtke interprets that small vessels, which she defines as under 15 cm in height, served a different function than the larger vessels. Archaeologists propose four interpretations to explain these miniature pots. The first is that they were practice pots made by young potters learning the techniques of potting. If this were the case, then one would expect them to be especially plentiful on sites where potters were manufacturing pots and that they would be cruder than full-sized pots. Alternately, if researchers have proposed that they were made by adults as toys for children. They would be expected to be less common in midden deposits but they would be fairly common due to high breakage rates associated with children's play things. Mrozowski (1980) sees them as possibly being pots created for the storage of condiments or herbs, which should result in them being as carefully made as full-sized pots and fairly uncommon in middens, as they would be expected to have had a longer use life. Finally, Luedtke presents the possibility that people used them to prepare or store special foods used in small quantities, such as medicines or baby foods (Luedtke 1985:223). In this case, they would expected to have been carefully made , not abundant in middens, show signs of use and may accompany bodies into graves for use in the afterlife (Luedtke 1985: 223-224).

Luedtke found that the miniature pots reported in the archaeological literature were often carefully made and sometimes decorated (Table 16). They were rarely found in middens and

Table 16. Recovery of miniature vessels (after Luedtke 1985: 225)

Location	Height	Age of Burial	Other Artifacts
Wapanucket Burial #2	15 cm	Adult	glass beads, copper spoon
West Ferry Burial #16	15 cm	4-5 year old child	brass spoon, clay balls
Hyannis	14.8 cm	7 mo fetus	none
Taylor Farm Burial #1	12.7, 5.1 cm	Adult	copper kettle, stone pestle, iron hoes, glass beads, mirror, scissors, buttons
West Ferry Burial #17	12.5 cm	6-8 yo child	none
West Ferry Burial #6	12.3 cm	infant under 4 yo	brass spoons

Table 16. (Cont.)

Location	Height	Age of Burial	Other Artifacts
Taylor Farm Burial #5	10.2 cm	infant	glass and shell beads
Burr's Hill	5 cm	Unknown	Unknown

are often difficult to identify until the measurement and analysis phase of pottery inspection. Most of the miniature pots have been found in graves or presumed burial contexts (such as Burr's Hill) in association most commonly with either infants or older persons and archaeologists have shown that they bear signs of use (Luedtke 1985: 224). Luedtke concluded that the "special foods" hypothesis was the most likely explanation for their production, although she admits that multiple uses and sources are possible. The use of miniature pots for medicine production and their occurrence during the Contact Period may relate to the increase in disease associated with contact with non-native pathogens transferred from European sailors, settlers and explorers during this period (Luedtke 1985: 226).

Archaeologists identified 11 miniature vessels from the Muttock-Pauwating site (Table 17).

Table 17. Vessels diameters from the Muttock-Pauwating site

Location	Surfaces I/E	Decoration	Body Size	Vessel Number
1HN	Sm/ Sm		7 cm	1
4S	Sm/ Sm		10 cm	25
4S	Sm/ Sm	Dentate stamped	9 cm	27
4S	Sm/ Sm		11 cm	38
4S	Sc/ Sm		10 cm	41
4S	Sm/Cm	½ moon shaped impression	10 cm	43
6H	Sm/ Sm		4 cm	67
6H	Sm/ Sm		7 cm	74
6S	Sm/ Sm	Rocker Stamped	12 cm	81
7H	Sm/ Sm	Incised line	?	92
7SN	Sm/ Sm		10 cm	96

Testing recovered most of these vessels from Lot 4S and Lot 6. Vessels size is similar to those reported by Luedtke.

