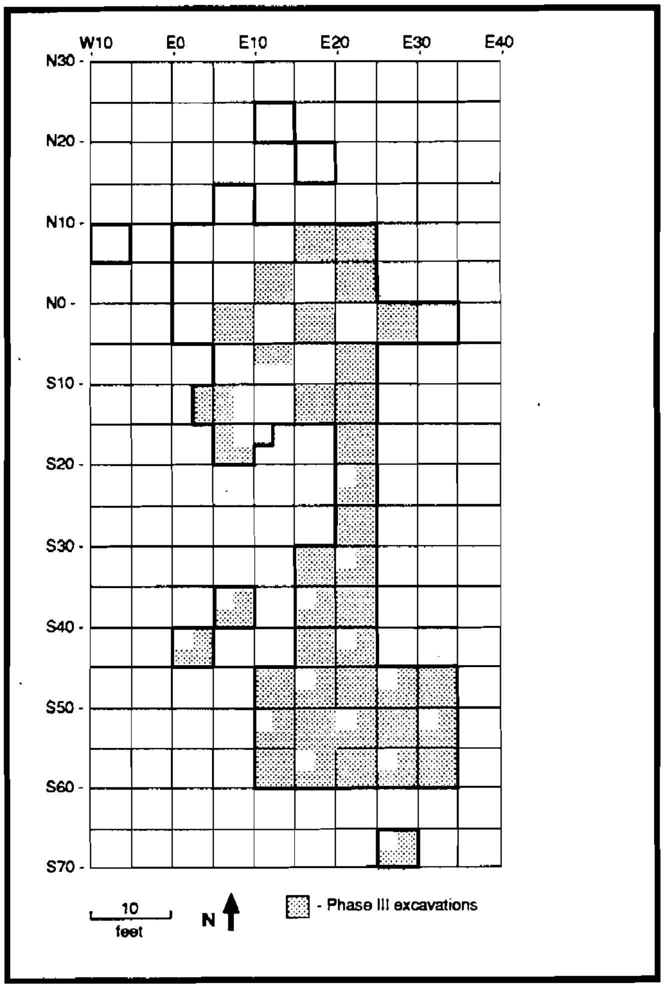
FIGURE 13

Location of Phase III Excavations, Dover Downs Site, Hill A (7K-C-365A)



As was true at 7K-C-360, soil and rock samples were recovered from each level in each unit to be used as a background control for blood residue analysis. Two areas of flotation samples were retained for analysis, one sample from the north half of the site, and one from the south half. Each sample consists of one 0.25-foot level from each excavated 2.5-foot square, resulting in approximately one 11-quart sample from each excavated level. A standard column soil sample was taken from three areas of the site as well. Figure 14 shows the location of both flotation and column soil samples.

Phase I testing at 7K-C-365B consisted of a pedestrian survey and two 3' X 3' test units placed on the east side and the west side of the crest of the rise on which the site was situated (Figure 15). During these investigations, a quartzite reduction area was identified in Test Unit 13-E.

In order to determine the extent of this concentration and locate any related features and artifact densities, as well as their cultural affiliation, a grid of 5' X 5' test squares was set up across the crest of the rise. In the southern portion of the site, 2.5' X 2.5' test units were used because the artifact density decreased in that direction. Shovel test pits were excavated on a 10-foot grid and were placed northwest of the core area exposed by the test units to determine the limits of the site. A total of 39 shovel test pits, 14 2.5' X 2.5' test units, and 54 5' X 5' test units were excavated in Phase II (Figure 15).

A soil sample and one unmodified pebble were taken from each 0.25' level of each 5' X 5' test unit to be used as background controls for blood residue analysis. In addition, a 16 percent flotation sample was taken from each 0.25' level of the 10' X 10' square grid. The sample was consistently taken from the southwest quadrant of a 5' X 5' test unit in each 10' X 10' square test grid.

The Dover Downs site, Hill B possessed sufficient integrity to establish its eligibility for the National Register of Historic Places. However, the excavations which were required to generate the information needed for a determination of National Register eligibility, and to develop a suitable data recovery plan, were sufficiently extensive to constitute data recovery and no further work at the site was recommended.

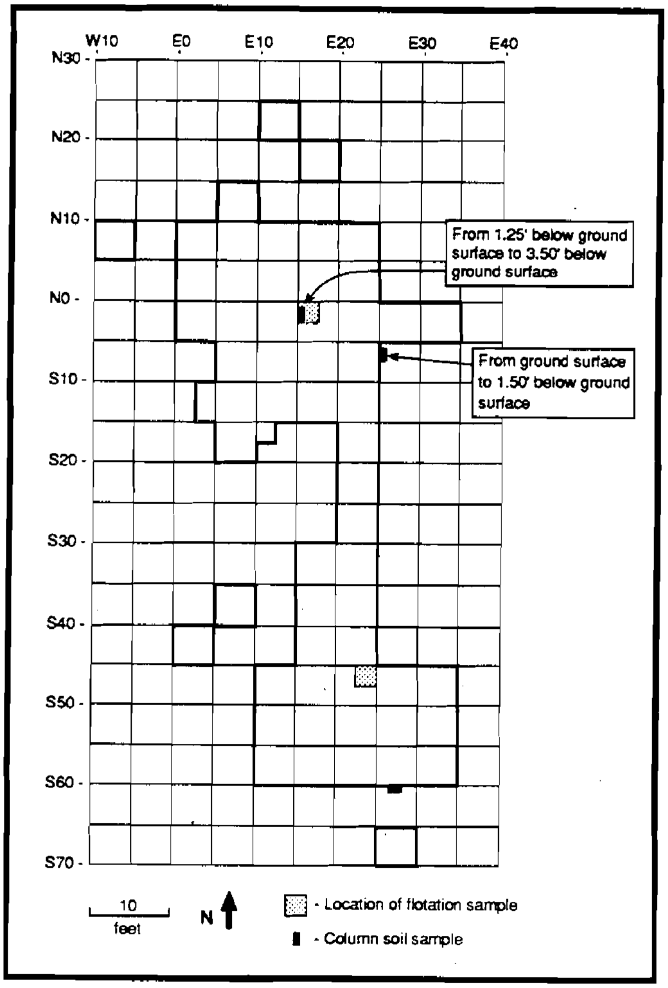
EXCAVATION RESULTS AND INTERPRETATIONS - SITE 7K-C-360

SITE STRATIGRAPHY

The following section will discuss the soil types and soil formation processes observed at 7K-C-360, and will consider the relationship of the soil types to the vertical distribution of artifacts at the site.

