of these artifact classes are presented below:

Cores (N=2)

Definition: Pieces of chert with: (1) good conchoidal fracturing property, (2) one or more flakes removed from parent material cobbles or tabular chunks from an outcrop, (3) no specialized preparation for production of blades (House 1975:65). Cores and core fragments were differentiated. The two cores recovered from the surface of 46CB98 were complete.

DISTRIBUTION: 46CB98(N=2)

Initial Reduction Biface (N=122)

Definition: These have been bifacially worked (i.e.,flaked along one or more edges from opposing directions), but only minimally. They generally retain cortex on most of one facet and reflect the initial step in preparing a piece of raw material for further bifacial reduction stages. The Greenbottom sites produced 122 initial reduction bifaces and fragments.

DISTRIBUTION:

Complete Specimens:	IF 1 (N=1)	46CB40 (N=9)	46CB90 (N=4)	46CB92 (N=18)
	46CB98 (N=15)	46CB99 (N=6)	46CB41 (N=2)	46CB15 (N=3)
	46CB100 (N=4)			
Fragments:	46CB40 (N=20)	46CB90 (N=9)	46CB92 (N=9)	46CB93 (N=2)
	46CB98 (N=8)	46CB99 (N=7)	46CB41 (N=1)	46CB100 (N=2)
	46CB102 (N=1)	46CB103 (N=1)		

Choppers (N=1)

Definition: These cores or cobbles should exhibit (1) enough flakes removed to produce a cutting edge with a high angle; (2) the cutting edge should exhit wear in the form of either battering with removal or hinge flakes from both faces, or dulling of the edge; and (3) a lack of regular over-all from such as an adze. (House 1975:62). One chopper, fashioned from chert, was recovered from the surface of site 46CB98.

DISTRIBUTION: 46CB98 (N=1)

Primary flakes (N=735)

Definition: Flakes that result from the initial reduction of a large quarry blade or core. These are recognized by their overall size and thickness, the lack of a well-developed dorsal ridge(s), and the presence of 50% or more cortex on one or more facets.

DISTRIBUTION:	46CB40 (N=50)	46CB90 (N=89)	46CB91 (N=3)	46CB92 (N=149)
	46CB93 (N=6)	46CB98 (N=88)	46CB99 (N=109)	46CB41 (N=195)
	46CB15 (N=7)	46CB100 (N=23)	46CB102 (N=4)	46CB104 (N=1)

Secondary flakes (N=1000)

Definition: Flakes that are interpreted to be the result of tool shaping (e.g., the waste flakes generated from reducing a crude preform). These flakes may or may not exhibit platform preparation but usually display one or more flake scars on the dorsal surface.

DISTRIBUTION: IF 8 (N=1) IF 9 (N=1) 46CB15 (N=4) 46CB40 (N=71)
46CB90 (N=99) 46CB91 (N=4) 46CB92 (N=211) 46CB93 (N=1)
46CB98 (N=110) 46CB99 (N=129) 46CB41 (N=292) 46CB100 (N=70)
46CB101 (N=2) 46CB102 (N=2) 46CB103 (N=1) 46CB104 (N=1)

Tertiary Flakes (N=1001)

Definition: This category of debitage refers to small sharpening, finishing and/or rejuvenation debris. They exhibit platforms and bulbs of percussion, and a general lack of cortex on all facets.

DISTRIBUTION: IF 3 (N=1) IF 4 (N=1) 46CB15 (N=7) 46CB40 (N=117)
46CB90 (N=81) 46CB91 (N=6) 46CB92 (N=201) 46CB93 (N=6)
46CB98 (N=15) 46CB99 (N=101) 46CB41 (N=422) 46CB100 (N=42)
46CB101 (N=1)

Shatter (N=901)

Definition: Angular pieces of chert and flake fragments that could not be classified according to flake type.

DISTRIBUTION: 46CB15 (N=8) 46CB40 (N=89) 46CB90 (N=105) 46CB91 (N=8)
46CB92 (N=217) 46CB93 (N=7) 46CB98 (N=135) 46CB99 (N=114)
46CB41 (N=158) 46CB100 (N=52) 46CB102 (N=5) 46CB103 (N=1)
46CB104 (N=2)

Bifacial Thinning Flakes (N=2)

Definition: Primary, secondary, or tertiary trimming flake which exhibits a thin, straight, or curved longitudinal cross-section, a dorsal surface with parallel, or more commonly, converging flake scars and a faceted platform remnant that is triangular in cross-section (Fitzgibbons 1982:94).

DISTRIBUTION: 46CB90 (N=2)

Primary Reduction. Artifacts that have been further reduced by the removal of additional flakes are included in this group. As Collins (1975:21-22) notes, the major objective of this stage in the reductive process is shaping of the artifact. Tools destined for use with only a minimum of simple retouch (e.g., blades, spokeshaves, unifacial scrapers) are completed at this stage, whereas those destined for further reduction before use are thinned, shaped, and/or prepared to receive secondary retouch in the next stage before they are ready for use. Artifacts included in this group can be finished tools, debris from making tool blanks, and preforms. Preforms are items which are subsequently shaped into only one tool type. Simple flake tools with only bifacial thinning are placed in this group if they have not been further shaped in final outline form. Artifacts included in this group that were recovered from the Greenbottom sites include marginally modified flakes, spokeshaves, end scrapers,blades, unifaces and primary reduction bifaces.

Primary Reduction Bifaces (N=38)

Definition: Primary reduction bifaces reflect initial shaping reduction processes by the removal of broad, usually thin flakes and they tend to be crudely made and thick. They can be amorphous, bipointed, ovoid, triangular or even quadrilateral in outline. There were twelve complete primary reduction bifaces and twenty-six primary reduction biface fragments recovered from the Greenbottom sites.

DISTRIBUTION:

Complete specimens:	46CB40 (N=4)	46CB92 (N=2)	46CB98 (N=2)
	46CB99 (N=3)	46CB41 (N=1)	
Fragments:	46CB40 (N=2)	46CB90 (N=2)	46CB92 (N=8)
	46CB98 (N=3)	46CB99 (N=3)	46CB41 (N=4)
	46CB100 (N=3)	46CB102 (N=1)	

Blades (N=2)

Definition: Flakes with a length-width ratio of at least two to one and, on the dorsal side, the evidence of one or more flake scars (House 1975:67). All five specimens exhibited use-wear on one or both blade edges. Utilized and modified blades were probably used as knives. Both of the specimens were bladelets.

DISTRIBUTION: 46CB41 (N=2)

Endscrapers (N=3)

Definition: These specimens are generally trimmed along the lateral edges, but characteristically endscrapers exhibit steep systematic retouch at the end of the flake.

DISTRIBUTION: 46CB40 (N=2) 46CB99 (N=1)

Spokeshaves (N=1)

Definition: A flake tool that exhibits edge modification in one or more areas to form a concave working edge or notch. The dimensions of the flake scars along the working edge must be less than 2 mm in length and the width of the notch must be equal or greater than 5 mm (House 1975:65). One spokeshave was recovered from site 46CB41.

DISTRIBUTION: 46CB41 (N=1)

Marginally Modified Flakes (N=16)

Definition: Marginally modified flakes exhibit the removal of one or more uniform retouch flakes along one or more edges, or a ground or crushed edge. These specimens are generally amorphous shaped and show little, if any systematic flake removal.

DISTRIBUTION: 46CB90 (N=1) 46CB93 (N=1) 46CB98 (N=7) 46CB99 (N=2) 46CB41 (N=3) 46CB100 (N=2)

Notched Modified Flakes (N=6)

Definition: A notched-modified flake is any flake that exhibits one or more working edges in the form of a notch. However, the length of the flake scars and the width of the notch do not conform with the descriptions for the spoke-shave flakes. The utilization of many of these flakes probably caused the concavity or notched working edge.

DISTRIBUTION: 46CB90 (N=1) 46CB98 (N=1) 46CB41 (N=3) 46CB101 (N=1)

Secondary Flaking. This is the final stage in the reductive sequence for most formed tools that require more than simple retouch prior to use. Bifacial implements which have received specialized edge treatment, as in the systematic removal of small tertiary flakes along one or more margins, or those that have been prepared for hafting, are considered to be the end products of secondary flaking. Stage IV artifacts are finished implements (made from preforms), debitage, and rejects. These are the result of optional secondary trimming and shaping. Common variations include notching, serrating, beveling, or straightening the edges. The items of this group are usually among the most variable in the assemblage, and their forms include the greatest amount of "stylistic" expression. It is with these items that typological analyses have the greatest promise for delineating time/space distribution patterns. Artifacts belonging to this stage of reduction and which were recovered from the Greenbottom sites are defined below:

Drills (N=2)

Definition: A pointed secondary reduction biface with narrow, parallel blade edges which are symmetrically flaked. Drills normally exhibit wear patterns on their tips which can be attributed to a circular drilling motion. They are frequently oval in cross-section and may exhibit well-developed hafting elements. Of the five drills recovered from the Greenbottom sites one was a complete specimen.

DISTRIBUTION: 46CB92 (N=3) 46CB99(N=1) 46CB41 (N=1)

Secondary Reduction Bifaces (N=81)

Definition: Secondary reduction bifaces are artifacts that have been reduced well beyond the simple shaping discussed above. These artifacts usually exhibit specialized edge treatment. They may range from "preforms" to finished tools, or they may have been broken and/or aborted during manufacture. Projectile point basal fragments, mid-sections and tips, drill fragments and other formal tool categories most frequently fall into this category. Of the fifty-six secondary reduction bifaces recovered from the Greenbottom sites, twelve were complete specimens. The remaining secondary reduction biface fragments were grouped into tips (distal ends), midsections, blade edge fragments, and proximal ends (basal fragments).

There were twenty-eight distal end fragments recovered. These were either projectile point fragments or preform distal ends. Many of the distal end fragments were undoubtedly projectile point fragments; however, they lacked shoulders or hafting areas and could not be assigned to the projectile point group. There were five bifacial midsection fragments recovered. These specimens retained portions of one or both blade edges. They did not retain any distal ends. They also lacked any diagnostic elements of the shoulders or hafting area. There is no way to confidently differentiate between a preform and a projectile point based on the attributes available from these midsections. There were thirteen bifacial blade edge fragments recovered from the Greenbottom sites. There were twenty-two proximal end fragments recovered. All samples of the basal fragments retained no portions of the shoulders or blade edges, making identification of particular point types very speculative or impossible in many cases.

