

DATA BASE

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Introduction

The data base recovered during the various archaeological investigations conducted by Mid-Atlantic Archaeological Research, Inc. at the Delaware Park Site (7NC-E-41) consists of a wide variety of information concerning artifact morphology, quantification and distribution; aboriginal feature morphology, fill content and spatial distribution; the presence of certain types and frequencies of pollen grains, carbonized botanical material, phytoliths and chemical residues; and radiocarbon dates derived from culturally charred organic debris. This data base has been analysed for archaeological interpretation and will be subjected to a detailed discussion in a later section of this project report. Prior to analysis and interpretation, however, the data base will be organized and described below.

The categories into which the recovered information has been placed are intended to facilitate later analysis and interpretation. It is basically a functional categorization with emphasis on the recording of data about the aboriginal economic practices of the Delaware Park Site occupants. In order to interpret the subsistence-settlement systems of the occupants, however, it is necessary to first define those occupations through assignment of the series of aboriginal manifestations present at the site to recognized cultural components, complexes, phases and traditions.

It is the contention of the Principal Investigator that the archaeological resources recovered during the investigations at the Delaware Park Site were deposited during a series of distinct occupations by social groups exhibiting cultural characteristics which can be related to general behavioral traditions which have been identified, although not well-defined, by archaeologists working with the prehistoric record of the Middle Atlantic Seaboard of the United States. These traditions are usually identified by one or more distinctive artifactual and/or behavioral traits and can be assigned a chronological position which can be limited to a relatively short period of time.

The following section of this description of the Delaware Park Site data base concerns those artifactual traits which have been identified with one or more socio-cultural group of the Middle Atlantic area. The artifacts to be categorized and described include projectile points (hafted lithic bifacial tools) and ceramics. Other tool types have been assigned to functional groups rather than cultural/morphological types.

The cultural/morphological type assignments is based on qualitative observations rather than quantitative data. This procedure is followed because of the minor numbers of artifacts present in each category, which, in the opinion of the Principal Investigator, does not justify a quantitative typological approach to categorizing artifact assemblages.

Lithic Material Types

The lithic types recognized and recovered from the Delaware Park Site surface and subsurface investigations are derived from two general sources: primary and secondary. Primary sources include lithic types derived from natural outcrops as well as from tabular laminae which cap various tectonic episodes throughout the Atlantic coastal plain. The outcrops included here are all part of the Delaware Chert Complex (Wilkins 1967) and include such named types as Newark Jasper, Cecil County Black flint and Broad Run Chalcedony. Rhyolite, siltstone/shale/argillite, and possibly Pennsylvania Jasper are other outcrop examples from outside of Delaware. Tabular laminae include materials such as limonitic sandstones, "Ferruginous Quartzite" and "Cuesta Quartzite".

Secondary sources, or secondary depositions, include all lithic types derived from cobble sources associated with drainage systems and terrace deposits. These sources are the most ubiquitous, occurring profusely throughout alluvial/fluvial gravel deposits, association with most drainage systems and watersheds.

The lithic types listed in this report will be referred to in their abbreviated form (symbols in parentheses whenever necessary). Lithic materials include both Newark Jasper "treated" and "untreated" (N.J.T.) and (N.J.); Cecil County Black Flint (CeC); Broad Run Chalcedony (B.R.C.); Rhyolite (Rhy); Diorite (Dio); Felsite (Fel); Shist (Sht); Siltstone (Silt); Shale (Sha); Argillite (Arg); Ferruginous Quartzite (FeQtzt); Cuesta Quartzite (CuQtzt), Cobble Chert (C.C.); Cobble Jasper (C.J.); Cobble Chert/Jasper (C.C/J).; Cobble Quartzite (C. Qtzt); Cobble Quartz (C. Qtz); Crystal Quartz (CrQtz); Sandstone (Sand); and unidentified/exotic (UEX).

Appendix I, entitled Lithic Material Utilization Patterns, lists the different types of material used and the functions for which they were used. Appendix I also inventories the lithic materials found in the various feature categories at the Delaware Park Site.

TABLE IV-1

Lithic Material Use Index for All Functional CategoriesFood Procurement / Processing / FaunaProjectile Points
(72)

PC/J	NJT	NJ	QTZT	QTZ	RHY	FEL	ARG/ SILT	UEX	SHT
8	7	2	10	20	3	1	10	9	2

Halfed Biface Knives
(3)

QTZ	FEL	ARG
1	1	1

Unhalfed Biface
Knives
(18)

NJT	QTZ	QTZT	CC/J	ARG	FEL
3	4	5	3	2	1

Chopping Tools
(16)

QTZ	QTZT	NJT	CC
7	6	1	2

Food Procurement / Processing / VegatalAnvil/Nutting
Implements
(18)

QTZT	SAND	DIO
13	4	1

Domestic Equipment
Utility/Misc.
Hammerstones
(34)

QTZT	QTZ	CC
30	2	2

Biface Fragment
(92)

NJT	NJ	CC/J	QTZT	ARG/ SILT	RHY	CEC	CQTZ	QTZ
18	5	15	8	6	2	1	2	35

Uniface Tools
(82)

Core

NJT	NJ	QTZ	QTZT	CC/S	CQTZ	FEL	CEC
1	1	14	2	3			

Flake

5	9	12	5	21	6	1	2
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Misc. Biface and
Uniface Items
(22)

NJT	CJ	QTZ	QTZT	CQTZ
2	2	12	1	5

Lithic Manufacturing

Remnant Cores
(65)

NJ	NJT	CC/J	QTZ	QTZT	CEC
1	1	7	35	20	1

Preforms
(66)

NJ	NJT	CC/J	QTZ	QTZT	ARG/ SHA	RHY	LIM
12	17	8	16	6	4	2	1

Woodworking
Perforators
(8)

NJT	CEC	QTZ
6	1	1

Cultural/Morphological Artifact Types

Although archaeologists recognize a number of artifact categories as having value as a diagnostic indicator of chronological periods and/or cultural types only a few of these have been subjected to the process of type definition. By this is meant a technique by which assumed diagnostic attributes are determined and described in the process of building an ideal morphological image. This image is then ascribed to the aboriginal worker who constructed the artifact and to the cultural period and manifestation to which that worker belongs.

Projectile points (hafted bifacial tools) and ceramics are the two artifact categories which are most often subjected to the typological process. They will be so treated in the following discussion. Also considered diagnostic of certain chronological periods and/or cultural manifestations are the following items found at the Delaware Park Site: grooved axes, pendants, pestles and certain types of cache blades. These will be briefly discussed below.

Projectile Point Types

Projectile points have been grouped into morphological categories based on such diagnostic features as shape, size, material and manufacturing techniques. After specific categories were defined as working classes they were combined into groups which corresponded to those defined by Daniel R. Griffith and Richard E. Artusy in a study conducted by the Delaware Section of Archaeology of the proposed Dover highway bypass project (Griffith & Artusy 1976). This study area is located approximately 60 miles south of the Delaware Park Site and group definitions were found to be useful for analysis of the Delaware Park Site collection. The following brief descriptions of categories do not include quantitative data due to the small sample size which may be misleading.

Group I (N=6)

These are small to medium triangular bifacial tools with outlines ranging from equilateral to isosceles. Bases are straight to concave without grinding.

Manufacturing techniques employed the use of primary flakes modified with little percussion thinning and shaping, but pressure thinning and refining predominate. These artifacts exhibit quality workmanship. Materials utilized include pebble chert and jasper. One specimen is quartzite from the Cohansay River valley in Salem County, New Jersey.



ACTUAL SIZE

The triangular projectile point form has a long history of use in the Eastern Woodlands sub-region, possibly going back into the Archaic Period. (Ritchie 1969:141). Certain forms resembling the common Late Woodland triangle have been identified with the later stages of the Paleo-Indian Period in the coastal plain (Gardner 1974:38-39, Cavallo 1980). The earliest dated context which dates triangular shaped projectile points within Delaware is at the Island Field Site where excavated grave features, some containing both triangular and pentagonal unnotched artifacts, were radiocarbon dated to approximately 700 A.D. (Thomas and Warren 1970).

Group II (N=10)

Variety A (N=7)

These projectile points are small to medium, side and/or corner notched, with straight to slightly convex bases. Bases are often ground. Blade outlines are triangular to oval although many of the examples in this group have been reworked. Basal projections are nearly as wide or wider than the shoulder barbs. Base and notch grinding was evident on five specimens.

Manufacturing techniques seem to indicate the use of primary flake preforms reduced by various percussion strategies and pressure refining. Decidedly, the predominate material used is milky quartz (pebble sources). One of the basal sections is of Onondaga Chert (a possible Meadowood type projectile point), a lithic material originating at sources located in the State of New York.



ACTUAL SIZE

The projectile points of Group II fit nicely into the description of the Archaic Brewerton Side Notched and Brewerton Corner Notched types (Ritchie 1961) as well as the Generalized side-notched points defined by Kinsey (1972: 443-444) for the Bushkill Complex. These points seem to range in time from the Late Archaic into the Middle Woodland Period, the one exception to this is the Kirk Corner Notched specimen, which has been dated to the Early Archaic Period, ca 6900 B.C. in West Virginia (Broyles 1971:62-65).

Variety B (N=3)

These projectile points are side-notched to corner removed, have expanded stems and are medium sized bifacial tools. Basal elements are straight to mildly convex with some grinding. Blade outlines seem to be triangular. Every specimen in this group has been re-worked into a perforating implement. The bases of these tools are one-half to two-thirds the width of the blades.

Manufacturing techniques of Type II-B tools are percussion thinning and pressure-refining with retouch modifications. Materials used range from Newark Jasper which is thermally-treated to varieties of Cecil County Flint and a New Jersey material referred to as "cuesta" quartzite (Cresson, personal communication). These points have affinities with Normanskill (Ritchie 1971) and MacPhearson (Kinsey 1972:415) types from the north and the Vernon (Stephenson & Ferguson 1963:144) type defined at the Accokeek Creek Site in Maryland. The above types range temporally from Late Archaic to Early/Middle Woodland Periods throughout the Middle Atlantic coast.

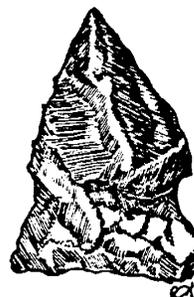


ACTUAL SIZE

Group III (N=4)

These projectile points are medium in size with corner notches, expanding broad stems and triangular blade elements. Bases are straight to concave. Notches and bases on all specimens show evidence of heavy grinding. Many of the specimens also appear to have been re-worked from slightly larger (longer) bifaces.

The manufacturing techniques used in the knapping of these tools include primary flake preforms reduced by percussion thinning and refinement by pressure finishing. The predominate lithic material is milky quartz (3) while the use of an unidentified siltstone can be documented. This group shows similarities to Kinsey's "fishtail tradition" (1972:430) and the "Broad-spear Tradition" of the Terminal Archaic Period. They are also related to the Clagett point definition (Stephenson & Ferguson 1963:142). Temporally, they range from the Late Archaic to the Terminal Archaic/Transitional Period (Witthoft 1953).



ACTUAL SIZE

Group IV (N=9)

These projectile points are medium sized, narrow bifaces with generally thick contracting stems. The bases are straight to slightly convex. Blades are isosceles in outline with straight to convex edges forming a very acute point tip. Some blades edges are incurvate indicating edge rejuvenation. Stemmed bases are formed from medium to deep corner notching and represent a hafting element one third to one quarter the length of the entire specimen. Bases are equal to one half the maximum width. Heavy stem and basal grinding was evident on only one point although three specimens were made of non-cryptocrystalline materials (argillite/siltstone). Three other specimens showed signs of some stem and base attrition which may represent haft wear patterns.

Manufacturing techniques exhibit generally well controlled percussion thinning with medium to hard percussors (hammerstones). Some edge straightening and finishing exhibits pressure refinement. Also, these bifaces have fairly steep edge angles and diamond shaped cross-sections, characterized by short hinged flake scars.

Materials are various types of quartzite (5), some argillite (3) and a single quartz specimen. This group falls into the Late Archaic, narrow blade and narrow stem tradition of the Piedmont/Taconic manifestations (Kinsey 1972, Brennan 1969), as well as relating to the broad category of Late Archaic contracting stemmed, flat based points known from this time period throughout the Middle Atlantic region. Points of this group are widely known from surface collections on the Delmarva Peninsula and represent one of the predominate forms on the Delaware Park Site.



ACTUAL SIZE

Group V (N=11)

These are small to medium, straight to slightly contracting stemmed, thick bifaces with straight to genetly convex bases. The half elements are square in outline. Generally narrow-bladed outlines, characteristic of this group, are isosceles with straight to excurvate edges. Stems are formed by shallow side-notches or corner removed flake scar bulbs, which produces a base one half to two thirds the total width of the artifact. Only three of the specimens showed any evidence of stem and base grinding and/or half element wear. Interestingly, each of these examples were fashioned of milky quartz. Two other examples were made of milky quartz while the remaining six were manufactured from both treated and untreated Newark Jasper.

These artifacts exhibit well made controlled percussion thinning from flake blanks (similar to those of Group IV) with medium to hard percussion implements (most likely hammerstones). Some edge straightening and finishing by pressure techniques can be recognized. Blade edges are steep with overlapping highed terminations forming thick cross sections that are diamond shaped to thick lenticular.



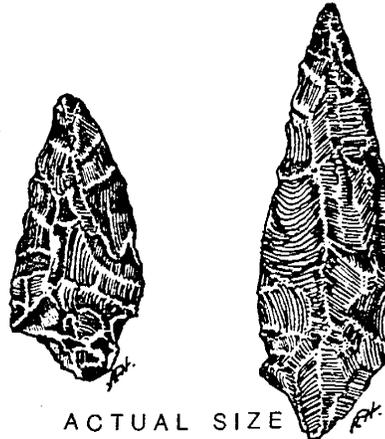
ACTUAL SIZE

Group V artifacts correspond to the narrow bladed stemmed projectile points of the Piedmont Tradition (Kinsey 1972:408), the Taconic Tradition (Brennan 1969) and the Lamoka type defined by Ritchie (1951) for New York. Other point types which relate to these specimens are the Dustin, Bare Island, Wading River, Lackawaxen and Squibnocket, ranging from 2500 to 1700 B.C.

Group VI (N=14)

These are small to large contracting stemmed points that have sharply pointed to slightly rounded bases. The cross sections are thick to moderately thin with blade outlines ranging from isosceles to ovate. The blade edges are excurvate. Based on the sample recovered at the Delaware Park Site it is clear that several different cultural traditions were responsible for this general grouping. Several varieties can be distinguished and are described below.

The smaller of these artifacts can be divided into two varieties. Variety A has thin, lenticular cross sections. Four of these specimens were found. The second variety of the small specimens, Variety B, number six artifacts all of which have thicker diamond-shaped cross sections. Both of the smaller varieties are illustrated.



Two varieties of this group can be referred to as large, Variety A (illustrated at the right) is a single, well-made projectile point/knife manufactured from a fine-grained quartzite. This point has a thin lenticular cross section. Variety B have thick, diamond-shaped cross sections and are not as well-made as is the single Variety A artifact. Three specimens from the Delaware Park Site have been labeled as Variety B.

The two small varieties of Group VI show marked use of local pebble resources and bifacially worked by both percussion and pressure reduction techniques with the latter being more frequently encountered. Materials used in manufacturing the small varieties include pebble chert (4), milky quartz (1), quartzite (2), Newark Jasper (2 heat treated specimens) and pebble quartz (1 pebble with cortex remaining).