FIGURE 14

Location of Phase III Flotation and Column Soil Samples, Dover Downs Site, Hill A (7K-C-365A)



Discussion of soils will generally consider the site as a whole, but will take into account the similarities and differences among the soils in each sub-area, as defined in the section on activity areas. The implications of the site's stratigraphy on site chronology and the vertical separation of the Archaic and Woodland occupations will be addressed. Figure 16 shows the location of the North/South and East/West composite profiles for Areas A, B, and C, and the location of the North/South composite profile for Area D.

Soil Horizon I (Figures 17-21) is a recent humus or A Horizon which overlays the entire site, although it has been heavily eroded in some places. It consists of a dark brown silty to sandy loam containing decayed organic material and leaf litter. It is generally around 5 cm thick and contained a small amount of prehistoric artifacts. No diagnostic artifacts were clearly associated with this horizon, however.

Horizon II is an elluviated or E Horizon consisting of a medium brown to gray-brown silty sand. In Area D this soil is more of a sandy silt (Figure 21) and this horizon was generally less developed in the southern half of the site. The soil ranges from 5 cm to 10 cm in thickness (Figures 17-21).

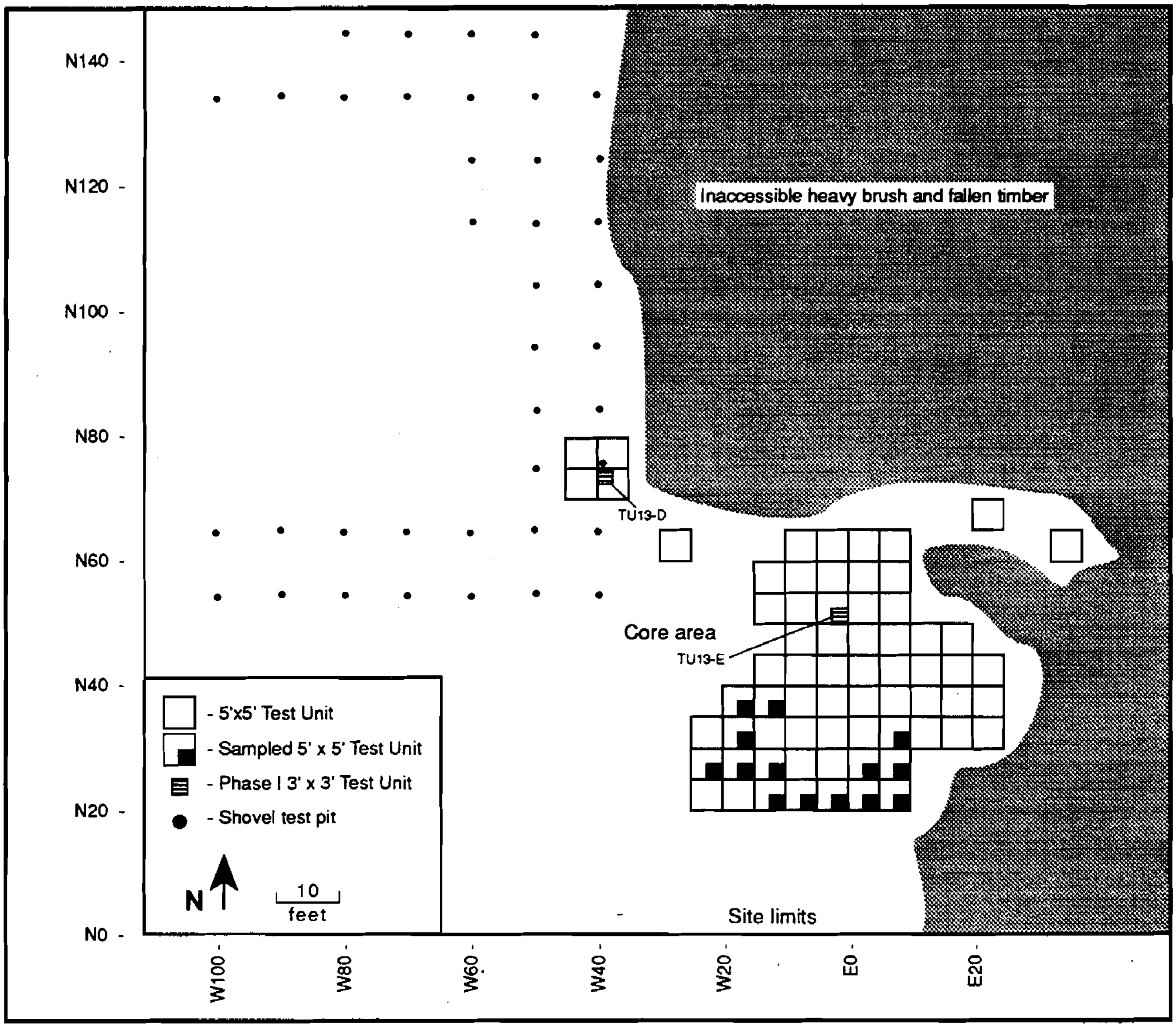
Horizons I and II correspond to excavation Level 1, which produced 11 percent of the total artifacts recovered from the site. A Woodland I stemmed point was recovered from the interface of Horizons I and II in Area B, and this was the only diagnostic artifact associated with these soils.

Soil Horizon III is a B11 Horizon consisting of a yellow-brown silty sand (Figures 17-21). It ranged in thickness from 5 cm to 30 cm, and was generally thinner to the north, in Area C (Figure 16). This soil corresponds to excavation Level 2 and portions of Level 3, and it produced 10 Woodland I stemmed points.

Horizon IV is a second B1 Horizon (i.e., B12) and is very similar to Horizon III, especially in the southern portion of the site. The borders between the two soils are smooth, indistinct, and gradual, and are represented by a dotted line in the composite profiles (Figures 17-21). The distinguishing difference between Horizons III and IV is a slight decrease in silt content in Horizon IV, particularly in Areas A and B. This decrease was extremely ephemeral, however, and the dotted line shown in the composite profiles is intended to indicate a gradual transition instead of actual horizonation. In Areas A and B Horizon IV is yellow-brown to light yellow slightly silty sand (Figures 17, 18, and 19), while in Area C it appears as a yellow-brown to orange-brown silty sand/sandy loam (Figure 20). In Area D it is a yellow-brown silty sand/sandy loam. The major distinction between this soil in Areas A and B as compared with Areas C and D is a slight amount of clay in Areas C and D. This clay is likely translocated material from Horizon III but was not abundant enough to label this soil a B2 or B12t

FIGURE 15

Phase I/II Testing, Dover Downs Site, Hill B (7K-C-365B)



Horizon. In all areas of the site, Horizon IV is a pedogenic horizon, signifying some stability in soil profile development. These soil horizons do not, however, indicate distinct depositional events.

