VI

SITE FORMATION PROCESSES AND PREHISTORIC COMPONENTS

The principal goal of this chapter is to establish cultural units for interpretation of the prehistoric use of the site. Because past human behavior cannot be directly observed, it must be examined through its tangible byproducts, artifacts. Inferences about past behavior are drawn from patterns observed in the spatial and temporal arrangement of artifacts. However, the arrangement of artifacts within an archaeological site is not always a direct reflection of past human behavior; both natural and cultural processes, over time, reshape or alter a site's archaeological record (Schiffer 1987). Consequently, the identification and evaluation of site formation processes must precede the definition of cultural or stratigraphic units, activity areas, and other patterning in the archaeological record that presumably reflects cultural behavior.

The typological evidence for establishing individual prehistoric components or occupations is discussed in Section A, and site formation processes are addressed in Section B. This latter discussion considers the natural processes of soil development and landscape evolution, the relationship of the prehistoric deposits and features to specific pedological contexts, and the historical and recent human activities that have modified the site's prehistoric archaeological record. The final section in this chapter (Section C) combines the above information in an attempt to define meaningful analytical units with which to investigate past human behavior as evidenced at Site 7S-F-68.

A. SITE FORMATION PROCESSES

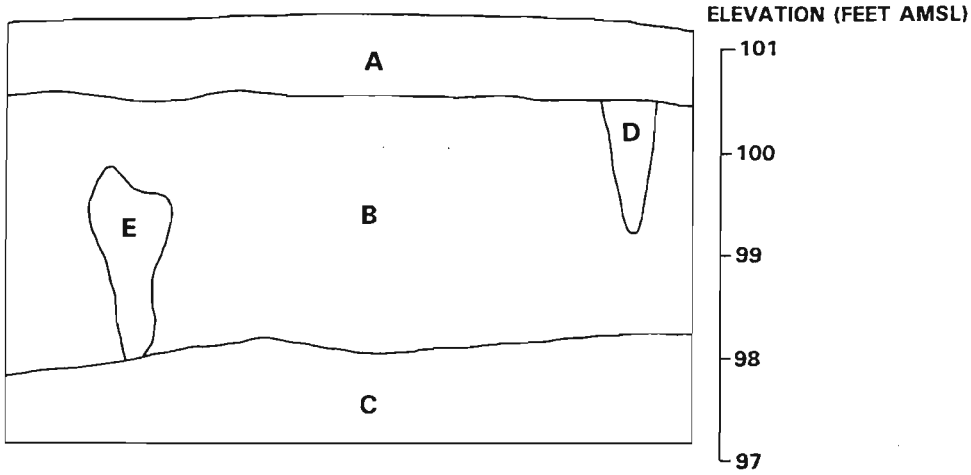
This section describes the natural and cultural formation processes that shaped the site's archaeological record. Identification of site formation processes must precede the definition of cultural or stratigraphic units, activity areas, or other patterning in the archaeological record that presumably reflects cultural behavior. The natural processes of soil development and landscape formation are discussed first, focusing on the pedological contexts which contained the site's archaeological deposits. This is followed by a general discussion of the prehistoric deposits and features, particularly as they relate to the pedological contexts. Historical and recent formation processes that have modified the archaeological record are discussed at the end of this chapter.

Three principal strata (A, B, and C) were defined during excavation. These stratigraphic designations provided a consistent field terminology for use during testing and data recovery, but they do not correspond to precisely defined pedological units. The soil stratigraphy was relatively simple, consisting of a plowzone (Ap-horizon) that overlay a weathered subsoil (Strata B and C). The soils consisted primarily of fine sands, with some mottling and argillic development visible in the lowermost levels. In the most elevated area of the site, the A-horizon was severely truncated, while the downslope area exhibited a much more massive organic surface soil. The soil profile of Excavation Unit 35 portrays the typical stratigraphy for the northern, more elevated portion of the site, while the profile for Test Unit 7 illustrates the typical stratigraphy for the southern, downslope area of the site, adjacent to the wetland (Figure 8). The plowzone, designated Stratum A, generally extended 25-30 cm below the extant surface, and it was typically described as a dark brown loamy sand. Strata B and C were yellowish brown sands, distinguished by a slightly paler color and a higher silt and clay content in Stratum C.

Wagner's pedological and geomorphological analysis of the site (see Chapter III) indicates that the site occupies a dunal landscape form. Dunal landscape forms are fairly common throughout southern Delaware, and they are often located at the margins of large swampy areas (Wagner 1992). The particle size analysis strongly supported the dunal origin of the site's landscape setting, and the profiles were dominated by fine and medium sands which are readily borne by wind. Throughout most of the site, only slight soil differences were apparent with depth, but a finer-textured substratum probably underlies the entire site area. This sandy clay loam substratum appears to have been the basal deposit upon which the aeolian sands were deposited during the Pleistocene (Wagner 1992).

Sandy soils typically display weak soil development, and they are quite susceptible to vegetative denudation, reworking, and erosion. Natural processes such as animal burrowing and tree fall also contribute significantly to mixing and reworking in sandy soils. Although it is difficult to interpret weathering and horizonation in sandy soils, the particle size distribution suggests two sequences of deposition and weathering, which may correlate to a period of soil formation during the early Holocene, followed by a later soil formation episode during a more recent xeric in

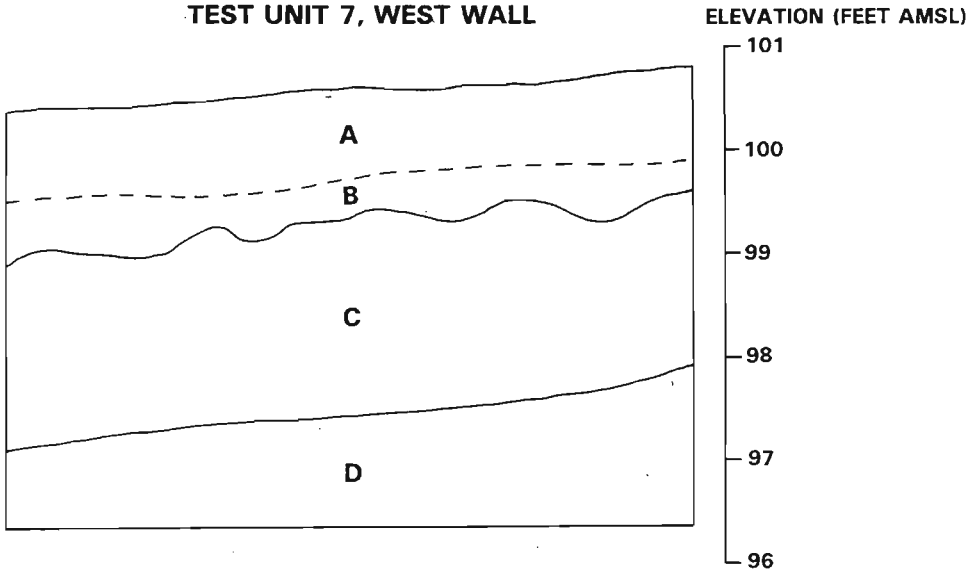
EXCAVATION UNIT 35, WEST WALL



LEGEND

- **A** YELLOWISH BROWN (10YR 5/4) LOAMY SAND
- **B** YELLOWISH BROWN (10YR 5/6) SAND GRADING INTO MOTTLED YELLOWISH BROWN (10YR 5/4), BROWNISH YELLOW (10YR 6/6), VERY PALE BROWN (10YR 7/4), LIGHT OLIVE BROWN (2.5Y 5/6), AND OLIVE YELLOW (2.5Y 6/6) SAND
- **C** COMPACT MOTTLED LIGHT YELLOWISH BROWN (10YR 6/4), VERY PALE BROWN (10YR 7/4), WHITE (10YR 8/2), AND BROWNISH YELLOW (10YR 6/8) SAND WITH IRON CONCRETIONS
- **D** TAPROOT STAIN: YELLOWISH BROWN (10YR 5/4) TO LIGHT YELLOWISH BROWN (10YR 6/4) SAND
- **E** WHITE (10YR 8/2) SAND

TEST UNIT 7, WEST WALL



LEGEND

- **A** DARK BROWN (10YR 3/3) LOAMY SAND
- **B** MOTTLED DARK YELLOWISH BROWN (10YR 3/4) LOAMY SAND
- **C** YELLOWISH BROWN (10YR 5/6) SAND
- **D** MOTTLED BROWNISH YELLOW (10YR 6/8) AND LIGHT GRAY (10YR 7/2) SAND

0 30 CM
0 1 FOOT

FIGURE 8: Representative Soil Profiles

terval (Wagner 1992). Although evidence of two distinct weathering episodes was not apparent at all sampling locations, the presence of strongly developed argillic horizons suggests that the landscape has remained relatively stable since the late Pleistocene.

The absence of clearcut lithological discontinuities in the stratigraphic profiles would be most consistent with a gradual, rather than episodic, introduction of new material. Moreover, a factor that would have accelerated the integration of new material into the existing soils is the sandy texture of the local soil. The pedological analysis did not indicate any lithological discontinuities, which suggests that artifact burial was primarily accomplished either through very localized reworking of the site soils or through the introduction of new materials comparable to those already on the site. Accretion of the landscape surface would be most readily attributed to the introduction of new material, most likely by aeolian activity. The homogeneous texture of the surficial soils would be consistent with accretion by introduction of new material, but only if introduced at rates sufficiently gradual to disguise different materials through the blending action of pedoturbation processes (Wagner 1990). The accumulation of roughly one meter of soil over a period of 10,000 years, an average rate of 1 cm per century, should be considered gradual. Experimental studies have demonstrated that sandy soils are much more readily "homogenized" than more finely textured soils (silts and clays) as a result of common processes such as animal burrowing, trampling, root growth, tree fall, and freeze-thaw cycles (Wood and Johnson 1978). Some downward movement of artifacts within the soil profile would be attributable to these pedoturbation processes, and this would account for the declining recovery of cultural material in the lowermost levels.

Based on typological evidence, prehistoric occupation of the site is considered to span the rather lengthy period from circa 9000 BC to 1600 BC, representing the Paleoindian through the Late Woodland periods. Given the sandy soils and the relatively shallow overall depth of deposits, it was expected that some mixing of deposits associated with various occupational episodes had occurred; nonetheless, preliminary analysis indicated that the deposits retained a measurable degree of temporal stratification.

Prehistoric artifacts were recovered from contexts ranging from the surface to a maximum depth of 1.2 meters below the extant ground surface. Distribution plots (Figure 9) indicate that nearly 90 percent of the prehistoric material was recovered from Levels 1-6 (plowzone and the first five subsoil levels). There was a sharp drop in the frequencies of recovered material below Level 6, and Levels 10-13 yielded a combined total of less than one percent of the total prehistoric assemblage. The plowzone was excavated as a single level (Level 1), and although it was equivalent in volume to two or three 10-cm subsoil levels, the amount of prehistoric material it contained was roughly equivalent to that of each of the three immediately underlying subsoil levels (Levels 2-4).

The prehistoric features identified at the site originated at depths ranging from 17 to 107 cm below the surface, and the depths from the modern ground surface to the top of the prehistoric features ranged from 10 to 90 cm, as shown in Figure 10. The burial of prehistoric features and deposits within the site must be attributed to some mechanism, either natural or cultural. For the most part, the archaeological features and deposits appear to be representative of material deposited on an occupation surface, and their burial would be attributable to natural processes.

The radiocarbon dates from the site reflect the lengthy period of site occupation, and they are consistent with use of the site from the Early Archaic through the Late Woodland/European Contact periods. Radiocarbon dates were obtained from charcoal samples from eight contexts (Figure 11). The contexts of the dated samples suggest that the deposits exhibit stratigraphic order, i.e., the oldest materials are in deep subsoil contexts, and the most recent occur in surface and near-surface horizons. The oldest date (7560 $\pm$ 340 years BP; Beta-56049) was obtained from charcoal recovered from Level 10 of Unit 45, while the most recent date (310 $\pm$ 80 years BP; Beta-56048) was obtained from Feature 20, a large charcoal concentration confined to the base of the A-horizon in Unit 47. The remaining six dates, obtained from various feature and level contexts within Levels 2-5, all fall between 1000 and 3000 years BP, an interval which roughly corresponds to the Early and Middle Woodland periods in the traditional Middle Atlantic chronology. The rough stratigraphic ordering of the radiocarbon dates supports the interpretation of gradual introduction of new material onto the site throughout the Holocene.