The single large point in Variety A is a finely controlled, percussion flaked tool of quartzite that shows definite basal thinning with a moderate amount of pressure edge refinement. The remaining three large points general exhibit less well executed bifacial thinning techniques than does the Variety A specimen. One of the three is made of pebble chert exhibiting percussion flaking with excessively deep edge forming flake scars and heavily over-lapped hinged terminations. The second sample is made of white quartzite, is percussion flaked, and shows reworking of the distal end.

Group VI encompasses several lithic traditions which reflect a wide ranging temporal framework. The Poplar Island complex (Witthoft 1946) and the Piedmont Tradition (Kinsey 1972) reflect Middle to Late Archaic ties. Specific projectile point types include Poplar Island/Rossville (Ritchie 1961), Morrow Mountain (Coe 1964), Piscataway (Stephenson & Ferguson 1963) and Lagoon (Ritchie 1971). These projectile point types range in time from ca. 4,000 B.C. to A.D. 100. Group VI is the most dominate projectile point /biface type found on the Delaware Park Site.

Group VII (N=6)

These are small to medium bifaces with thick cross sections and triangular blade outlines that have straight to excurvate edges. The points of Group VII have weak shoulders and broad parallel-sided to slightly contracting stems with straight bases. Four specimens are whole while the fifth and sixth are only represented by the basal portions. All four whole specimens show evidence of stem and base grinding and/or half element wear patterns. Five of the points are made of quartz while the fifth is fashioned from heat-treated Newark Jasper.



ACTUAL SIZE

Several of these specimens, because of their abrupt, thick distal cross-sections, indicate that they have been resharpended. These points were worked by percussion thinning from primary flake preforms with little pressure modification (only 2 re-worked tools were pressure flaked). Steep hinge-scarred blade edges are common traits on these points.

The projectile points of Group VII closely resemble the Calvert projectile point type described by Stephenson and Ferguson (1963) from the Accokeek Creek Site. The Calvert point type is ususally associated with Pope Creek and Accokeek pottery types and appear to belong to the Early/Middle Woodland Periods. Although there are very few published references to points similar to those of Group VII, they have been found in other excavated contexts in the Delmarva Peninsula where they are associated with net and cord impressed ceramics and are related to Early/Middle Woodland complexes as defined in southern Delaware (Custer personal communication).

Group VIII (N=7)

The points of this group are small, narrow bifaces which are moderately thin and have shallow to moderately deep side notches. The stems are both expanded to slightly contracting with straight to convex bases. This group is represented by five whole artifacts and two basal portions.



ACTUAL SIZE

No stem or base grinding or haft wear is apparent on Group VIII points but similar notching characteristics are evident on six of the seven examples. These have been executed unifacially in an alternate edge pattern which creates a beveled cross-section where the stem constricts. Material used in manufacture include argillites, shales and siltstones (5 specimens). Two of the points are cryptocrystalline pebble cherts and one was made of rhyolite.

Because of the size limitations reflected in this group, primary or possible secondary flake blanks were roughly shaped by percussion. However, most of the remaining flake scars on all specimens were apparently due to pressure shaping and refinement techniques.

This group has no close typological similarities from the Middle Atlantic area although they might be considered as variants of Lamoka projectile points. They are, however, much smaller than the majority of points of the Lamoka type. Many of these specimens have been found in association with dated features at the Delaware Park Site and may eventually be more firmly assigned to temporal and cultural artifact complexes or known components.

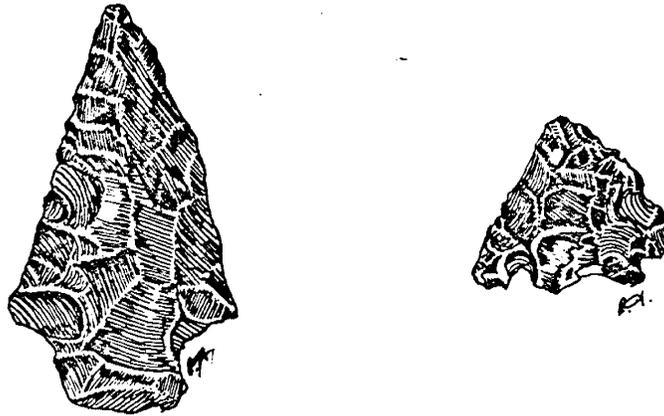
Group IX (N=6)

Specimens of this group include those that do not fit into any of the categories outlined above. This, then, is a catch-all of miscellaneous types from the Delaware Park Site. They will be briefly discussed in sub-groupings.

Variety A consists of two medium sized, corner-notched points with indented or bifurcate bases. No grinding is evident. The Blade outline is isocles and broad with straight to slightly excurvate edges. The stems are straight to slightly contracting and are approximately one half as wide as is the lower blade element. Although only one of these specimens is complete, it is reasonably safe to say these bifaces were produced predominately by percussion flaking from flake blanks. Percussion scars are more evident on the broken specimen, yet both exhibit pressure shaping or refinement. Both specimens are made of ferruginous quartzite.

The two Variety A specimens have close affinities with the biface types of the Middle Archaic Period. One of the two can be classified as a Stanley (Coe 1964) or Neville (Dincauze 1976), dated at around 5,000 B.C. The other might also be aligned with this lithic tradition, yet it has a basic similarity to the Kanawha type dated at the St. Albans Site in West Virginia at 6,210 B.C. (Broyles 1971:58-59). These points would be placed in the Atlantic Phase as defined by Dincauze (1976).

A single point of Variety B is a smaller triangular-bladed biface with straight edges and a basal area formed by notches placed equidistantly in from the shoulder ears. Notch grinding is evident but since the base has been damaged it can not be determined if basal grinding is also present.



ACTUAL SIZE

This point is a fairly well made, thin biface fashioned from a primary or secondary flake source. All evidence reflects well-controlled pressure reduction. The material used is a black, unidentified chert that may be derived from a pebble source. No cortex, however, is present. This point can be related to the "Eshback" projectile point type defined for the Upper Delaware Valley by Kinsey (1972). Kinsey assigns a Middle Archaic to Late Archaic temporal placement to this type although continued use into the Middle Woodland may be suggested (Custer, personal communication). This type of projectile point has no firm radiocarbon date associated with it in the Delaware Valley.

Variety C consists of a single medium sized, shallow, broad, side-notched, stemmed biface. The point has a long isosceles blade outline with excurvate edges. The base of the stem is convex. This specimen is made of argillite that have been appreciably weathered. As a consequence, it is difficult to determine manufacturing sequences. The point was probably fashioned from a flake blank with reduction by both percussion and pressure.

This tool resembles some of the forms found in the Fishtail Tradition (Kinsey 1972) of the Orient/Dry Brook types. This tradition has been radiocarbon dates in Long Island and the Upper Delaware River Valley between 1340 B.C. and 700 B.C.

Variety D includes two medium sized projectile points. They are stemmed with fairly broad, triangular to ovate, outlines with straight to excurvate edges. Shoulders are strongly formed by medium to large corner notches. Stems expand to slightly rounder basal corners with straight to convex bases. Basal grinding is evident on one piece.

Both specimens appear to be made from flake blanks (primary flakes or preforms). Flake scars show predominance of percussion reduction with some pressure edge and notch refinement. One specimen



ACTUAL SIZE

has been reworked from a somewhat longer biface and now shows a pentagonal outline. Both tools were made from a shaley/siltstone material.

The reworked specimen has broad similarities to many forms from the Late Archaic Period including Lackawaxen Expanding Stem and Mac Pherson types from the Delaware Valley Archaic Complex (Kinsey 1973). The temporal range is from 2,500 B.C. to 1,700 B.C. The other specimen is very much like a small variety of the Terminal Archaic "Broad Spear" having similarities to Perkiomen and Susquehanna types. It also roughly conforms to the Egypt Mills point, a Late Archaic type from the Upper Delaware Valley (Kinsey 1973). This type has a temporal range through the Late and Terminal Archaic Periods, from 1,800 B.C. to 800 B.C.

Group X (N=5)

This group is a miscellaneous category of broken, unidentified basal portions or blade fragments that can not be assigned to one of the above groups. A cursory observation finds that flaking characteristic similar to those of Early and Late Archaic and Early Woodland periods can be found in this group. This observation is supported by choice of materials used to manufacture these tools.

Pottery Types

The ceramic items recovered from the Delaware Park Site investigations came from both the top soil and from within features. A total of 151 sherds were analyzed to determine their placement into three broad categories. These categories were determined based upon the characteristics of exterior and interior surface treatment, temper material, surface color, wall thickness and indications of manufacturing techniques.

Group I (N=50)

This group is represented by sherds with cord-marked exteriors and one of three interior surface treatments. Interiors are either cord roughened, smoothed over cord, or smoothed. Temper particles range from grit to fired clay (grog) to crushed quartz to crushed shist (mica). Colors vary from very dark greyish browns to reddish brown and yellow on the exterior surface to dark greyish brown, red and grey/brown on interior surfaces. Thickness ranges between 6 and 11 mm. The technique of manufacture appears to include a basic construction from coils with kneading and malleating with a paddle used to finish-shape the vessels. The sherds in this group appear to be fairly well fired.

This group includes 33.1% of the sherds associated with dated features at the Delaware Park Site. The dates obtained (see Appendix K) range from A.D. 80 to A.D. 605. This group and its sub-varieties show basic affinities to Early and Middle Woodland ceramic traditions found throughout the Middle Atlantic and Northeast regions. Known types include Vinette I (Ritchie & McNeish 1949:100), Accokeek Cord Marked (Stephenson and Ferguson 1963:98-100), Albemarle Cord Marked (Evans 1955:41), Kinsey's

Exterior Corded/Interior Smoothed type from the Upper Delaware Valley (Kinsey 1972:454-455), and the locally-defined Hell Island Cord Marked (Griffith & Artusy 1977).

Group II (N=49)

These sherds are characterized by net and/or fabric impressed exteriors with both roughened and smoothed interiors. Temper particles include grit, fired clay (grog), crushed quartz (2-6mm.) and crushed shist (mica). Surface colors range from breyish brown, brownish yellow and reddish brown exteriors to very dark grey, greyish brown and reddish brown interiors. Thickness ranges from 7 to 8.5 mmm. The techniques used to manufacture the vessels represented by sherds of Group II are very similar to those of Group I except for the surface treatments.

This group represents 32.4% of recovered sherds within features. Those dated range from 425 B.C. to A.D. 455. All the sherds within this group are body sherds with the exception of two rimsherds. This group shares key attributes with Middle Woodland Ceramic trends throughout much of the eastern seaboard. Known type similarities include relationships to Popes Creek Net-impressed (Stephenson & Ferguson 1963:92-96), Broadhead Net Marked (Kinsey 1972:455), Albemarle Net Impressed (Evans 1955:43) and the locally-defined type Hell Island Fabric Impressed (Griffith & Artusy 1976).

Group III (N=33)

Group III ceramics include those with fabric impressed exterior surfaces, smoothed over interior surfaces and either grit or crushed quartz temper particles. (1-2 mm.). Surface colors range from light grey to pale brown exteriors with dark greyish brown, pale brown or light grey interiors. Sherd thickness ranges from 3.5 to 9 mm. The techniques of manufacture recognized in sherds of this group includes a basic coil technique for vessel formation with pinched and hand malleated surface smoothing.

This group represents 21.8% (14 sherds) of the sample from the Delaware Park Site. None were found in features that have been dated. This group includes ceramic types of the Middle to Late Woodland Periods in the Middle Atlantic region. Known types are Riggins Fabric Impressed (Cross 1956:150-153), Albemarle Fabric Impressed (Evans 1955:41-43) and the Potomac Creek wares (Stephenson & Ferguson 1963:113-120). No locally-defined ceramic types are present in the Group III sample.

Miscellaneous Sherds (N=19)

This category includes all of the unidentified pieces and fragments (for the most part exfoliated sherds without diagnostic attributes) as well as those that do not fit into any of the above groups. This group represents 12.6% of the sample by count. Two rimsherds are included in the category. Sherds from this miscellaneous group were found in features ranging in radiocarbon dates from A.D. 605 to A.D. 640.

Artifact Function Categories

Before describing the artifact function categories developed during the analysis of the Delaware Park Site assemblage, a brief discussion of the concept of artifact function is needed. The use to which an archaeologically-recovered artifact had been put is a critical determinate to the accurate recreation of prehistoric economies as well as to other aspects of sociocultural life. The artifacts from the Delaware Park Site have been placed into morphological/functional groupings defined on the basis of tool size, working edge configuration, gross wear patterns, and general artifact form and material. These selected characteristics are those which can be directly related to the implied use of a tool. As a consequence, the categories or groups defined can be considered as functional in nature.

While the tool categories are considered as functional based on the observations listed above, it is not always possible to verify the function of each member of the category. While the study of individual artifacts for evidence of actual tool use (wear patterns such as striations, edge battering, polishing, etc.) is to be preferred, it is often necessary to rely on ethnohistorical or ethnological analogs for inferences concerning a defined group (see below*).

The artifacts from the Delaware Park Site have been grouped into seven major categories as follows: Faunal Food Procurement and Processing Tools, Floral Food Procurement and Processing Tools, Domestic Equipment or either a General Utility or Miscellaneous category, and Manufacturing Tools for either Lithic Fabrication or Woodworking. The final category is one that includes only two artifacts of an Ornamental nature. While it is recognized that a specific tool may have more than one function and can logically be identified with perhaps Woodworking and Floral Food Processing, the Delaware Park tools have been placed in only one category each, that functional group which appears to represent its primary function.

Food Procurement and Processing Tools - Faunal This category includes all recognized implements and items related to animal procurement (hunting, fishing, trapping, etc.) and the processing of these resources for consumption. Included are the chipped stone categories consisting of bifacial projectile points and knives (hafted and unhafted), chopping tools; fire-cracked rock (FCR) and ceramics. General morphological descriptions are provided later indicating spatial/temporal evidence when possible. The frequency of on site and in feature occurrence, as well as measurements of significant attributes, are also given. Table IV-1 has been given indicating material preference for each functional category. Ceramic utilization is included within this group since they probably functioned in some processing (cooking, storage, etc.) capacity. General description of sherd types and frequency throughout the site as well as within the features are also provided. Attributes of color, surface treatment, temper type and particle size, wall thickness and methods of manufacture are listed as well as general similarities between known and dated types within the Middle Atlantic coastal region.

* The use of analogy in archaeology is discussed in detail in Lewis R. Binford's "Smudge Pits and Hide Smoking: the Role of Analogy in Archaeological Reasoning" (American Antiquity 1967, 32(1):1-12.

Food Procurement and Processing Tools - Floral This category includes all recognized tools, implements and items related to vegetal food procurement and processing. This includes many of the tools in the ground stone category such as pestles, anvil and nutting stones, mortars, mullers, as well as fire-cracked rock and ceramics. Tools of the cutting and chopping classes can also be included in this group, but were not statistically included because of the indefinite nature of their relationship to this function (many tool types found at the Delaware Park Site have multiple functions).

Morphological descriptions are given with reference to a spatial and/or temporal relationship whenever possible. Tool and ceramic frequencies are listed by on site and in feature occurrence. Information provided includes maximum and minimum measurements and material use. See the previous functional group for a discussion of ceramic considerations.

Domestic Equipment - General Utility This heading includes those tools that have a more general function and are usually not associated with a single function or activity alone. Members of this group include hammerstones, bifacial fragments, unifacial scrapers, choppers, planes of a unifacial form and unifacial knives.

Hammerstones are generally not specific enough to determine use function, so they were considered in this group (also in a following group). Bifacial fragments include all those rough and refined fragmentary tools (distal, medial and proximal fragments) that could not be classified as projectile points, nor as preforms, but indicated some use activity.