DISTRIBUTION:

Complete Specimens:	46CB15 (N=1)	46CB40 (N=4)	46CB92 (N=1)	46CB98 (N=3)
	46CB99 (N=2)	46CB41 (N=1)		
Distal Ends:	46CB40 (N=4)	46CB90 (N=2)	46CB92 (N=3)	46CB98 (N=5)
	46CB99 (N=3)	46CB41 (N=9)	46CB100 (N=2)	
Midsections:	46CB90 (N=1)	46CB92 (N=3)	46CB99 (N=1)	
Blade Edge Fragments:	46CB90 (N=1)	46CB92 (N=2)	46CB98 (N=3)	46CB99 (N=1)
	46CB98 (N=3)	46CB41 (N=3)		
Proximal Ends:	46CB41 (N=6)	46CB90 (N=1)	46CB91 (N=1)	46CB92 (N=5)
	46CB98 (N=2)	46CB99 (N=4)	46CB41 (N=2)	46CB100 (N=2)

Projectile Points (N= 52)

Definition: Hafted secondary reduction bifaces that were intended to be cutting and piercing tools. Within this class of artifacts, both arrow points and dart points, or fragments thereof, can be identified. Arrow points are "symmetrically pointed bifaces with sharp tips and low edge angles (less than 45 degrees) on blade edges. Preparation for hafting, as in the case of the Mississippi Triangular (Madison) may not be distinct. Maximum thickness is 5 mm" (House 1975:60). Dart points are symmetrically pointed bifaces with sharp tips and relatively low blade edge angles. Dart points exhibit prepared hafting elements and the tool's thickness is greater than 5 mm (House 1975:60).

Projectile points recovered from the Greenbottom sites were subject to stylistic comparisons with published type descriptions in order to determine their temporal and cultural placement. To facilitate this comparison, each projectile point was subjected to standardized observations (Appendix D). Length, width and thickness were measured to the nearest 1/100 cm. The total collection of projectile points recovered during this investigation included the following types:

Type 1, Kanawha Stemmed (N=2), (Fig. 2, a-b)
1 Broken Specimen, 1 Complete Specimen

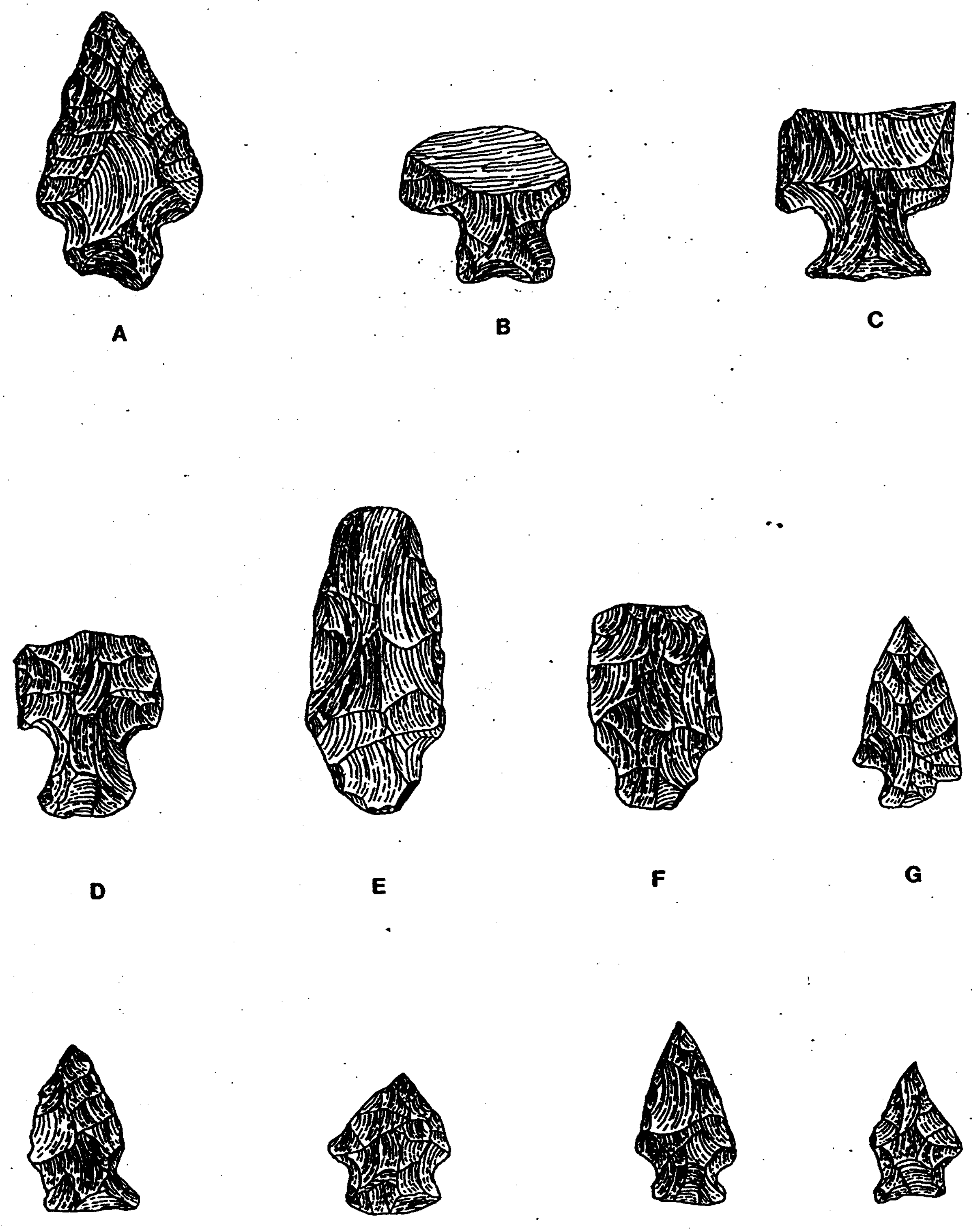

Figure 2. Selected projectile points recovered. Kanawha Stemmed, a-b; Motley, c-d; McWhinney, e-f; Merom-Trimble, g-k. Scale 1:1.

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	N/A	4.30 cm	4.30 cm	1
Width	N/A	2.70 cm	2.70 cm	1
Base width	1.50 cm	1.55 cm	1.52 cm	2
Haft length	1.20 cm	1.30 cm	1.25 cm	2
Weight	N/A	9.80 gm	9.80 gm	1
Thickness	0.60 cm	0.82 cm	0.71 cm	2

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB99	47	Surface (Fig. b)
	46CB102	4	Surface (Fig. a)

COMPARISONS: The Kanawha point is distributed throughout West Virginia, northern Alabama, western Tennessee, New York, Michigan and other areas where the LeCroy point is found. Perino (1985:197) states that there seems to be a relationship with the slightly older LeCroy points and also to the Fox Valley point. There is some suggestion that it might be ancestral to the Stanly point named by Coe (1964:35). It is dated to the Early Archaic, ca. 6200 B.C. range (Broyles 1966:27-28, 1971:31,59).

Type 2, Motley (N=2) (Fig. 2, c-d)
2 Broken Specimens

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	N/A	N/A	N/A	
Width	2.53 cm	2.87 cm	2.70 cm	2
Base width	1.58 cm	1.89 cm	1.74 cm	2
Haft length	1.20 cm	1.50 cm	1.35 cm	2
Thickness	0.70 cm	0.84 cm	0.77 cm	2
Weight	N/A	N/A	N/A	

MATERIAL: Kanawha (1), Newman (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB92	69	Surface (Fig. 2, c)
	46CB92	65	Surface (Fig. 2, d)

COMPARISONS: Although broken, the two specimens conform to the metrics reported by Ford and Webb (1956:57) from the Poverty Point site in Louisiana. These two medium size projectile points conform to the morphological characteristics of the Motley point type reported by Cambron and Hulse (1965:A109). The Motley point type was defined by William Haag (Ford, Phillips and Haag 1955:129). According to Justice (1987) Motley points appear in the Late Archaic period and survive into the Early Woodland period. The type was placed within an age range of 800 B.C. to 600 B.C. based on its occurrence in the Poverty Point levels at Jaketown and Poverty Point sites in the Deep South which were radiocarbon dated to about 1300 B.C. (Ford and Webb 1956:116,123). The Motley point has been reported in Louisiana, Mississippi, Kentucky and parts of Alabama, Tennessee, Arkansas and extreme southeastern Oklahoma (Perino 1985:263).

Type 3, McWhinney Heavy Stemmed (N=3) (Fig. 2, e-f)
1 Complete Specimen, 2 Broken Specimens

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	5.00 cm	5.00 cm	5.00 cm	1
Width	2.10 cm	2.50 cm	2.33 cm	3
Haft Length	1.00 cm	1.20 cm	1.10 cm	3
Base Width	1.45 cm	1.65 cm	1.55 cm	3
Thickness	0.90 cm	1.25 cm	1.06 cm	3
Weight	N/A	13.50 gm	N/A	1

MATERIAL: Kanawha (1) Newman (2)

DISTRIBUTION:

Site No.	Artifact No.	Provenience
46CB92	57	Surface (Fig. 2, f)
46CB92	59	Surface (Fig. 2, e)
46CB92	71	Surface

COMPARISONS: These points fit within the description of the McWhinney type (Vickery 1972) from type sites located in southwest Ohio. The type description for McWhinney Heavy Stemmed points emphasizes variable blade and shoulder morphology, and probably represent several varieties. A number of short stubby stemmed projectile points fall within the range of variability of the McWhinney Heavy Stemmed type. They include Rowlett in south central Kentucky (Duffield 1966), Scherschel in southwest Indiana (Tomak 1983), and Cowan's Type 4 in eastern Kentucky (Cowan 1975; 1976). The McWhinney Heavy Stemmed style is distinguished by a prominent midline ridge (1 cm thick) on the blade and the frequent retention of cortex at the base of the stem. These points are documented between 2750 to 1000 B.C. in the Late Archaic and are common in both the Central Ohio Valley Archaic and the Maple Creek phases (Vickery 1980).

Type 4, Merom-Trimble (N=5) (Fig. 2, g-k)
4 Complete Specimens, 1 Broken Specimen

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	2.20 cm	3.00 cm	2.64 cm	5
Width	1.53 cm	1.90 cm	1.70 cm	5
Haft Length	0.65 cm	0.95 cm	0.76 cm	5
Base width	1.28 cm	1.50 cm	1.28 cm	4
Thickness	0.50 cm	0.88 cm	0.64 cm	5
Weight	1.80 gm	3.70 gm	2.50 gm	4

MATERIAL: Hughes River (1) Kanawha (2) Newman (2)

DISTRIBUTION:

Site No.	Artifact No.	Provenience
46CB90	25	Surface (Fig. 2, h)
46CB92	60	Surface (Fig. 2, i)
46CB92	64	Surface (Fig. 2, j)
46CB92	66	Surface (Fig. 2, k)
46CB99	48	Surface (Fig. 2, g)