Crossmending, or refitting, of artifacts provides additional information pertinent to understanding the site's formation processes. After cataloging was completed, a systematic exercise to refit lithic artifacts was carried out, and a number of crossmends were identified (Table 7). Each group of two or more items that crossmended was given a specific refit number, with a letter suffix indicating the artifact class ("B" for bifaces; "U" for unifaces; "FCR" for fire-cracked rock). The refits were classified in one of four groups based on the relationship of the contexts of the crossmended pieces, "W" indicating crossmending within the same provenience, "H" indicating

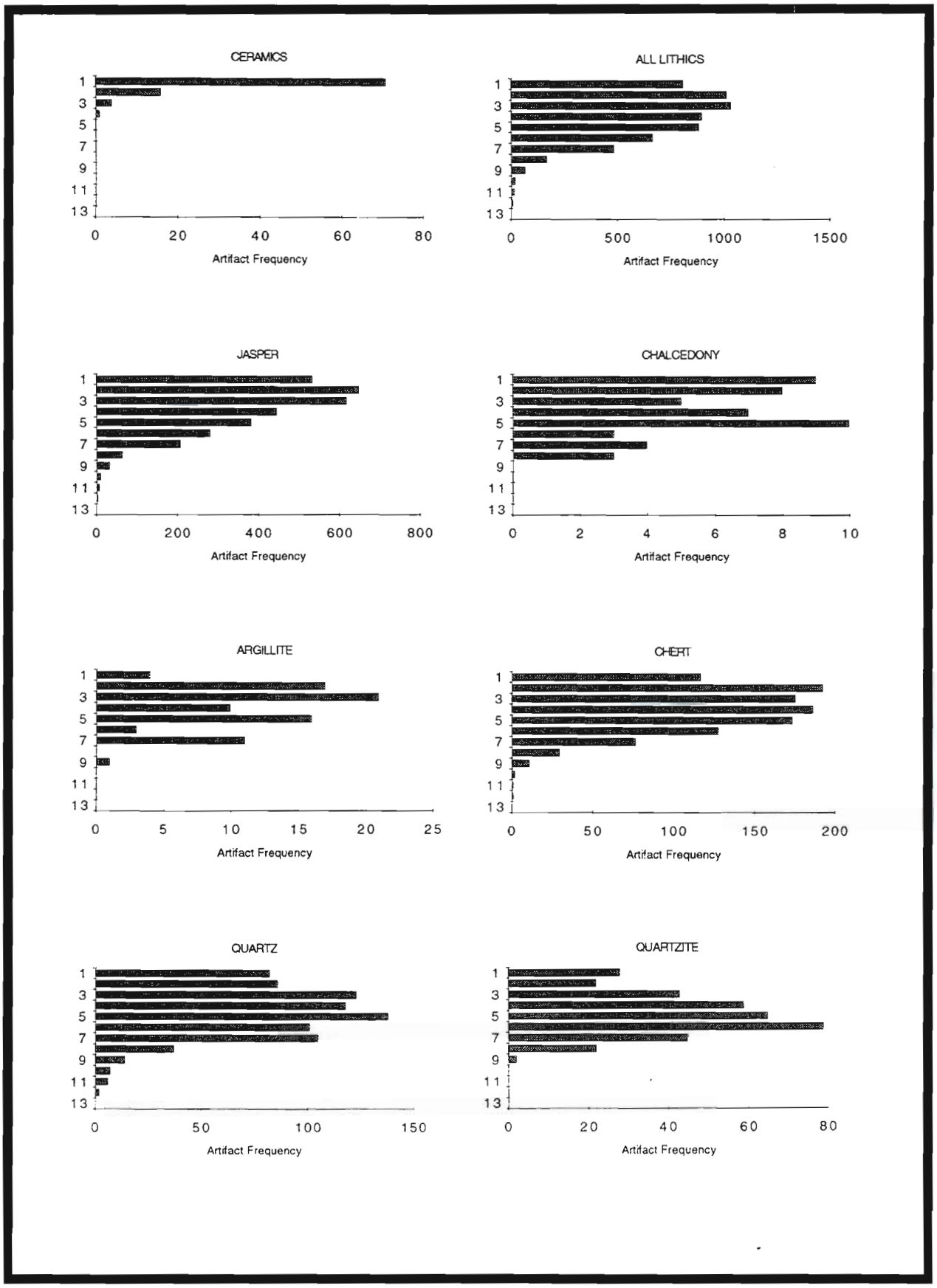
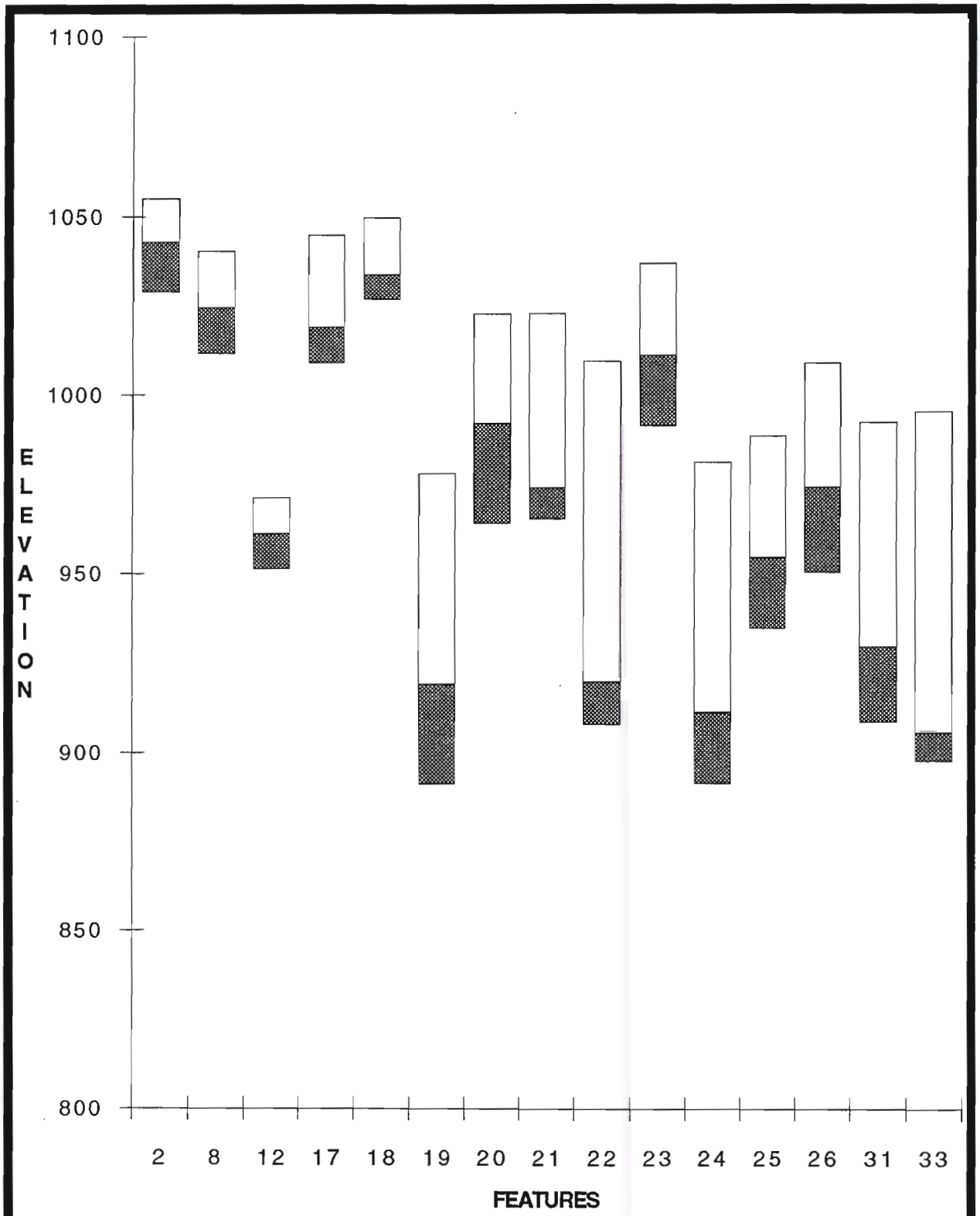


FIGURE 9: Vertical Distribution of Cultural Material



NOTE: GRAPH SHOWS ORIGIN OF FEATURES BELOW GROUND SURFACE; SHADED AREA REPRESENTS FEATURE DEPTH BELOW GROUND SURFACE; ELEVATIONS ARE EXPRESSED IN CENTIMETERS ABOVE ARBITRARY VERTICAL DATUM