Domestic Equipment - Miscellaneous This category considers bifacial and unifacial items that do not clearly embrace any of the above categories but do indicate cutting and scraping activities. Also those tools that are not recognizable or identifiable (unfinished) in function, as well as all of the use-modified flakes recovered from both surface and sub-surface investigations are included. Morphology, materials and measurements are listed along with possible functional interpretations in the following sections. Flake tools are considered according to geometry, kind of functional edges, frequency and kind of material used.

Manufacturing Tools - Lithic Fabrication This category includes hammerstones, remnant cores and fragments, preforms and general and specialized debitage flakes. Three of the hammerstones recovered at the Delaware Park Site are included in this group because of unique surface characteristics. Unidirectional, bidirectional and multidirectional cores and the entire recovered flake debitage (classed according to shape characteristics) are placed in this group as are general chunks. Items from the Delaware Park Site have been analyzed according to size, geometry, material and frequency of occurrence in both the site assemblage and in individual features. Preforms are also considered by size (large, medium and small), by flaked surface (rough or refined) and by edge angles and material preference.

Manufacturing Tools - Woodworking This group has only two recognized sub-categories; perforators and axes. Although a number of spoke-shave-like implements were recovered they were assigned to the uniface classes because definite functional assignment was not possible. This holds true of some of the biface categories.

Perforators included reworked projectile points and pointed and spurred tools made on flakes and small bifaces. Some typological similarities are made in the specimens with hafting elements (see projectile points, Group IIB). A single ground stone axe was found with a cache of preforms. The tools of this group were analyzed according to size, shape, functional edges, material, location within the site and frequency.

Ornamental

The artifacts within this category (only two were found) do not suggest tool use but rather use as non-essential items of adornment or clothing. The category has been set up only to indicate that non-functional (in the sense of economic tools) artifacts were present and do reflect, however, slightly, upon non-economic functions carried out at the site.

Faunal Food Procurement and Processing Tools

Projectile Points These bifacially worked implements with a definite shape, usually symmetrical, and with a specialized hafting element are referred to as projectile points although it is understood that they often served as well as bifacial knives. This class has been more specifically addressed in an earlier section on cultural/morphological types. The total number of projectile points under this functional group is 72 with 50 having been found in association with Delaware Park Site features. They represent two broad cultural traditions (Archaic and Woodland), many cultural types, several lithic traditions and have a cultural/temporal range of from Early Archaic to Late Woodland (6800 B.C. to A.D. 1000).

Hafted and Unhafted Bifacial Knives Three recognized hafted knives are included in the Delaware Park Site data base, one of which is associated with a feature (Fea. 56). One was a surface find and the other came from a specific unit excavation (S20/W20/S-L-1). This category has a blade outline and hafting element similar to that of the projectile points with the exception that the blade outline is asymmetrical causing the distal end to be misaligned with the base. Sometimes edge attrition can be noted on the asymmetrical blade edges.

Length 5 - 6.5 cm. Width 2 - 2.5 cm. Thickness .6 - 1 cm.

A total of 18 unhafted implements were found of which 11 originated in a feature matrix. The whole or almost complete specimens range in shape from ovate to triangular with some being slightly irregular in form. They are generally thick, sturdy specimens. Many have been bifacially modified by percussion thinning with pressure modified/shaped edges. Edge attrition is an attribute of this class of tools. In some cases the tools doubled as specialized implements where edges have been intentionally prepared to sharp points or concavities.

Although many of these specimens, because of resource material selection, exhibit cobble reduction strategies (12), only 9 actually show cobble cortex. Three of the items are heat treated Newark Jasper and one has been fashioned from argillite source material. It is interesting to note that many of these knives exhibit biface reduction strategies the closest similarity to which are the projectile points.

Length 4.2 - 10.2 cm. Width 2.8 - 5.2 cm. Thickness .6 to 1.5 cm.

Chopping Tools This category is comprised of heavy core bifaces manufactured from small to large oval to irregular cobbles. The lithic source material was either cleaved into hemispheres or worked in block form. Most specimens show primary flake removal around part of the circumference leaving a sharpened or pointed edge with a sinuous character. These 18 tools may have provided flake material for tool manufacture since many show bidirectional as well as multidirectional flaking. Most of them have been recovered from surface contexts, just two examples are known from features.

The size of these chopping tools varies greatly, not clustering around a specific size. The range is from 3 centimeters to 10 centimeters in maximum diameter.

Pottery The artifacts of this category have been adequately described under the cultural/morphological section of this report. Ceramics were used in the food processing activities at the Delaware Park Site for both faunal and floral foods. It is implied that both cooking and storage of food products were part of the Delaware Park Site activities.

Fire-cracked Rock This very common, ubiquitous artifact category includes fractured chunks and blocks of stone, as well as whole or nearly whole cobbles and pebbles that have indications of having been in contact with heat. Surfaces show crazing, discoloration, dehydration and pot lidding or surface spalling. A total of 1,986 pieces of fire-cracked rock were recovered from the Delaware Park Site. The range of materials used include sandstone, quartz, quartzite and shist. The implications concerning frequency correlated with feature type will be dealt with under the Interpretation section of this report.

Floral Food Procurement and Processing Tools

Pestles Three fragments of Cylindrical pestles and one fragment of an elongated pebble pestle were recovered from the Delaware Park Site. Three fragments show pecking and grinding as the method of manufacture. The fourth is, except for a fractured end and minor surface modification, the end section of an elongated pebble of quartzite. Two of these four fragments are from the same tools and can be placed together in a tight fit. One came from the surface collection and the other from Feature 39. They represent most of one half of the entire tool. The working end shows a flattened area as if it were used as a hammer. Also, the sides of this reconstructed pestle show minimum use as an anvil. This tool measures 11 centimeters in length, 4.5 centimeters in width and is 5.1 centimeters in thickness. The tool has been modified on all surfaces during its manufacture. The last of the fragments is a mid-section, showing post manufacturing fracture use on the working end. It has been reshaped and possibly reused. This specimen is almost round in cross-section and measures 10 cm. long and 4.6 cm. wide. The three fragments of non-cobble material are made of diorite.

Elongated pestles have little in the way of temporal specificity. Cylindrical pestles, or roller pestles, are synonymous with Woodland ceramics and are presumably attributed to the Woodland occupation of the Delaware Park Site.

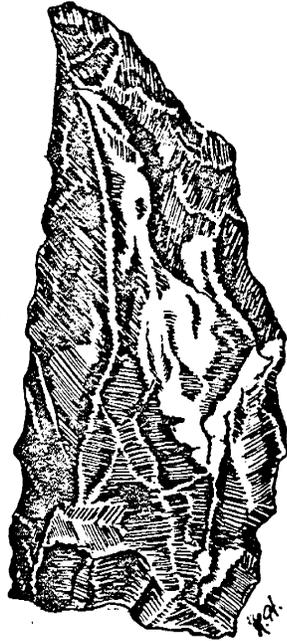
Anvil/Nuttingstones Specimens of this group exhibit pitting, or crushing on one or more of the flat surfaces, sometimes causing a shallow circular depression. This class of tool is usually manufactured on simple, oval to round, medium to large cobbles. Pitting occurs on the relatively flat surfaces of these cobbles, which are often bi-pitted as well as multi-pitted. These implements also show a bi-functional or multi-functional use, since many doubled as hammerstones as well as abraders, or both. One mortar (shown in the sketch) saw limited use as an anvil, evidenced by the random battering on either side. Some pitted areas show randomness and irregular depressions while others exhibit smooth even depressions as if purposely designed.

The largest of these tools is a triangular granite chunk measuring 27, 21 and 20 centimeters on the sides and 12 centimeters in thickness. It has an oval pitted area on one face which is 11 centimeters in length and 8 centimeters in width. The smallest of the eighteen specimens of this group is an oval pebble measuring 8.5 cm. in length, 8.5 cm. in width, and 4 cm. in thickness. Fourteen of these implements were found in Subsurface features. Because of sheer size some of these tools were probably left in places and might possibly indicate a specialized activity of the features within the Delaware Park Site context.

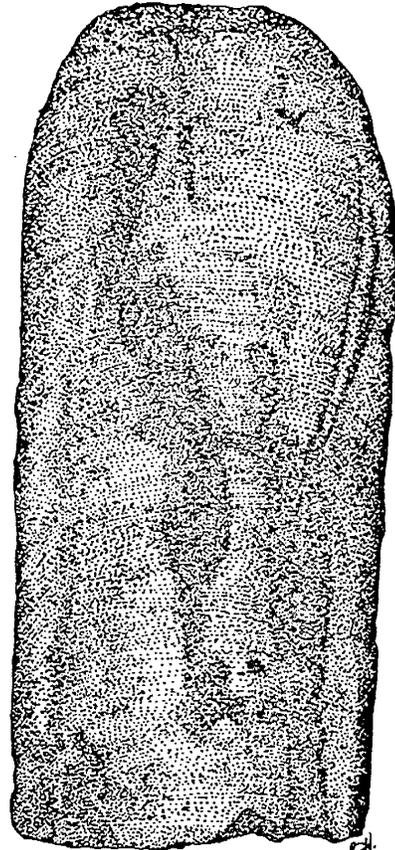
Mortars/Mullers This class of artifacts is presented by two specimens. One is a large, dual flat quartzite river cobble with pecked, abraded and battered circular depressions on either side. The tool measures 30 cm. by 23 cm. by 9 cm. and the depressions are 9.5 and 5 cm. in diameter and .6 and .4 cm. deep. The second specimen is a large, tabular, rectangular block of cobble sandstone measuring 23 cm. by 17 cm. by 9.5 cm. This specimen has only one pecked and abraded circular depression. On both sides, however, there is battering randomly clustered in several areas, possibly the result of fortuitous anvil service. Both mortars came from the subsurface investigations at the Delaware Park Site, one from Unit N10/W20/4-L-1 and the other from Feature 57.

Mullers Only three mullers were recovered from the excavations, all associated with features. This class, similar to that of nutting/anvil stones and similarly manufactured from simple oval cobbles, shows one or more surfaces, dorsal and ventral, with flat abraded surfaces. These abrasions almost cover the entire surface of the cobble. On occasion these abrasions appear to indicate the direction of use movement, e.g. back and forth or clockwise/counter-clockwise, etc. The peripheral edges of these cobble tools also show abrasion which sometimes corresponds with the wear on the flat surfaces, indicated use in a trough-like depression with angled sides.

All three of the tools in this class have evidence of two other functional activities. Flat surface show evidence of battering and the sides or prominent points along the edges also show the same battered appearance. The largest of this class measures 11.5 cm. long and 10 cm. wide and 5.5 cm. thick. The smallest is 8 cm. long, 7 cm. wide and 5 cm. thick. Two of the three are made of sandstone and the third is manufactured from a quartzite cobble.

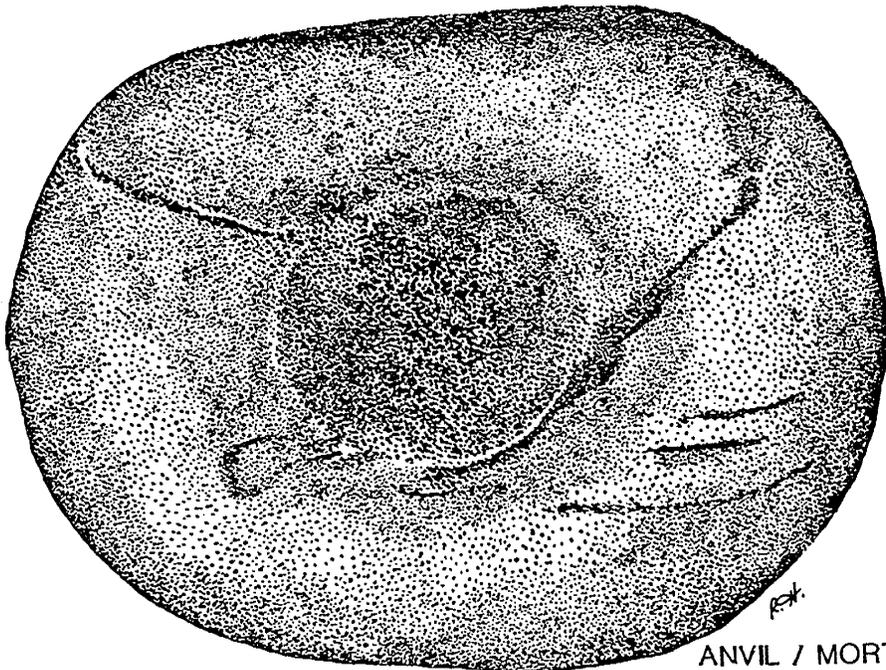


BIFACIAL KNIFE



PESTLE

ACTUAL SIZE



ANVIL / MORTAR

Fire-cracked Rock Although grouped with faunal food processing tools in the previous functional group, fire-cracked rock is just as indicative of the processing of floral food items and rightfully belongs in this category as well. The presence of fire-cracked rock indicates the utilization of fire for cooking or leaching nuts and such root crops as Tuckahoe, among other plant foods. The previous description of this functional category (fire-cracked rocks) will serve for the present to describe both categories.

Ceramics As with fire-cracked rock, ceramics have been grouped in both floral and faunal food processing categories. The Delaware Park Site pottery has been described in detail in the section on cultural/morphological types. Ceramic vessels, used to process vegetal foods as well as faunal foods, belong to both categories.

Domestic Equipment - General Utility

Hammerstones All of the 34 specimens in this class are use-modified pebbles and cobbles generally utilized for simple hammering activities. This is evidenced by the battering on the surface of the prominent protuberances and ridges inherent in the morphology of the raw materials used to manufacture this tool type. Most of these tools exhibit multiple impact surfaces yet the actual attrition is minimal, indicating limited use time for the altered areas. Use alteration occurs on the convex polar ends and sides. While many show multiple functional activity (anvils, abraders, etc.), these tools are generally little more than natural cobbles. The specimens in this group range in size from 6.5 to 15 centimeters in maximum dimension.

There are three implements in this group that indicate a specialized activity (lithic reduction). Two are spherical, multi-faceted hammerstones of pebble chert. The third is a flattened elongated pebble (ferruginous fine grained quartzite) with similar characteristic use wear effected not by the direct impact to the altered surface, as in most non-specialized hammerstones, but by a glancing blow delivered in an arcing motion rather than a direct straight blow. This motion and resultant wear pattern is the focus of ongoing studies by this researcher (Cresson n.d.).

Also on this elongated hammerstone, the rounded end has been modified by pecking and gridding to produce a V shaped beveled notch. The function of this notch is not known. This aspect will be dealt with in the following category , Domestic Equipment - Unidentified Function.

Bifacial Fragments This class can be broken down into two separate categories; those that are recognizable as defined artifact categories and those that are unrecognizable and fit into a general catch-all class of tools with bifacially-worked edges. Sixty-three of this category were recovered in features.

The first group includes distal, medial, and proximal (basal) fragments and small and medium biface cores. They are further qualified as to rough or refined characteristics and described by flaked surfaces and edge angles. The edge angles will be a factor in general interpretation of the function of this group. The second group includes lateral edge fragments, irregularly shaped biface cores (?), and unidentified chunks with biface modification.

The distal fragments are represented both in the rough and refined categories. The refined number 25 pieces which indicate breakage from finished or almost finished tools. Sizes range from 3.7 to 0.9 cm. in length; 2.5 to 1.3 cm. in width; and 0.9 to 0.35 cm. thick. The rough fragments number only five, indicating breakage from partially finished tools. These range in size from 5.4 to 1.4 cm. long; 3.2 to 1.6 cm. wide; and are from 1.3 to 0.6 cm. thick.