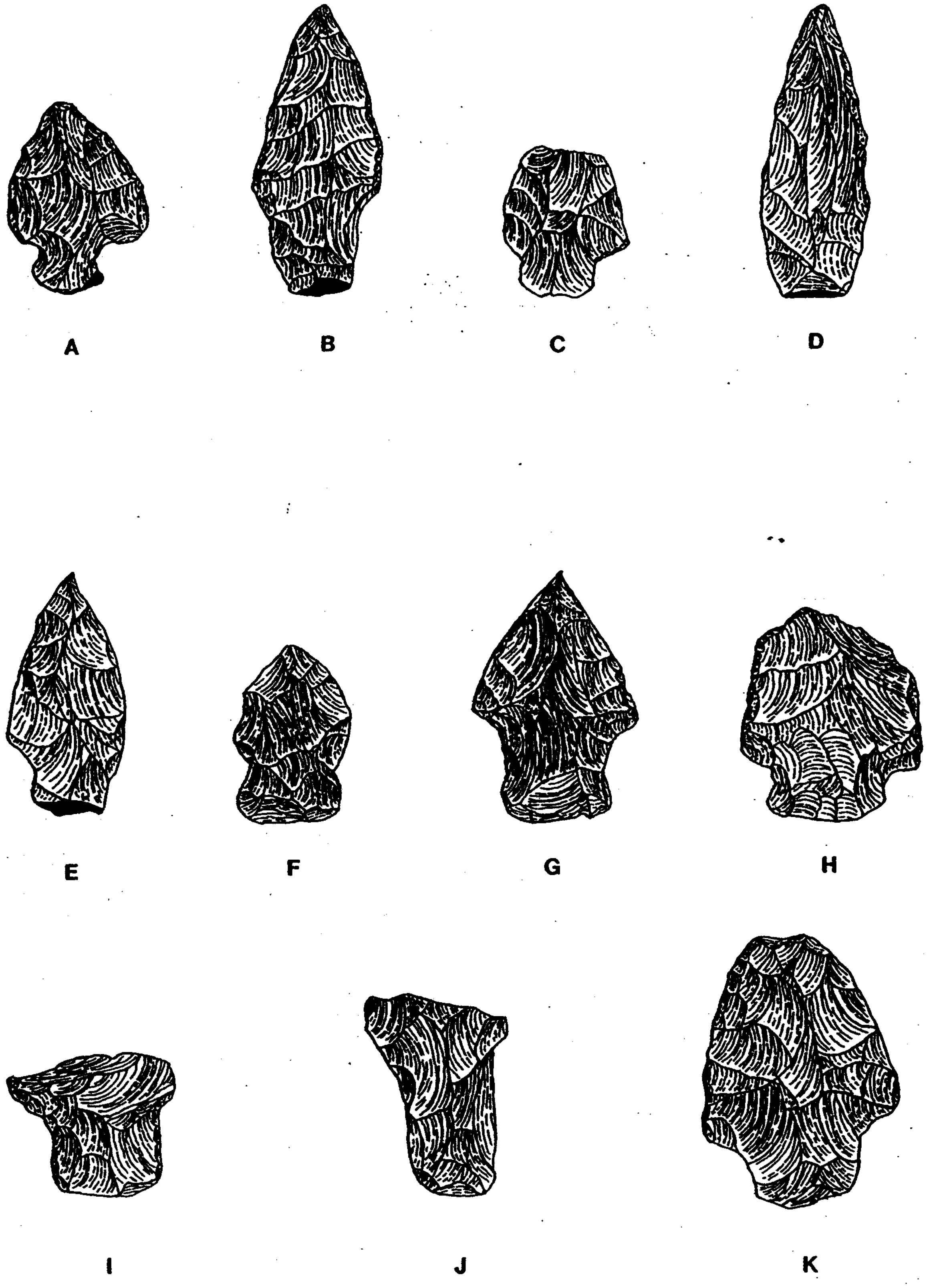

Figure 3. Selected projectile points recovered. Bottleneck Stemmed, a; Lamoka, b-f; Saratoga Expanding Stem (like), g; Brewerton Corner Notched, h; Kramer (like), i; Adena, j-k. Scale 1:1.

COMPARISONS: These small dart points are representative of the cluster of Riverton points described by Perino (1985:325). Winters (1969:152, Plate 13 and 14) has defined three types of Riverton points, including Robeson, Merom, and Trimble varieties. Separating the three types into morphologically distinct types is nearly impossible. Therefore, we elected to call the points recovered from the Greenbottom sites Merom-Trimble points. Merom-Trimble points are attributed to the terminal Late Archaic and have been radiometrically assayed at ca. 2,000 B.C. to 1,000 B.C. They are found throughout the central Ohio River Valley and adjacent regions.

Type 5, Bottleneck Stemmed (N=1) (Fig. 3, a)
1 Complete specimen

METRICS:

Observation	
Length	3.11 cm
Width	2.39 cm
Haft Length	1.15 cm
Base Width	1.25 cm
Thickness	0.68 cm
Weight	5.00 gm

MATERIAL: Kanawha (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB92	67	Surface (Fig. 3, a)

COMPARISONS: This point conformed with the description given by Justice (1987:124-126) and with the original definition by Kramer (1947). Bottleneck Stemmed projectile points are distributed throughout the Midwest and overlap the geographical distribution of the Table Rock Stemmed point. Other morphological correlates include the Apple Blossom Stemmed (Cook 1976:147-148, Fig. 42, lower right) and the Flint Creek projectile point (Cambron and Hulse 1965). Bottleneck Stemmed points have been associated with the Late Archaic period and have been radiocarbon dated at 3770 B.C. to 3000 B.C. from Horizon 6 at the Koster site in Illinois. Justice (1987:126) suggests that this point type is derived from the Matanzas Side Notched point.

Type 6, Lamoka (N=6) (Fig. 3, b-f)
5 Complete Specimens, 1 Broken Specimen.

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	2.90 cm	4.78 cm	3.95 cm	N=5
Width	1.70 cm	2.50 cm	2.07 cm	N=6
Haft Length	0.70 cm	1.60 cm	1.08 cm	N=5
Base width	1.10 cm	1.70 cm	1.35 cm	N=6
Thickness	0.65 cm	1.00 cm	0.83 cm	N=6
Weight	3.90 gm	8.20 gm	6.40 gm	N=5

MATERIAL: Kanawha (3) Hughes River (2) Newman (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB90	27	Surface (Fig. 3, b)
	46CB92	63	Surface (Fig. 3, c)
	46CB92	68	Surface (Fig. 3, d)
	46CB98	55	Surface (Fig. 3, e)
	46CB98	57	Surface
	46CB99	34	Surface (Fig. 3, f)

COMPARISONS: The Greenbottom specimens conformed well with the morphological characteristics of the Lamoka type. The thick, crude appearance of the base is a key diagnostic feature of Lamoka points. Ritchie (1961:29) considers the thick "unfinished" base the prime diagnostic feature of the Lamoka point. Adovasio (1982:558) reports six Lamoka-like points from the Big Sandy drainage in Eastern Kentucky which do not have the "unfinished" bases. Collins (1979:175) reports the "unfinished" base present on one-third of the Lamoka-like points recovered from Jefferson County, Kentucky. The tendency to leave the bases "unfinished" could be in part due to the pebble industry at the Lamoka Lake type site in New York, which would account in part for the intact original surfaces (Justice 1987:129). Related point types such as the Dustin and Durst exhibit the unfinished bases in varying proportions (Justice 1987:127-128). Lamoka point types are found throughout the northeast and parts of the adjacent regions, including Kentucky (Justice 1987:129). Perino (1985:218) affiliates the Lamoka type with Late Archaic, ca. 2500 B.C. Apparently they persisted in minor proportions until the Middle Woodland period at least in central New York (Ritchie 1961:29).

Type 7, Saratoga Expanding Stem (Like) (N=1) (Fig. 3, g)
1 Complete Specimen

METRICS:

Observation	
Length	3.90 cm
Width	2.70 cm
Haft Length	1.85 cm
Base Width	1.70 cm
Thickness	0.95 cm
Weight	8.4 gm

MATERIAL: Hughes River (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB99	35	Surface (Fig. 3, g)

COMPARISONS: This point resembled the Saratoga Expanding Stem type which dates to the Late Archaic period in southern Illinois (Winters 1963;1967;1969). The point type is morphologically related to Cook's Straight Stemmed Matanzas point (Cook 1976:166) which he assigns to the Helton Phase in the Illinois River Valley, suggesting a late Middle Archaic time period. The geographic distribution of the Saratoga Expanding Stem is generally limited to Kentucky, southern Illinois and Indiana, Missouri, Tennessee, and Alabama. This point type has a Late Archaic to Early Woodland cultural affiliation, and at the Carrier Mills site in the Saline Valley in Illinois, has been associated with dates ranging from 3,000 to 500 B.C. (May 1982:1364).

Type 8, Brewerton Corner Notched (N=1) (Fig. 3, h)
1 Broken specimen

METRICS:
Observation

Length	N/A
Width	2.70 cm
Haft Length	1.85 cm
Base Width	1.70 cm
Thickness	0.95 cm
Weight	8.4 gm

MATERIAL: Kanawha (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB98	52	Surface (Fig.3, h)

COMPARISONS: These points fit the morphological characteristics and size range defined by Ritchie (1961:16,66-67) for the Brewerton Corner Notched point type. The Brewerton Corner Notched and Side Notched are characteristic of the Late Archaic Laurentian tradition, Brewerton phase, in New York and the surrounding region (Justice 1987:115; Kinsey 1972:405). The type is found in New York, New England, and in the Upper Ohio Valley (Perino 1985:47).

Type 9, Kramer (Like) (N=1) (Fig. 3, i)
1 Broken Specimen

METRICS:
Observation

Length	N/A
Width	N/A
Haft Length	1.30 cm
Base Width	1.78 cm
Thickness	0.65 cm
Weight	N/A

MATERIAL: Hughes River (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB90	29	Surface (Fig. 3, i)

COMPARISONS: This point base is morphologically similar to the description of the Kramer type provided by Justice (1987:184-187,fig.40) and Perino (1985:212). It was also comparable to the morphological characteristics given by Munson (1966;1971:7,Table 3) and by Justice (1987:253) for Kramer points from the American Bottoms in Illinois. The known distribution of Kramer points includes Illinois, Ohio, Indiana, Wisconsin, Iowa, and Missouri (Perino 1985:212). Kramer points have also been reported from Kentucky within the Paintsville Reservoir area in eastern Kentucky (Adovasio 1982:588). Kramer points are generally associated with the Late Archaic-Early Woodland cultures and date between 1000 B.C. and 500 B.C. (Perino 1985:212).

Type 10, Adena (N=2) (Fig. 3, j-k)
1 Complete Specimens, 1 Broken Specimen

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	N/A	4.60 cm	4.60 cm	N=1
Width	N/A	3.18 cm	3.18 cm	N=1
Haft Length	1.40 cm	2.50 cm	1.95 cm	N=2
Base Width	1.60 cm	1.86 cm	1.73 cm	N=2
Thickness	1.00 cm	1.50 cm	1.25 cm	N=2
Weight	N/A	14.00 gm	14.00 gm	N=1

MATERIAL: Newman (1), Hughes River (1)

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB90	28	Surface (Fig. 3, j)
	46CB90	26	Surface (Fig. 3, k)

COMPARISONS: This point type is associated with the Adena culture of the Early Woodland and early Middle Woodland periods, ranging in time from approximately 500 B.C. to 100 A.D. (Dragoo 1963:111-113, 178, Fig. 10B, Plates 39, 42E). The Adena point type probably has evolved from the Cresap point and Perino (1985:2) has added that the early forms of the Adena point may be related to the Mason point in Illinois and Indiana. Radiocarbon dates associated with Adena points from the central Ohio Valley range from 455 B.C. (Willow Island Mound in West Virginia) to 210 A.D. (Wright Mound in Montgomery County, Kentucky). The Adena point type distribution includes Kentucky, Ohio, West Virginia, Indiana, and parts of Pennsylvania.