Horizon IV ranges in thickness from 10 cm to 30 cm and corresponds to portions of excavation Level 3, excavation Level 4, and portions of excavation Level 5. Five Woodland I stemmed points were recovered from the interface of Horizons III and IV, as were two Archaic bifurcate points. Two additional bifurcates were found entirely within Horizon IV. The majority of artifacts found at 7K-C-360 were from soil Horizons III and IV.

Like the border between Horizons III and IV, the border between Horizon IV and Horizon V was not clearly defined, but was somewhat more noticeable. Horizon V was an orange to yellow-brown sandy loam/clayey sand with a small amount of gravel and showed an increase in clay compared to the horizon directly above it. The border between Horizons IV and V appears to be a result of pedogenesis or movement of clay-sized particles from Horizon IV to Horizon V, not a stratigraphic break or discontinuity between the two soils. The increase in clay is significant, however, so Horizon V is therefore labeled a B2t Horizon.

FIGURE 16

Location of North/South and East/West Composite Profiles, Site 7K-C-360, Activity Areas A, B, C, and D

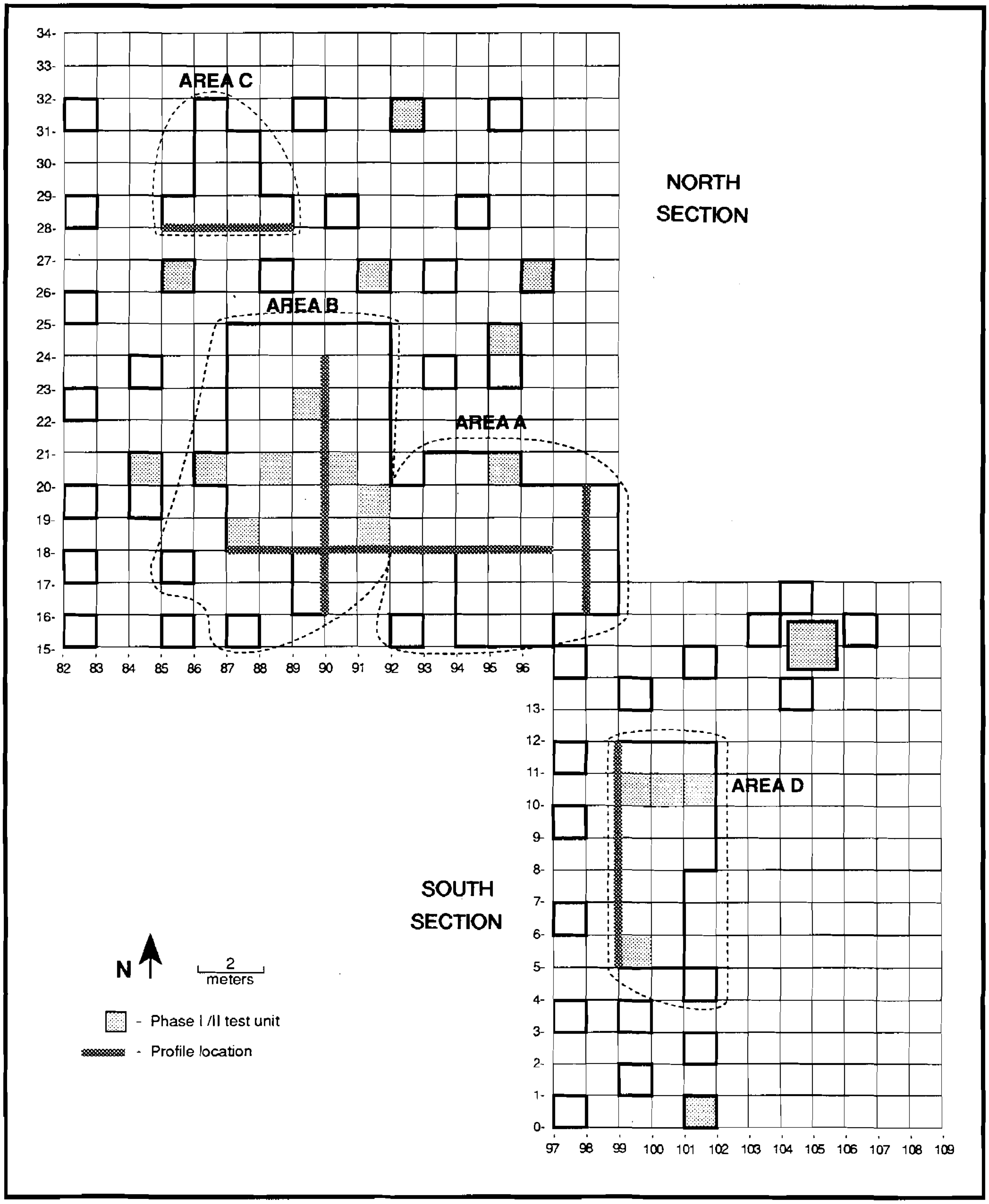
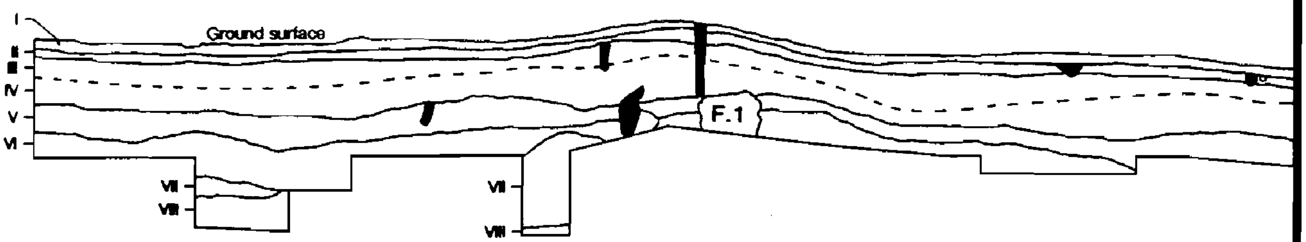