Only four medial biface fragments have been recorded; all are from the refined category and represent broken finished biface tools. One specimen is a fine jasper biface fragment with a utilized concave edge (spokeshave). They measure from 1.6 to 3.0 cm. in length, 0.6 to 3.2 centimeters in width, and 0.5 to 1.1 cm. in thickness.

The proximal biface fragments are also represented by the two recognized kinds of flaked surfaces - rough and refined. The refined number 8 fragments which indicate breakage from finished or almost finished tools. Incidentally, none of these proximal fragments are defined or specialized enough to include them into the projectile point or hafted knives groups. Sizes range from .6 to 2.8 cm. in length; 2.6 to 3.4 cm. in width; and .55 to .9 cm. in thickness.

The rough examples (20) exhibit fracture failure either in manufacture or possibly use. Some edges show what appears to be wear and not platform preparation. The sizes of the rough proximal biface fragments range in length from 1.1 to 3.8 cm.; in width from 2.6 to 3.4 cm. ; and have a range in thickness from .65 to 1.1 cm.

The rest of this biface category includes fragments that are non-conforming to either of the categories already described and include lateral edge fragments, irregularly shaped biface cores, and miscellaneous chunks with bifacially worked edges. The examples in the biface core category range from irregular, dual or triangular shaped bifaces all with some part of their edges bifacially altered. Eleven of these tools are present; eight are of quartz, two of quartzite and one of pebble chert. The miscellaneous chunks total 16 in number and all are of quartz, probably indicate a mixed bag of site activities.

Unifacial Scrapers, Choppers, Planes and Knives

This category displays attributes of unifacial manufacture and/or use in which either cores or flakes have been unifacially modified to produce a general or specialized functional scraping and/or cutting edge. Ventral surfaces are almost always flat. The working edges are generally steeply beveled, occurring on the ends and sides of small to large split and broken cobble fragments as well as on prepared and unprepared flake spalls struck from cobbles.

The Delaware Park Site uniface inventory is separated into two sub-groups: those that are core derived and those that are flake derived. The core specimens are usually the larger scraping implements; sometimes referred to as unifacial choppers, scraping cores, planes, hemispherical scrapers, etc. These are usually assigned to heavy functional use. The flake derived specimens are usually much smaller and in many cases more finely worked. They often exhibit a variety of prepared scraping edges on the same implement. Also, within this flake derived category are included uniface flake knives, which are fairly large implements made on decortification and primary flakes. These tools exhibit long, straight to convex cutting edges and are referred to in the literature as teshoas (Holmes 1899, Kraft 1970).

The core derived implements total 21 in number with 12 recovered from feature fill. They range in shape from ovate to triangular with hemispherical and irregular forms also occurring. Most have convex, concave and straight cutting and scraping edges, manufactured by direct percussion techniques.

The flake derived category includes those tools commonly referred to as end scrapers (Thumbnail scrapers), tailed end scrapers and side scrapers. They are usually made on flake products or small to medium split pebble spalls. They are shaped by percussion techniques and are usually pressure rejuvenated. A total of 55 specimens have been cataloged for the Delaware Park Site collection, 33 of which were found in features. Shapes range from ovate to rectangular and irregular with a small portion (8) consisting of only fragments of the tools.

Functional edges of these items are straight, convex, concave, irregular, beaked, pointed and spurred. Sizes range from 1.8 to 5.5 cm. in length; .8 to 4.2 cm. in width; and .5 to 1.1 cm. in thickness.

The final functional category within the uniface division are the flake derived, unifacial knives. A total of 6 of these implements were recognized with only one coming from a feature. The forms are ovate to triangular with irregular variations occurring on these general shapes. They exhibit both percussion and pressure modifying techniques. The sizes range from .8 cm. to 4.5 cm. in length; 3.7 cm. to 5.5 cm. in width; and 1 to 1.3 cm. in thickness.

Domestic Equipment - Miscellaneous

Unidentified Function/Unfinished Tools Two enigmatic artifacts have been assigned to this class. One is what appears to be an elongated pebble or water worn piece of argillite. Yet on closer inspection, the entire surface of this specimens has been altered by pecking with more concentrated pecking occurring on the ends and sides. The intended shape is not clearly realized. A slightly tapered outline, in plan view, appears to have been the intention of the aboriginal manufacturer. The implement resembles a celt or adze but no working edges are present. It is also possible that the items was meant to have been made into a bipinate atlatl weight. The object measures 9.7 cm. long, 3.5 and 3.0 cm. in width and is from 1.7 to 2.3 cm. in thickness.

The second implement, already mentioned in conjunction with the hammerstones in the General Utility class of the Domestic Equipment functional group, has definite functional characteristics as a specialized hammer, but the V shaped beveled notch located on the convex end of this elongated hammerstone reflects some other kind of use function. This may or may not have been carried out since the notched area retains much of the original shaping marks (pecking). It also shows some abraded striae along the intersecting angles of the beveled notch, as if it were used as some kind of specialized abrader (ground edge tool sharpener?).

Utilized Flake Tools This category represents tools that were produced simply by the process of use of unmodified raw flakes, probably immediately after they were reduced from the core. These tools occur on all flake morphological shapes but the Delaware Park Site specimens occurred most frequently on primary, decortification and secondary flakes, in that order of frequency. However, a single flake tool was attributable to the finishing/retouch form of flake.

The functional edges of these utilized flake tools included convex, concave, irregular, straight, denticulate and pointed. Many exhibited minute, irregular and non-patterned flake scar removal resulting from use. The total number of these tools recovered is 171, 125 of which came from feature fill. Flake shapes were quite varied and included trapezoidal, dual, triangular, rectangular and irregular. Generally the larger flake tools tended to be made from the quartz and quartzite cobble resources while the smaller ones were manufactured from sources from within the Delaware Chert Complex as well as from pebble chert and jaspers. Sizes ranged from 1.2 to 6.7 cm. in length; .9 to 4 cm. in width; and .3 to 1.8 cm. in thickness.

Bifacial and Unifacial Tools Bifacially and unifacially modified fragmented items that do not clearly fit into any of the defined categories, yet do have some affinities to the other domestic items, have been classified in this class. Only one biface and twenty-one uniface chunks and fragments are represented in this group. Because of their extremely fragmented nature, little in the way of interpretation can be done other than noting the material of manufacture and functional edge location.

Cutting and scraping edges occur on the prominent ridges and scars of blocky chunks of pebble material left over from percussion flaking. Some of these show apparent edge rejuvenation. These edges have a variety of functional forms including convex, concave, straight, beaked and irregular edges made for cutting and/or scraping. These tools are generally associated with tool maintenance activities. They range in length from 1.7 to 4.3 cm.; in width from .8 to 3.7 cm.; and in thickness from .4 to 1.2 cm.

Manufacturing - Lithic

Hammerstones This category has been discussed within the Domestic Equipment section and is represented by those three specialized hammerstones which are considered as having been used in the lithic fabrication process. This assignment of the tools to the manufacturing functional group is based on both the personal experience of the investigator as well as on compatible evidence from archaeologically recovered lithic manufacturing assemblages. It should not be assumed, however, that any or all of the other hammerstones found at the Delaware Park Site could not have also been used in the lithic fabrication process.

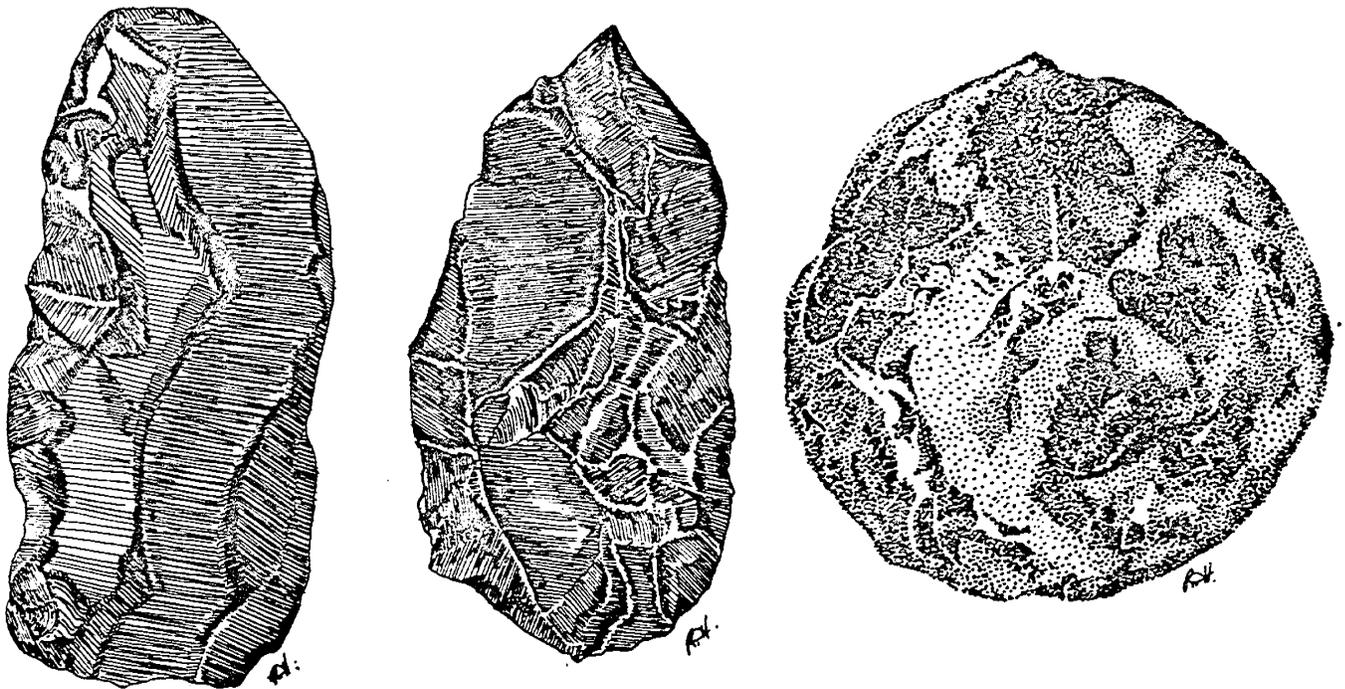
Remnant Cores and Fragments These artifacts are small to large modified lithic fragments that exhibit uni-directional to multi-directional flake detachments for either the purpose of deriving flake material for additional tool modification or for the direct use of the fragment. Core geometry can vary from thick, blocky, irregular forms to tabular, oval and rectilinear pieces. Pebble quartz, quartzites, cherts and jaspers are the most frequent material types found in this category of artifacts.

This category includes those objects that do not share the attributes of usual bifacial lithic reduction, although some bifacial flake removal is apparent on some of these specimens. Only four cores were found associated with features, one was recovered from a subsurface excavation unit and the remainder of the specimens were recovered during the controlled surface survey. Sizes range from 2.9 to 11 cm. in length; .2 to 8.5 cm. in width; and 1 to 7 cm. in thickness.

Flake Debitage This includes all lithic reduction products and/or waste by-products except cores. This category has been subdivided into morphological kinds as well as specific material types. Morphological types include bipolar decortification, decortification/edging, primary, secondary/overshot, finishing/retouch, miscellaneous (unidentified fragments) and chunks. Material types include Newark Jasper (both untreated and heat-treated), Pebble cherts, jaspers and quartzites, ferruginous quartzite, crystal quartz, Cecil County Black Flint, Rhyolite, siltstone/shale, Argillite, sandstone and other exotic or unidentified lithic types.

Six thousand, one hundred and ninety-two (6,192) debitage items are part of the lithic material rejectage from the Delaware Park Site. Specialized flake morphologies directly attributable to individual lithic technologies or flake removal strategies were noted. These include bipolar (core/anvil) techniques, direct percussion (hard and soft hammer) and pressure reduction techniques. Also recognized were edge beveling, platform preparation and heat treating strategies. Specific relationships between flake types and feature association and material preference will be discussed in the Interpretation section.

Preforms This category of lithic manufacturing includes what are usually referred to in the literature as "biface preforms", "blanks", "crude blades" "rejects", etc. They either represent implements intended for further lithic



ACTUAL SIZE

refinement or have been discarded unfinished due to flaking irregularities and inherent flaws within the stone. Many of the artifacts still retain sharp cutting edges providing a potential for general purpose cutting and chopping tool use. They are also generally thick in cross section with fairly steep durable edges which generally reflect early stage biface reduction and thinning techniques. A total of 66 whole or fragmented specimens are included in the Preform category from the Delaware Park Site.

Forty-four of the preforms have been recovered from feature contexts. Morphological shapes include ovate, triangular and irregular groupings which have been separated into three sizes. Further classification into two categories of flake surface treatment, rough and refined, is possible. Edge angle measurements were also considered in the selection of implements to this category.

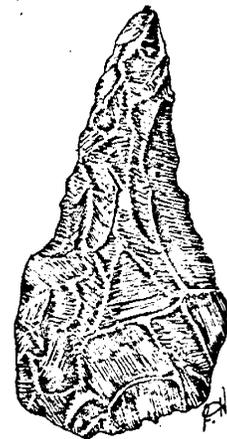
One cache of five preforms (2 of Newark Jasper, 1 of quartz, 1 of argillite and 1 of limonite) were found in association with a three-quarter grooved axe in the northwest corner of Feature 94. This feature has been classed as a Type B feature (see following section) and has been radiocarbon dated at 1850 B.C. (See Appendix K).

The numerical breakdown of the flake subgroups include 14 in the large/rough subgroup, 19 classed as medium/rough, 7 as medium/refined, 16 as small/rough and 10 as small/refined. (size approximate)

The edge/angle measurement of these preforms range between 35 degrees and 87 degrees with a mean of 71.1 degrees.

Manufacturing - Woodworking

Perforators This class of tools is presumed to be, because of morphological characteristics, made on flake material or small biface cores, some times exhibiting the reworking of projectile point forms (4 of 8 were reworked). Eight perforators, constituting the entire sample were found in feature contexts. These tools range in shape from acutely pointed, broad triangular to elongated (willow leaf) ovate forms. Four of the tools show hafting evidence very similar to the general forms of those defined in the section on cultural/morphological types of projectile points. Three of the specimens fit into the side notched Group IIB and the fourth can be associated with Group VI, small group B. Thus they may have actually been mechanical drills while the others were hand-held, twist reamers, drills, etc.



ACTUAL SIZE

Manufacturing techniques are similar to those of the projectile points with more specialized pressure flaking used to fabricate the perforator working edge. Sizes range from 2.7 to 5.5 cm. in length; 1.5 to 2.5 cm. in width; and .7 to .9 cm. in thickness. Edge/angle measurements range between 65 degrees to 85 degrees with a mean of 71.3 degrees. The cross sections show alternate flaking of the working edges of these implements. The geometry includes tetrahedral, trihedral and rhombic outlines. Edge and distal end wear is quite evident on all specimens some of which show extreme wear polish and edge failure on the distal ends and upper edges.

Axes Only one tool was recovered from the Delaware Park Site that could be positively attributed to this category of tool, although some of the heavier bifaces may have served as wood cutting implements. This item is an unfinished three-quarter grooved axe and was found with five preforms in a cache associated with Feature 94 (see Preforms).