Type 11, Type 1 Triangle (N=2) (Fig. 4, a-b)
2 Broken Specimens

METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	N/A	2.85 cm	2.85 cm	N=1
Width	N/A	2.50 cm	2.50 cm	N=1
Haft Length	N/A	N/A	N/A	N=0
Base width	N/A	2.50 cm	2.50 cm	N=1
Thickness	0.50 cm	0.58 cm	0.54 cm	N=2
Weight	N/A	N/A	N/A	N=0

MATERIAL: Kanawha (1), Hughes River (1),

DISTRIBUTION:	Site No.	Artifact No.	Provenience
	46CB40	55	Surface (Fig. 4, a)
	46CB90	24	Surface (Fig. 4, b)

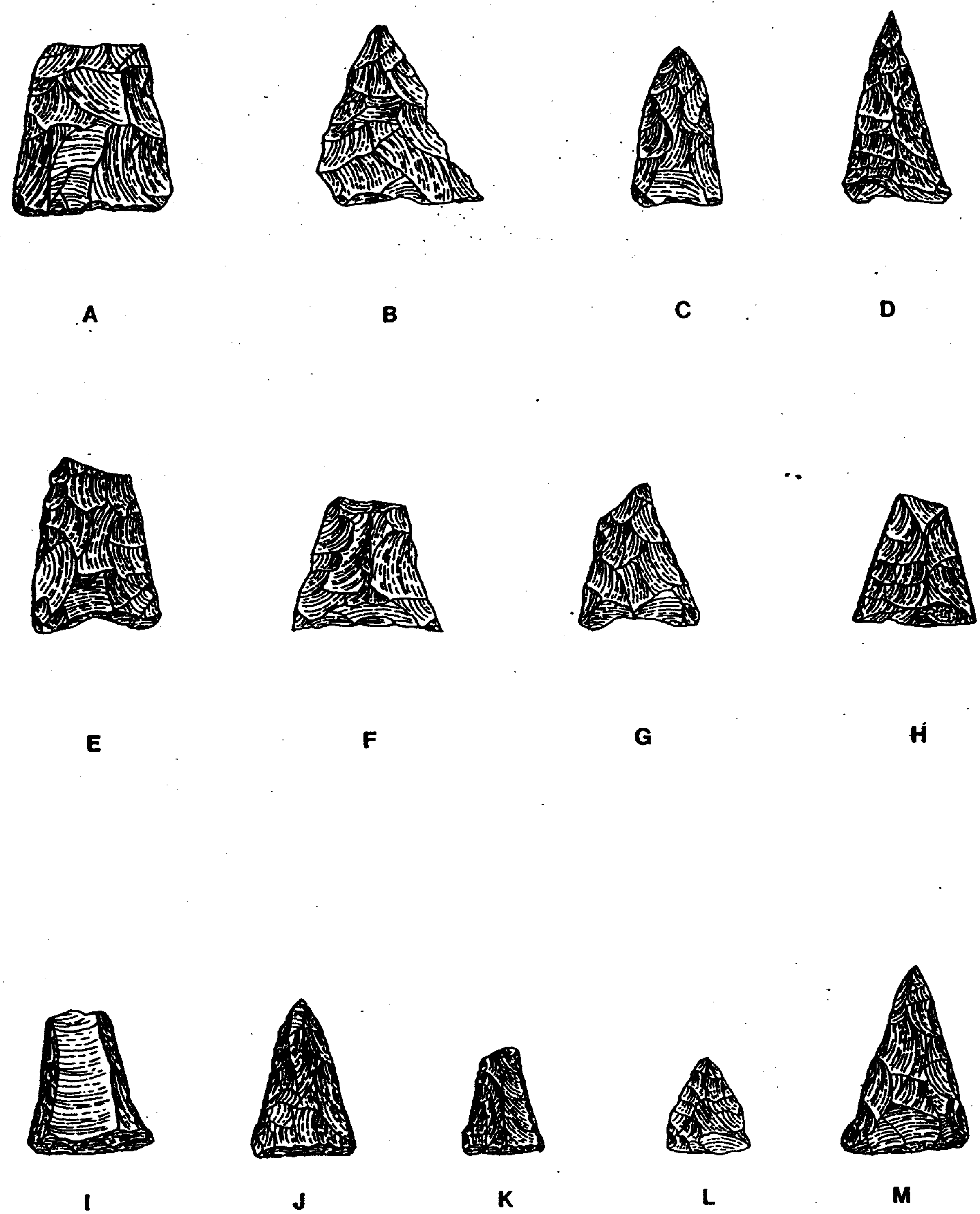

Figure 4. Selected projectile points recovered. Type A Triangle, a-b; Madison, c-m. Scale 1:1.

COMPARISONS: This group of tools/points remains untyped, but they exhibit gross similarities with Madison and Levanna triangulars, both Late Woodland to Late Prehistoric projectile points. The crude and unfinished appearance of the point and the lack of evidence for hafting suggests that it was a preform. Another possibility for the function of this distinct group of artifacts is as a hafted knife. Since the artifacts in question remain untyped it is impossible to determine their temporal and geographical associations. For the purposes of this report it is assumed that they are associated with the Madison triangular point and date to the Late Woodland/Late Prehistoric.

Type 12, Madison (N=25) (Fig. 4, c-m)
7 Complete Specimens, 18 Broken Specimens
METRICS:

Observation	Smallest	Largest	Mean	Sample Size
Length	1.52 cm	3.67 cm	2.72 cm	N=9
Width	1.28 cm	2.50 cm	1.78 cm	N=22
Haft Length	N/A	N/A	N/A	N=0
Base Width	1.28 cm	2.50 cm	1.78 cm	N=21
Thickness	0.31 cm	0.75 cm	0.49 cm	N=25
Weight	0.90 gm	3.60 gm	1.68 gm	N=7

MATERIAL: Kanawha (4), Hughes River (12), Newman (5), Pebble Chert (4)

DISTRIBUTION:

Site No.	Artifact No.	Provenience
46CB40	53	Surface (Fig. 4, c)
46CB40	54	Surface (Fig. 4, d)
46CB40	56	Surface
46CB40	57	Surface (Fig. 4, e)
46CB40	58	Surface (Fig. 4, f)
46CB40	59	Surface
46CB41	12	N40/E60, 0-50 cm bgs (Fig. 4, g)
46CB41	145	N90/E30, 0-50 cm bgs (Fig. 4, h)
46CB41	191	N76/E20, 20-40 cm bud (Fig. 4, i)
46CB41	211	N80.60/W13.35, 20-40 cm bud (Fig.4,j)
46CB41	212	N80.60/W13.35, 20-40 cm bud
46CB92	58	Surface
46CB92	61	Surface
46CB92	62	Surface
46CB92	72	Surface
46CB98	51	Surface
46CB98	56	Surface
46CB98	58	Surface
46CB98	59	Surface (Fig. 4, k)
46CB99	33	Surface (Fig. 4, l)
46CB99	36	Surface
46CB99	37	Surface
46CB99	38	Surface
46CB100	17	Surface (Fig. 4, m)
46CB103	3	Surface

COMPARISONS: This type is identical to the Madison style point (Scully 1951:14) found in the Late Woodland/Late Prehistoric period. Its geographical distribution includes the eastern half of the United States east of the Mississippi River. These projectile points are known to have occurred from Late Woodland (750 A.D.) to historic contact.

As noted by others (e.g., Turnbow et al. 1983:176-177; Sharp 1984:107), triangular points have been lumped historically into a single named projectile point type, Madison, after Bell (1960). Attempting to deal with variability within this named type, a number of authors have attempted to separate out subtypes such as Hamiltons (Kneburg 1956:24; Bell 1960:54-55; Cambron and Hulse 1965), and others have tried to seriate variations in base shape to infer chronological differences within the point type (Graybill 1981:104-107, Table 8). It was not prudent at this time to subdivide the Madison type, nor was it advantageous to draw upon the literature in an attempt to infer chronological differences in the sites yielding Madison points. Let it suffice to say that triangular points which fit within the Madison type description have been recovered from Late Woodland and Late Prehistoric (Fort Ancient) contexts in the middle Ohio River drainage.

<u>Ground, Battered and Abraded Stone Tools.</u> This section of the lithic analysis centers on stone tools that do not fit into any of the previously discussed categories. Examples of such stone tools include pitted cobbles, celts, grinding slabs, handstones, hammerstones, abraded (grooved) stones, grooved pebbles, axes, pestles and atlatl weights. The artifacts in this category were produced by a series of different manufacturing techniques (e.g., grinding, drilling, abrading, sawing, battering, pecking, polishing and chipping), while others, like battered stone, are the result of damage incurred during use.

Pitted Stones (N=10)

Definition: The presence of small pits or depressions of varying sizes and shapes on the face of a cobble or tabular stone. Pitted stones, depending on their size and shape, may contain multiple pits or as few as one pit. Pitted stone specimens may have one or more surfaces of battering. Generally, three different pit shapes can be distinguished: "U" shaped, "V" shaped, and irregular. Whether pit shape represents differential functions or manufacture has not been established. The traditional explanation holds that pitted stones served as anvils for nut-cracking. Honea (1965) suggests, however, that where evidence of bipolar flaking is widespread, pitted cobbles may be anvils for reduction of cores of a bipolar technique. Nine complete and one fragmentary pitted stones were recovered from the Greenbottom sites.

DISTRIBUTION:

Complete : 46CB15 (N=1) 46CB90 (N=1) 46CB92 (N=4) 46CB41 (N=2) 46CB102 (N=1)

Fragments : 46CB90 (N=1)

MATERIAL: Sandstone (N=10)

Abrading Stones (N=1)

Definition: Relatively hard, grainy, abrasive stones which exhibit one or more grooves that have been worn into the surface. It is hypothesized that these tools were used for smoothing and/or sharpening cylindrical tools such as bone awls and needles (House 1975:69). One abrading stone was recovered from site 46CB102.

DISTRIBUTION: 46CB102 (N=1)

MATERIAL: Sandstone (N=1)

Celts (N=5)

Definition: Wedge-shaped groundstone tools that exhibit a sharp transverse bit with a roughly equal amount of wear on both faces (House 1975:69). Pecking was probably used to shape the artifact. The evidence of polishing may be the result of wear or usage. Celts were probably used for chopping and cutting.

One complete and four celt fragments were recovered from the Greenbottom sites. All of the celt specimens were fashioned from granite, presumably derived from glacial till.

DISTRIBUTION: Complete Celts: IF 10 (N=1)

Celt Fragments: 46CB40 (N=2) 46CB92 (N=1) 46CB41 (N=1)

MATERIAL: Granite (N=5)

Hammerstones (N=3)

Definition: Roughly rounded or globular shaped stone tools which exhibit battering or pecking on one or more of their surfaces. Although these artifacts are generally associated with the manufacture of chipped stone tools, they are thought to have been used in a variety of food processing tasks, such as cracking nuts, pulverizing plant remains, etc.