A total of 65 vessel lots had measurable rim and/or body diameters (Table 18). The average

Table 18. Ceramic vessel lot body and rim diameters

Body Diameter	Grit-tempered	Shell-Tempered	Rim Diameter	Grit-tempered	Shell-Tempered
4 cm	1				
7 cm		1			
9 cm	1				
10 cm	2		**10 cm**	1	2
11 cm	1				
12 cm	1				
14 cm	1		**14 cm**	1	
16 cm		1	**16 cm**	2	
17 cm	1				
18 cm	4	1	**18 cm**	6	
19 cm	1				
20 cm	3				
22 cm	6	5	**22 cm**	1	
23 cm	5	1	**23 cm**	2	
24 cm	11	2			
25 cm	2				
26 cm	4	2			
27 cm	2				
28 cm	1	1			
Average	**16.8 cm**	**18.9 cm**		**17.8 cm**	**10 cm**

body diameter for grit-tempered vessels was 16.8 cm while it was 18.9 cm for shell-tempered vessels. Shell-tempered vessels were generally thinner than grit-tempered vessels and had finer temper particle sizes. The thinner walls and smaller temper size allowed for the construction of larger vessels. The range of vessels sizes confirms the seventeenth century ethnohistoric accounts of the Native people having pots of various sizes.

A comparison of vessel size by Windsor Tradition type shows a general increase in size through time from Vinette I to Hackney Pond style pots, although there is a range of sizes for all tradition types (Table 19).

Table 19. Windsor Tradition vessel diameters

Windsor Style	Grit-Tempered	Average	Shell-Tempered	Average
Vinette I	18, 19, 20, 22, 23, 25 (2) cm	21.7 cm		
Windsor Cord Marked	22, 23, 24 (2) cm	23.3 cm	7, 22, 28 cm	19 cm
Windsor Brushed			10, 22, 24 (2), 26 cm	21.2 cm
Hollister Stamped	9, 20, 22, 24, 26, 27 (2) cm	22.1 cm		
Seldon Island	22 (2) cm	22 cm		
Windsor Plain	10 (2), 11, 14, 17, 22, 26 cm	15.7 cm	22, 26 cm	24 cm
Niantic Stamped	18, 24 cm	21 cm		
Hackney Pond	18, 24 (4), 26 cm	23.3 cm	16, 18, 22 (2) cm	19.5 cm

Rim Shape

Luedtke found that rim shapes changed over time as well. Early Woodland pots had rounded and rounded and decorated rims. The majority of the Middle Woodland pots had rounded, flat and decorated and flat rims (with rounded and decorated and flat and tapered also occurring). The Late Woodland shell tempered pots predominantly had flat and tapered, rounded and flat rims, with rounded and decorated also occurring. Rounded and flat rims were found associated with the Late Woodland grit tempered pots (the other forms also occurred in lesser quantities) Luedtke 1985:244).

Rim shapes were found vary considerably through time and among temper types, but rim decoration was found on grit-tempered vessels and that the rims became plainer and more rounded to the south (Luedtke 1986:127). One final trend noted in the study was that grit-tempering again replaced shell tempering by the later Late Woodland. The later grit tempered forms were thin, finely tempered, very hard and very dark, suggesting a different form of firing technology at this time, but with the same general shape and decorative techniques being used (Luedtke 1986:131).

Rim shapes from the Muttock-Pauwating site were predominantly squared, characteristic of the Late Woodland, on both the Grit-tempered and shell-tempered vessels (Table 20) **(Figure 7).**

Table 20. Rim shapes and associated decorative techniques

Rim Shape	Grit-Tempered	Shell-Tempered	Decorative styles
Rounded	13/ 86.7%	2/ 13.3%	Dentate
Squared	20/ 68.9%	9/ 31%	Dentate
Pointed	8/ 80%	2/ 20%	Incised, Fabric Impressed, Rocker Stamped, Shell Impressed, Cord Impressed
Totals	**41**	**13**	