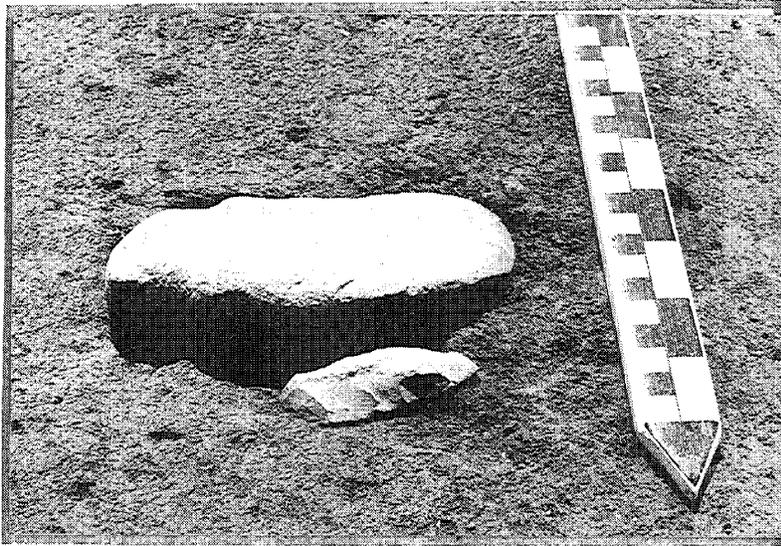


PLATE IV-1 ARTIFACTS IN SITU - FEATURE 94

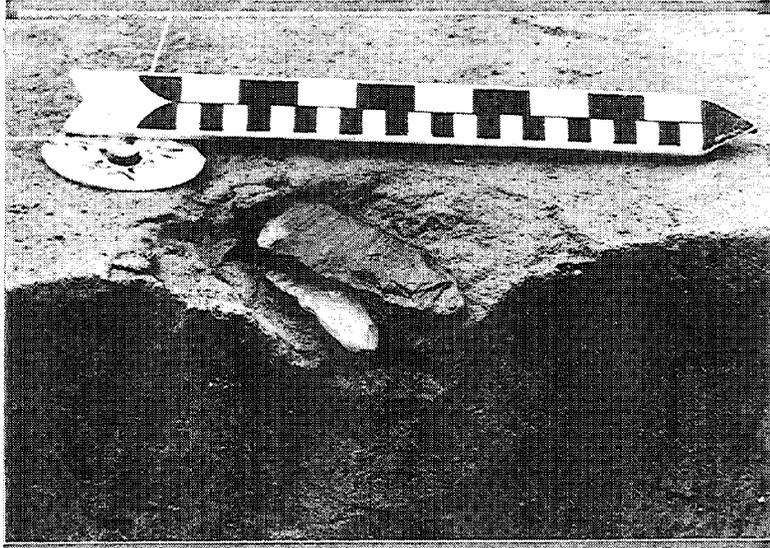


PLATE IV-2 ARTIFACTS IN SITU - FEATURE 94

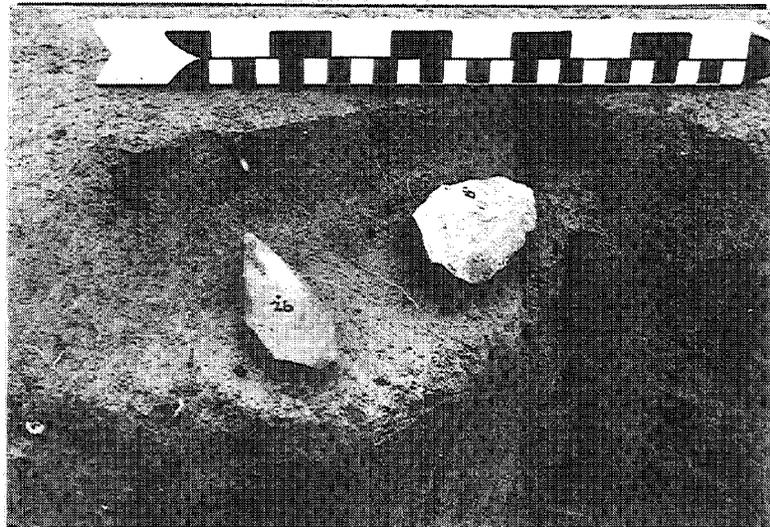
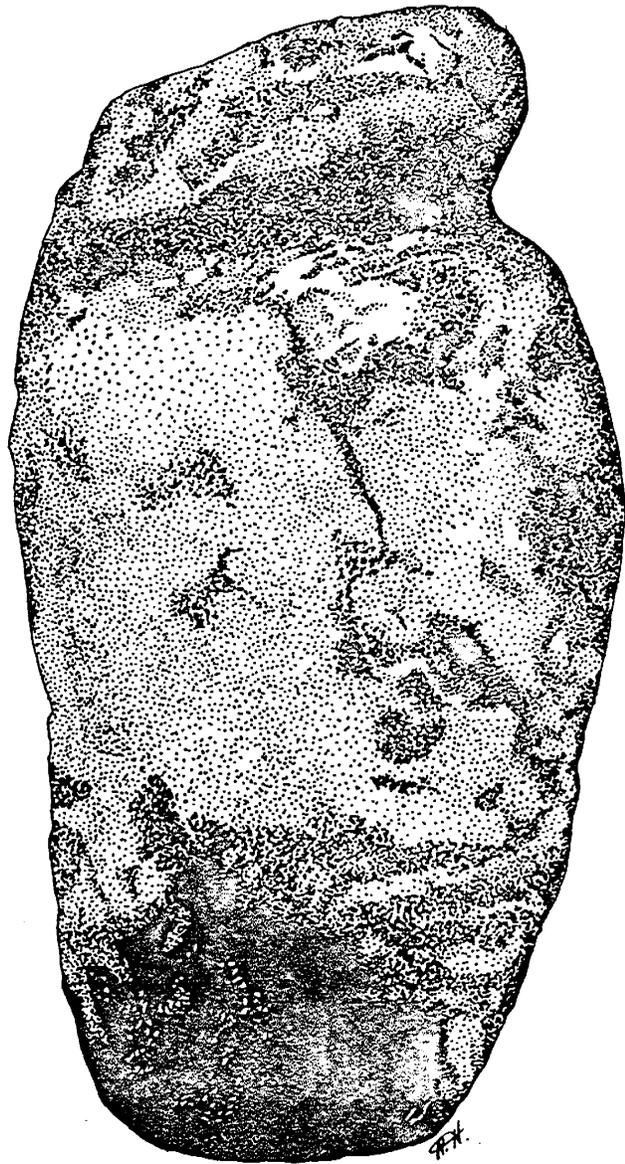


PLATE IV-3 ARTIFACTS IN SITU - SUB-SOIL

The artifact still retains evidence of most of the sequences of manufacture that were used in its fabrication. The tool is made from an ovate cobble of fine-grained sandstone. Percussion flaking was used to reduce it to shape. Although most of the surface of the original cobble has been reduced some of the cortex is still showing. After flaking, most of the surface area was pecked to begin the refining process. The groove was probably executed during this early part of the sequence. The final work was the initial grinding of the bit area which was never completed. The edge (bit) is actually rounded yet surface striations on one face show directional movement perpendicular to the edge (as if caused by a chopping action) while the obverse face indicates striae parallel or oblique to the cutting edge (indicative of edge grinding activities).

Also, on either face of this tool a small area shows what appears to be use-wear related to some sort of anvil technique. These are characterized by tight clusters of pecking or battering that have penetrated the pecked surface substantially.

Measurements are 14.6 cm. long, 7.9 cm. wide and 3.0 cm. thick. The poll groove is about 1.2 to 2.1 cm. wide and .3 to .5 cm. in depth. The specimen is roughly oval with a straightened poll and convex sides tapering to a dull convex bit. The cross section, an elongated triangle, tapers from the poll end. Three-quarter grooved axes have some diagnostic value since they have long been associated with the clearly known Archaic assemblages of the Eastern Woodlands area (see Thomas 1976 or Kinsey 1976).



ACTUAL SIZE

Ornamental Items

This category includes those stone, bone, antler and wooden objects that are usually associated with religious and/or ceremonial activities in prehistoric cultural manifestations. It is recognized that many items can be improperly identified with such activities and one such category, ornaments, may often be so misidentified. Examples of items that are to be considered as ornaments, and which also may have ceremonial or religious meaning, are pendants, gorgets, ear spools, hair rings, combs and pins, amulets, etc.

Only two objects in this group were found at the Delaware Park Site during the 1979 and 1980 investigations. Both are pendants, one of which is complete. This item, illustrated at the right, is made from a small flat, tear-drop shaped, chert pebble. The only alteration attempted is the rubbing of a hole through the tapered end and the modification of the peripheral edge with a series of incised slashes (33). One face shows a number of oblique lines or scratches that do not appear to be natural.



ACTUAL SIZE

The perforation appears to be rubbed and not drilled because of the elongated wear depressions on either side of this opening. The edge incising was executed with a sharp implement. These slashes are clean and crisp, but very shallow. This pendant measures 3.6 cm. long, 1.8 cm. wide and is .2 cm. thick.

The second pendant is a fragment of shist showing some surface and edge grinding as well as four V shaped incisions (3 are about 0.15 cm. deep and 1 is very shallow). One U shaped notch occurs on another edge (shallow). The V incisions are parallel and rounded toward the apex. This object is roughly rectangular and thin. It measures 2.4 cm. in length; 1.4 cm. in width; and .2 cm. in thickness.

Little in the way of diagnostic value exists with these ornamental items. Pendants have been found in cultural contexts in the Eastern Woodlands from throughout the Archaic and the Woodland Periods.

Feature Typology

The subsurface cultural features excavated at the Delaware Park Site (7NC-E-41) by the Mid-Atlantic Archaeological Research, Inc. field team comprised the single largest type of evidence recovered at the site. The analysis of this data category proceeded not only on the basis of feature morphology but also considered the nature of the feature contents. Feature contents consisted of finished artifacts and debris, charred seeds, pollen and phytoliths and soil chemical residues. These items have been described in an earlier section of this report. The association of contents with the function of the feature in which it was found is not always possible. Very often features appeared to be naturally filled and/or intentionally filled with debris probably obtained from the surrounding ground surfaces. Consequently, function was not always inferable on the basis of contents.

Although one hundred and ninety one subsurface features were investigated during the 1980 field season (a total of 29 additional features were assigned in 1979) only one hundred and seventy three will be dealt with in this report. After investigation, fifteen of the features (#'s 74, 77, 78, 100, 104, 120, 193, 196, 197, 198, 199, 200, 201, 208, 218) were found to be natural surface stains (non-cultural). One feature, Feature # 49, was found to be a modern water pipe trench transecting the site from east to west. Two features, Feature # 66 and Feature # 161, were originally thought to be separate features but have been combined with other numbered features after excavation showed them to be parts of single features. Twenty-nine features were located outside of the Delaware Department of Transportation construction easement and were not considered a part of the project study area.

Analysis of Feature Morphology

The purpose of this analysis was to try to distinguish types of features on the basis of morphology. Rather than use complex multivariate analysis, it was deemed more appropriate to utilize less complex methods. This approach is advocated in a number of texts (Thomas 1976, Parsons 1974). Simple descriptive statistics and correlation of key variables was used to develop the typological classes described in this section.

The first step in the analysis was to pick out feature attributes that were thought the most useful in the development of feature classes. The key attribute was thought to be that of size. Of the attributes recorded for the features, it was assumed that volume was the best overall indicator of size because it incorporates the attributes of surface opening size and depth. Mean volume for the entire sample of features was calculated and seen to be equal to 1359.53 liters with a standard deviation of 1397.57. The smallest feature size was 9 liters and the largest 8140 liters. The moment coefficient of skewness was seen to be equal to 1.56 and the moment coefficient of kurtosis equal to 6.77. These statistics indicate a distribution highly skewed toward the lower values with a fairly high peaked curve. Simply, there more were small features than large ones.

The next step was to group the features into classes of similar volumes. Sturges' Rule* was used to general the appropriate number of classes and indicated that either seven or eight classes would be appropriate. The mean was used as the center of one class. Class width was set to equal to the standard deviation. The classes and the frequency of features per class are noted below.

<u>Class</u>	<u>Frequency</u>	<u>Class</u>	<u>Frequency</u>
0 - 660.74	74	4853.46 - 6251.03	1
660.74 - 2058.32	32	6521.03 - 7648.60	0
2058.32 - 3455.89	34	7648.60 - 9046.17	1
3455.89 - 4853.46	7		

A perusal of the distribution of the features by size class seems to indicate that the data can be collapsed into three main size classes. These size classes are noted below: they are used in the following analysis.

- Small Features - Volume less than 660 liters
- Medium Features - Volume greater than 660 liters and less than 3456 liters
- Large Features - Volume greater than 3456 liters

* Sturges' Rule is described in Robert Parson's Statistical Analysis: A Decision Making Approach, Holt and Rhinehart

After the size categories were determined an analysis of their descriptive shape categories was attempted. The variable of side shape, surface configuration and bottom configuration were examined for concomitant variation and none was evidenced. The implication is that the shape variables in combination are not particularly indicative of any special categories in feature morphology. Because these variables in combination were not seen to be useful indicators it was decided to examine the concomitant variation of the size classes and the descriptive attributes. Only side shape was seen to provide any meaningful co-variation. A cross-tabulation of the feature shapes and the size categories is provided below. Note that the side shape classes are the same as those noted in the original feature inventory.

<u>Side/Shape Classes</u>	Small	Medium	Large
1 vertical	10	20	3
2 $\pm 30^\circ$ slope	15	2	3
3 $\pm 60^\circ$ slope	13	17	1
4 concave	10	7	0
5 1 vert. - 1 sloping	8	2	0
6 Double concave	1	0	0
7 Concave-convex	0	1	0
8 Irregular	2	5	1
9 1 30° - 1 80°	6	1	0
10 Other	5	8	0
Totals	70	61	8

Most of the features from the Delaware Park Site fall within the first five shape categories and the remaining categories seem to be mainly variations of the first five classes or catch-all categories. A perusal of the cross-tabulation indicates some interesting patterns. In the large size category there are two main associations. One is large size and straight sides and the other is large size and sloping sides with a slope angle of 30° or less. Each of these associations is seen as a Feature Type and are defined below.

TYPE I - Straight side shape with a volume in excess of 3456 liters.

Type II - Sloping side shape with an angle of approximately 30° with a volume in excess of 3456 liters.

Analysis of the small and medium categories was not as simple a task. In this case the difference of proportion test was applied to each pair of proportions of side class per size category. The difference of proportion test was applied because the $2 \times k$ contingency test using the chi-square statistic was only marginally applicable and Kendall's tau showed that any association of the side and size classes was quite weak when considered as a whole. The pairs of proportions tests and the results of the tests are noted below:

<u>Side Category</u>	<u>Small Prop.</u>	<u>Medium Prop.</u>	<u>Z Statistic</u>	<u>p</u>
1	10/70 = .14	20/63 = .32	1.80	.07
2	15/70 = .21	2/63 = .03	3.00	.01
3	13/70 = .21	17/63 = .27	1.14	.25
4	10/70 = .14	7/63 = .11	.50	.62
5	8/70 = .11	2/63 = .03	1.33	.18

The only significant differences noted are in the first two categories indicating an association of Medium straight sided features and an association of small low angle side features. These two associations can be viewed as two additional feature types. Also, the lack of association of size and the third side category indicates an additional feature type. The three additional feature types are described below:

Type III - Straight side shape with a volume greater than 660 liters but less than 3456 liters.