FIGURE 17

North/South Cross-Section Profile, Site 7K-C-360, Activity Area B



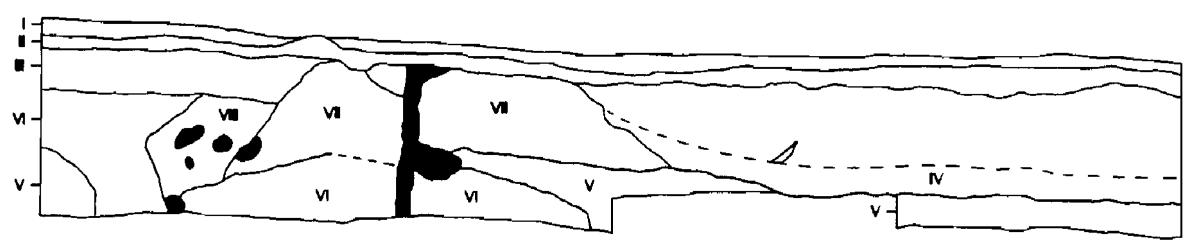
- Root disturbance
---- Indistinct border
I - (A) Humus; dark brown silty to sandy loam with organic material
II - (E) Medium brown / gray brown silty sand
III - (B11) Yellow brown silty sand
IV - (B12) Light yellow brown silty sand, decreasing silt
V - (B2t) Orange brown sandy loam / clayey sand
VI - (IIB1t) Orange brown clayey sand with gravel; plastic, sticky
VII - (IIB2t) Orange clayey sand / sandy clay with small amount of gravel
VIII - (C) Orange and yellow sand with gravel; loose, nonsticky, nonplastic

1 meter

N S

FIGURE 18

North/South Cross-Section Profile, Site 7K-C-360, Activity Area A



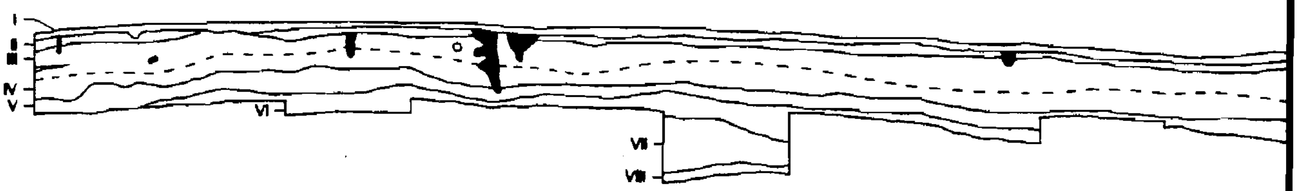
- Root disturbance
---- Indistinct border
I - (A) Humus; dark brown silty to sandy loam
II - (E) Medium brown / gray brown silty sand, highly compacted
III - (B11) Yellow brown silty sand
IV - (B12) Yellow brown slightly silty sand
V - (B2t) Orange / yellow brown sand loam / clayey sand with small amount of gravel
VI - Orange / gray mottled slightly silty sand with moderate amount of gravel; root disturbed soil
VII - Orange brown clayey sand, moderately compacted; root disturbed soil
VIII - Gray / orange sand; root disturbed soil

.5 meter

N S

FIGURE 19

East/West Cross-Section Profile, Site 7K-C-360, Activity Areas A and B



- Root disturbance

---- Indistinct border

I - (A) Humus; dark brown silty to sandy loam with organic material

II - (E) Medium brown / gray brown silty sand

III - (B11) Yellow brown silty sand

IV - (B12) Light yellow brown slightly silty sand

V - (B2t) Orange brown sandy loam / clayey sand

VI - (IIB1t) Orange brown clayey sand with gravel

VII - (IIB2t) Brownish orange clayey sand / sandy clay with small amount of gravel

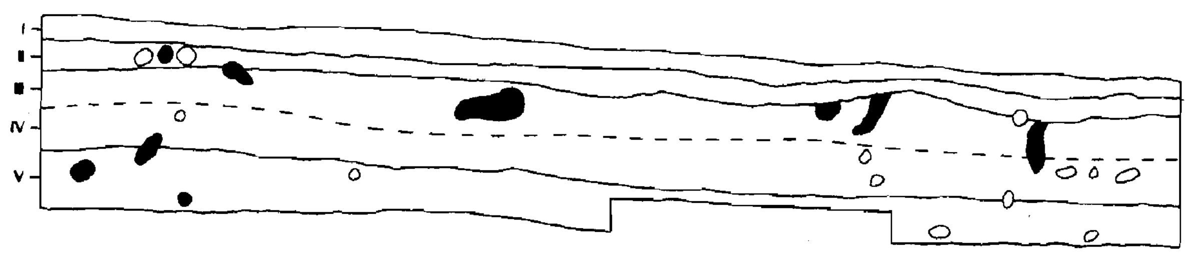
VIII - (C) Orange and yellow sand with gravel;