FIGURE 10: Vertical Origin of Prehistoric Features

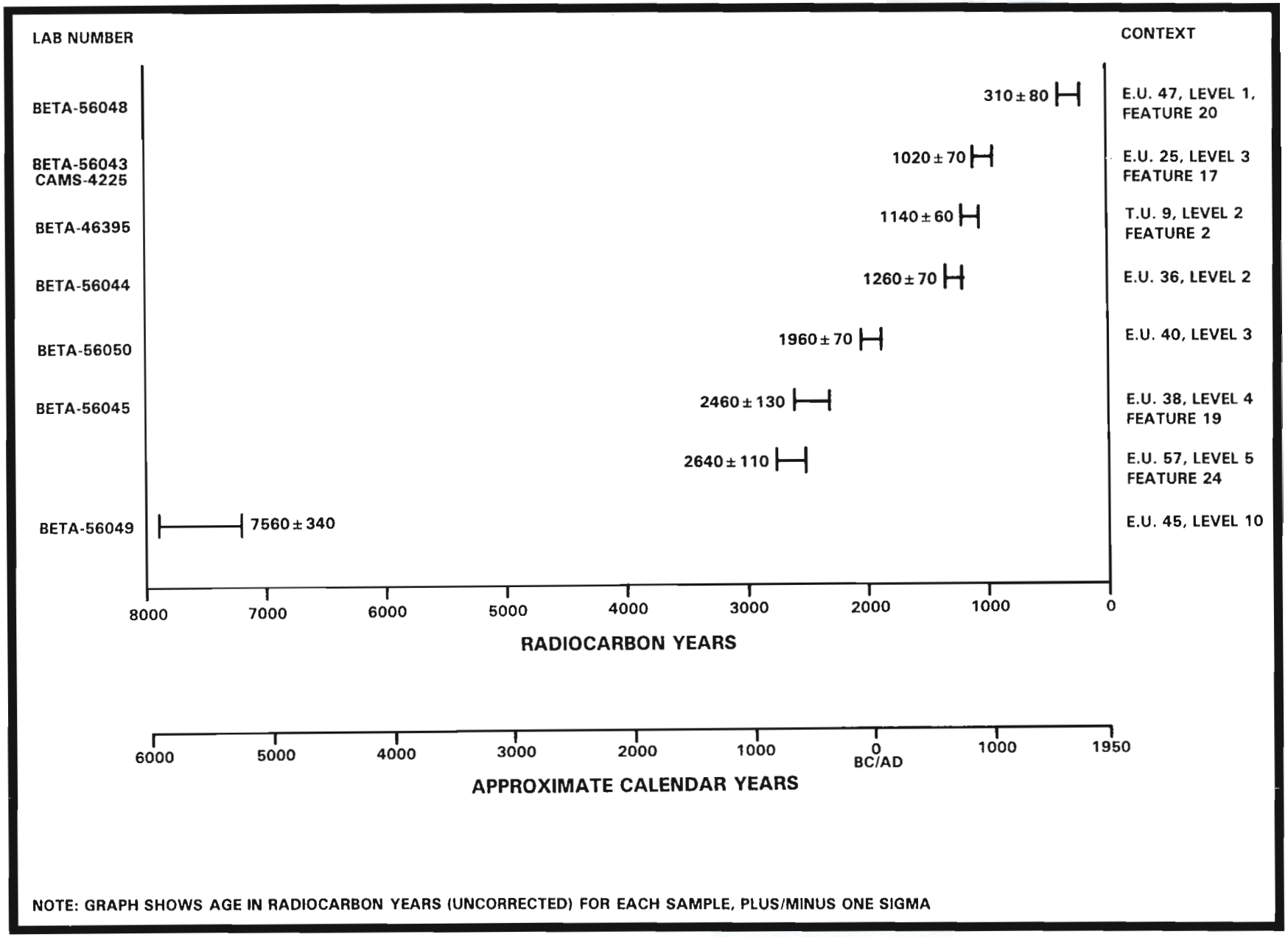


FIGURE 11: Radiocarbon Dates

TABLE 7: SUMMARY OF LITHIC REFITS

REFIT NO.		PROVENIENCES	TYPE	REMARKS
B-1	1)	EU 19, Str. B, Lv. 4 SE	O	Basal and medial projectile point fragments
	2)	Feature 39		
B-2	1)	TU 10, Str. B, Lv. 2	O	Base and tip of projectile point
	2)	E U 26, Str. B, Lv. 3, NE		
B-3	1)	EU 42, Str. B, Lv. 2, SE	V	Two basal projectile point fragments
	2)	EU 42, Str. B, Lv. 6, NW		
B-4	1)	TU 1, Str. B, Lv. 6	O	Base and tip of projectile point
	2)	EU 42, Str. B, Lv. 7, NE		
U-1	1)	EU 18, Str. B, Lv. 3, SW	O	Two fragments of sidescraper
	2)	EU 21, Str. B, wall collapse		
FCR-1	1)	TU 1, Str. B, Lv. 4	O	After crossmending, hammerstone use and anvil use was observed on the refitted object.
	2)	TU 1, Str. B, Lv. 5		
	3)	EU 36, Str. B, Lv. 2, SE		
	4)	EU 36, Str. B, Lv. 3, SW		
	5)	EU 39, Str. B, Lv. 2, NW		
	6)	EU 39, Str. B, Lv. 4, NW		
	7)	EU 41, Str. B, Lv. 4, SW		
	8)	EU 43, Str. B, Lv. 6, SE		
	9)	EU 52, Str. B, Lv. 3, NW		
	10)	EU 52, Str. B, Lv. 4, SE		
	11)	EU 52, Feature 31 (4 pieces)		
FCR-2	1)	EU 39, Str. B, Lv. 5, SW	O	
	2)	EU 45, Str. B, Lv. 4, SE		
FCR-3	1)	TU 6, Strat C, Lv. 7	O	After crossmending, hammerstone use was observed on the refitted object.
	2)	EU 42, Strat B, Lv. 5, SE (2 pieces)		
	3)	EU 42, Str. B, Lv. 6, SE		
	4)	EU 51, Str. B, Lv. 3, SE		
	5)	EU 51, Str. B, Lv. 4, NE (2 pieces)		
	6)	EU 52, Feature 31		
	7)	EU 54, Str. B, Lv. 6, SE (2 pieces)		
FCR-5	1)	TU 9, Strat B, Lv. 3	H	
	2)	TU 9, Feature 2		
FCR-6	1)	EU 42, Str. B, Lv. 7, SE (2 pieces)	V	
	2)	EU 42, Str. B, Lv. 8, SE		
FCR-7	1)	EU 48, Feature 21 (6 pieces)	W	
FCR-8	1)	TU 9, Strat B, Lv. 4	O	
	2)	TU 10, Strat B, Lv. 2		
FCR-9	1)	EU 57, Feature 31 (6 pieces)	W	
FCR-11	1)	EU 31, Str. B, Lv. 2, NE	O	
	2)	EU 52, Str. B, Lv. 4, SW		
FCR-12	1)	EU 26, Str. B, Lv. 4, NE	O	
	2)	EU 31, Str. B, Lv. 5, NW		
FCR-13	1)	TU 12, Str. B. Lv. 4, (2 pieces)	W	
FCR-14	1)	EU 25, Str. B, Lv. 3, NE	O	
	2)	EU 27, Str. B, Lv. 2, NW		
	3)	EU 27, Str. B, Lv. 2, SW		

B: Biface; U: Uniface; FCR: Fire-cracked rock. Refits FCR-4 and FCR-10 were absorbed into other FCR refits as crossmending proceeded; W: crossmending within same provenience; H: crossmending between same level of adjacent quadrants; V: crossmending between levels of same excavation unit; O: crossmending between disparate contexts.

crossmending within the same level of adjacent quadrants, "V" indicating crossmending between different levels or strata of the same unit, and "O" indicating crossmending between other disparate contexts. Among the 17 refits, only 3 were within the same context (Type W), and only three were within the same excavation unit (Type H) or the same level of adjacent units.

The spatial patterning of crossmending artifacts may

reflect segregation of activity areas, discard behavior patterns, or post-depositional activities such as cleaning of the living area or various historical processes. The small number of refits allows only a limited scope of interpretation in this regard; however, there are some important insights to be gained. The majority of refits, even those involving fragments from the same unit or adjacent excavation units, occur across different excavation levels. This overall pattern might be indicative of a general pattern of reuse of lithic material at the site during successive episodes of occupation, or it may be a product of the site's loose, sandy soils which allowed extensive vertical transmigration of artifacts after discard. The refits involving formal tools (bifaces and unifaces) show extensive mending across vertical levels, which supports the latter interpretation, because there is no evidence that these tools were reused after breakage. Altogether, there are only five refits involving formal tools, including three in the north excavation block and two in the south excavation block (Figure 12).

The 12 refits involving fire-cracked rock ranged from 2 to 14 fragments per refit. Some of the refits exhibit distinct spatial clustering but, like the formal tools, the refits infrequently occurred within the same 10-cm excavation level. The most notable exception to this general pattern was FCR-7, which involved six fragments of fire-cracked rock associated with Feature 21; this feature had a depth of only 9 cm. The majority of the fire-cracked rock refits occurred within the south excavation block. Among these, three involved Feature 31, which was defined as a cluster of fire-cracked rock in an area of reddened soil. Fire-cracked rock fragments that crossmended to Feature 31 were scattered widely throughout the South Excavation Block. The remaining two fire-cracked rock refits in the south excavation block both overlap the area encompassed by the refits that crossmend to Feature 31. Within the North Excavation Block, there appear to be distinct groupings of refits. One group involving a total of four fragments (FCR-5 and FCR-8) is confined to Test Units 9 and 10 and appears to be associated with Feature 2, a charcoal concentration. The other group involves five fragments (FCR-12 and FCR-14) that mend across the southern part of the north excavation block; these crossmends represent relatively dispersed contexts and do not involve a feature.

Certain cultural formation processes may also be identified that have had an obvious effect on the prehistoric archaeological record at Site 7S-F-68. For the most part, these processes are historical or modern activities that have displaced or removed the prehistoric deposits. The small rise occupied by the site was used as a family cemetery during the late eighteenth century (LeeDecker et al. 1995). The family cemetery contained nine interments, concentrated in the north part of the site. The burial pits associated with the cemetery penetrated well into subsoil and disturbed a substantial part of the north excavation block and adjacent area. The presence of a plowzone is the most obvious example of a modern or historical activity that has displaced the prehistoric deposits, and the site was probably placed in cultivation during the late nineteenth century, after abandonment of the cemetery. Cultivation of the A-horizon would not only have disturbed the spatial integrity of the deposits and truncated features, but it may have accelerated erosion and deflation of the site. After the acquisition of the site area as state right-of-way 1911, cultivation of the site may have been discontinued.

The U.S. Route 113 roadway defines the eastern boundary of the site, as presently configured, but it is not known how much of the site was lost during downcutting and grading for the highway. Construction of a driveway to the automobile repair shop also resulted in downcutting along the northeastern margin of the site. Other modern intrusions include various posts for roadside signs, a geological boring, and three dog burials. Given the range of historical activities that have occurred on the site, it is remarkable that archaeological contexts have been preserved in a condition that permits analysis and interpretation of the prehistoric occupation.

B. PREHISTORIC COMPONENTS

Diagnostic lithic and ceramic artifacts indicate that the site was repeatedly occupied from the Paleoindian period through the Late Woodland period, with some occupations better represented than others. The assignment of individual components to cultural periods follows traditional conventions that are used across the Eastern Woodlands, in contrast to the framework developed for Delaware by Custer (1984), which expands upon work by Gardner (1974, 1977). For example, in the Custer (1984) system, Early Archaic point types, such as Palmers and Kirks, are considered to be part of the Paleoindian period; and the Late Archaic, Early Woodland, and Middle Woodland periods are combined into one unit called "Woodland I." These larger groupings are based upon similarities that have been observed in lithic procurement and settlement patterns. There is some merit to partitioning prehistory in this manner, for it highlights certain long-term trends. But, for the purposes of this study, an attempt is made to delineate more discrete temporal units, which of course can always be combined into larger units. The following two sections provide an overview of the temporally diagnostic artifacts recovered from the site that were used to identify individual prehistoric occupations.

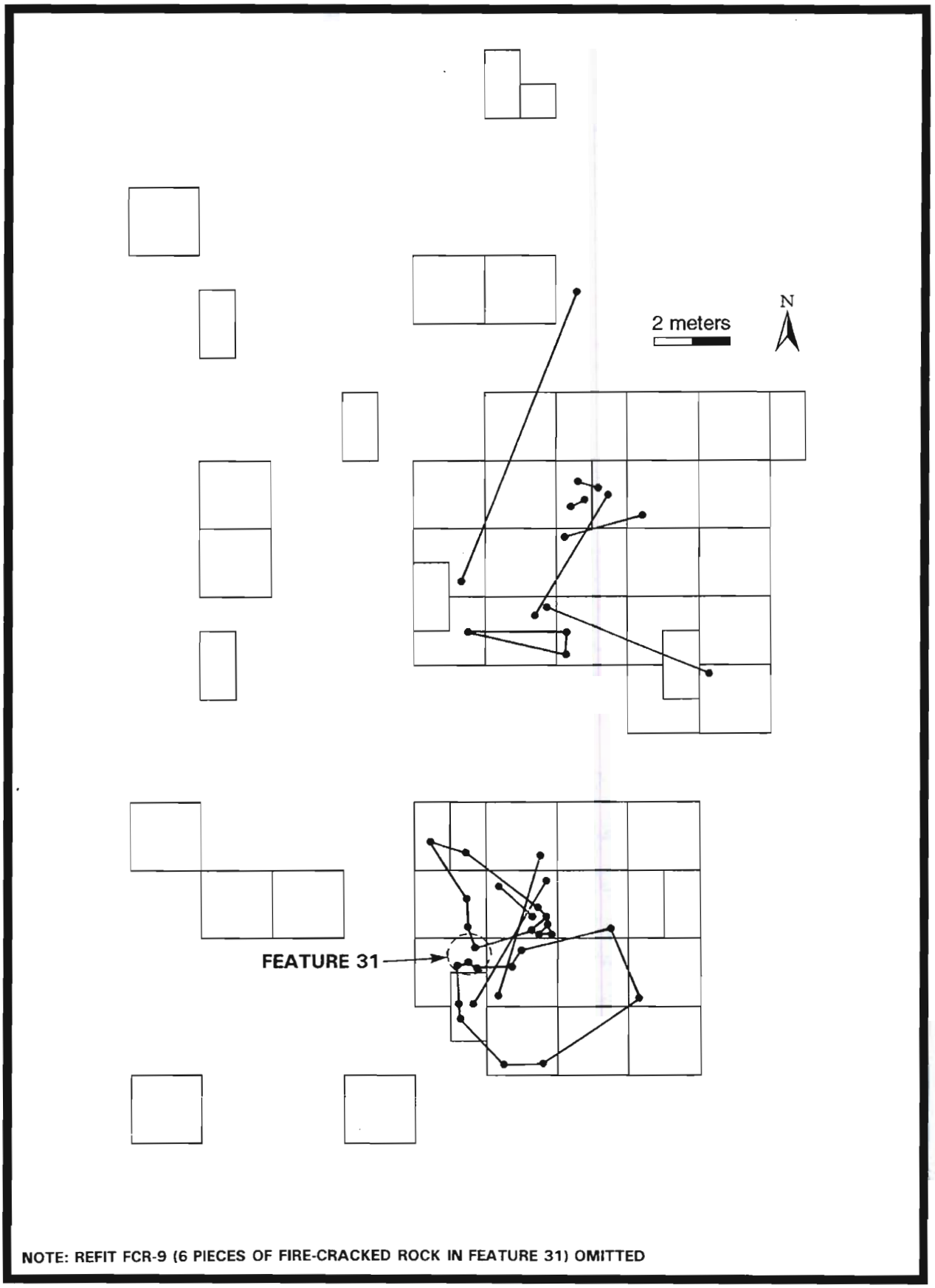


FIGURE 12: Horizontal Pattern of Refits

1. *Ceramic Assemblage*

The ceramic assemblage is made up of 109 extremely fragmentary specimens, weighing 172.2 g in total and 1.6 g on average. The majority of the sherds are shell tempered: 57 sherds have shell temper and eroded or indeterminate surfaces (72.7 g); 34 sherds have shell temper and fabric-impressed exteriors and plain interiors (77.1 g); 2 sherds have shell temper and fabric-impressed exteriors and interiors (4.4 g); 2 sherds have shell temper and plain exteriors and interiors (2.1 g); 2 sherds have sand and shell temper and cordmarked exteriors and plain interiors (6.5 g); 4 sherds have sand temper and eroded surfaces (4.5 g); 2 sherds have grit temper and eroded surfaces (1.0 g); and 5 tiny sherds have indeterminate tempers and surfaces (1.3 g). Also included in the assemblage is one fragment of fired clay (2.6 g).