DISTRIBUTION: 46CB92 (N=2) 46CB99 (N=1)

MATERIAL: Sandstone (N=2), Kanawha chert (N=1)

Hoes (N=1)

Definition: Generally a flattened wedge or subrectangular shaped digging tool, with a transverse bit that may exhibit polish or striations. Hoes can be manufactured from sandstone, shale, chert, shell, or bone. These tools are assumed to be associated with digging and horticultural activities. One complete hoe was recovered from site 46CB40.

DISTRIBUTION: 46CB40 (N=1)

MATERIAL: Ferriginous sandstone (N=1)

Gorget/Pendant Fragment (N=7)

Definition: Tabular pieces of ground and polished stone which, because of their fragmentary nature, appear to be either gorgets or pendants. Only one gorget fragment was recovered from the Greenbottom sites. This one specimen was fabricated from slate.

DISTRIBUTION: 46CB40 (N=1)

MATERIAL: Slate (N=1)

Axe Fragments (N=2)

Definition: Ground and/or pecked tools which appear to be fragmentary axes. Two axe fragments were recovered from the Greenbottom sites.

DISTRIBUTION: 46CB98 (N=1) 46CB99 (N=1)

MATERIAL: Granite (N=2)

Mano (N=1)

Definition: A hand-size cobble on which the cortex of one or more facets is worn away leaving a slightly convex face and/or a greater degree of smoothness than is present than that on a typical unmodified cobble surface (House 1975:71). One mano was recovered from site 46CB40.

DISTRIBUTION: 46CB40 (N=1)

MATERIAL: Granite (N=1)

Miscellaneous Groundstone (N=5)

Definition: Ground, polished, pecked or abraded stone tool fragments that can not be defined by tool type due to their fragmentary nature. These fragments are flattened, subangular, or rounded in shape. Polish or pecking is present on one or more surfaces.

DISTRIBUTION: 46CB92 (N=1) 46CB98 (N=2) 46CB41 (N=1) 46CB102 (N=1)

MATERIAL: Sandstone (N=4), Gabbro (N=1)

Modified Hematite (N=4)

Definition: Pieces of the mineral hematite which exhibit grinding on one or more facets (House:1975:69). The four specimens recovered from the Greenbottom sites have varying amounts of grinding on one or more facets. It is presumed that these specimens were ground to produce a red pigment.

DISTRIBUTION: 46CB40 (N=1) 46CB92 (N=2) 46CB41 (N=1)

Discussion. Having described the stone artifacts recovered from the Greenbottom sites it is appropriate to examine these data more fully and attempt to interpret them. While the preceding portion of this chapter centered upon a technological analysis of lithic manufacture, a functional analysis of tools, and a stylistic comparison of tools recovered, this analysis will take into account the frequency of occurrence and distribution of certain classes of stone tools. The following discussion, organized by research topics, focuses upon chronology, lithic technology, and an examination of site use on an intersite basis.

Chronology

Four of the fourteen sites considered here were occupied and/or used by more than one cultural group (Table 1). Based solely upon the temporally diagnostic lithic artifacts recovered, it would appear that these four sites (46CB90 46CB92, 46CB98, and 46CB99) were occupied/used by Late Archaic and Late Woodland/Late Prehistoric groups in varying proportions (Table 2). Of these sites, 46CB90 also yielded two Adena points (Woodland) and 46CB99 produced one Kanawha Stemmed (Early Archaic) projectile point. The only other site that produced an Early Archaic projectile point was 46CB102. No Paleo-Indian projectile points were recovered from the project area; nor were any points found on sites 46CB15 and 46CB104. Additionally, Middle Woodland period projectiles point were unrepresented on all sites except 46CB90, and Late Woodland/Late Prehistoric point types were unrepresented on 46CB102.

Of the fourteen sites investigated, projectile points recovered from 46CB40 and 46CB41 were confined to the Late Woodland/Late Prehistoric period. The Madison point types recovered from 46CB40 were considered to be Late Prehistoric in age based on the presence of shell tempered pottery on the site. Furthermore, based on the high percentage of limestone tempered pottery recovered at 46CB41, the Madison type projectile points from this site were most likely Late Woodland in age. The bases of the triangular points recovered from the Clover site (46CB40) included four specimens with incurvate bases and two specimens with straight bases.. Similarly, the bases of the triangular points recovered from 46CB41 included two specimens with incurvate bases and three specimens with straight bases. No significant difference in the occurrence of straight or incurvate base shapes were observed for 46CB41 and 46CB40.

Overall, Late Woodland/Late Prehistoric and Late Archaic period projectile points were roughly equally represented at the Greenbottom sites. Late Woodland period points types represented 52.0% while Late Archaic period points comprised 40.0% of the total points recovered. In contrast, Middle Woodland and Early Archaic period projectile points were relatively under-represented each comprising 4.0% of the total point assemblage from the Greenbottom sites.

Lithic Technology

As discussed previously in this chapter, initial reduction refers to the preparation of chert or other siliceous stone for subsequent use and/or further reduction. Artifact classes that are representative of this activity include tested cobbles, cores, and initial reduction bifaces (Table 3). Pri-

Table 1. Distribution and relative frequency of projectile points recovered by site and by time period (table includes Phase I and II data).

	46CB40	46CB41	46CB90	46CB92	46CB98	46CB99	46CB100	46CB102	46CB103
Wood/L. Preh.									
Madison	6	5		4	4	4	1		1
Type A Triangle	1		1						
Middle Woodland									
Adena			2						
Late Archaic									
Saratoga Expanding Stem						1			
Motley				2					
Kramer			1						
Lamoka			1	2	2	1			
Bottleneck Stemmed				1					
McWhinney Hvy. Stem				3					
Brewerton Corner Notched					1				
Merom-Trimble			1	3		1			
Early Archaic									
Kanawha Stemmed						1		1	
Totals	7	5	6	15	7	8	1	1	1

mary reduction occurs when artifacts are reduced further by the removal of additional flakes. Tools destined for use with only a minimal amount of retouching are completed at this stage. Representative artifact classes include primary reduction bifaces, unifaces, blades, scrapers, gravers, and notched and modified flakes. Secondary reduction refers to the final shaping of an artifact prior to use. Artifacts representative of this stage of reduction include secondary reduction bifaces, drills, perforators, and projectile points. Recycling refers to tool rejuvenation. In this stage, secondary tools may have become broken or damaged through use and these are salvaged through additional modification to prolong their use life. Finally, ground, battered and abraded tools are artifacts that may or may not include chipped-stone technology in their manufacture, but which do include grinding of one or more facets. Examples might include celts whose unfinished form may have included some chipping but grinding was required prior to completion of the finished artifact.

With a few exceptions, the chipped stone debitage from the Greenbottom sites was roughly equally distributed (Table 4). Sites 46CB41 and, particularly, 46CB100, exhibited a relatively higher percentage of tertiary flakes and secondary flakes. Primary flakes were relatively underrepresented at these two sites. This would suggest that the site's inhabitants engaged predominately in the latter ranges of stone tool manufacture. In contrast, site

Table 2. Percentage of projectile points recovered by site and relative to the total Greenbottom sites assemblage by time period.

Site	L. Woodland/ L. Preh.	Middle Woodland	Late Archaic	Early Archaic
46CB40	7 (100.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)
46CB41	5 (100.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)
46CB90	1 (16.66%)	2 (33.33%)	3 (50.00%)	0 (00.00%)
46CB92	4 (26.66%)	0 (00.00%)	11 (73.33%)	0 (00.00%)
46CB98	4 (57.14%)	0 (00.00%)	3 (42.85%)	0 (00.00%)
46CB99	4 (50.00%)	0 (00.00%)	3 (37.50%)	1 (12.50%)
46CB100	1 (100.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)
46CB102	0 (00.00%)	0 (00.00%)	0 (00.00%)	1 (100.00%)
46CB103	1 (100.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)
Totals	26 (52.00%)	2 (4.00%)	20 (40.00%)	2 (4.00%)

Table 3. Distribution and relative frequency of stone tools recovered, by reduction sequence.

	CB 15	CB 40	CB 41	CB 90	CB 91	CB 92	CB 93	CB 98	CB 99	CB 100	CB 101	CB 102	CB 103
Initial Reduction													
Core								2					
Init. Red. Biface	1	29	3	13		27	2	23	13	6		1	1
Choppers								1					
Subtotals	1	29	3	13	0	27	2	26	13	6	0	1	1
Primary Reduction													
Prim. Red. Biface	1	6	5	2		10		5	6	3		1	
Blades			2										
Endscrapers		1	1										
Notched Mod. Flakes			3	1				1			1		
Marg. Mod. Flakes			3	1			1	7	2	2			
Subtotals	1	7	14	4	0	10	1	13	8	5	1	1	0
Secondary Reduction													
Sec. Red. Biface	1	14	15	5	1	16		13	12	4			
Drills / Perforator			1			1							
Microperforators													
Proj. Point frags.													
Projectile Points		7	5	6		15		7	8	1		1	1
Subtotals	1	21	21	11	1	32	0	20	20	5	0	1	1
Ground, Battered & Abraded													
Hammerstones						2		1	1				
Pitted Stones			2	2		4						1	
Celts/frags		2	1			1		1					
Gorget/frags		1											
Hematite (modified)		1				2			1				
Groundstone												1	
Subtotals	0	4	3	2	0	9	0	2	2	0	0	2	0

Table 4. Distribution and relative frequency of chert debitage at the Greenbottom sites.

Site	Primary Flakes	Secondary Flakes	Tertiary Flakes
46CB15	7 (38.89%)	4 (22.22%)	7 (38.89%)
46CB40	50 (21.01%)	71 (29.83%)	117 (49.16%)
46CB41	195 (21.45%)	292 (32.12%)	422 (46.42%)
46CB90	89 (33.09%)	99 (36.80%)	81 (30.11%)
46CB91	3 (23.08%)	4 (30.77%)	6 (46.15%)
46CB92	149 (26.55%)	211 (37.61%)	201 (35.83%)
46CB93	6 (46.15%)	1 (07.70%)	6 (46.15%)
46CB98	88 (41.32%)	110 (51.64%)	15 (07.04%)
46CB99	120 (34.28%)	129 (36.86%)	101 (28.86%)
46CB100	23 (17.04%)	70 (51.85%)	42 (31.11%)
46CB101	0 (00.00%)	2 (66.67%)	1 (33.33%)
46CB102	4 (57.14%)	3 (42.86%)	0 (00.00%)
46CB103	0 (00.00%)	1 (100.0%)	0 (00.00%)
46CB104	1 (50.00%)	1 (50.00%)	0 (00.00%)

46CB98 reflected a high percentage of primary flakes and secondary flakes while tertiary flakes were underrepresented which was indicative of the earlier stages of stone tool fabrication. These interpretations did not consistently conform with the frequency of stone tools recovered by reductive sequence. This inconsistency is not fully understood at this time; however, the discrepancies were most likely due to small sample sizes, and it was acknowledged that the significance of these differences is questionable. The remainder of the sites exhibited either equal distribution or the collections were too small to attempt to interpret accurately.

Table 5 reflects the relative frequency of stone tools by site and by reduction stage. The relative proportions of tools belonging to the different stages of lithic reduction reflect subtle and in some cases, significant intersite differences.