Figure 7. Rim shapes

Figure 7. (Cont.)
Row 1 Left to Right: L2H-B1 N271 E214 45-50 cm, L2H-B1 N270 E21`5 45-50 cm,
L4S-Scraping N144 E148, L4S-Scraping N144 E148, L4S-C N150 E147.5 0-30 cm,
L4S-C N146 E147 0-38 cm, L4H-PZ N142 E130 0-30 cm, L4S-A N141.7 E146.75 40cm
Row 2 Left to Right: L4S-C N144 E120 0-35 cm, L4S-C N145.75 E146.4 60-65 cm N1/2,
L5H-C N134 E190.5 30-35 cm, L5H-C N135 E176 0-40 cm
Row 3 Left to Right: L6S-C N111.5 E257 0-30 cm, L6H-A N111.2 E228.2 60-65cm C. Stain E1/2,
L6H-A N102.5 E235 50-55cm, L7HE1/2 N71 E261 30-35 cm S1/2,
L7H-Stripping N67.5 E258.5 30 cm
Row 4 Left to Right: L7SN-Stripping 1.8m W 50cm E of SE
Row 5 Left to Right: L7SN-Stripping 1.9m n 1.35m W, L5H-PZ N130 E180 0-65cm,
L6S-A N116 E255.3 50-55cm W1/2

When rim sherds were found associated with decorative styles, pointed rims were more commonly associated with a wider variety of decorative styles whereas round and squared rims were more commonly associated with dentate decorated pottery.

Thickness

Analysis measured the thickness of the vessel walls by measuring sherds with intact interior and exterior surfaces. Most of the grit-tempered sherds had thicknesses between .6 and 1 cm while the shell-tempered sherds had their maximum thickness at .4 to .7 cm (Table 21). The average

Table 21. Ceramic sherd thickness comparison

Size	Grit-Tempered	Shell-tempered
.3 cm	3/ 100%	0
.4 cm	6/ 66.6 %	3/ 33.3%
.5 cm	46/ 63.8%	26/ 36.2%
.6 cm	93/82.3%	20/ 17.7%
.7 cm	145/ 70.7%	60/ 29.3%
.8 cm	77/ 84.6%	14/ 15.4%
.9 cm	55/88.7%	7/ 11.3%
1 cm	52/ 94.5%	3/ 5.5 %
1.1 cm	11/100%	0
1.2 cm	2/100%	0
1.3 cm	1/ 25%	3/ 75%
Totals	491	136
Average	**.7 cm**	**.6 cm**

thickness for grit-tempered sherds was also slightly thicker than shell-tempered (Table 21). Analysts compared the thickness of the sherds bearing decorative elements to examine any differences between grit-tempered and shell-tempered sherds (Table 22). It was found that

Table 22. Comparison of the thickness of sherds bearing decorative elements

Decorative Element	Grit-Tempered	Shell-Tempered
Cord wrapped stick	0.8 cm	0.5 cm
Dentate	0.6 cm	
Fabric Impressed	0.8 cm	
Incised	0.7 cm	0.6 cm
Rocker Stamped	0.6 cm	
Shell-Impressed	0.8 cm	0.8 cm
Incised and Dentate		0.5 cm

overall, shell-tempered sherds were thinner than grit-tempered sherds with similar decorative elements were thinner between vessels, except in the case of shell stamped sherds.

Cordage Impressions

Analysis found a few pieces of shell tempered and many pieces of grit tempered pottery covered with impressions from the cord wrapped sticks used to form and possibly decorate their surfaces. When these impressions are present, the surface is typically described as cord-marked, cord-impressed, cord-malleated, or fabric-impressed. These marks are the result of the cord-wrapped paddles that potters used to gently paddle the coils of the pots together as they formed the pots, thus ensuring a tighter fit, joining of the coils, eliminating air pockets that could explode during firing, helping to align the temper in the clay so that it lies more uniformly in the body and helping to give the vessel a textured surface.

In plant cells, parallel bundles of cellulose molecules form small fibrils that are laid down in successive layers as the plant grows. These layers of fibrils trace a spiral inside each plant cell, that make the plant cells predisposed to spinning and cordage making. The twist direction is consistent for any plant species with twists going from right to left or right to left. These twists correspond to the diagonal bars in the letters Z (right to left) or S (left to right). Plants like milkweed, flax, ramie and Indian hemp have S-twists while hemp, jute, sisal and yucca have Z twists (Buchanan 1987:10). The observation of the natural twists in plants may have first led people to create cordage possibly over 30, 000 years ago. Cordage is stronger and smoother if it is spun in the direction of the natural twist of the plant. Since we know that Contact Period natives made use of milkweed and Indian hemp (*Apocaynon*) for making cordage, we may expect to find S-twisted cordage patterns on pottery fragments if in fact they were spinning this cordage in the direction of the fibers.