The temper in all of the shell-tempered sherds has been completely removed by leaching. The only two rim sherds in the assemblage are shell tempered: one is eroded and the other is fabric impressed on its exterior. The latter has a squared lip that measures 4.6 mm in thickness. This measurement represents the minimum thickness for the fabric-impressed sherds; the mean thickness for these sherds is 5.8 mm, and maximum thickness is 6.4, which probably represents a basal sherd. Three of the best-preserved fabric-impressed sherds are shown in Plate 5.

The shell-tempered fabric-impressed sherds are so consistent in their physical characteristics that it is likely that they are derived from only one or two vessels. All of these sherds easily fit into the Townsend/Rappahannock ware types of the Late Woodland period (Robert Wall, personal communication 1993). The Late Woodland radiocarbon dates, discussed later in this chapter, undoubtedly date the site's Late Woodland component. The other shell-tempered sherds are probably part of this same component. The few sherds with sand and grit temper may represent Early or Middle Woodland components.

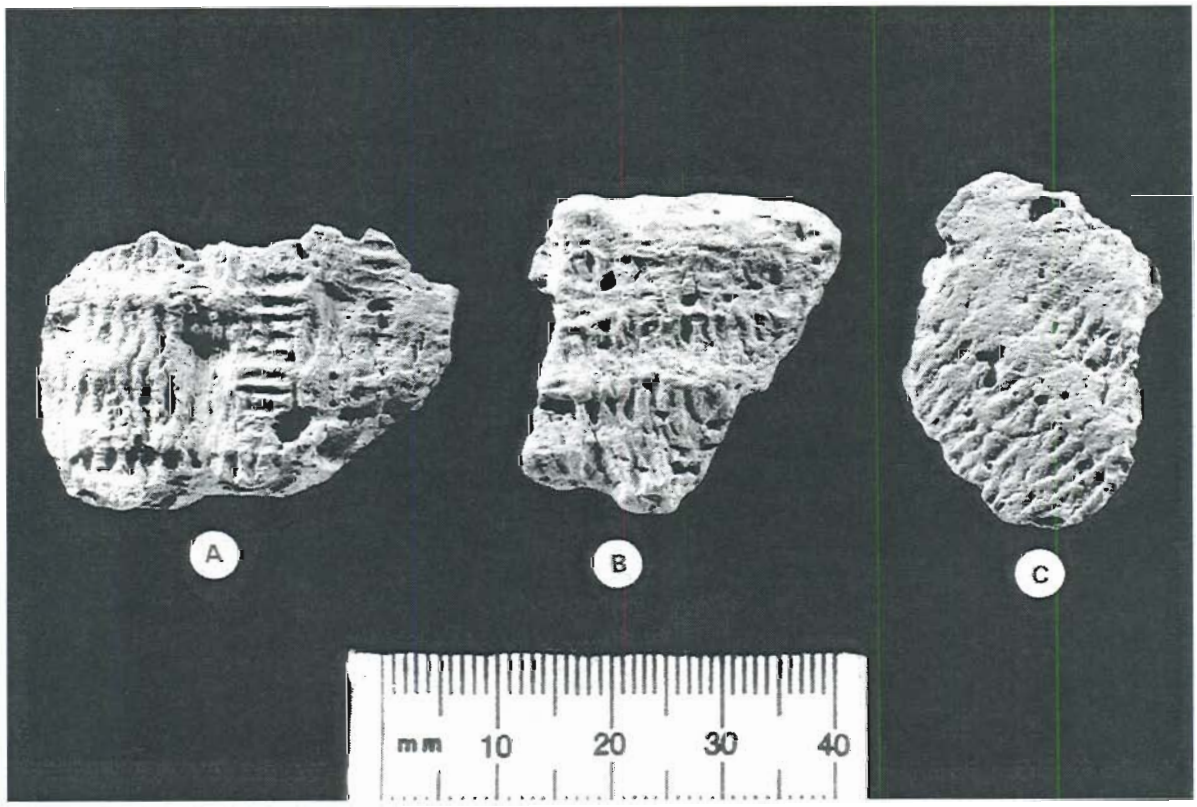


PLATE 5: Body Sherds, Fabric Impressed, Shell Temper.
A: Cat. No. 621 (Excavation Unit 29, Stratum A, Level 1); B: Cat. No. 739 (Excavation Unit 44, Stratum A, Level 1); C: Cat. No. 88 (Test Unit 7, Stratum C, Level 7).

2. *Biface Assemblage*

One hundred and twenty-five bifaces were recovered from the site: 76 are projectile points, 34 of which are assigned to cultural components. The following discussion focuses on typological data, providing preliminary interpretations and a general approximation of the sequence of occupations at the site.

A possible Paleoindian component is represented by a quartz crystal late-stage biface that appears to be a fluted-point production failure, snapped as a result of "end shock" (Crabtree 1972:60) during a fluting attempt. In Plate 6, remnants of a failed, isolated striking platform (or nipple) can clearly be seen, centered between slight projections that would have become the basal "ears" of the fluted point if it had been successfully completed. It is noteworthy that all of the fluted points from the Higgins Site in Anne Arundel County, Maryland, are manufactured from quartz (Ebright 1992). Another possibly early point is a thin, lanceolate specimen with a narrow, unground base. It is manufactured from jasper (Plate 7).

A substantial Early Archaic component (or components) is represented by 19 points, manufactured primarily from jasper and chert (Plates 8-10): 1 Palmer, 1 Kirk Corner Notched, 1 Decatur, 7 Kirk Stemmed, 6 Bifurcates, and 3 indeterminate fragments. The last are clearly portions of Early Archaic points but are too fragmentary to be assigned to point types. With its fractured or burinated base, the Decatur point is a good example of its type (Plate 8:c), which has been assigned to the Kirk Corner Notched Cluster by Justice (1987:71). It is on the extreme lower end of the size range for this point type (Justice 1987:245), but it is comparable in size to other Early Archaic points (Plates 8 and 10). Similar points, with burinated bases, are illustrated by Custer (1986b: figure 1, center) and Lowery and Custer (1990: figures 6d and 8g). The bifurcate-based points best fit the LeCroy and St. Albans types, and one of the Kirk Stemmed points (Plate 9:d) is actually typical of Coe's Kirk Serrated type (1964:70). Notable are the distal impact fractures present on one Kirk Stemmed point, two bifurcate-based points (Plate 10:a, b), and the Palmer and Decatur points (Plate 8), testifying to their use as projectiles.

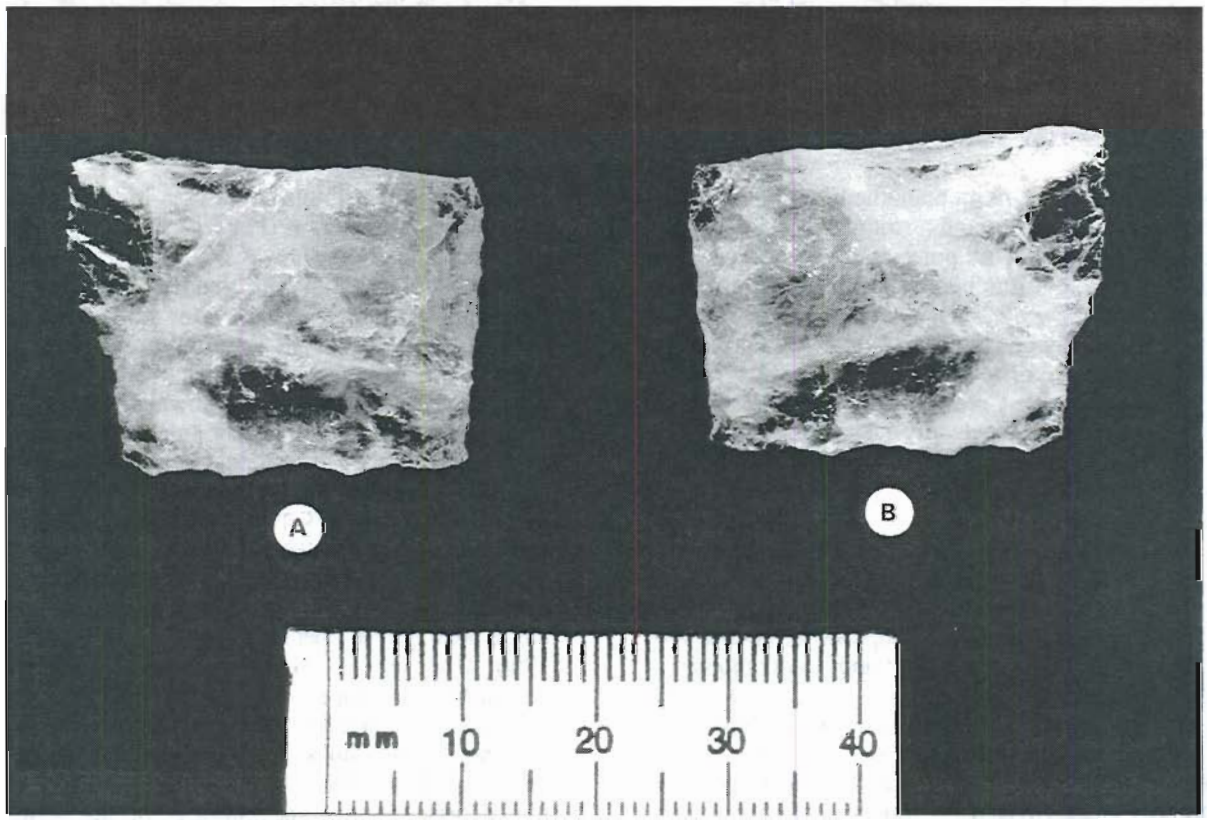


PLATE 6: Possible Fluted Point Preform, Quartz, Cat. No.380 (Excavation Unit 35, Stratum B, Level 6). A: Obverse; B: Reverse.

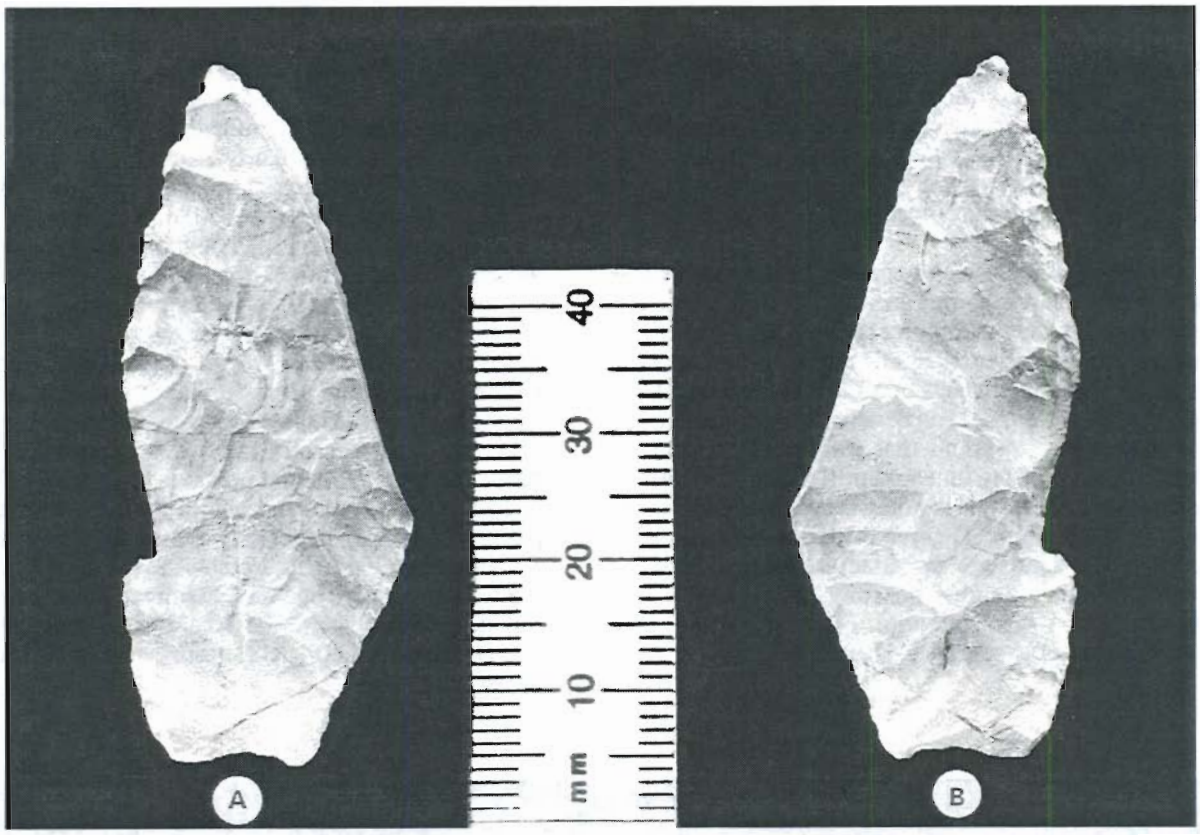


PLATE 7: Possible Late Paleoindian Lanceolate Point, Jasper, Cat. No. 129 (Surface Find). A: Obverse; B: Reverse.