1 meter

E W

FIGURE 20

East/West Cross-Section Profile, Site 7K-C-360, Activity Area C



- Root disturbance

---- Indistinct border

I - (A) Dark brown silty to sandy loam with organic material

II - (E) Medium brown silty sand / sandy loam

III - (B11) Yellow brown silty sand

IV - (B12) Yellow brown / orange brown silty sand, with slight increase in clay

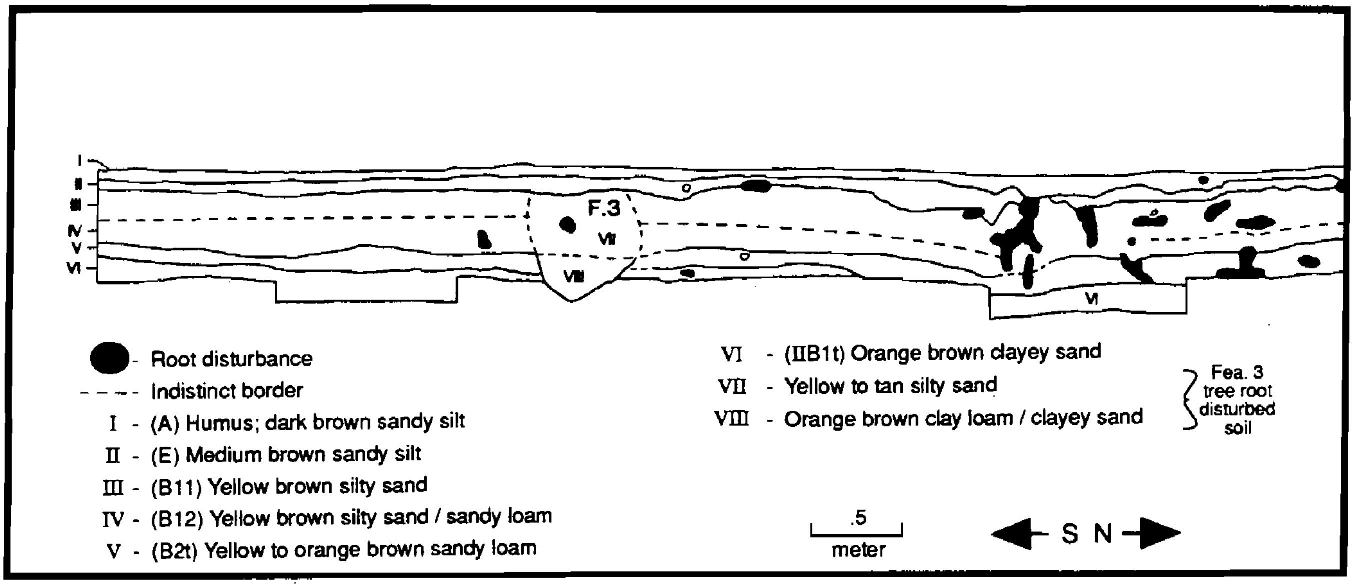
V - (B2t) Orange brown sandy loam / clayey sand with small amount of gravel

.5 meter

E W

FIGURE 21

North/South Cross-Section Profile, Site 7K-C-360, Activity Area D



Horizon V varied in thickness from 8 cm to 20 cm. No diagnostic artifacts clearly situated in Horizon V were found; however, one Archaic bifurcate point was found in the interface between Horizons IV and V. Horizon V corresponds to portions of excavated Level 4, excavated Level 5, and portions of excavated Level 6 in Areas A, C, and D, and to excavated Levels 6 and portions of Level 7 in Area B. A small number of artifacts were found in Levels 5 and 6, representing only 13 percent of the total artifacts from the site.

Horizon VI shows a sharper break with Horizon V than did Horizon V with Horizon IV. Horizon VI is an orange-brown clayey sand with a moderate amount of gravel. This soil was plastic and sticky, and soil particles show well developed clay cutons or skins. The clay content of this soil is much higher than that of Horizon V, and the amount of gravel is greater. The difference between Horizon VI and the soil above it somewhat resembles a stratigraphic break or discontinuity between two soils, but this is not clearly indicated. Rather, it is likely that this soil is an older B Horizon with a greater amount of translocated clay. It is labeled a IIB1t soil.

Horizon VI is at least 30 cm thick in some places, and as little as 5 cm in others. In Areas A and D, this soil corresponds to portions of excavated Level 6 and excavated Level 7; in Area B it corresponds to portions of excavated Level 7 and excavated Level 8. None of this soil was excavated in Area C. The only artifacts found in Levels 7 and 8 were in heavily root-disturbed areas; the remainder of Horizon VI was culturally sterile.

Horizons VII and VIII are the last two to be described, and were exposed in only a few units (Figures 17-19 and 21). Horizon VII is a IIB2t soil composed of a brownish-orange clayey sand/sandy clay with a moderate to small amount of gravel. This soil has the greatest amount of clay of any soil at the site and is the final B Horizon at the site. As can be seen in Figure 17, this soil was found to be over 60 cm thick in places, and it corresponds to excavated Levels 7 through portions of Level 11 in Area B, the only area where this soil was tested. No artifacts were recovered from this soil.

Horizon VIII is composed of orange and yellow sands with a large amount of gravel, and represents outwash deposits from Pleistocene glaciation. Although a small amount of clay was observed in the uppermost portion of this soil (translocated from Horizon VII), it was for the most part loose, non-sticky and non-plastic. This soil is a C Horizon, and was observed to be at least 20 cm thick, although it was undoubtedly much thicker. No cultural artifacts were found in this soil, which was tested in Area B only (Figures 17 and 19).

Horizon I is a forest humus soil of recent age which lays on an elluviated E Horizon (Horizon II) that contained a Woodland I stemmed point. Horizon II is the leached out upper portion of Horizon III. Horizons III an IV are composed of fine-grained sands and silts which suggest aeolian-deposited soils. In addition, the modern topography of the site, an elevated knoll, precludes any other method of deposition besides aeolian. Diagnostic artifacts recovered from Horizons III and IV include Woodland I and Archaic projectile points suggesting an age for these soils of 6500 B.C. to A.D. 1000. At least 60 cm of these aeolian soils are present at the site, and the recovery of a Woodland I point less than 10 cm below ground surface (in Horizons I and II) indicates that some erosion of these soils has also taken place.

The origin of soil Horizon V is slightly less clear. As previously mentioned, this soil contained more clay than Horizon IV, but the border between these soils was gradual. No indications of profile disturbance were suggested here. Assuming Horizon V is a pedogenic horizon formed in the same soil as Horizons III and IV, then over 80 cm of aeolian-deposited soils are present at the site, some of which pre-date 6500 B.C. The soil in Horizon V is moderately to well developed, as would be expected in an undisturbed soil of that age, and its loamy texture does not preclude aeolian deposition.

Horizons VI and VII also pre-date 6500 B.C., and the amount of clay in these soils suggests a period of stability of at least 8000 years. Although no clear break between Horizon VI and the one above it was observed, the amount of clay present in the lower soil was significantly higher, and the presence of gravel in both Horizon VI and Horizon VII argue against aeolian deposition. There is, however, no clear indication that these soils are not pedogenic horizons formed from the accumulating aeolian soils above them, and the large amounts of clay in these soils support this. They are considered to be Late Pleistocene/Early Holocene in age, ca. 10,000 to 6500 B.C. Concerning their origin, the absence of any relict stream channels in the site suggests that these soils are not alluvial in nature. Colluvial deposition may have been possible if the Late Pleistocene/Early Holocene landscape was lower than the Middle Holocene elevated topography.