All the sites considered here had relatively small sample sizes; however, some sites were considerably smaller than others. These sites, 46CB15, 46CB91, 46CB93, 46CB101, 46CB102, and 46CB103, each produced less than ten stone tools. Additionally, no stone tools were recovered from site 46CB104. Therefore, the bias introduced by lack of data renders an interpretation of the relative percentage and frequency of the stone tools from the above sites relatively ineffectual.

It should be noted that site 46CB41 reflects not only artifacts recovered from surface collection, but also reflects those recovered from the subsurface testing. This site demonstrated a relatively high percentage of primary, and especially secondary reduction stone tools while the initial reduction tool frequency was relatively low. The high relative frequencies of primary and especially secondary reduction artifact tool classes is consistent with our expectations for sites whose primary use was probably short-term and oriented perhaps towards hunting and/or gathering activities. The lack of reworked tools, when compared to the other categories, is not fully understood at this point.

Site Use

In order to examine site use on an intersite basis, we employed a modified version of Winters' (1969) model of Late Archaic settlement. This adaption of Winters' model serves as one means by which to compare and contrast the data obtained during the course of the present study. In this model, *General Utility* tools refer to blades, bladelets, scrapers, hammerstones, choppers and other similar general purpose tools. *Hunting* tools are limited to atlatl weights, plummets, boatstone, loafstone, and projectile points; and, *Fabricating/Processing* tools include drills, gravers, perforators, notched and marginally modified flakes. *Domestic* tools are represented by multi-purpose groundstone and pitted cobbles. *Woodworking* tools include celts, axes, spokeshaves and adzes. Finally, *Ornamental* tools include pendants, gorgets and beads; whereas, *Ceremonial* equipment consists of modified hematite, mica, worked coal and pipes.

The Systemic Index expresses a relationship between hunting activities and "more sedentary" patterns characterized by the processing of a wide range of raw materials and the manufacture of basic implements of production. It is derived by dividing the total number of fabricating/processing tools plus domestic implements by the total number of weapons. For example,

$$\text{Systemic Index} = \frac{\text{Fabricating/Processing + Domestic Implements}}{\text{Weapons}}$$

Table 6 reflects the quantity and calculated systemic index of the functional artifact categories listed above for each of the Greenbottom sites. While far from conclusive, the data do indicate a high relative frequency of General Utility and Hunting tools over all other tool categories. These ratios suggest that sites 46CB90, 46CB92, and 46CB99 represent hunting camp(s) or specialized camp(s). The calculated systemic index for site 46CB41 suggest that this site may have functioned as a transient camp while site 46CB98 was within the range of a base camp. Sites 46CB15, 46CB91, 46CB93, 46CB100,

Table 5. Distribution, frequency and relative percentage of stone tools recovered by reduction sequence.

Site	Init. Red.	Pri. Red.	Sec. Red.	Use/Recy.	Gr./Bat./Abr.
46CB15	3 (49.99%)	1 (16.67%)	1(16.67%)	0 (00.00%)	1 (16.67%)
46CB40	29 (46.03%)	7 (11.11%)	21 (33.33%)	0 (00.00%)	6 (09.52%)
46CB41	3 (07.31%)	14 (34.14%)	21 (51.21%)	0 (00.00%)	3 (07.31%)
46CB90	13 (43.33%)	4 (13.33%)	11 (36.66%)	0 (00.00%)	2 (06.66%)
46CB91	0 (00.00%)	0 (00.00%)	1(100.00%)	0 (00.00%)	0 (00.00%)
46CB92	27 (34.61%)	10 (12.82%)	32 (41.02%)	0 (00.00%)	9 (11.53%)
46CB93	2 (66.66%)	1 (33.33%)	0 (00.00%)	0 (00.00%)	0 (00.00%)
46CB98	26 (42.62%)	13 (21.31%)	2 (32.78%)	0 (00.00%)	2 (03.27%)
46CB99	13 (28.89%)	9 (20.00%)	20 (44.44%)	0 (00.00%)	3 (06.67%)
46CB100	6 (37.50%)	5 (31.25%)	5 (31.25%)	0 (00.00%)	0 (00.00%)
46CB101	0 (00.00%)	1 (100.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)
46CB102	1 (12.50%)	1 (12.50%)	1 (12.50%)	0 (00.00%)	5 (62.50%)
46CB103	1 (50.00%)	0 (00.00%)	1 (50.00%)	0 (00.00%)	0 (00.00%)
46CB104	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)	0 (00.00%)

46CB101, 46CB102, 46CB103, and 46CB104 failed to yield sufficient data to apply to the model. Finally, our surface collections from Clover were peripheral to the main site area and are not representative.

The relative frequencies specific tool types represented at the Greenbottom sites suggest that hunting/animal processing and lithic reduction played a primary role in each site's use over time (Table 7). Vegetal product processing, leather working maintenance (lithic reduction) and wood working activities were relatively underrepresented at most sites. Lithic reduction and wood working activities were equally represented at Site 46CB41. In general, these findings indicate that these sites represent a series of overlapping hunting camps.

Table 6. Quantity and ratios of major functional categories of tools recovered from the Greenbottom sites.

Winters Calculations	CB 15	CB 40	CB 41	CB 90	CB 91	CB 92	CB 93	CB 98	CB 99	CB 100	CB 101	CB 102	CB 103	CB 104
General Utility (GU)	0	1	2	0	0	2	0	1	2	0	0	0	0	0
Weapons (W)	0	7	5	6	0	15	0	7	8	1	0	1	1	0
Ornaments (O)	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ceremonial (C)	0	0	0	0	0	2	0	0	1	0	0	0	0	0
Digging Implements (DI)	0	1	0	0	0	0	0	8	0	0	0	0	0	0
Fabricating and Processing (F+P)	0	0	7	2	0	1	1	8	2	2	1	1	0	0
Domestic Equipment (D)	1	1	2	2	0	4	0	1	0	0	0	1	0	0
Wood Working (WW)	0	2	2	0	0	1	0	0	0	0	0	0	0	0
Systemic Index (F+P+D)/W =	N\A	.14	1.80	0.67	N\A	0.33	N\A	1.29	0.25	N\A	N\A	N\A	N\A	N\A

Table 7. Behavioral Correlates of Artifacts Recovered from the Greenbottom Site

Activities Indicated by:	46CB15		46CB40		46CB41		46CB90		46CB91		46CB92		46CB93	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Hunting/Animal processing														
Projectile Points	0		7		5		6		0		15		0	
Point Fragments	0		10		14		5		1		15		0	
Scrapers	0		1		0		0		0		0		0	
Subtotal	0	0	18	33	19	68	11	42	1	100	30	45	0	0
Lithic Reduction														
Hammerstones	0		0		0		0		0		2		0	
Initial Red. Bifaces	3		29		3		13		0		27		2	
Subtotal	3	60	29	54	3	11	13	50	0	0	29	44	2	100
Leatherworking														
Scrapers	1		4		1		0		0		1		0	
Subtotal	1	20	4	7	1	4	0	0	0	0	1	2	0	0
Vegetal Product Processing														
Mano	0		1		0		0		0		0		0	
Pitted Stones	1		0		2		2		0		4		0	
Subtotal	1	20	1	2	2	7	2	8	0	0	4	6	0	0
Woodworking														
Celts	0		2		1		0		0		1		0	
Drills	0		0		1		0		0		1		0	
Spokeshaves	0		0		1		0		0		0		0	
Subtotal	0	0	2	4	3	11	0	0	0	0	2	3	0	0
TOTALS:	5	100	54	100	28	100	26	100	1	100	66	100	2	100

Table 7 continued. Behavioral Correlates of Artifacts Recovered from the Greenbottom Site

Activities Indicated by:	46CB98 N	46CB98 %	46CB99 N	46CB99 %	46CB100 N	46CB100 %	46CB102 N	46CB102 %	46CB103 N	46CB103 %	46CB104 N	46CB104 %
Hunting/Animal processing												
Projectile Points	7		8		1		1		1		0	
Point Fragments	10		10		4		0		0		0	
Blades	0		1		0		0		0		0	
Choppers	1		0		0		0		0		0	
Subtotal	18	38	19	53	5	45	1	25	1	50	0	0
Lithic Reduction												
Hammerstones	0		1		0		0		0		0	
Cores	2		0		0		0		0		0	
Initial Red. Bifaces	23		13		6		1		1		0	
Subtotal	25	52	14	39	6	55	1	25	1	50	0	0
Leatherworking												
Scrapers	3		2		0		0		0		0	
Subtotal	3	6	2	6	0	0	0	0	0	0	0	0
Vegetal Product Processing												
Pitted Stones	0		0		0		1		0		0	
Multi-purpose Battered Stones	1		0		0		0		0		0	
Subtotal	1	2	0	0	0	0	1	25	0	0	0	0
Woodworking												
Axe/Celt Fragments	1		1		0		0		0		0	
Abraders	0		0		0		1		0		0	
Subtotal	1	2	1	2	0	0	1	25	0	0	0	0
TOTALS:	48	100	36	100	11	100	4	100	2	100	0	0

Prehistoric Ceramic Analysis

Introduction. For many of the sherds included in the assemblage to be described in the following pages, we have no real understanding of the time/space relationships that these represent. Therefore, we will refer to "ware groups" to mean collections of sherds within the assemblage that are similar with respect to attributes of paste and temper type. Within each ware group, there will be one or more different "categories" that are differentiated from one another based upon attributes of surface treatment. To illustrate, the following discussion will include a description of the *Siltstone Tempered Ware Group* in which there are ceramic categories such as *Siltstone Cordmarked* and *Siltstone Plain*. Following the descriptions the assemblages from each site will be compared and contrasted in order to demonstrate the possible relationships between the sites especially in terms of the Fort Ancient occupations within the project area. In addition, ware groups and ceramic categories will be compared to published series, types and varieties whenever possible.

A total of 661 sherds were recovered from eight of 18 sites examined during the phase I and II investigations of the Greenbottom project (Table 8). Of these, 76 were sherdlets less than two square cm in area and were not included in the analysis. The great majority of the analyzed pottery consisted of body sherds (N=465). Of the remainder, 16 were rims and 28 were sherds representing other portions of the vessels.

Analytical Procedures. Of the total collection, 585 sherds were analyzed, the balance being too small for meaningful analytical purposes. Any sherds less than one square centimeter in size (N=76) were excluded from analysis and were simply counted by provenience unit. Sherds which could be glued together were counted as one sherd. The ceramic analysis included examination of each sherd under a 10x bent-arm lens magnifying glass to identify attributes of paste and temper. Ceramics were separated into ware groups based on temper type and within these, ceramic categories were created based upon variations in surface treatment. The raw counts of analyzed sherds by provenience unit and ceramic category are given in Table 9 (eroded sherds not included). The frequency, percentage of the total ceramic assemblage, and the percentage of site assemblage for each category is given in Table 10. Sherds with problematic temper were treated with a 37% solution of hydrochloric acid to identify or discount the presence of limestone as a tempering agent. Minute observations were made on sherds with particle inclusions (e.g., the presence of a single sandstone or chert particle); and, a mean temper size was measured for both the primary tempering agent and the inclusions. Mean temper size was determined by observing the particles exposed on the sherd edge and surface and by measuring the temper particle most representative in size of all the particles observed. The percentage of the temper and inclusions were determined on a one hundred point scale with the primary temper generally being greater than 50%. The density of tempers within the paste was determined on a percentage scale with 0% representing a sherd with no temper and 100% theoretically representing a sherd comprised only of tempering materials. To make the scale more usable, it has been divided into three possible densities. A

Table 8. Frequency distribution of sherds recovered by site.