Type IV - Sloping side shape with an angle of approximately 30° with a volume less than 660 liters

Type V - Sloping side shape with an angle between 60° and 90°, size is variable

These five categories of features represent the best morphological distinctions of feature types that can be derived based on statistical tests. The features from the Delaware Park Site that can be assigned to this classification numbers 80 or less than 40% of the recorded features. The remaining features can probably be fit into these classes by using a polythetic classification rather than a monothetic one. Also, a re-evaluation of the side shape categories to correspond with the first five described will define additional feature. Probably many features will remain outside of the classification and the interpretation of these features will have to be made on something other than morphology.

The above statistical analysis provided the basis for typing the features, however, the final categories presented in this section of the project report were based on a combination of the statistically-derived significant characteristics and additional morphological characteristics. The characteristics defined by Dr. Jay Custer, side configuration and volume, as significant were used to develop five feature categories. After review of the data, however, it became obvious that the fifth group (Type V above) could be subdivided into three, more definitive, classes using the added factor of feature depth. In applying this characteristic to the original groupings some minor revisions became necessary.

In order to avoid pre-supposing functional use of the following feature types by using group names such as hearths, silos, etc., the seven types described are labeled Type A through Type G. The attributes of each type and the features that fall into each category are described below. Unassigned numbers were originally thought to be features but were later discounted as cultural in origin.

Feature Type A

Feature Type A is a cylindrical pit with vertical sides and a flat bottom (see photograph and profile drawing below). These features have a mean depth of 114.7 cm. and a range from 67 cm. to 155 cm. The mean volume is 2900.9 liters and the range is from 1110 liters to 4939 liters. Type A is the third largest group of features recognized at the Delaware Park Site and comprises 17.9% of the total (31 features).

FEATURE 37

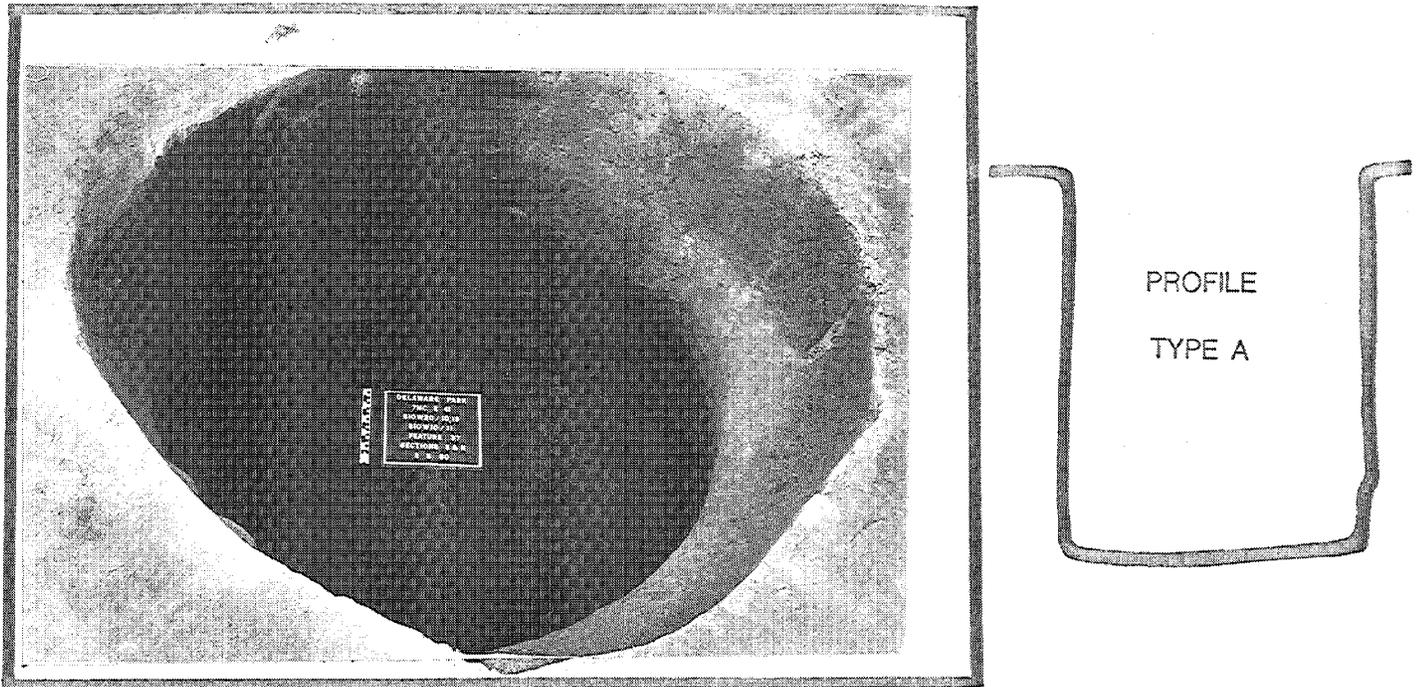


FIGURE IV-2

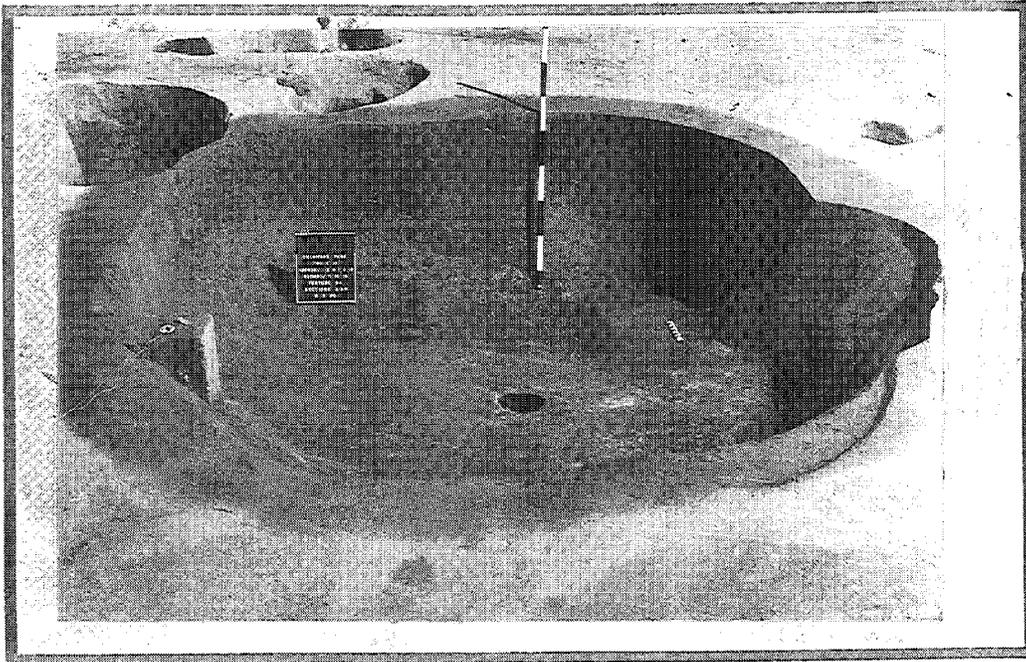
Type A Features:

# 10	# 50	# 95	# 155
37	51	103	156
38	55	126	163
39	62	137	165
40	63	139	174
41	70	140	194
45	91	148	206
47	93	149	

Feature Type B

Feature Type B is a large, shallow pit with sloping sides of $\pm 30^\circ$ slope and flat to slightly sloped floors (see photograph and drawing below). These features have a mean depth of 57 cm. and range from 16 cm. deep to 92 cm. in depth. The mean volume for Type B features is 3496.5 liters and the range is from 777 liters to 8,140 liters. Type B is the smallest group comprising only 2.3% of the total (4 features).

FEATURE 94



Type B Features:

57

72

94

130



FIGURE IV-3

Feature Type C

Feature Type C is a relatively small pit with slightly sloping sides of $\pm 60^\circ$ to $\pm 80\%$ and a flat bottom (refer to profile drawing and photograph below). These features have a mean depth of 68.6 cm. and range in depth from 36 cm. to 120 cm. The mean volume is 1813 liters and the features range from 407 liters to 3330 liters in volume. Type C is the second largest group with 43 features comprising 24.8% of the total feature population at the Delaware Park Site.

FEATURE 188

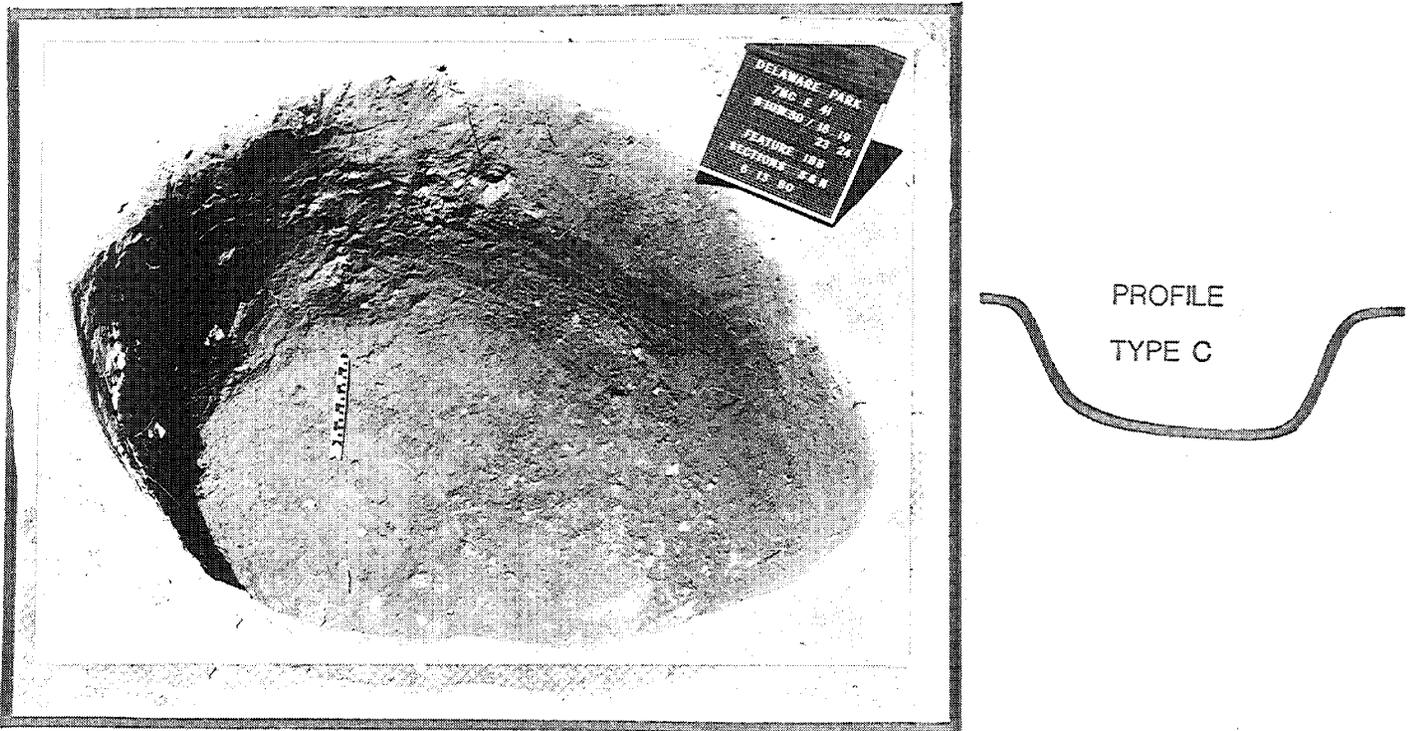


FIGURE IV-4

Type C Features:

# 1	# 53	# 79	# 114	# 146	# 178
8	56	81	118	152	180
11	58	84	121	167	188
12	59	99	122	168	189
36	67	108	129	170	191
46	71	111	138	171	195
48	75	112	143	173	
			145	177	

Feature Type D

Feature Type D resembles Type A except for its smaller overall size. The features of this type have vertical sides and a flat bottom (see photograph and profile drawing). The mean depth for Feature Type D is 85.4 and the range is from 64 cm. to 120 cm. The mean volume of these features is 1308 liters with a range of 610.5 liters to 1998 liters. Type D is the second smallest group identified at the Delaware Park Site with only eight features (4.6% of the total).

FEATURE 157

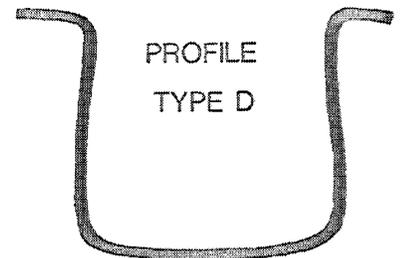
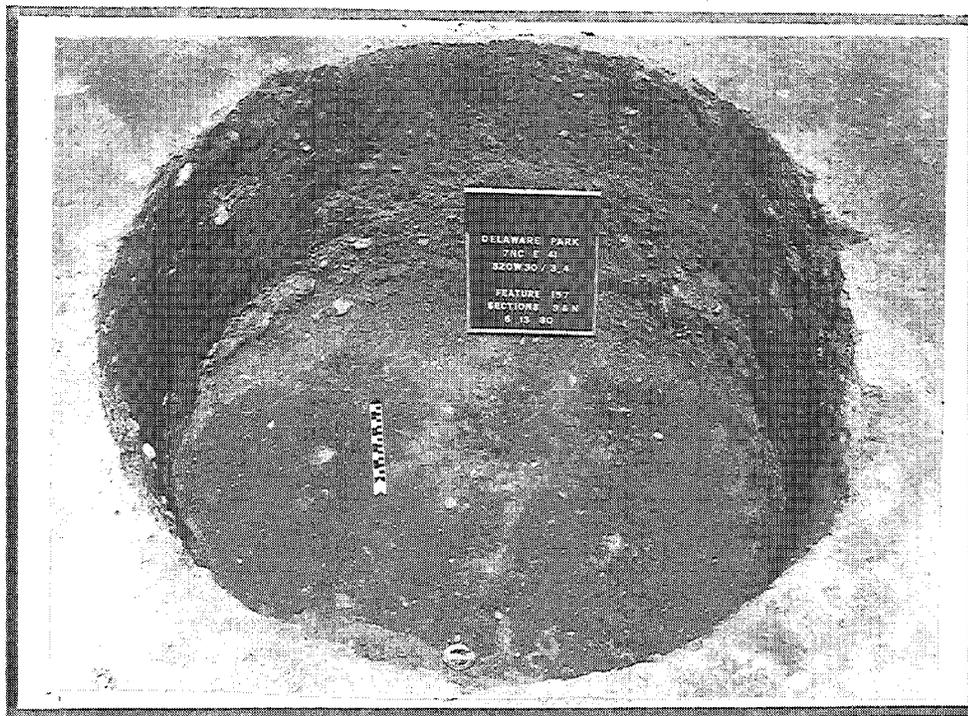


FIGURE IV-5

Feature Type D:

42
96

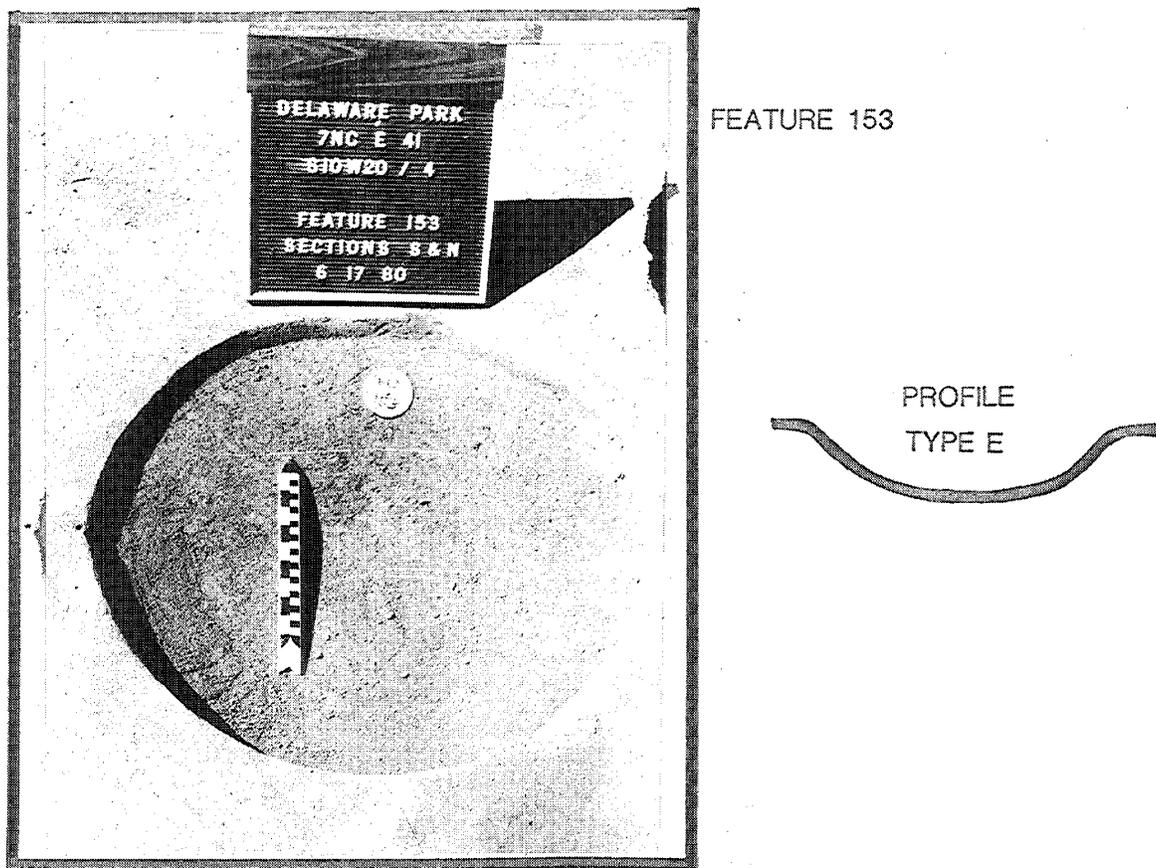
157
159

166
192

210
220

Feature Type E

This feature type is comprised of very shallow subsurface pits with sloping sides of $\pm 30^\circ$ slope and flat bottoms (see photograph and profile drawing below). Feature Type E has a mean depth of 25.9 cm. and a range of 2 cm. to 80 cm. The mean volume is 233.4 liters with a range from .48 liters to 490.3 liters. Type E is the largest group identified at the Delaware Park Site with 47 features comprising 27.1% of the total.



Feature Type E:

FIGURE IV-6

# 43	# 85	# 123	# 153	# 182	# 203
52	90	125	154	183	204
61	92	133	162	184	207
68	101	134	164	185	212
69	105	136	169	186	214
73	110	144	172	187	217
76	116	150	175	190	219
83	119	151	179	202	

Feature Type F

Feature Type F is a very shallow pit with slightly sloping sides of $\pm 60^\circ$ to 80° slope and a flat bottom (see photograph and drawing). These features have a mean depth of 48.8 cm. and a range of 18 cm. to 76 cm. The mean volume is 318.4 liters and the range is from 18.5 liters to 647.6 liters. Type F is the fourth largest group with 21 features comprising 12.1% of the total identified at the Delaware Park Site.

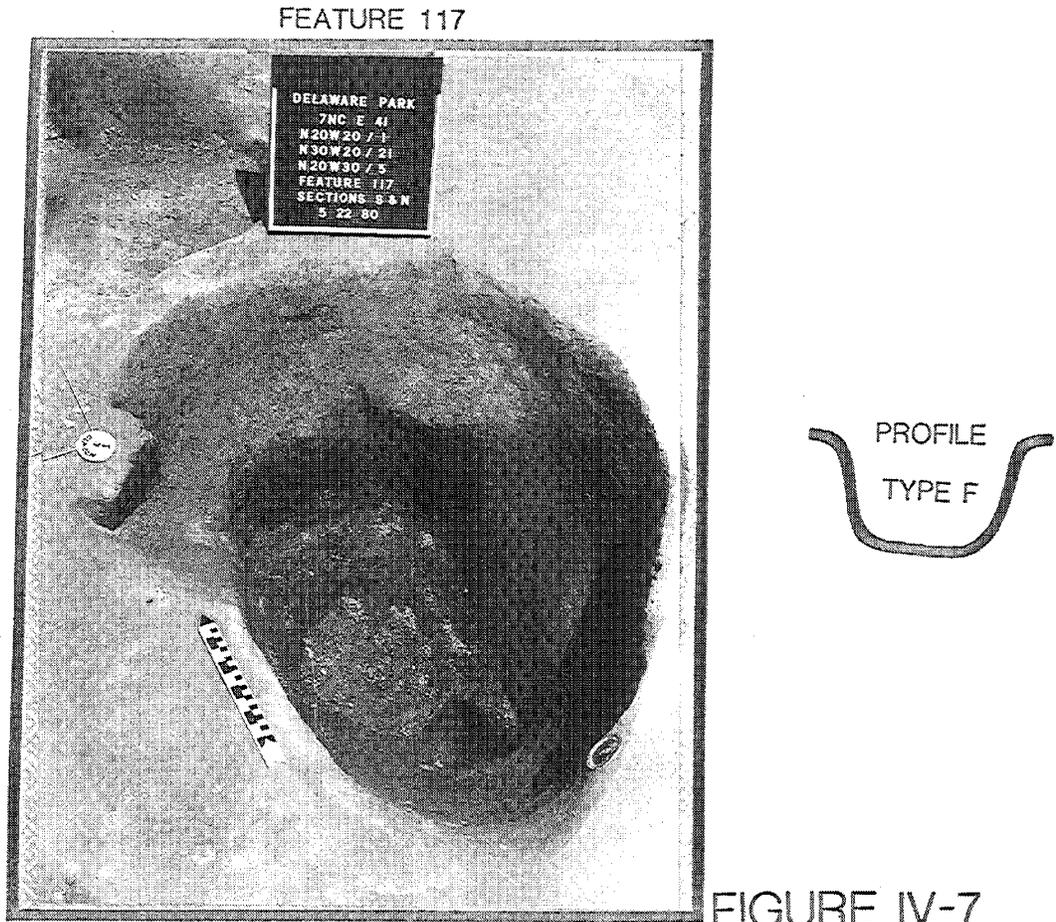


FIGURE IV-7

Feature Type F:

# 44	# 87	# 128	# 176
54	106	131	205
65	107	141	209
80	113	142	
82	117	147	
86	127	160	

Feature Type G

This class of features is a miscellaneous category. The features placed in Type G do not fit into any of the previously described types. Because of the small number of features remaining after the first six categories were defined, 10.9% or 19 features, no attempt was made to subdivide this group into additional types. Also, the quantities of artifacts contained in the features of this group are insignificant and the amorphous nature of the features lend support to the contention that further attempts at categorization would not be useful.

FEATURE 109

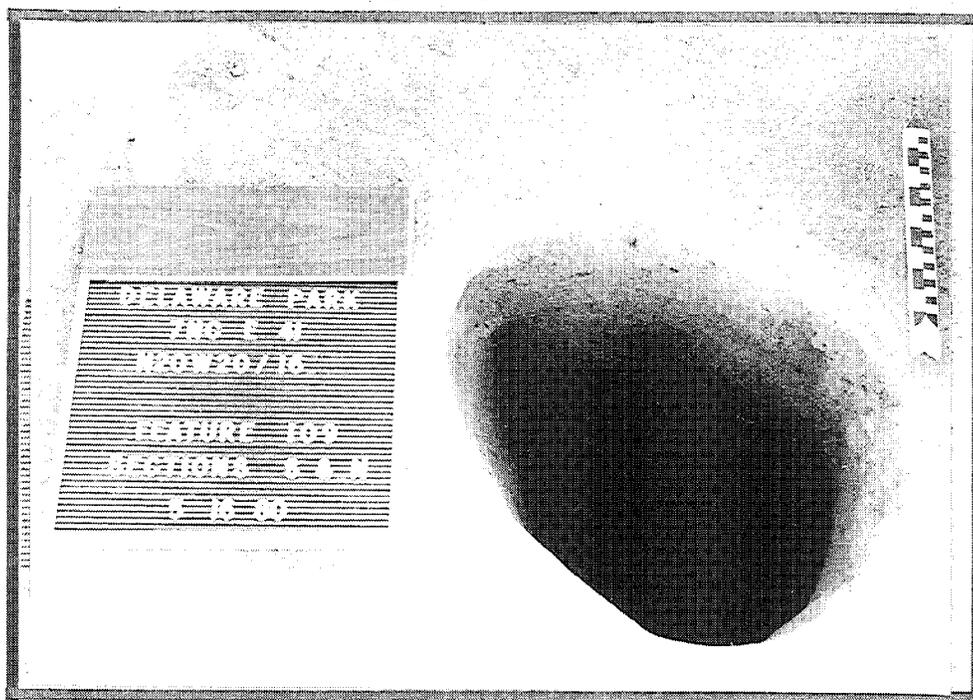


FIGURE IV-8

Feature Type G:

# 9	# 97	# 124	# 211
60	98	132	213
64	102	135	215
88	109	158	216
89	115	181	

Feature Dates

The radiocarbon dates for some groups are limited or non-existent due to an insufficient amount of charcoal from the fill. A complete listing of radiocarbon dates by feature is given in Appendix K. The range of radiocarbon dates for Feature Type A is 425 B.C. to A.D. 640 and includes nine dates. Feature Type B has only two dates, 1850 B.C. and 790 B.C. Feature Type C has a date range of 740 B.C. to A.D. 190 and is comprised of seven dates. Feature Type D has a single associated radiocarbon date of A.D. 605. Two dates were processed for features of Type E, A.D. 80 and A.D. 95. There was not enough charcoal available to run dates on features of Type F and no dates were processed for Feature Type G since this was a non-diagnostic category.

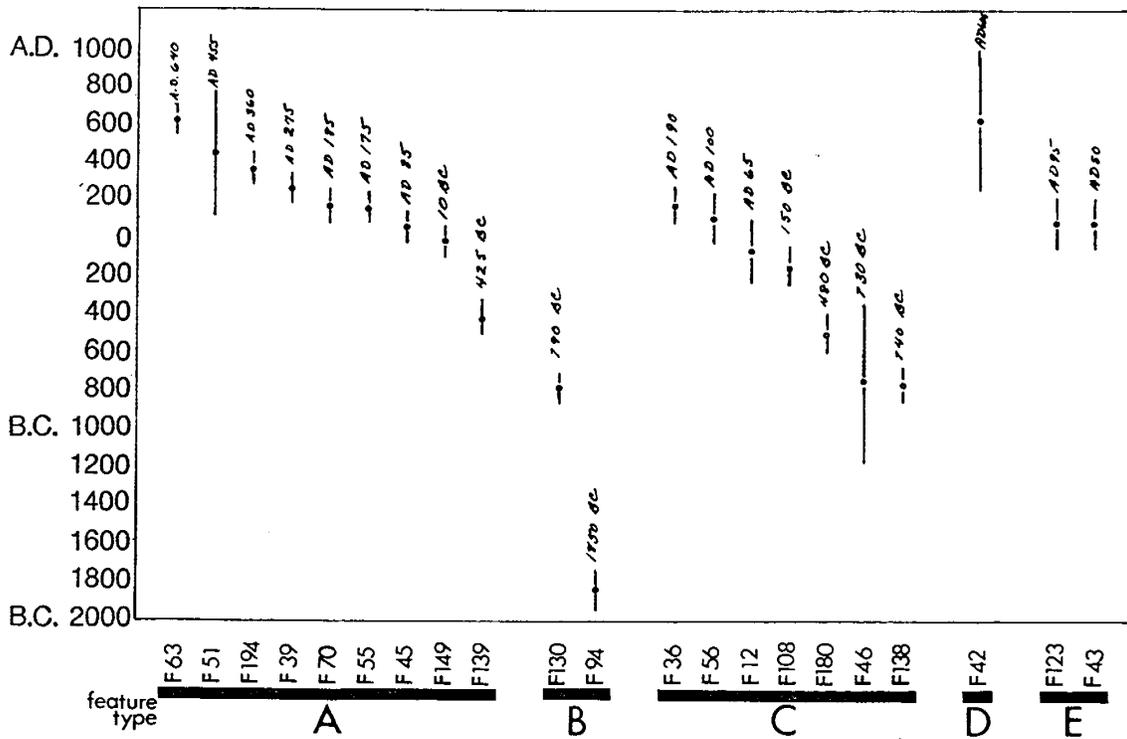


FIGURE IV-9

In none of the descriptions of feature types was there mention of functional evidences associated with feature walls. Content, while perhaps indicative of activities that went on around or even within a feature, are not direct indicators of the original use to which a subsurface feature was placed. More will be said on this matter in the Interpretation section of this report.

Feature Distribution

The distribution of the various defined feature types throughout the excavated project area at the Delaware Park Site was carefully investigated to determine if any functional activity areas could be ascertained. The analysis of the data is presented in the interpretation section of this report. Appendix M contains block maps, each presenting the distributive data from within a ten meter square block, intended to allow for further analysis of feature type distribution.

The data presented in the block site maps includes the feature outline as is was recorded after the surface had been removed by machinery, the feature had been outlined during flat shoveling procedures and after the entire feature had been excavated. This allowed earlier estimates of surface configuration to be corrected through exact detailed excavation. The block maps have been combined to form the overall site map which is included as an insertion at the back of this project report.

Each block map is accompanied by an overlay which presents the typological identification of each feature within the block. The overlay includes all seven feature types (A - G.) as well as any radiocarbon dates obtained from features within that particular block. (see Appendix M)

Brief comments can be made at this time concerning the distribution of the feature types in relation to the site topography and in relation to other features of similar type (implying functional activity areas). No statistical tests have been run on this data (nearest neighbor analysis, etc.). It does appear, however, as if clustering can be seen in certain parts of the site. This will be further discussed later.

The fact should be again emphasized that the distribution of features illustrated in the block maps and in the overall site map does not include all features present at the Delaware Park Site, only those within the excavated project area. During the 1979 investigations (intensive survey) a number of features were identified, and several excavated, (see MAAR's survey report on Routes 4, 7 and 273) that are outside of the project area. It is probable that the distribution within the project area is reflective of the distribution of the entire site, however, it is just as likely that the overall Delaware Park Site activity area is more or less patterned with certain feature types clustered within the project area (Type A or C, for instance) while others that are poorly represented in the block maps are more frequent in a portion of the site that has not been investigated.

The discussion of the site's function and chronological/cultural associations will clarify this problem of whether or not the excavated portion of the Delaware Park Site is likely to be representative of the entire site.

Perishable Items

Within the feature matrices were preserved a considerable amount of non-artifactual data. This data included charred seeds, pollen, phytoliths, chemical residues and charred organic material. The recovery of this data was a primary objective of the research design (see Appendix A. The field and laboratory methodology adapted for the project (Appendix B) included techniques by which information of this sort could be recovered, processed and analysed. Due to the specialized nature of such investigations, a number of specialists were contracted. Their reports are included as appendices to this report. The information presented below is summarized as a ready source of general information. The appendices should be consulted for detailed information on this data base.