The final horizon (VIII) contains large amounts of fluvially derived sands and gravel. This material most likely originated from Late Pleistocene/Early Holocene glacial outwash of the Columbia Formation, ca. 15,000 to 10,000 B.C.

Aeolian site burial in central Delaware has been noted by other researchers. Ward and Bachman (1987) identified 60 prehistoric sites in that locale which showed evidence of wind-blown soil deposits. Aeolian deposition has also been documented on Coastal Plain sites outside of Delaware (Stewart 1983; Curry and Ebright 1989). The major time period hypothesized for this event has been the Middle Holocene, ca. 3000 to 1000 B.C., with the impetus being the climatic perturbations and warm and dry conditions prevalent at this time (Curry 1980; Curry and Custer 1982; Catlin, Custer, and Stewart 1982; Custer 1984a). These climatic shifts would create local denudations of landscape vegetation resulting in the wind-born transportation of topsoil and localized areas of erosion and deposition. Sites in central Delaware with aeolian deposits and diagnostic artifacts have consistently been Woodland I and II occupations, although some sites in northern Delaware have remnant soil deposits with Archaic artifacts below the aeolian soils (Custer and Watson 1987:83). The presence of Woodland I points in Horizons III and IV at 7K-C-360 indicate that some aeolian deposits in these horizons are also Middle Holocene in age. The presence of Archaic points in Horizon IV, and in the intersection of Horizons IV and V, make site 7K-C-360 somewhat unique in that aeolian deposits which date to 6500 B.C. or earlier are also present. Wind-blown loess deposits dating to the Late Pleistocene have been noted for the eastern shore of Maryland (Foss et al. 1978) and are derived from the erosion of open grassland areas. Deposition in these areas occurs at the interface of the open grasslands and the forested areas, and this could be the origin of pre-6500 B.C. aeolian deposits at 7K-C-360, although this is uncertain. Aeolian soils of Pleistocene age have also been noted in northern Delaware (Adams and Boggess 1964; Boggess and Adams 1963; Custer 1982).

The site is also interesting in that no stratigraphic break or discontinuity is associated with the Middle Holocene aeolian deposits. Sites in northern Delaware and other areas of the Middle Atlantic frequently show stratigraphic discontinuities beneath Middle Holocene aeolian deposits which post-date 6500 B.C. (Custer and Watson 1987; Stewart 1983). These breaks are associated with large scale erosional events at the onset of warm and dry climatic conditions ca. 3000 B.C. Earlier Holocene-age soils at these sites were eroded, and later Holocene aeolian soils rest unconformably on Pleistocene age deposits. Local denudation of vegetation is again thought to be responsible for the erosional event. No such erosional event is evident at 7K-C-360, although over 80 cm of aeolian deposited soils are present. One possible explanation for this absence of erosion is the presence of poorly-drained low areas and wetlands directly adjacent to the site. It has been hypothesized that the erosional and depositional processes operating in the Middle Holocene are complex, small scale systems which are greatly affected by local soil stability and water retention, and by the stability and drought resistance of local plant communities (Ward and Bachman 1987). If so, the presence of water-retaining low areas very near the site may have reduced or prevented vegetational die-off in periods of climatic stress. In addition, the high clay content of soil Horizons VI and VII, which are located below the aeolian deposited soils, may have acted as water-impermeable barriers, inhibiting water percolation to the deeper water table, beyond the reach of vegetation. Either scenario would have aided plant growth and thereby reduced the amount of erosion, preserving the early Holocene soils. The presence of microtopographic features such as vegetational ground cover may also have promoted aeolian deposition at the site (Curry and Ebright 1989; Stewart 1983).

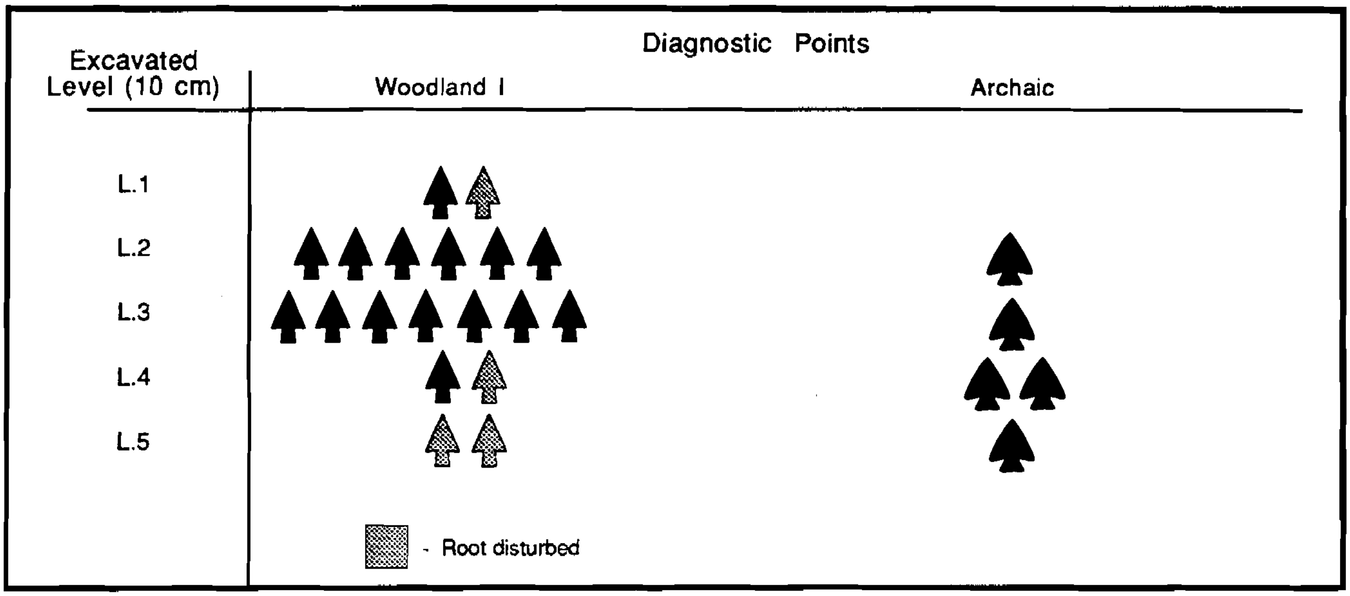
The final discussion of site stratigraphy concerns the vertical distribution of prehistoric artifacts at 7K-C-360. As previously mentioned in this section (and as will be discussed in greater detail in the section on site chronologies), diagnostic artifacts recovered from the site include Archaic bifurcate points ca. 6500 B.C. and Woodland I points ca. 3000 B.C. to A.D. 1000. Figure 22 shows the vertical distribution of these artifacts by both excavation level and soil horizon. As may be seen in Figure 22, the vertical distribution of points by 10 cm excavation levels shows considerable movement of Archaic and Woodland I points, with 11 Woodland points from Levels 3, 4, and 5 recovered below the highest bifurcate point (found in Level 2). A comparison of the vertical distribution of points by soil type (excluding points from obviously disturbed contexts) shows somewhat less dispersion, with Woodland I points clustering in Horizon III and the interface of Horizons III and IV, and Archaic points in the Horizon III/IV interface, Horizon IV, and the interface of Horizons IV and V. Some vertical separation of the Archaic and Woodland points is apparent, although no clear pedogenic or depositional break between the two point types is present. In fact, the two artifact groups are extremely close, and actually overlap in the soil profile. One possible explanation for their close proximity is that Horizon IV is actually an older, early Holocene soil and the Archaic points were once higher in the profile. Middle Holocene aeolian erosion then took place, removing the Archaic living surface and deflating the Archaic materials to Horizon IV. Sometime soon after, aeolian soils were deposited at the site, and a Woodland I occupation produced the stemmed and notched points now found in close association with the Archaic artifacts.