Site Number	Total Number of Sherds Recovered
46CB15	2
46CB40	121
46CB41	507
46CB90	5
46CB92	5
46CB98	9
46CB99	9
46CB100	3
Total:	661

Table 9. Count of ceramic categories by provenience.

	Ceramic Category																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Provenience	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
46CB41																						
Auger holes																						
40N/10E	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
40N/70E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
50N/40E	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
50N/50E	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
50N/60E	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
60N/20E	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
60N/90E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
70N/20E	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
80N/0E	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
80N/10E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
80N/40E	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
80N/20W	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Test units																						
72N/20E, lev 1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
lev 2	0	0	0	0	0	0	1	4	8	0	0	0	0	1	0	1	0	0	4	0	0	21
76N/3W, lev 1	1	0	8	0	0	0	7	1	5	0	0	0	0	0	0	0	0	0	1	0	0	25
lev 2	1	1	4	0	0	0	6	3	15	1	0	0	1	0	0	0	1	0	2	0	0	43
76N/20E, lev 2	0	0	3	0	0	0	7	3	43	0	0	1	5	5	0	0	0	0	1	0	0	76
lev 3	3	1	0	0	1	2	20	4	39	0	2	0	3	1	0	0	0	0	1	0	0	88
80N/19E, lev 1	1	1	5	0	0	0	1	1	4	0	0	0	0	1	0	0	0	1	1	0	0	19
80N/20E, lev 1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
lev 2	4	0	0	0	0	0	5	2	21	0	0	0	1	3	0	0	0	0	0	0	0	41
lev 3	0	1	3	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	1	0	0	9

Table 9 (continued). Count of ceramic categories by provenience.

	Ceramic Category																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Provenience	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
80.60N/13.35W lev 2	7	1	28	1	0	0	0	0	2	2	4	0	0	5	0	0	14	2	15	0	0	93
Subtotal	23	5	57	1	1	2	50	19	141	3	6	1	11	16	0	1	17	3	27	0	0	384
46CB15, surface					1													1				2
46CB40, surface														37	2	55	1			1	2	98
46CB90, surface			2	1															2			5
46CB92, surface	1		2											2								5
46CB98, surface	1													3	2	2			1			9
46CB99, surface	1													3		2						6
46CB100, surface							1	1														2
Total	23	5	61	2	2	2	51	20	141	3	6	1	11	61	4	60	18	4	30	1	2	511

Table 10. Frequency, percent of total assemblage and percent of site assemblage for each ceramic category by site.

	46CB15			46CB40		
	N	% of total assemblage	% of site assemblage	N	% of total assemblage	% of site assemblage
Cat. 1						
Cat. 2						
Cat. 3						
Cat. 4						
Cat. 5	1	00.20	50.00			
Cat. 6						
Cat. 7						
Cat. 8						
Cat. 9						
Cat. 10						
Cat. 11						
Cat. 12						
Cat. 13						
Cat. 14				37	7.24	37.76
Cat. 15				2	0.39	2.04
Cat. 16				55	10.76	56.12
Cat. 17				1	0.20	1.02
Cat. 18						
Cat. 19	1	00.20	50.00			
Cat. 20				1	0.20	1.02
Cat. 21				2	0.39	2.04
Total	2	0.40	100.00	98	19.18	100.00

Table 10 (continued). Frequency, percent of total assemblage and percent of site assemblage for each ceramic category by site.

	46CB41			46CB90		
	N	% of total assemblage	% of site assemblage	N	% of total assemblage	% of site assemblage
Cat. 1	23	4.50	5.99			
Cat. 2	5	0.97	1.30			
Cat. 3	57	11.15	14.84	2	0.39	40.00
Cat. 4	1	0.20	0.26	1	0.20	20.00
Cat. 5	1	0.20	0.26			
Cat. 6	2	0.39	0.52			
Cat. 7	50	9.78	13.02			
Cat. 8	19	3.71	4.95			
Cat. 9	141	27.50	36.72			
Cat. 10	3	0.58	0.79			
Cat. 11	6	1.17	1.56			
Cat. 12	1	0.20	0.26			
Cat. 13	11	2.15	2.86			
Cat. 14	16	3.13	4.16			
Cat. 15						
Cat. 16	1	0.20	0.26			
Cat. 17	17	3.33	4.43			
Cat. 18	3	0.58	0.79			
Cat. 19	27	5.28	7.03	2	0.39	40.00
Cat. 20						
Cat. 21						
Total	384	75.02	100.00	5	0.98	100.00

Table 10 (continued). Frequency, percent of total assemblage and percent of site assemblage for each ceramic category by site.

	46CB92			46CB98		
	N	% of total assemblage	% of site assemblage	N	% of total assemblage	% of site assemblage
Cat. 1	1	0.20	20.00	1	0.20	11.11
Cat. 2						
Cat. 3	2	0.39	40.00			
Cat. 4						
Cat. 5						
Cat. 6						
Cat. 7						
Cat. 8						
Cat. 9						
Cat. 10						
Cat. 11						
Cat. 12						
Cat. 13						
Cat. 14	2	0.39	40.00	3	0.59	33.34
Cat. 15				2	0.39	22.22
Cat. 16				2	0.39	22.22
Cat. 17						
Cat. 18						
Cat. 19				1	0.20	11.11
Cat. 20						
Cat. 21						
Total	5	0.98	100.00	9	1.77	100.00

Table 10 (continued). Frequency, percent of total assemblage and percent of site assemblage for each ceramic category by site.

	46CB99			46CB100		
	N	% of total assemblage	% of site assemblage	N	% of total assemblage	% of site assemblage
Cat. 1	1	0.20	16.67			
Cat. 2						
Cat. 3						
Cat. 4						
Cat. 5						
Cat. 6						
Cat. 7				1	0.20	50.00
Cat. 8				1	0.20	50.00
Cat. 9						
Cat. 10						
Cat. 11						
Cat. 12						
Cat. 13						
Cat. 14	3	0.58	50.00			
Cat. 15						
Cat. 16	2	0.39	33.33			
Cat. 17						
Cat. 18						
Cat. 19						
Cat. 20						
Cat. 21						
Total	6	1.17	100.00	2	0.40	100.00

sherd with a low density of temper in its paste had from 0% to 25% tempering materials in its paste, medium density had 25% to 75% tempering agents and high density had greater than 75% tempering agents.

Sherd thickness (body, neck, shoulder, basal and lip) was measured in millimeters using calipers. A mean sherd thickness was measured when necessary (i.e. when the sherd exhibited a variance in thickness) by measuring the thickest and narrowest point of each sherd for an average. If a sherd was split or so eroded that an accurate measure of the thickness could not be obtained, it was not included in the thickness analysis. Rim and lip shapes were determined for each rim sherd and the range of forms present in the assemblage are displayed in Figure 5 and Figure 6. Sherd color designations were not made because color was considered to be a relatively insignificant variable in the ceramic analysis. Assessments were made as to the degree of firing displayed by the compactness or friability of each sherd. Cordage twist identifications were made by pressing the cordmarked and smoothed-cordmarked surfaces into modeling clay and then by comparing the impression in the clay to the cordage twist types shown in Hurley (1982). The cordage thickness and maximum number of twists per centimeter were determined where smoothing or erosion did not obscure the cordage impressions.

All of the ceramics recovered from sites 46CB15, 46CB40, 46CB41, 46CB90, 46CB92, 46CB98, 46CB99 and 46CB100 were coded into a dBASE IV computer program. The coding format for this program is presented in Table 11. A database is simply a tool that organizes information and allows it to be modified and manipulated for specific purposes. For example, a database of names and addresses can be created. Each name and address is a record and each record is divided into fields, consisting of name, address, city, state, zip code and phone number. The dBase IV program can then be used to, for example, sort the records alphabetically by last name, or to give a list of all people living in Kentucky. Similarly, the ceramic records can be organized by sorting and counting temper types, calculating mean sherd thicknesses, or finding the range of the mean temper size for a specific category of sherds. Each sherd was examined and recorded separately on the basis of the information listed in Table 11. In regard to ceramic form, the accompanying figures with Table 11 displays the rim and lip shapes exhibited by the Greenbottom assemblage. This figure should be referred to for the rim sherd descriptions that follow.

The primary temper types recognized included shell, siltstone and limestone each with and without inclusions. Five additional minor temper types (sandstone, chert, quartz, leached and no temper) were observed. The ceramic assemblage exhibited three principle surface treatments: plain, cordmarked and smoothed cordmarked. A total of 25 limestone, 23 shell, 13 leached, 9 siltstone, 2 chert, 1 sandstone and 1 quartz tempered sherds had exterior surfaces that were eroded and therefore their surface treatments could not be determined. These sherds were included in the total assemblage of analyzed sherds; however, they were not described as a separate ceramic group because they did not differ markedly from their respective plain, cordmarked and smoothed cordmarked varieties. One siltstone and one quartz tempered rim sherd was described in the siltstone smoothed cordmarked and quartz smoothed cordmarked category, respectively. The basic strategy was to lump sherds with similar temper and surface treatment attributes into a single category, rather than to create many categories exhibiting minute differences, unless significant