In recent archaeological studies to the north and south of Massachusetts, archaeologists have used cordage twist to show cultural identity and to highlight differences between themselves and their neighbors. At certain times and places worldwide, people subjected cordage twist to highly selective processes that result in a preference or selection of one of two twist and spin options, choices that superseded handedness and natural fiber twist. The question posed by archaeologists working on the East Coast has been whether Native people in the Eastern Woodlands made these selective choices as well. Jay Custer succinctly sums up the question of cordage twist and ethnicity "We know that an individual society group (of whatever size) *may* produce cordage assemblages with very little variation in spin and twist direction. Therefore, if we can find archaeological assemblages of cordage with similarly low variation in spin and twist direction from specific temporal and spatial contexts, then we can infer the existence of identifiable social groups similar to those of the ethnographic examples at a particular place and time" (Custer 2004: 140). He found that in a comparison of twist direction from several sites in Delaware and eastern Pennsylvania, that twist direction was variable between assemblages and even highly variable *within* an individual assemblage. This indicates that at least in the assemblages that he examined, a positive correlation could not be reached between twist direction and cultural selection. Cordage twist essentially becomes an ingrained cultural preference, one that people may not even realize that they are doing in a certain way "...once a population adopts a particular cordage twist...they rarely, if ever change it." (Petersen 1996). Petersen did find though that cordage twist most likely represents an assertive versus an emblematic style (Petersen 1996: 114).

Assertive versus emblematic styles have two very different meanings and the identification cultural traits as either carries significant potential consequences for interpretation. The following discussion of assertive versus emblematic style sis based on Wiessner's definition of them (1982: 257-258). Assertive style is a formal variation in material culture which is personally based and which carries information on individual identity with no distinct referents. It does not directly symbolize individual identity and was employed consciously or unconsciously with the potential to diffuse with acculturation and enculturation, thus potentially providing a measure interpersonal contact for archaeologists. Unfortunately, whether it does carry such information is a complex matter based on a number of factors including decisions of the maker on the nature, function and social properties of an object. Emblematic style is a formal variation in material culture that has a distinct referent and transmits a clear message to a defined target population about conscious affiliations and identity. Emblematic styles express social attributes of identity and carry information on the existence of groups and boundaries and not about the degree of interaction across or between them .

Robert Maslowski found what he interpreted as a strong correlation between cordage twist and possible cultural identity in his study from several sites in the Ohio Valley (1996). Maslowski's thesis was that "...cordage twist pattern are the result of highly standardized, culture-specific motor habits. Such motor habits are learned at an early age and are transmitted from generation to generation within family groups or work groups." (Maslowski 1996: 89). He found that in his study area there was a definite pattern to Z twist versus S-twist cordage impressions on pottery.

Building on Ma11slowski's work, James Petersen (1996) examined cordage twist from coastal Maine and compared it from assemblages inland from Vermont. He found an overwhelming predominance of Z twist on the coast and S-twist inland with some examples of each of the another twist in each assemblage (Petersen 1996:113). Petersen attributes the predominance of ceramics bearing evidence of one cord twist with the co occurrence of a much smaller assemblage of ceramics with the opposite twist in an assemblage as evidence of trade in ceramic vessels at least by the early Late Woodland period. Over 60% of all early Late Woodland period vessels in Maine were tempered with shell derived from marine species and archaeologists have identified shell-tempered vessels bearing Z-twist impressions 150-200 km inland in interior upland Maine, indicating a likely trade of vessels from the coast to the inland (Petersen 1996: 113). In Vermont the presence of Z-twist vessels in predominantly S-twist assemblages, is attributed to trade with the Z-twist favoring Iroquois neighbors (Petersen 1996:114). One of the outcomes of this research was he contribution of data challenging the long-held belief that Native people from the interior moved to the coast in the summer and inland in the winter (Petersen 1996:114). If such a movement had occurred, the twists present should be similar between coastal and inland areas, when in fact, they aren't, a fact supported by subsistence data as well (Sanger 1982).
Archaeologists identified the twist of the cordage that left the impressions on the pottery at the Muttock-Pauwating site by looking at the impressions on the pottery with a hand lens and then identifying the twist as S if it went right to left on the impression and Z if it went left to right. This was done because the impression is the mirror image of the original cordage spin. It would appear that if the inhabitants were spinning cordage in the direction of the natural fiber twists, then they must have used some plant other than milkweed or Indian hemp to do so. This is only the second site in Massachusetts where archaeologists have recorded cordage twist. The first is the Agawam Site in Wareham which Chartier tested in 2003 (Chartier 2007).