The only diagnostic point manufactured from rhyolite has broad side notches and a straight base, all heavily ground (Plate 11). This point could be a Brewerton Side Notched, but it is believed to be an Otter Creek point, and following Ebright's work at the Higgins Site (1992), it is considered Middle Archaic. Like most of the rhyolite Otter Creek points at the Higgins and Indian Creek V sites (LeeDecker et al. 1991), it has been repeatedly resharpened in such a manner that its blade developed an asymmetrical outline (Ebright 1992:190).

A heterogeneous group of 12 stemmed points was initially sorted into one group that was believed to represent a Late Archaic component (or components), but upon closer inspection it appears likely that several points may represent earlier and later components (Plates 12 and 13). Even though the majority of the points have contracting stems, there are no more than two points that closely resemble each other in size and haft morphology. The points are easily separated into two groups based on raw material: seven are made from argillite, and five are made from jasper and chert.

One of the jasper points could be a Middle Archaic, Morrow Mountain point (Plate 12:a), given its broad shoulders and short stem (Coe 1964:37). A jasper and a chert point, both with slender blades and weak shoulders (Plate 12:c, d), are similar to Late Archaic/Early Woodland Teardrop points (Kraft and Blenk 1974; Mounier and Martin 1994). The serrations on the chert point are, however, atypical for teardrop points. Another jasper point (Plate 12:b) and several argillite points (Plate 13) resemble Early to Middle Woodland Rossville points (Kraft 1975; Ritchie 1971). However, because some of the argillite points are exceedingly weathered (e.g., Plate 13:c), it is difficult to be certain of their original haft morphology. The largest argillite point also resembles a heavily resharpened Koens Crispin point (Plate 13:a). The only expanding stem point in the group resembles a broadspear (Plate 14:b). Probably dating to the Late Archaic period is an untyped narrow-stemmed point, with wide shoulders and a snapped or unfinished base (Plate 14:a). In light of these typological assessments, the majority of the stemmed points probably represent Late Archaic and Early Woodland occupations.

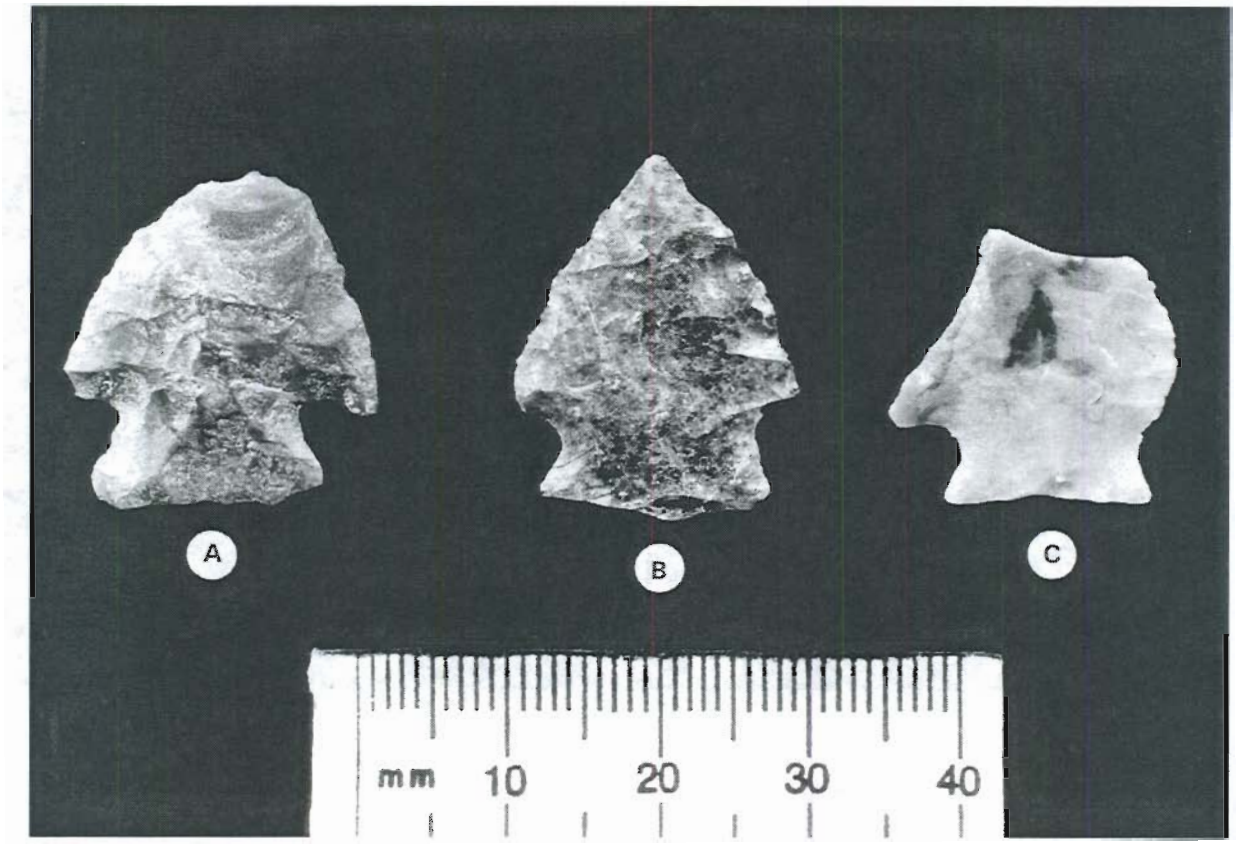


PLATE 8: Early Archaic Projectile Points. A: Palmer Point, Jasper, Cat. No. 910 (Excavation Unit 53, Stratum A, Level 1); B: Possible Small Kirk Corner Notched Point, Jasper, Cat. No. 60 (Test Unit 2, Stratum C, Level 11); C: Decatur Point, Chert, Cat. No. 893 (Excavation Unit 45, Stratum B, Level 6).

A Late Woodland component is represented by a single triangular arrowpoint manufactured from jasper (Plate 14:c). It is undoubtedly associated with the small sample of shell-tempered ceramics recovered from the site.

In sum, the stone points document a nearly continuous use of the site, with the Early Archaic and Late Archaic/Early Woodland periods witnessing the most intense use of the site (as measured by number of points). Yet, even during these periods, the diversity of point types indicates a number of separate occupations, rather than one large occupation. For example, during the Early Archaic period the Palmer, Kirk Corner Notched, and Decatur points may represent one occupation, while the bifurcate-based points and Kirk Stemmed points represent separate, slightly later occupations. The site was apparently never the locus of a substantial occupation, as a base camp or hamlet; rather, it appears to have been a preferred short-term campsite throughout prehistory.

C. ANALYTICAL UNITS

A series of analytical units (AUs) were defined as a means to examine differences in the use of the site through time. In essence, an analytical unit is a formal device to "lump" or combine deposits from discrete excavation contexts, enabling analysis to proceed according to more inclusive data sets. Various criteria may be used for construction of analytical units: pedological criteria, stratigraphic relationships, archaeological formation processes, post-depositional disturbances, deposit dates derived from typologies, artifact refit patterns or crossmending, and characteristics of the refuse assemblage such as frequency and artifact patterns (LBA 1986:129-131). All of these criteria have been used effectively; however, it is important to note that the utility of the criteria varies according to particular site conditions as well as the particular analytical goals.

Site 7S-F-68 did not contain the clearcut stratigraphy or well-defined, refuse-bearing features that would readily lend themselves for use as analytical units. Typological evidence indicates use of the site from

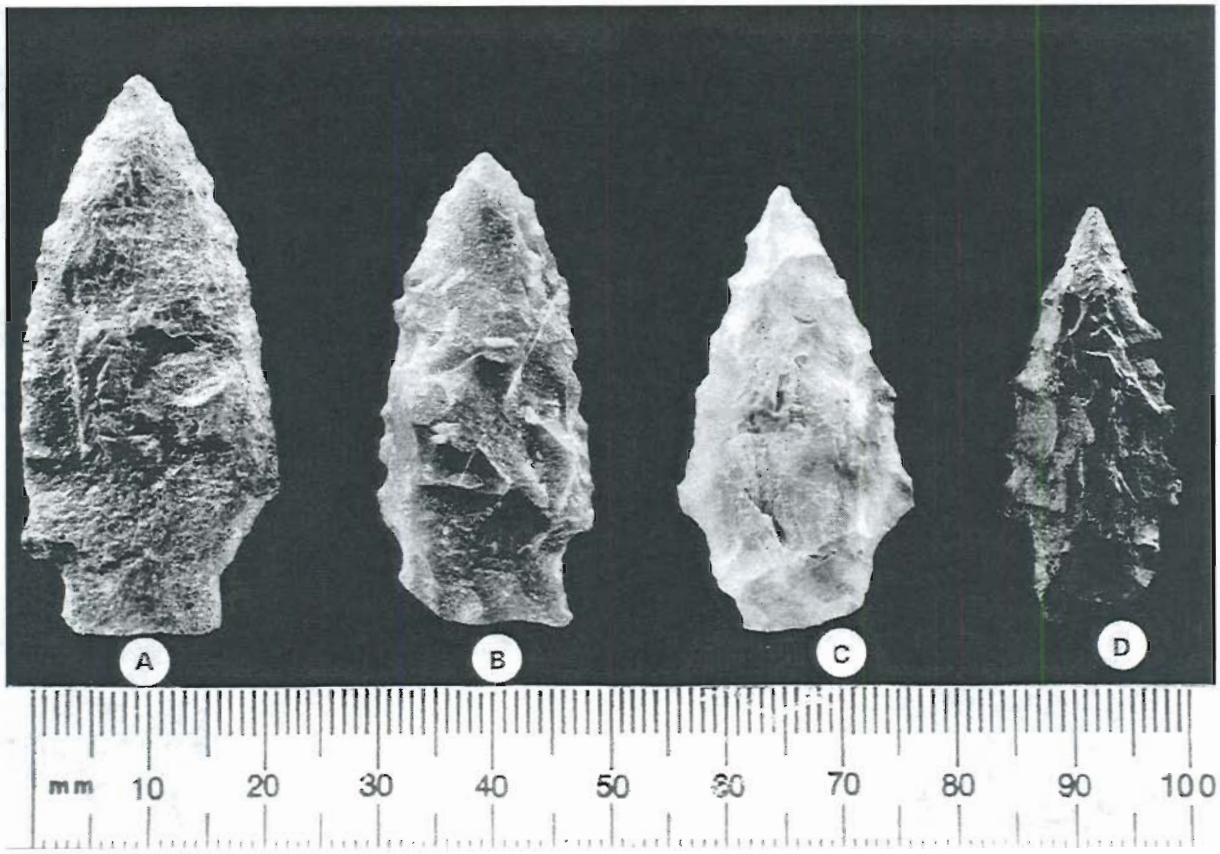


PLATE 9: Kirk Stemmed Points. A: Quartzite, Cat. No. 875 (Excavation Unit 45, Stratum B, Level 2); B: Chalcedony, Cat. No. 884 (Excavation Unit 45, Stratum B, Level 4); C: Chert, Cat. No. 874 (Excavation Unit 45, Stratum A, Level 1); D: Chert, Cat. No. 960 (Excavation Unit 46, Stratum B, Level 4).

the Paleoindian through the Late Woodland period, and the associated deposits were found in sandy, dunal landscape surface contexts that accumulated gradually during the Holocene epoch. The stratigraphic sequence observed during excavation was relatively simple, consisting of a truncated plowzone overlying a weathered subsoil. By the gradual introduction of new material through aeolian deposition, and continued use of the site throughout prehistory, the deposits were mixed to a degree that obliterated depositional planes or occupational surfaces.

Given the absence of well-defined stratigraphic units, initial analysis of the deposits focused on the distribution of material according to vertical provenience (i.e., excavation levels). As mentioned in the preceding section, the rough chronological ordering of the radiocarbon dates in the excavation levels did indicate that the site had retained a degree of stratigraphic integrity.