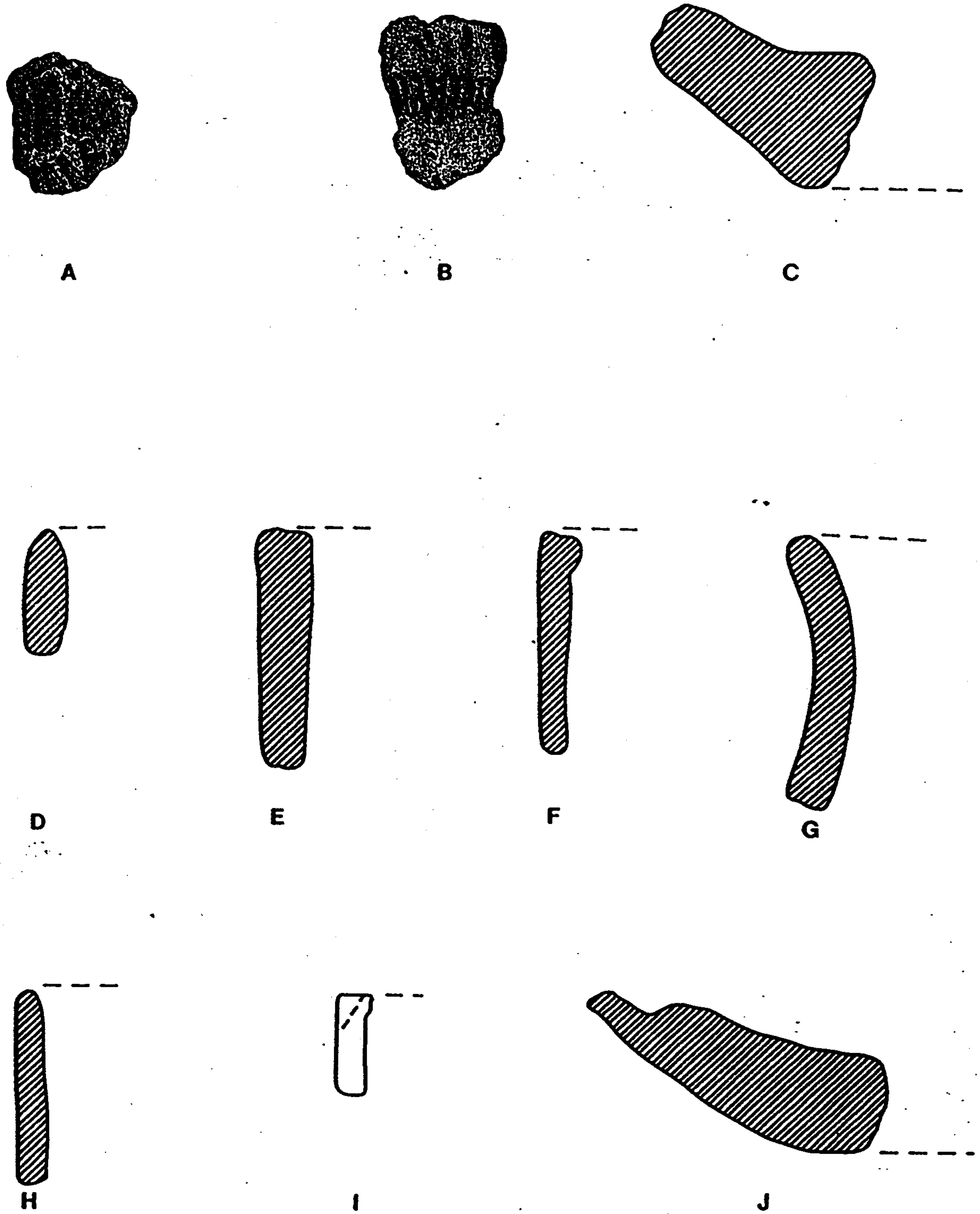

Figure 5. Cordwrapped dowel impressed body sherds, selected basal sherds and rim profiles recovered. Cordwrapped dowel impressed body sherds, a-b; basal sherd, c; peaked lip form, d; straight rim shape, square, flat lip form, e; straight rim shape, interior rolled lip, f; excurvate rim shape, rounded lip, g; straight rim shape, rounded lip, h; notched lip form, i; basal sherd, j. Scale 1:1.

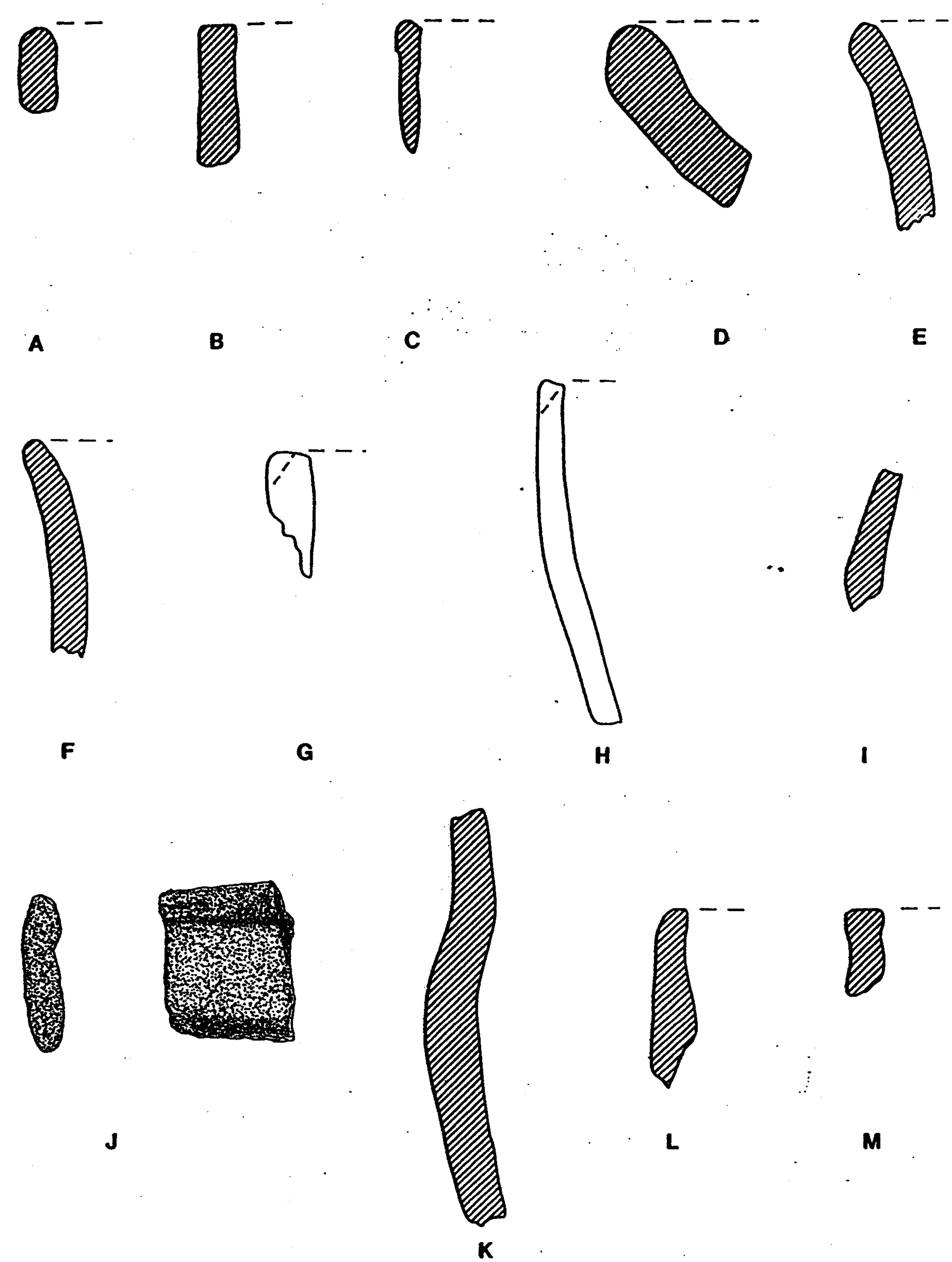

Figure 6. Selected rim profiles and handle illustrations. Square rim shape, a; Rounded lip shape, b; rounded lip form, c; very excurvate rim shape, rounded lip, d; excurvate rim shape, rounded lip, e; excurvate rim shape, rounded lip, f; rounded, notched lip form, g; straight rim shape, flat, notched lip, h; shoulder sherd, i; handle illustration and profile, j; shoulder sherd, k; rounded lip form, l; thickened rim, m. Scale 1:1.

Table 11. Coding format for the dBase IV program.

Provenience Information

1. **Northing**
   _########_

2. **Easting**
   _########_

3. **Level (Upper)**
   _##_ (cm bgs.)

4. **Level (Lower)**
   _##_ (cm bgs.)

5. **Feature Number**
   _###.#_

6. **Post Mold Number**
   _###.#_

7. **Sherd Type**
   _1_ Body
   _2_ Rim
   _3_ Neck
   _4_ Shoulder
   _5_ Base
   _6_ Handle
   _7_ Foot
   _8_ Lobe
   _9_ Partial Vessel
   _10_ Whole Vessel
   _11_ Indeterminate

Temper Attributes

8. **Primary Temper** _##_
9. **Primary Temper Percentage** _###_ (numeric)
10. **Secondary Temper** _##_
11. **Secondary Temper Percentage** _##_ (numeric)
12. **Tertiary Temper** _##_
13. **Tertiary Temper Percentage** _##_ (numeric)

Possible tempers include

_1_ Siltstone	_2_ Sandstone	_3_ Limestone
_4_ Chert	_5_ Hematite	_6_ Sand
_7_ Quartz	_8_ Grit (crushed granitic rock)	_9_ Shell

_10_ Mica _11_ Bone _12_ Grog

_13_ Hornblende _14_ Leached (temper dissolved, type unknown)

_15_ Unknown _16_ No Temper

14. Primary Temper Size _##.##_ mm Mean. (numeric)
15. Secondary Temper Size ##.##_ mm Mean. (numeric)
16. Tertiary Temper Size _##.##_ mm Mean. (numeric)

17. Percentage of temper in paste
_1_ high, over 75%
_2_ medium,
_3_ low, under 25%
_4_ indeterminate

Surface Treatment Attributes

18. Exterior Surface Treatment:
_1_ Plain
_2_ Cordmarked
_3_ Smoothed Cordmarked
_4_ Combed
_5_ Fabric Impressed
_6_ Smoothed Fabric Impressed
_7_ Netting Impressed
_8_ Smoothed Netting Impressed
_9_ Burnished
_10_ Scratched
_11_ Brushed
_12_ Scraped
_13_ Roughened
_14_ Bast Wrapped Stick
_15_ Eroded
_16_ Indeterminate

19. Orientation of Exterior Surface Treatment:
_1_ Not Applicable
_2_ Perpendicular to Rim
_3_ Parallel to Rim
_4_ Angled to Right of Perpendicular
_5_ Angled to Left of Perpendicular
_6_ Crisscross
_7_ Indeterminate

20. Distance of Exterior Surface Treatment from Rim.:
_1_ 0 cm
_2_ Less than 3 cm
_3_ Greater than 3 cm
_4_ Indeterminate
_5_ Non-Applicable

21. Interior Surface Treatment:
_1_ Plain
_2_ Cordmarked Negative
_3_ Smoothed Cordmarked Negative
_4_ Combed
_5_ Fabric Impressed
_6_ Smoothed Fabric Impressed
_7_ Netting Impressed
_8_ Smoothed Netting Impressed
_9_ Burnished
_10_ Scratched
_11_ Brushed
_12_ Scraped
_13_ Roughened
_14_ Bast Wrapped Stick
_15_ Rim Channel
_16_ Cordmarked Positive
_17_ Cordmarked Positive Smoothed
_15_ Eroded
_16_ Indeterminate

22. Orientation of Interior Surface Treatment: (see #19)

23. Distance of Interior Surface Treatment from Rim.: (see #20)

24. Brim of Lip Surface Treatment.: (see #18)
include _17_ Notched

25. Orientation of Brim of Lip Surface Treatment.:
_1_ Non-Applicable
_2_ Parallel to Diameter
_3_ Angled to Right of Diameter
_4_ Angled to Left of Diameter

26. Twist
_1_ Z-twist
_2_ S-twist

27. Diameter of Cords _#.##_ mm. (numeric)

28. No. twists per cm:
_##_ Maximum Number of Twists per cm (numeric)

Size Attributes

29. Body Sherd Thickness: _##.##_ mm. (numeric)

30. Neck Sherd Thickness: _##.##_ mm. (numeric)

31. Basal Sherd Thickness: _###.##_ mm. (numeric)

32. Lip Thickness: _##.##_ mm. (numeric)