A total of nine fragments bore impressions that were clear enough to discern the some information about the characteristics of the cord used at the Agawam Site (Table 23).

Table 23. Cordage characteristics from impressions on pottery From the Agawam Site

Vessel #	Twist	Period	Cordage Width
No vessel	Z		3mm
2	Z	MW	2mm
7	Z	EW	2mm
8	Z	EW	3mm
9	Z	EW	1.5mm
11	Z	MW	1mm
12	S	MW	1mm
6	Z	MW	2mm

The twist identified from the Muttock-Pauwating site was the opposite to that from the Agawam Site (Table 24). Whereas at the Agawam Site, a coastal site, the Z-twist

Table 24. Cordage twist from the Muttock-Pauwating site

Period	Vessel	Surfaces E/I	Temper	Diameter	Twist	Cordage dia
EW	5	CM/ CM	Grit	16-22 cm	S	.125 cm
EW	15	CM/ CM	Grit	16-20 cm	S	.1 cm
EW	35	CM/ CM	Grit	20-26 cm	S	.1 cm
EW	46	CM/ CM	Grit	18-20 cm	Z	.1 cm
EW	47	CM/ CM	Grit	18-28 cm	S	.05-.3 cm
EW	48	CM/ CM	Grit		S	.05-.125 cm
EW	54	CM/ CM	Grit	18-26 cm	S	.1-.125 cm
EW	82	CM/ CM	Grit	22-28 cm	S	.125 cm
EW	90	CM/ CM	Grit		S	.1 cm
EW	97	CM/ CM	Grit	16-18 cm	S	.1-.125 cm
LW	7	SM/ SM Fabric Impressed	Grit	22-26 cm	S	.125-.2 cm
LW	78	Sm/ SM Fabric Impressed	Grit	22-26 cm	S	.1-.2 cm
LW	16	Sm/ SM Cord Wrapped Stick	Grit	22-26 cm	S	.125-.2 cm
LW	26	CM/ SM	Grit	16 cm	S	.1-.2 cm
LW	2	CM/ SM	Shell		S	.1 cm
LW	11	CM/ SM	Shell		S	.1-.125 cm
LW	39	CM/ SM	Shell		S	.1-.125 cm
LW	68	CM/ SM	Shell	22 cm	Z	**LW**
LW	83	CM/ SM	Shell		S	.125 cm

Table 24. (Cont.)

Period	Vessel	Surfaces E/I	Temper	Diameter	Twist	Cordage dia
LW	84	CM/ SM	Shell	28 cm	S	.2 cm
LW	89	CM/ SM	Shell		S	.1 cm
LW	102	CM/ SM	Shell		S	.1-.125 cm
LW?	4	CM/ SM	Grit	24 cm	S	.05-.1 cm
LW?	14	CM/ SM	Grit	22 cm	S	.05-.125 cm
LW?	36	CM/ SM	Grit	18 cm	S	.1 cm
LW?	49	CM/ SM	Grit	18-28 cm	S	.05-.125 cm
LW?	60	CM/ SM	Grit	24 cm	S	.1-.125 cm
LW?	88	CM/ SM	Grit		S	.1 cm
LW?	107	CM/ SM	Grit		S	.1 cm

predominated, the opposite was true from the Muttock-Pauwating site. One possible explanation is that inland people, or at least the people in the Muttock-Pauwating community used a Z-twist whereas the people from the community of Agawam used an S-twist. It is possible that there is even a larger inland versus coastal difference in twist trends. Petersen's work in Maine and Barber's (1982) at the Wheeler's site both identified overwhelming associations of Z-twist in coastal settings, a finding consistent with those from the Agawam site in Wareham. Until archaeologists conduct further studies and CRM archaeologists, those who are conducting most of the current archaeological field work in the study area, begin to record more variables for artifacts such as pottery, larger syntheses will remain tantalizingly hypothetical.