The vertical distribution of diagnostic artifacts also supports the conclusion that the deposits exhibit temporal stratification, although it is apparent that some mixing of deposits has occurred. Prehistoric ceramics, nearly all of which appear to be of the Late Woodland or Woodland II Townsend series, were most concentrated in plowzone and first subsoil level (see Figure 9), while lithic material exhibited a much greater vertical distribution. In addition, certain raw materials which are strongly associated with a particular cultural component exhibit a distinctive vertical patterning. For example, quartz and quartzite are strongly associated with the Paleoindian and Early Archaic components, and these materials were most concentrated in the lower excavation levels. Argillite, which is strongly associated with the Late Archaic/Early Woodland component, was more concentrated in the higher excavation levels.

The projectile point distributions (Figure 13) clearly exhibit certain anomalies, some of which may be attributable to cultural formation processes. For example, the presence of the earliest diagnostics, such as the Palmer point and the possible Paleoindian point, in surface and plowzone contexts might be explained by reuse of these tools during later periods of prehistoric site occupation or by their having been brought

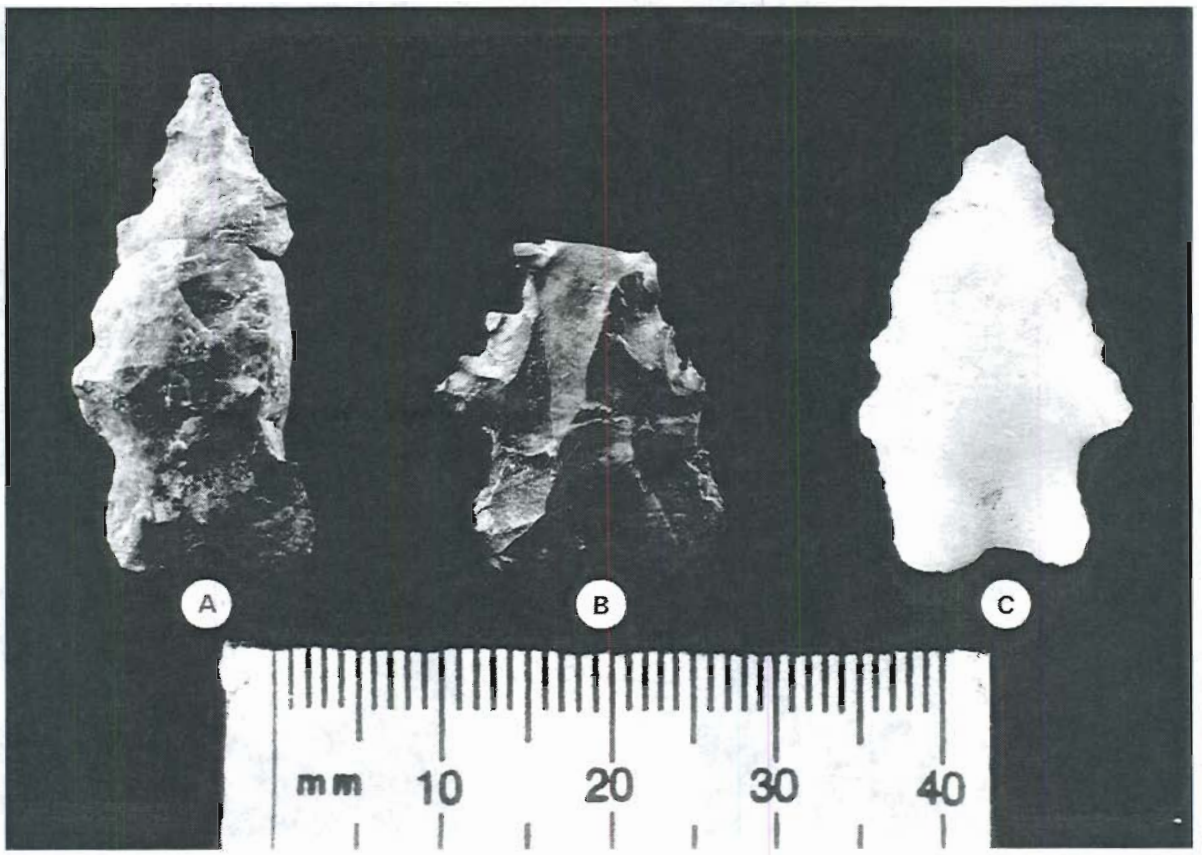


PLATE 10: Bifurcate Base Points. A: Chert, Deer Family-Level Blood Residue, Cat. No. 49/502 (Test Unit 1, Stratum B, Level 6 and Excavation Unit 42, Stratum B, Level 7); B: Jasper, Cat. No. 484/499 (Excavation Unit 42, Stratum B, Levels 2 and 6); C: Quartz, Cat. No. 73 (Test Unit 3, Feature 1).

to the surface by intrusive activities, such as the excavation of postholes, grave pits, or plowing during the historic period. The bifurcate-based points seem to represent the stratigraphically earliest group of which there is an appreciable sample size. The generalized Early Archaic and Late Archaic/Early Woodland point groups apparently occupy a stratigraphically superior position relative to the bifurcate-based points. One anomalous pattern that is not easily explained is the distribution of the Kirk points. The single Kirk Corner Notched point was recovered from Level 11, while the six Kirk Stemmed points were recovered from Level 1 (plowzone) through Level 4, and this group obviously represents a more recent stratigraphic group than the bifurcate-based points. (One Kirk Stemmed point recovered from a collapsed wall is not plotted in Figure 13). Wesler (1983) has previously pointed out that the two Kirk point types are not contemporaneous, and this fact is clearly expressed at Site 7S-F-68.

The three principal analytical units defined--Early, Middle, and Late--represent broad periods of the site's occupation. A few excavation contexts were assigned to a residual analytical unit because they could not be readily assigned to the Early, Middle or Late AU. Most of these residual contexts represented modern features or disturbances, such as the modern geological boring (Feature 4) or the historic burials. A brief discussion of the analytical units is presented below. Additional analysis focusing on the analytical units, particularly the spatial patterning within analytical units, is discussed in the following chapter.

1. *Early Analytical Unit*

The Early AU is most representative of the Early Archaic component, which was the first significant use of the site, but it contains material that may be associated with Paleoindian and Middle Archaic occupations as well. The Early AU generally includes subsoil contexts beginning with Level 4 or Level 5 and continuing to the base of excavation. In areas that exhibited significant downcutting or truncation, most of which were included in the North Excavation Block, the Early AU began with Level 4. In areas with little or no apparent landscape truncation, includ

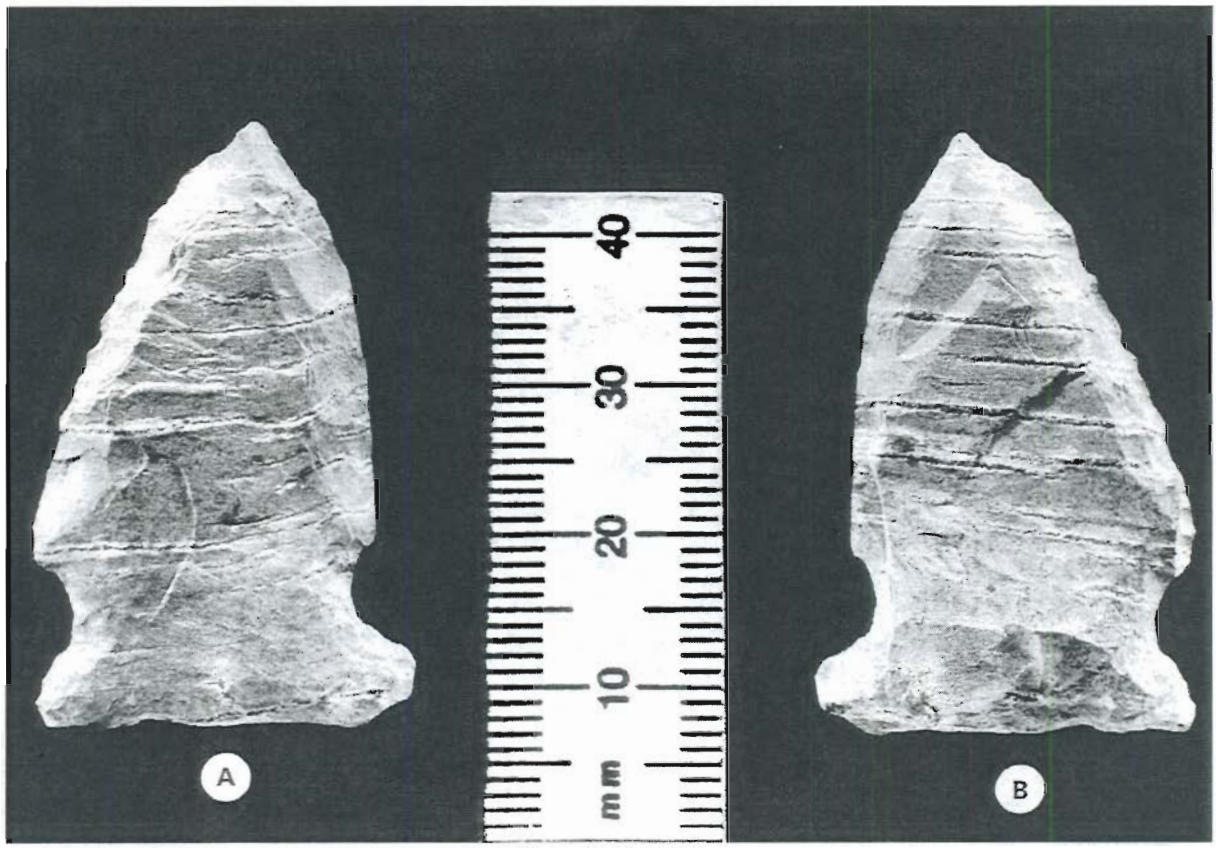


PLATE 11: Otter Creek/Brewerton Point, Deer and Rabbit Family-Level Blood residue, Cat. No. 67 (Test Unit 5, Stratum B, Level 5). A:Obverse; B: Reverse.

ing the South Excavation Block, the Early AU began with Level 5.

There is limited evidence of Paleoindian occupation--a quartz crystal late-stage biface that appears to represent a fluted-point production failure, and a crystal quartz point tip that appears to be a resharpened fluted point fragment. The surface collection from the site also contains a possible Paleoindian lanceolate point made of jasper. The fluted-point production failure was recovered from a context assigned to the Early AU, but the material from surface contexts was not assigned to one of the principal AUs. Although the site assemblage contains very little quartz crystal, this material was distributed over a small, well-defined area. With the exception of two pieces, quartz crystal debitage was recovered exclusively from a block of two units (Units 35 and 48) on the western edge of the site, and all of the quartz crystal debitage was recovered from subsoil contexts. By count, quartz crystal was most frequent in the Early AU (25 pieces), but it was also represented in the Middle AU (7 pieces). Aside from the fluted-point failure, the only other tool made of quartz crystal is a utilized flake; this item was recovered from a context in the South Excavation Block assigned to the Early AU.

The Early Archaic points were made from a variety of raw materials: jasper, chert, quartz, quartzite, and chalcedony. Among these raw materials, quartzite was used exclusively for Early Archaic points, the two examples being Kirk Stemmed points. In terms of counts by level, quartzite exhibits the lowest overall distribution by excavation levels (see Figure 9). Quartzite debitage also has a rather distinctive horizontal distribution pattern, and it is most concentrated in the South Excavation Block, centered on Feature 31 and encompassing Features 22, 25, and 28. In the units that include this quartzite concentration, the vertical distribution of quartzite matches fairly well with the Early AU, as 79 percent of the quartzite was recovered from contexts below Level 4. Vein quartz was also used exclusively for Early Archaic points, and this material has the second lowest overall vertical distribution at the site (see Figure 9).