Charred Seeds

During the intensive survey of the Delaware Park Site it was recognized that charred seeds of probable aboriginal derivation were present in the subsurface features. Consequently, the "Blueprint for Action" addressed the question of recovery of this valuable data base. Soil samples from all cultural features as well as from natural strata were subjected to the flotation process. Both the light fraction and the heavy fraction from the flotation material was saved and selected material was submitted to the MASCA laboratories at the University of Pennsylvania for identification and interpretation.

Ms. Pam Crabtree and Ms. Alexandra Langendorfer working under the supervision of Dr. Stuart Fleming, MASCA Director, analyzed the samples from the Delaware Park Site and submitted a report included as Appendix E. The following is a summary of that report.

The charred seeds recovered from the flotation of soil samples show a wide range of plant species, many of which may have been utilized by the aboriginal occupants of the site during the two thousand year span that the Delaware Park Site witnessed aboriginal activity. During that time span no clear indication of change in the range of available plant species could be noted. The investigators could not draw supportable conclusions about seasonality of use of the site although it is suggested that a fall occupation would not be incompatible with the interpretations that could be drawn from the seed data base.

The majority of the plant species recovered were in very low quantities. Fifty plant taxa were identified but 28 of these are represented from only one or two features. Also, the presence of at least one Old World plant taxa indicates that some contamination of the aboriginal feature matrices must be expected. Consequently, only those plants that are represented by relatively large amounts of carbonized seeds can be considered as likely to represent species that were available for and utilized by aboriginal site occupants.

The following plant types can be considered as the predominant plants at the Delaware Park Site, although it is not certain that any of them were utilized by the site occupants:

Juglandaceae Carya sp. - hickory
Chenopodium Amaranthus - goosefoot, pigweed, lambsquarters
Rosaceae Rubus sp. - blackberry/raspberry
Cruciferae Brassica sp. - mustard
Leguminosae Amphicarpa bracteata - hog peanut
Liliceae Polygonatum biflorum - Solomon's seal
Phytolaccaceae Phytolacca americana - pokeweed
Vitaceae Vitis riparia - wild grape
Fagaceae Quercus sp. - acorn

Also utilized by aboriginal peoples of the eastern United States are plants providing parts as medicines. The complete list of seeds recovered at the Delaware Park Site, together with their potential uses, is provided in Appendix E.

One additional bit of information needs mentioning at this time. In none of the flotation samples submitted for analysis were there any indications of cultivated plants. Although it is known that Chenopodium and Amaranthus were cultivated, or at least manipulated by man in other parts of the New World, the seeds from the Delaware Park Site do not indicate selection (cultivation).

Pollen

The following is taken from the summary section of Appendix G: Pollen Found at the Delaware Park Site, by Michelle Doyle, as presented in this report. Pollen studies were scheduled in an attempt to determine as much as possible about the climate of the immediate area of the Delaware Park Site during the various periods of occupation. It was also oriented towards the determination of the potential floral resources available to the aboriginal occupants of the site and to the determination of those resources that might have been exploited. Pollen samples were also taken in non-feature contexts (strata cuts) in an attempt to support the reconstruction of the geological factors that led to the formation of the site during the early Holocene.

"Pollen studies conducted on a series of grab samples taken in archaeological features at the Delaware Park site near Stanton have provided data for paleoenvironmental reconstruction. Three major floral environments have been recognized - mixed deciduous forest, forest opening, verge or meadow, and a fresh or slightly brackish swamp area. Geological evidence and present-day topography has been used to plot the distribution of these elements in the area of the site". (see Doyle's appendix to this report)

Doyle's research indicates that climatic conditions varied at the time of site occupation from present conditions. A summary analysis of the paleo-environmental data, both pollen and phytoliths, is useful at this point. Table 4, attached to the Doyle appendix, lists selected pollen percentages from dated archaeological features. Feature # 194 was not included in the analysis because of the low number of pollen grains (14) in the analysed sample. It can be seen that the species composition of the samples remain remarkably consistent from 1850 B.C. to A.D. 640. Non-aboreal pollen comprises the majority of the pollen in the samples in all cases with aboreal pollen indicating an oak-pine-elm or oak-elm-pine forest setting, As noted in the appendix, a heavily vegetated open meadow or grassland setting is projected with interspersed stands of mixed deciduous-coniferous forests. Table 4 indicates that this environmental setting lasted at least from 1850 B.C. to A.D. 640 and did not change appreciably during the entire span of human occupation at the site.

The environmental reconstruction generated from the Delaware Park Site pollen data fits well with available pollen data from the local area as well as pollen summaries from the Middle Atlantic region in general. In a summary of pollen distributions and Holocene environments of northeastern North America, Bernabo and Webb (1977:81, Fig. 17) note oak-pine pollen concentrations in the Middle Atlantic area during the middle Holocene along with substantial non-aboreal pollen elements. Similarly, Carbone (1976:76) in a review of the specific pollen data from the Middle Atlantic notes that the time period represented by the Delaware Park Site data, the Sub-boreal climatic episode, is characterized by oak-pine forests throughout much of the Transitional area of the Middle Atlantic with many areas showing substantial non-aboreal components. These environments, especially places where hickory is evident, are seen as indicators of warmer and dryer climatic conditions associated with the mid-postglacial xerothermic.

Low pollen data also corresponds to the Delaware Park Site data. Rasmussen (1958) notes oak-hickory and grass pollen in the upper levels of deposits within a bay-basin feature (Borthwick Basin) near Blackbird State Forest in southern New Castle County. Although this pollen assemblage is not dated, it occurs stratigraphically above a hemlock dominated assemblage that can be dated to approximately 6000 to 4000 B.C. Therefore, the Borthwick Basin data shows non-aboreal pollen and oak dominated xeric forests appearing some time after 4000 B.C. At the Dill Farm Site in southern Kent County (data on file at the Island Field Archaeological Museum and Research Center) a pollen assemblage dated to 450 B.C. contained an oak dominated assemblage with substantial non-aboreal pollen.

Also, a variety of undated assemblages that can be tentatively assigned to the post-3000 B.C. period show similar pollen profiles. Included in this group would be a series of cores from the lower Chesapeake Bay (Harrison et al 1965), a series of cores from the vicinity of Reedy Island in the Upper Delaware Bay (Owens et al 1974) and a series of cores from various terraces of the lower Delaware River near Camden, New Jersey (Sirkin et al 1970). Finally, pollen data from a sinkhole near Hockessin shows a pronounced increase in non-aboreal pollen associated with mid-Holocene deposits. In sum, the Delaware Park pollen assemblage with its oak-dominated aboreal pollen components and its high percentage of non-aboreal pollen fits in with other data from the general area.

It can be stated that the Delaware Park pollen and phytolith assemblages (see next section) seem to be quite similar to other similarly dated, middle Holocene, pollen assemblages in the local and regional areas. The preponderance of non-aboreal species indicates a grassland setting or open woodland. Following the work of Carbone (1976) this can be interpreted as indications of somewhat warmer and dryer conditions that correspond to the mid-postglacial xerothermic. It should be noted, however, that a number of aquatics and fresh-water marsh species are noted in the Delaware Park site assemblages. These species are seen as indicative of local marsh edaphic settings within the broader matrix of environments that are indicative of warmer and dryer settings. Indeed, the presence of these species probably indicates the attractiveness of the Delaware Park site as a habitation location. The location of the site at the junction of a variety of environmental settings; fresh to brackish water swamp/marsh, grasslands or open woodland, and mixed forest, would have maximized the variety of natural food resources available within the local area. Also, the presence of the swampy and marshy settings would indicate availability of surface water that would represent a critical resource during the mid-post-glacial xerothermic. An especially interesting feature of the Delaware Park site assemblage is the late date of the pollen assemblages showing the grassland and open woodland environments. Regional pollen data has shown the onset of warm and dry conditions in the Middle Atlantic occurs around 3000 B.C.; however good data is not available on the temporal extent of these conditions. The data from the Delaware Park site shows that these climatic conditions lasted at least until A.D. 640. As such, the mid-postglacial xerothermic would seem to correlate nicely with the Late Archaic through Middle Woodland Periods.

Phytoliths

A total of 17 samples of soil from Delaware Park Site features were submitted for analysis to Dolores Piperno, Temple University, a specialist in the identification and interpretation of phytoliths. The primary objective of the analysis was to determine if any cultigens were present in the site soil and might be indicative of horticultural practices during the occupation span of the site.

Two samples taken from Feature 59 at the site were analysed, one from near the top and the other from deeper levels. The first sample proved to have maize phytoliths while the lower sample showed little evidence for maize. The small percentage of cross-shaped phytoliths (large numbers of which indicate maize) were well within the values obtained from wild grasses. Phytoliths isolated from the total sample examined indicated a variety of wild plant types with grasses being the most common. Sedge and sponge phytoliths were a frequent occurrence in the sample slides examined, an indication that a source of fresh water was nearby.

The general indication of the study is that an open land environment was present during the period of site occupation. This open land would have been heavily vegetated with well-watered grasses and shrubs. The picture that arises is not unlike that provided by the seed analysis and the pollen analysis. The maize phytoliths identified were probably intrusive and the deeper cross-shaped phytoliths can be attributed to the grasses.

Soil Residues

Chemical analyses of soil samples taken from features and excavation control units at the Delaware Park site (7NC-E-41) were done through the services of the University of Delaware Soil Laboratory. These analyses resulted in the determination of phosphorus content, Potassium content, Magnesium content, Calcium content and soil pH. A decided difference in content was recorded between the control samples and those taken from the various cultural features (pH was taken to determine if it had any patterned effect on the concentration of other elements). The following results were obtained.

Phosphorus residues are formed from high plant organic concentrations. Their presence in archaeological soil samples usually indicate that floral food debris was formerly present. Table IV-2 indicates that the normal phosphorus content of control soil samples is 6.9 ppm while that of the feature samples varies from 11.8 ppm to 20.5 ppm, two to three times that that would be expected if plant materials in high concentrations were not present in the feature fills. It is also possible that the high phosphorus content indicates human activity in the form of excrement and urine residues. Also contributing to the phosphorus content of the feature fill may have been animal or human bone and fleshy materials.

The calcium content of the features, as it relates to the control samples, is even more striking. Control sample calcium has a mean of 20.0 ppm., based on the 35 samples taken from excavation units (refer to Appendix h). In contrast, the calcium mean ppm.'s from Feature Type A samples is 669.3 ppm. (see table below). The presence of calcium is often interpreted as indicating a disintegrated bone residue. The pH of the soil throughout the site, both in and out of pits, is exceedingly acidic and any bone which may have been present at the site (none was recovered) would have quickly disintegrated. Based on a mean frequency for the five features types sampled of 735.8 ppm., it is likely that the features excavated at the Delaware Park site contained, at one time or another, large quantities of faunal remains (either animal food resources or human burials, etc.).

Neither Potassium nor Magnesium show as sharp a difference between the samples from features and from control units. Potassium concentration in the control units have a mean ppm. of 18.9 while that of Feature Type A, for instance is 68.1. Magnesium ppm. mean from the five control units is 48.1 and that of the five feature types is 96.5. The meaning of these higher concentrations for Potassium and Magnesium is not speculated upon.

In summary, it is suggested that the chemical residues present within the feature types excavated at the Delaware Park site are due to human activity rather than natural factors. Since the samples were taken from the fill and not the walls or floor of the features, it can only be stated that cultural activity pertaining to the filling of the open subsurface pits can be demonstrated. This activity almost certainly consisted of food material processing and discarding, may have involved human excretionary activities, and could possibly have included human mortuary practices.

#	Type	Phosphorus	Potassium	Magnesium	Calcium
10	Feature Type A	20.5	68.1	127.6	669.3
2	" " B	19.5	129.5	73.5	1050
17	" " C	20.1	95.4	91.3	685.8
11	" " E	17.8	95.0	58.0	606.6
10	" " F	11.8	112.8	76.5	667.4
Unit					
4	N10/W30 - 23	8.0	22.5	30.5	24.0
11	N20/W20 - 8	7.1	20.9	47.3	23.3
5	N10/W10 - 12	6.6	12.8	41.6	19.2
6	N10/W20 - 17	6.2	26.6	46.6	17.0
10	S20/W20 - 4	6.7	11.7	74.3	17.3

Table IV-2 - Chemical Residue PPM Means from the Delaware Park Site

Faunal Resources

Due, undoubtedly, to the high pH of the soil at the Delaware Park Site, little in the way of faunal remains was found during the 1979 and 1980 investigations by Mid-Atlantic Archaeological Research, Inc. Flotation was conducted with a large enough sample to be able to note any minute material, as a consequence, it appears possible to state that, with one exception, no faunal material has been preserved for examination at the Delaware Park site. The exception to this statement is the recovery from one feature of fish scales in a concentrated area. These scales appear to be from a trout-sized fish, probably of local (White Clay Creek) derivation, but not positively identified. The explanation for this sole preserved faunal item has not been determined.

The only other faunal item found appears to be intrusive. It is a single large bone fragment of an unidentified mammal (possibly a deer or similar-sized domestic animal). This fragment appears to have been gnawed and may have been dragged into the site matrix by a fox or other burrowing animal in recent times.

Radiocarbon Dates

All radiocarbon dates obtained on charcoal recovered at the Delaware Park Site were processed by the Center for Applied Isotope Studies at the University of Georgia in Athens. The dates were submitted in four lots beginning during the field season. A total of 24 samples were submitted, 21 of which resulted in the dating of feature matrix from prehistoric Delaware Park Site features.

All samples submitted were composed of wood charcoal with one exception. A preserved wood specimen, recovered from a strata cut excavated for geomorphological purposes, was sent down but not processed due to the presence of too little CO₂. For the most part the charcoal was recovered enmass although a few samples consisted of charcoal flakes taken from throughout a particular feature lens. In all cases, the material submitted was from a cultural subsurface feature with either artifacts of a diagnostic data or with supplemental data from pollen analysis, phytolith studies and/or soil analysis.

The following chart gives the range of radiocarbon dates obtained from the Delaware Park Site. Specific dates, together with photographs of the diagnostic artifacts found in the dated feature matrix, are presented in Appendix K. Several dates have extremely high sigma ranges. These are due to the small sample size remaining after laboratory burning. They were run, however, since the feature matrices which they date contained diagnostic artifacts.

In general, the range of dates obtained from the Delaware Park Site feature matrices agrees rather well with the range expected based on cultural/morphological stylistic dating factors. The earliest of the dates relates to a feature containing a cache of Terminal Archaic cache blades and a grooved axe. The date of 1850 ± 100 years B.C. appears to fit this association. Although it was originally felt that the surface collected material from the 1979 field investigations related primarily to the Late Archaic Period the radiocarbon date range indicates a primary site occupation in the Early/Middle Woodland Period. The scarcity of Late Woodland artifacts found at the site (limited to a few triangular projectile points and a single pottery category) appears to be supported by the terminal radiocarbon date of A.D. 640 ± 155 .

Although the charcoal submitted for processing, in all cases, was recovered from cultural features a word of caution is necessary. During the process of feature excavation and filling, materials lying on the surface and immediately below the surface might be inadvertently disturbed and included with the feature fill. As a consequence, diagnostic artifacts, and possibly charcoal, could relate to earlier deposits within the Delaware Park Site rather than to the period when the feature was being used. Certain kinds of paleoethnobotanical materials would be more likely to relate to the period of feature use, especially if found in large numbers, since organic material is likely to have decayed if left exposed to the weather for long periods of time. Of course, small numbers of charred seed, pollen grains and phytoliths could also be intrusive into excavated features. For these reasons, the radiocarbon dates presented should be assessed on a number of bases before they are accepted without question.

FIGURE IV-10

1 CM. = 200YRS.