Average cordage site appears to have changed over time as well (Table 25). The shift appears

Table 25. Average cord thickness from the Muttock-Pauwating site

	Average cordage width
EW	.11 cm
MW-LW	.16 cm
LW Grit	.16 cm
LW Shell	.19 cm
LW?	.18 cm

to be from thinner to thicker over time. This is likely the result of the use of thicker cords for decorative techniques in the Middle to Late Woodland times-fabric impressed and cord wrapped stick decoration versus simpler cord-marking and use of thicker cord wrapped around ceramic forming paddles. At the Agawam site an opposite pattern was apparent with finer cordage being used between the Early and Middle Woodland periods.

Pipes

Ceramic pipes are relatively rare at archaeological sites. Pipe production and use in New England extended from Connecticut to Maine Luedtke and Barber did not find any pipes in their excavations at

Shattuck Farm and the Wheeler's Site. Ripley Bullen noted their absence in his excavations at inland sites (Bullen 1949) and Moorhead noted that they were not often found from the length of the Merrimack drainage (Luedtke 1985: 256). Pipes appear more common on coastal sites, as noted by Luedtke, at Calf Island and Clark's Pond (Luedtke 1985: 256). Luedtke (1985:256) attributes their scarcity to the possibility that they were more commonly broken where potters made them versus where users broke them and that due to the possibility of special clays being used, considerable care in their production and the ritual and religious significance surrounding tobacco use.

Smoking pipes in New England make their first appearance in the Early Woodland Period (Snow 1980:266). Early pipes appear to have been conical in shape and the examples from New England mirror the conical-shaped pipes associated with the Adena Culture centered in the Midwest, which made limited manifestations in New England. Later pipes bore the more familiar obtuse angle from stem to bowl which was eventually copied by European pipe makers. William Howes, in his 1960: 1 article in the Bulletin of the Massachusetts Archaeological Society, provided a compilation of ceramic pipe recoveries from the Connecticut River Valley. His article, while showcasing the various styles of pipes recovered from the area, is lacking in context information. An addendum on the article by the editor discussed the 1959 discovery of two pipes, one chlorite and one pottery, from a single it at the Nook Farm site in Plymouth, Massachusetts (Howes 1960: 4). The pipes were apparently purposefully buried together in the pit which also contained many broken and whole shells. Howes described one pipe as of the “ceramic straight type, the other a stone elbow type made of chlorite.” (Howes 1960: 6). The ceramic pipe was shell tempered and “rudely constructed” with a 1/8” bore hole and no taper and a 1” diameter bowl mouth diameter and 1 1/2” deep bowl (Howes 1960: 8). No New England reference to the production of ceramic pipes exists but, due to the religious restrictions surrounding the tending and use of tobacco, it can be assumed that men made their own pipes. Pierre Boucher, a French traveler among the among the Huron in the 1630s, reported that “The men...make the tobacco fields, and the calumets [ceremonial pipes] and tobacco pipes with which they smoke...” (Boucher 1964:101). The presence of tobacco pipe fragments and an abandoned steatite pipe blank is an indication that men were present, at least in the Lot 4 impact areas, during the occupation.

Testing recovered two pottery and one steatite pipes from the Lot 4 house and septic impact areas. No other pipe fragments or evidence of pipe making was found elsewhere within the project area. The occurrence of the pipe fragments near the longhouse form may reflect the ritual use of tobacco during council meeting and curing ceremonies, activities associated with the longhouse.