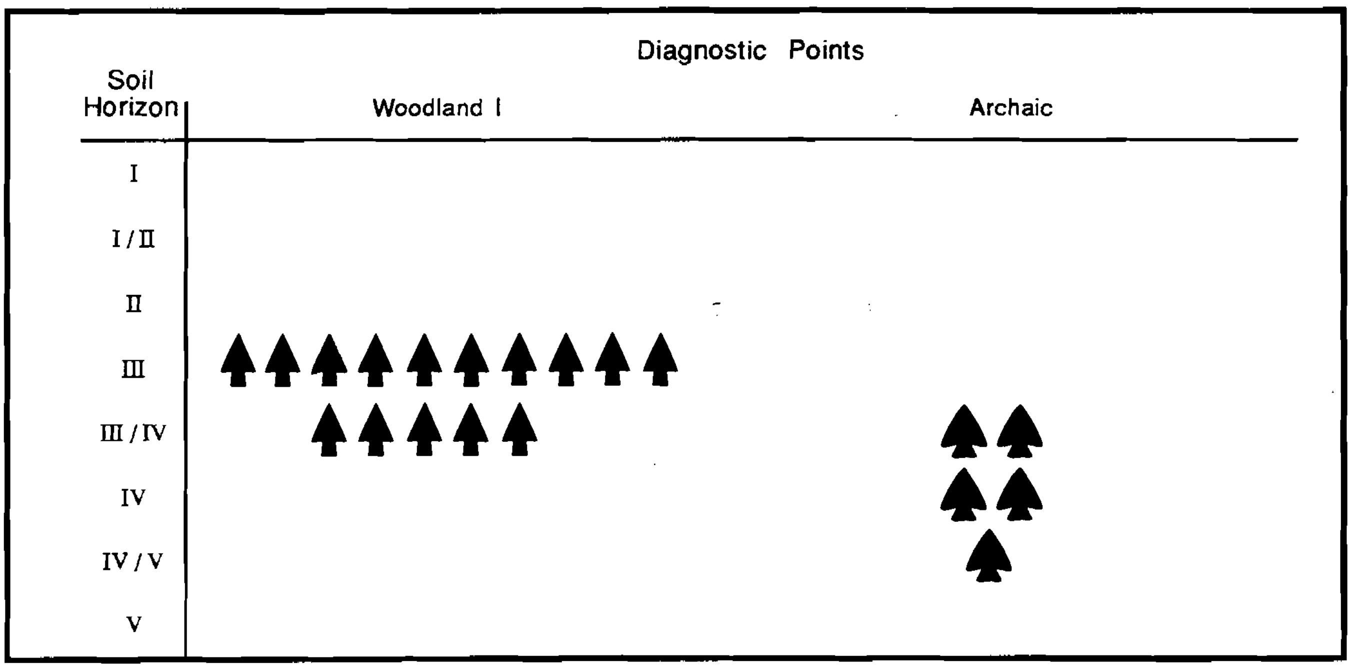
There are several problems with this argument, the strongest of which is the lack of evidence in Horizons III and IV of a stratigraphic discontinuity. As previously mentioned, the boundary between Horizons III and IV is so indistinct as to be nearly undetectable, and it is drastically unlike stratigraphic breaks seen elsewhere in Delaware (Custer and Watson 1987). It is also likely that if Horizon IV had been buried by wind-blown soils ca. 3000 B.C. (i.e., by Horizon III, and possibly Horizon II), more pedologic development would have been seen in Horizon IV than was present. A more plausible explanation for the lack of separation between Archaic and Woodland artifacts at 7K-C-360 is that the artifacts have moved through the profile by natural perturbations.

A large amount of root and rodent soil disturbance was noted during data recovery excavations at 7K-C-360. The composite profile shown in Figure 18 depicts one tree root disturbance, of which there were many. These disturbances have already been observed to have moved projectile points downward through the profile (Figure 22); in fact, three Woodland I points in root disturbances were

FIGURE 22

Diagnostic Points by Excavated Level and Soil Horizon, Site 7K-C-360, North Area





recovered from below Archaic bifurcate points. All tree root and rodent disturbances at the site were excavated and screened separately as a control for these disturbances, but this procedure can only affect soil disturbances that are now visible. While some research has shown that natural features as old as 1005 B.C. may still be definable in the soil (Custer, Watson, and De Santis 1987) this may not be applicable as far back as 6500 B.C. Tree falls and frost push/pull may also have moved artifacts in an upward direction.