Chert and jasper are the most common raw materials associated with Early Archaic points, but they were also used for various Late Archaic/Early Woodland and Late Woodland points. Chert and jasper have a broad vertical distribution, but their horizontal distribution shows sufficient patterning to indicate that some concentrations are probably associated with the

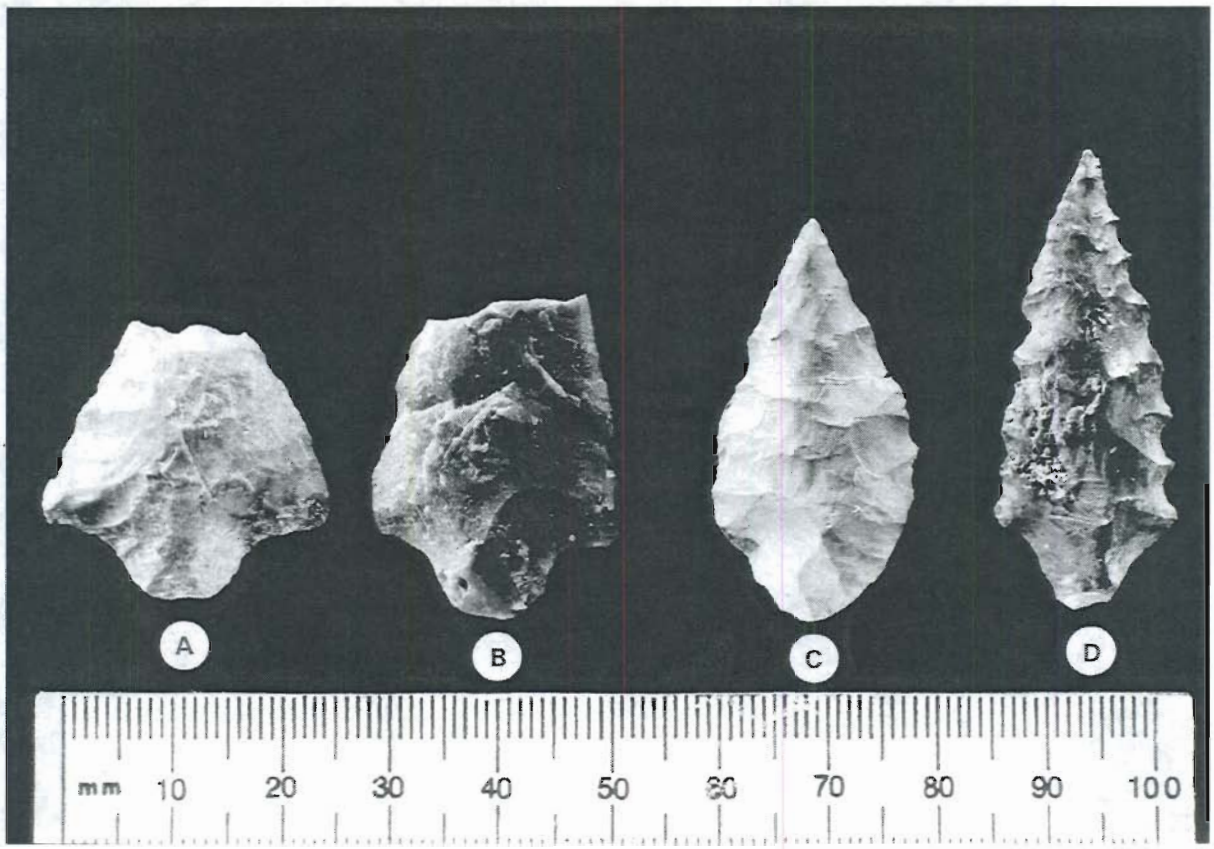


PLATE 12: Contracting Stem Points. A: Jasper, Rabbit Family-Level Blood Residue, Cat. No. 725 (Excavation Unit 49, Stratum B, Level 5); B: Jasper, Cat. No. 1 (Surface Find); C: Jasper, Bovine Family-Level Blood Residue, Cat. No. 108/425 (Test Unit 10, Stratum B, Level 2 and Excavation Unit 26, Stratum B, Level 3); D: Chert, Cat. No. 262 (Excavation Unit 22, Stratum B, Level 2).

Early Archaic occupation. The highest concentration of chert debitage was located in the subsoil levels of Unit 51, immediately adjacent to Feature 31, which was also the focus of the quartzite concentration associated with the Kirk Stemmed points. In Unit 51, chert was most concentrated in the excavation levels associated with the Early AUs, as 82 percent of the chert from this unit was recovered from Levels 4-7. There was also a concentration of jasper debitage adjacent to Feature 31, encompassing portions of Units 42, 51, and 52. In these units, most of the jasper (72%) was recovered from contexts assigned to the Early AU.

The one Early Archaic point made of chalcedony was recovered from a context assigned to the Early AU in Unit 45; this locus is also within the principal concentration of Early Archaic points that spreads across the northwestern sector of the South Excavation Block. Chalcedony debitage was not found in sufficient quantities to define major concentrations, although it is apparent that most was recovered from the northern part of the site. Units 14 and 35 had the highest chalcedony debitage counts. In Unit 14, located at the northern end of the North Excavation Block, chalcedony debitage was roughly distributed between contexts assigned to the Early and Middle AUs. In Unit 35, all of the chalcedony debitage was associated with contexts assigned to the early AU; this concentration overlaps the distribution of crystal quartz debitage believed to be associated with Paleoindian use of the site.

2. *Middle Analytical Unit*

Contexts assigned to the Middle AU consist primarily of the first two to three subsoil levels below the plowzone, which were excavated as Levels 2, 3, and 4. The inclusion of Level 4 in the Middle or the Early AU varied across the site, depending on the degree of downcutting or deflation in particular areas of the site.

The Middle AU is best considered as representative of the Late Archaic/Early Woodland occupation of the site, although contexts associated with this analytical

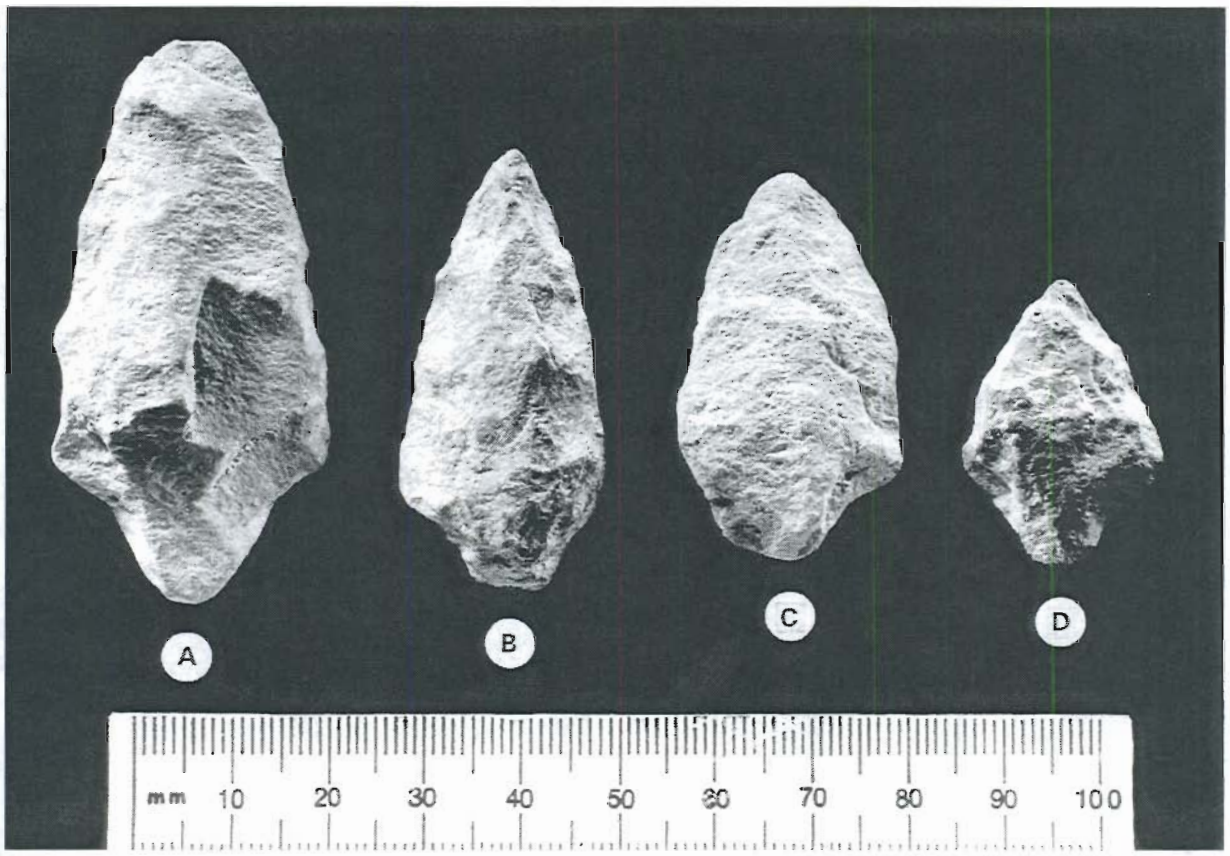


PLATE 13: Contracting Stem Points, Argillite.
A: Cat. No. 114 (Test Unit 11, Stratum A, Level 1); B: Cat. No. 109 (Test Unit 10, Stratum B, Level 3); C: Cat. No. 99 (Test Unit 9, Stratum B, Level 2); D: Cat. No. 208 (Excavation Unit 19, Stratum B, Level 4).

unit contained a mixture of earlier and later materials. While there is evidence of relatively frequent use of the site during the Early Archaic, based on the number of discarded projectiles, there is only scant evidence of Middle Archaic occupation. The one Middle Archaic diagnostic point, a side-notched rhyolite point assigned to the Otter Creek point type, was recovered from Level 5 of Unit 5, which was included in the Middle AU. Rhyolite is only sparsely represented in the site assemblage. Most of the rhyolite debitage was recovered from subsoil contexts in the North Excavation Block, but there was insufficient material to define spatial patterning.

A heterogeneous group of 12 stemmed points suggests another period of frequent use of the site during the Late Archaic to Early Woodland periods. These points were made from a variety of materials, including argillite (N=7), jasper (N=4), and chert (N=1). In terms of their horizontal distribution across the site, these points were scattered in a broad swath across the North Excavation Block, with single outliers found in the southern area of the site (Units 38 and 49). Seven of these points were from contexts assigned to the Middle AU, two were from Early AU contexts, and one was from a Late AU context. One jasper stemmed point recovered from a surface context was not assigned to an analytical unit.

The strong association of argillite with the Late Archaic to Early Woodland use of the site is borne out by the vertical distribution of argillite throughout the site. When total counts are viewed by excavation levels, it is apparent that argillite falls lower in the profile than ceramics but higher than other materials that are clearly associated with the Early Archaic occupations, such as quartz and quartzite (see Figure 9). Argillite is relatively scarce in the site assemblage, and none of the excavation units contained more than eight argillite items. The highest concentrations of argillite were observed in Units 15, 18, and 23 of the North Excavation Block; however, these units exhibited extensive disturbance from historic burials and downcutting associated with the driveway to the automobile repair shop. In the North Excavation Block, 60 percent of the argillite (N=34) were recovered from contexts assigned to the Middle AU, while in the South Excavation Block, 95 percent (N=19) of

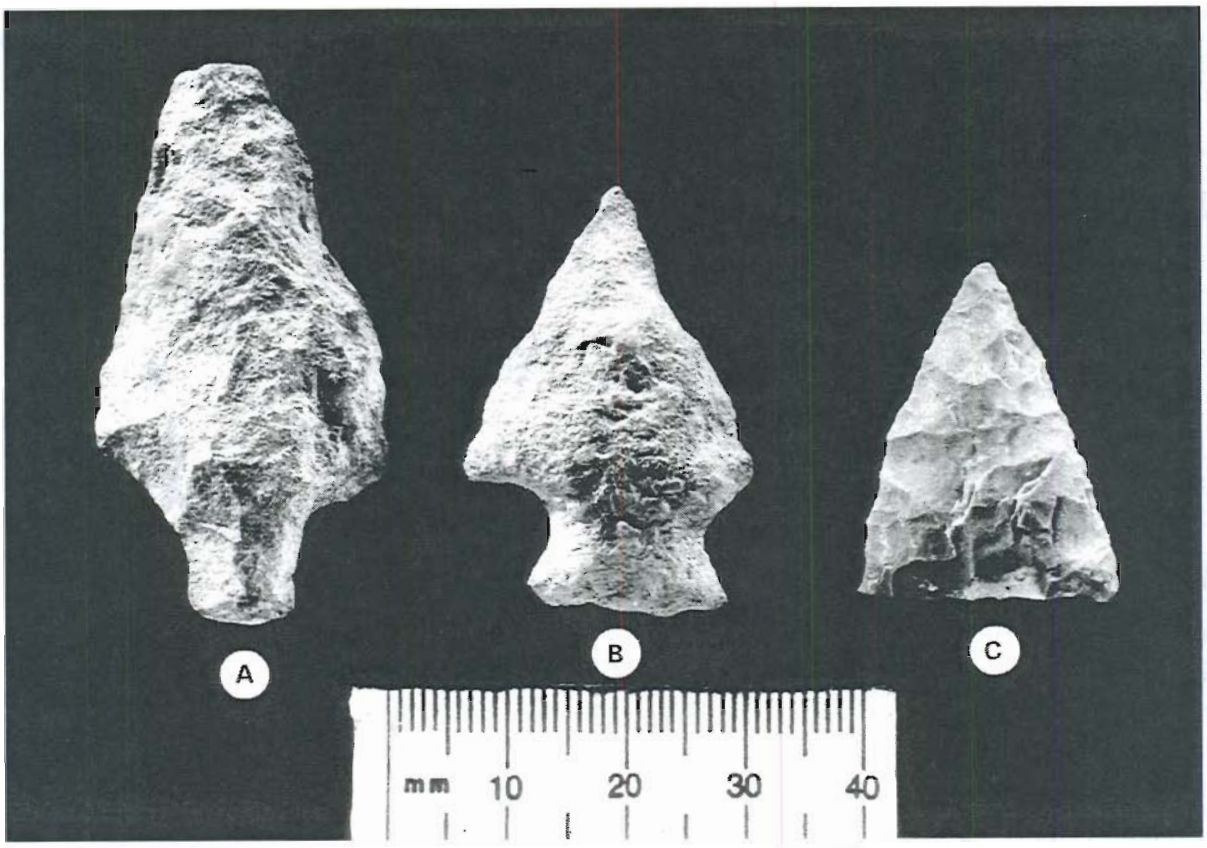


PLATE 14: Assorted Projectile Points. A: Stemmed Point, Argillite, Cat. No. 666 (Excavation Unit 24, Wall Collapse); B: Possible Triangular Broadspear Point, Argillite, Cat. No. 263 (Excavation Unit 22, Stratum B, Level 2); C: Triangular Arrow Point, Jasper, Dog Family-Level Blood Residue, Cat. No. 484 (Excavation Unit 42, Stratum B, Level 2).