Pottery Summary

Archaeologists recovered 3082 pottery fragments from both field investigations and flotation of soil samples. Analysis separated these sherds into a minimum of 110 vessel lots based on similarities in attributes and decoration. The majority of the sherds recovered were grit-tempered (58.2%) while a smaller percentage were shell-tempered (41.8%). Testing recovered pottery sherds from across the project area but the highest recoveries were in L2H, L4S, and L6H and from anomalies in L2H, L4, and L6H. The pottery recovered from the L6H anomalies came from several large deep pits that were Late Woodland storage pits. Analysis of the pottery followed both traditional methods and by an attribute analysis championed by Child (1981). The recovered pottery lots were also placed within the types associated with southern New England Windsor Ceramic Tradition as presented by Lavin and Levee.

Analysis identified 67 (60.9%) of the 110 vessel lots that as grit-tempered vessels while the remaining 42 (39.1%) were shell-tempered. It is possible that, because this site is located inland from the coast, that shell-tempered pottery was less commonly used than grit-tempered, even during the Late Woodland period. The vessel lots also included two pottery tobacco pipes. Ten of the vessels lots were Early Woodland Vinette I vessels, a finding that supports the findings of the lithic analysis, which showed a strong occurrence of Transitional Archaic to Early Woodland point styles across the project area. The remaining vessels lots represented Middle Woodland and especially Middle Woodland to Contact Period styles.

Grit and shell-tempered sherd recovery from the anomalies mirrored that of the general recovery with most being grit-tempered (55.3%) with a slightly smaller percentage being shell-tempered (44.7%). Most of the recovered sherds bore fine to medium and medium to coarse size temper with some coarsely and some finely grit-tempered sherds also being present. Most pots of both temper types bore either smooth interior and exterior surfaces or cord marked exteriors and smoothed interiors. shell-tempered pots more often bore cord-marked exteriors and either smooth or scraped interiors.

While testing recovered a few sherds that could be defined as misfired pieces, testing failed to identify substantial evidence of manufacture at the site. Analysis found no evidence of cracking, dunting, or spalling, supporting the lack of evidence of manufacture at the site. Most of the sherds bore either oxidized exterior and interior surfaces or oxidized exteriors and reduced interiors. These two combinations of were common among vessels from all periods and from both grit and shell-tempered sherds. This probably indicates no substantial difference in manufacture techniques from the early to Late Woodland periods. Pots appear to have been either fired upright in a fire or inverted, rim-side-down, in an open fire. No evidence was found to support Luedtke's hypothesis that Late Woodland potters fired pots more often under completely reducing conditions.
faunal analysis

A variety of decorative techniques were evident on the sherds with incising, a technique commonly attributed to the Late Woodland to Contact periods, being most common on sherds of both temper types. Dentate stamping and rocker stamping was present only on grit-tempered sherds while incising and shell stamping was most common on shell-tempered sherds. Sherds decorated by incising were most common in L1HN, L6H, L6S, L7H, and L8HN while cord-wrapped stick decorations, a technique that is believed to be antecedent to incising, was most common in the L4H, L4S, L5H, and L7SN impact areas. Potters used these techniques on vessels that were a variety of sizes. Analysis identified 11 miniature pots from L1HN, L4S (which yielded five of the 11) , L6H, L6S, L7H, and L7SN. The average body diameter of the grit-tempered vessels was 16.8 cm while it was slightly larger, at 18.9 cm, for shell-tempered vessels. Average thickness was .7 cm for grit-tempered and .6 cm for shell-tempered. These findings are consistent with those from other sites where grit-tempered vessels were thicker and smaller than shell-tempered vessels. Rim shape on these vessels was most commonly squared but pointed rims had a wider variety of decorative styles associated with it.

Cordage impressions from the interior and exterior of vessels from all Woodland periods indicates a general thickening of cordage used in association with pottery over time. Cordage twist also indicated a preference for S-twist strands versus Z-twist. The latter was found more commonly on coastal sites. The lower occurrence of shell-tempered pottery, more common on coastal sites, the higher occurrence

of S-twist cordage, less common on coastal sites, as well as the presence of ocean shells (surf clam- see faunal analysis below), and the differences in Wayland Notched styles between this site and coastal sites, may indicate that real material culture differences were present in the prehistoric period between coastal and more inland people.