the argillite was from contexts assigned to the Early AU. It is also notable that the large argillite early-stage biface and associated debitage (Feature 33) falls within the Early AU. The argillite recovered from Early AU contexts in the South Excavation Block may be a result of mixing or other post-depositional processes.

Jasper is the most common raw material in the site assemblage, and it was one of the preferred materials during each of the three major periods of site occupation. The horizontal distribution of jasper exhibits at least two major concentrations. One concentration in the South Excavation Block was adjacent to Feature 31 and associated with the Early AU. The highest concentrations were located in the northeastern sector of the North Excavation Block, particularly Units 10, 14, 15, and 18. In this area, the distribution of approximately 95 percent of the total jasper was recovered from Excavation Levels 1-4, which were assigned to the Middle and Late AUs. This area of the site had also been subjected to a number of post-depositional disturbances, including historic interments and down-cutting associated with roadway and driveway construction. Another discrete jasper concentration was identified in the eastern half of Unit 23; however, the material had a wide vertical distribution in contexts assigned to the Early, Middle, and Late AUs. Unit 23 also exhibited significant post-depositional disturbances from historic burials and roadway construction. Like jasper, chert was apparently a preferred raw material throughout the site's periods of occupation. The single stemmed chert point in the assemblage was recovered from a context in Unit 22 that was assigned to the Middle AU. The horizontal distribution of chert was roughly similar to that of jasper, with the principal concentration located in the North Excavation Block (Units 14 and 18) and a secondary concentration in the South Block adjacent to Feature 31. In the North Block chert concentration 93 percent of the total chert was recovered from Levels 2-4, which were assigned to the Middle AU. The concentration of chert in the South Excavation Block (Unit 51) is apparently associated with the Early Archaic occupation, as 82 percent of the total chert from this area was recovered from contexts assigned to the Early AU.

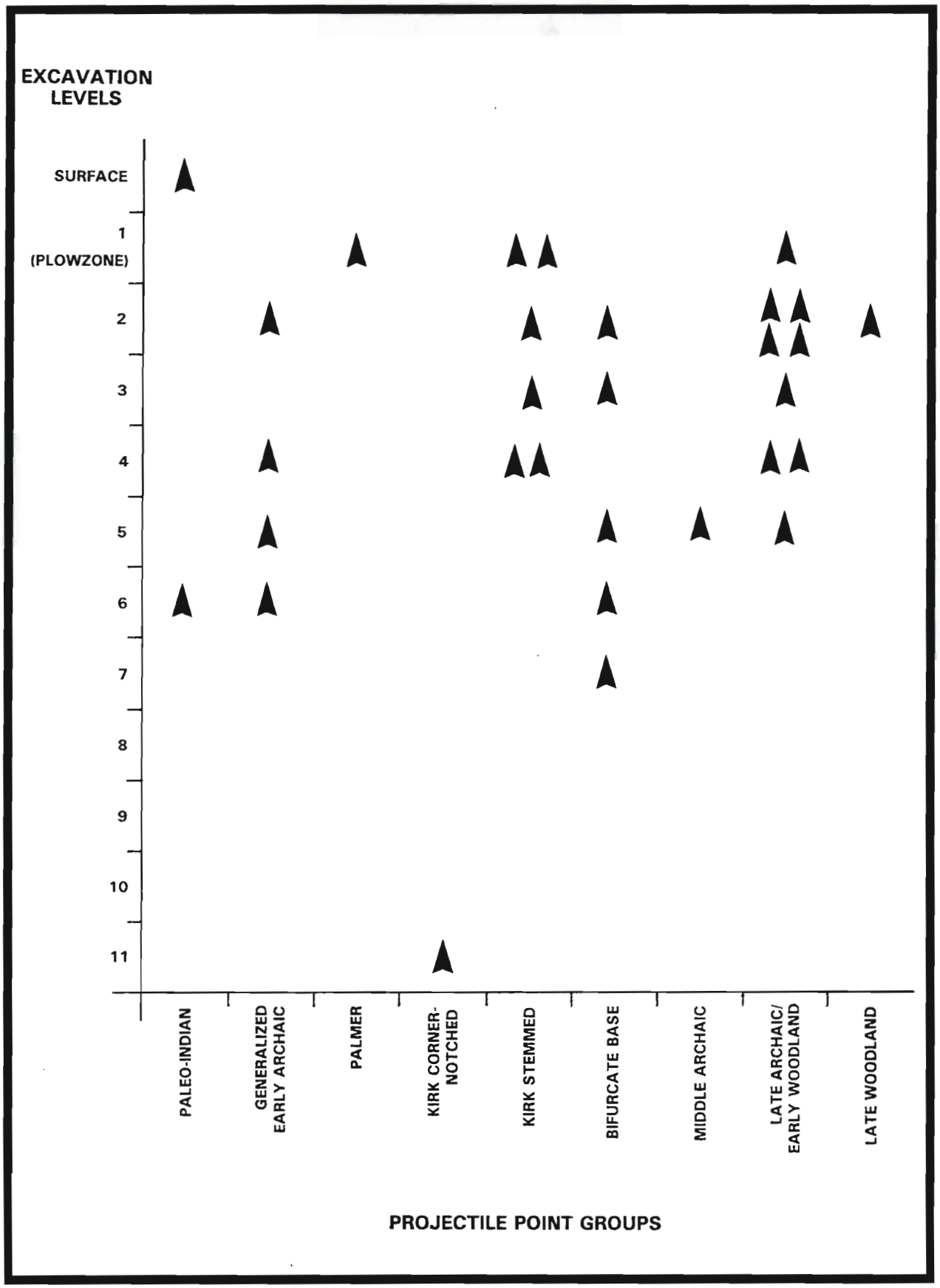


FIGURE 13: Vertical Distribution of Diagnostic Projectile Points

3. *Late Analytical Unit*

The Late AU is best considered Late Woodland, as it was defined primarily by the vertical distribution of ceramics, most of which can be identified as Townsend ware. The contexts assigned to the Late AU generally include the modern plowzone or A-horizon, except in areas that had been severely truncated, such as the northeastern margin of the site, where construction of the U.S. Route 113 roadway and the automobile repair shop driveway had truncated the landscape surface.

Throughout the entire site, the ceramics show a much higher vertical distribution than any of the lithics (see Figure 9). Ceramics were most concentrated in the plowzone, which roughly corresponds to the Late AU, but a few were recovered from subsoil contexts assigned to the Middle AU. Of the ceramics from assignable analytical units, 87 percent were associated with Late AU contexts, while the remaining 13 percent were associated with the Middle AU. The highest ceramic concentration in the plowzone (Late AU), according to sherd frequency and total weight, was identified in Unit 5. The Late Woodland projectile point in the assemblage, a jasper triangle, was recovered from Level 2 of Unit 42, a context that was assigned to the Middle AU. Jasper was a preferred lithic material throughout the site's major occupation periods, and the relatively elevated position of this raw material in the soil column attests to the frequent use of jasper during the more recent occupations. The highest concentrations of jasper are located in the North Excavation Block, particularly Units 10, 14, 15, 18, and 23. In this area most of the total jasper was recovered from Excavation Levels 1-4, which were assigned to the Middle and Late AUs. The highest concentrations of jasper debitage in the plowzone (Late AU) were identified in Units 15, 21, and 23, all of which are in the North Excavation Block.

VII

ARTIFACT ANALYSIS

A. INTRODUCTION

Archaeological investigations at Site 7S-F-68 resulted in the recovery of 6,518 prehistoric artifacts, of which 6,409 are stone tools and debris and 109 are pottery sherds and fragments of burned clay. Chipped-stone tools and debitage are the most common lithic artifacts, and they are primarily manufactured from jasper and chert (Table 8 and 9).

Temporally diagnostic artifacts, primarily bifaces (Tables 10-12), indicate that the site was repeatedly occupied from the Paleoindian through the Late Woodland period, but none of these occupations were long-term settlements. In the preceding chapter it was demonstrated that, while discrete occupational episodes are difficult to delineate, occupations can be grouped into three broad temporal units: Early (Paleoindian and Early Archaic), Middle (Late Archaic and Early Woodland), and Late (Late Woodland).

In this chapter, lithic and ceramic data are used to investigate site chronology, site function, site patterning, settlement patterns, and subsistence practices. To facilitate the investigation of these issues, artifacts from all phases of work were combined into one database. The Phase I and II artifacts were reexamined to ensure that all of the information in the database was recorded in the same fashion and at the same level of detail. This step was easily completed and permitted the largest possible database to be assembled.

B. THEORETICAL ORIENTATION AND RESEARCH ISSUES

Lithic artifacts account for more than 90 percent of the prehistoric artifacts recovered from the site and thus constitute the primary data set. Their abundance is partly attributable to their durability and chemical stability, unlike artifacts fashioned from organic materials or even artifacts manufactured from fired clay. This differential preservation of the total artifact assemblage skews interpretations by placing greater emphasis on those activities that required stone tools and generated lithic debris. It also forces researchers to glean as much information as possible from lithic assemblages.

An exception to the rule of lithic artifact stability is the rapid weathering of artifacts manufactured from argillite. Their instability must be kept in mind when comparing the quantities of different lithic materials in an assemblage. Small, thin argillite artifacts, like debitage, can often be completely erased (eroded) from archaeological deposits.

In this study, stone tools are considered byproducts of human behavior, particularly economic behavior. The economy of a society is the process by which that society provisions itself, and technology is the means by which provisioning is achieved and maintained. Technology is a key element in human adaptive strategies (White 1959).

Lithic technology--the manufacture and use of stone tools--is the primary focus of this chapter and is examined through an organizational approach, referred to as "the organization of technology" or "technological organization" (see Nelson 1991). Central to the approach is the investigation of assemblage variability, with the realization that variability is shaped by a number of interrelated factors or constraints, for example, settlement mobility, subsistence strategies, raw material availability, and site formation processes.

The organization of lithic technology is investigated by sorting lithic assemblages into a series of chipped-stone and groundstone industries (e.g., Clark 1988; Koldehoff 1987; Parry 1987). Specific industries are defined on the basis of production procedures, raw material requirements, and tool-design strategies. Industries are characterized as following an expedient or curated tool-design strategy. Expedient tools are usually informal tools that are made, used, and discarded at the same location, while curated tools are usually formalized tools that are made to be reused over an extended period, often at varying locations across the landscape (Binford 1979; Nelson 1991). Examples of curated tools are projectile points and other types of hafted bifaces; examples of expedient tools are unretouched or minimally retouched flake knives and scrapers. By design, curated tools have longer use lives than do expedient tools, and curated tools tend to have longer and more complicated life cycles because they are routinely subjected to maintenance and are often recycled (Schiffer 1972) (Figure 14).

The concepts of tool-design strategies, tool use lives, and tool life cycles are important to the investigation