Additional evidence for vertical artifact movement at the site may be found by looking at the horizontal distribution of artifacts by level. These distributions will be described in greater detail in the

TABLE 1

Prehistoric Artifact Summary, Site 7K-C-360

	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Chalcedony	Other	Total
Flakes	321(70)	502(97)	267(74)	730(300)	30	32	2	158(28)	12(3)	2054(572)
Utilized flakes	6(3)	8(3)	5(3)	21(15)	1	—	—	9(6)	—	50(30)
End scrapers	2(1)	4(3)	8(5)	10(9)	—	—	—	2(1)	—	26(19)
Side scrapers	—	1(1)	2(2)	4(3)	—	—	—	—	—	7(6)
Drills	—	—	1	—	—	—	—	—	—	1
Denticulates	—	—	—	1	—	—	—	—	—	1
Flake tools	—	1(1)	1(1)	3(1)	—	—	—	—	—	5(3)
Pebble tools	—	—	—	1(1)	—	—	—	—	—	1(1)
Archaic points	—	—	1	1	1*	—	—	—	—	3
Woodland I points	1	—	2	7(1)	—	6	—	1	—	17(1)
Early stage biface reject	1	1	2(1)	4(3)	—	—	1	—	—	9(4)
Late stage biface reject	1	—	—	1(1)	—	—	—	—	—	2(1)
Late stage biface discard	—	—	1(1)	3(2)	1	—	—	—	—	5(3)
Biface fragments	2	2	3(2)	1	1	3	1	—	—	13(2)
Miscellaneous stone tools	—	—	1(1)	1(1)	—	—	—	—	—	2(2)
Shatter	11(1)	53(14)	1	2(1)	—	—	—	—	1	68(16)
Cores	3(3)	9(7)	3(1)	6(6)	—	1	—	6(6)	—	28(23)
Total	348(78)	581(126)	298(91)	796(344)	34	42	4	176(41)	13(3)	2292(683)

	Total count	Percent
Quartzite	348(78)	15.20
Quartz	581(126)	25.40
Chert	298(91)	13.00
Jasper	796(344)	34.80
Rhyolite	34	1.40
Argillite	42	1.80
Ironstone	4	0.20
Chalcedony	176(41)	7.70
Other	13(3)	0.50
Total		100.00

* Felsite

521 Fire-cracked rocks
6 Hammerstones

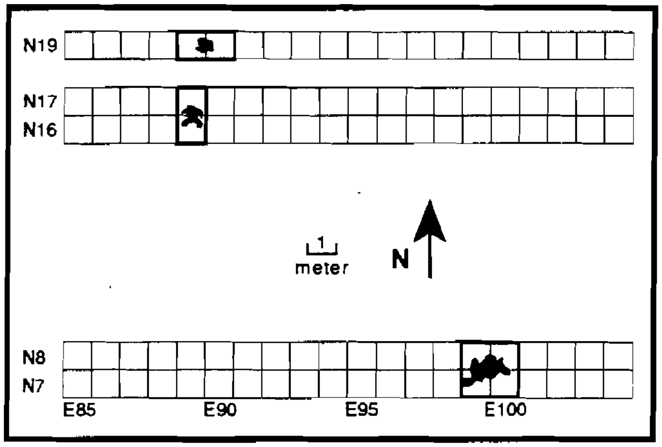
section on activity areas, so only some general observations which apply to the integrity of the vertical artifact distributions will be mentioned here.

A comparison of the horizontal distribution of various artifact types and attributes by excavated level was undertaken. No significant changes were seen in the location or concentrations of artifacts with depth, nor are there appreciable differences in the frequency of raw material percentages. The horizontal distribution of artifact types and the percentages of artifacts with cortex also do not change significantly with depth. A final example of artifact movement concerns two biface fragments recovered from test units N28E87 and N28E88. The fragments refit to one another, but were found in Levels 1 and 3, respectively, indicating at least 10 cm of vertical displacement, if not more. All of these occurrences point to artifact movement through the profile, and the mixing of earlier and later occupations.

Unfortunately, the disturbance of artifacts at 7K-C-360 allows separation of only the diagnostic artifacts of the Archaic occupation from the Woodland I occupation. This difficulty is somewhat offset by the valuable information presented by the lengthy record of soil deposition and erosion at the site. The implications of this soil information for local and regional paleoenvironments will be explored further in the final sections of the report.

FIGURE 23

Location of Soil Stains, Site 7K-C-360



EXCAVATED ARTIFACTS

A summary catalog of excavated artifacts is contained in Table 1. A variety of lithic artifacts including projectile points, bifaces, cores, scrapers, flakes, flake tools, and utilized flakes comprise the assemblage.

FEATURE EXCAVATIONS

Figure 23 shows the location of all soil stains and disturbances located during the Phase III excavations. All of these stains were determined to be natural in origin, the result of decayed tree roots and stumps. No prehistoric cultural features were encountered in the Phase III excavations.

FLOATED ARTIFACTS AND ECOFACTS

A flotation sample was retained from three 1m x 1m test units and one feature at Site 7K-C-360 (Figure 11). All soil from one 50cm square quadrant from each of these units was saved by 10cm level and was returned to the lab for processing. All samples were processed using a water driven flotation tank with heavy fractions being collected in window mesh sized screen and light fractions collected in a silk bag. After drying, all artifacts and ecofacts were removed and cataloged.

Table 2 shows a summary of all artifacts recovered from both the heavy fraction and the light fraction. The majority of artifacts consist of debitage, with a small amount of charcoal included. One charred Amaranth seed, one charred Eleusine indica seed, and six charred Chenopodium seeds as well as numerous charred unidentifiable nut hull fragments were recovered from the flotation samples.

Table 3 shows a comparison of raw material frequency between debitage recovered from flotation and debitage recovered from 1/4-inch screens. Notable differences exist between the two assemblages. For example, there is a total absence of quartz and quartzite in the flotation sample whereas these materials are relatively prominent in the 1/4-inch screen assemblage. These materials were used for the manufacture of both bifaces and flake tools, which would have generally required medium to large size preforms. These early stages of manufacture would likely produce flakes large enough to be collected in 1/4-inch screen. Cryptocrystalline chert and chalcedony, however, had considerably higher percentages of debitage in the flotation assemblage than in the 1/4-inch mesh assemblage. Jasper percentages were similar in both assemblages. These cryptocrystalline materials were used to manufacture bifaces and flake tools, but were also well represented in the finished points and late stage bifaces. These materials produce a sharper, although less durable, edge than quartzites, argillites, and even quartz which is more brittle. Therefore, more frequent resharpening is necessary to maintain these edges, and this activity would be expected to produce large numbers of small flakes, as would be collected in a flotation sample. There were no examples of argillite, rhyolite, ironstone, or other materials in the flotation debitage, and only very small percentages of these materials were present in the 1/4-inch mesh assemblage.

TABLE 2

Artifact Flotation Sample

Site 7K-C-360 (N9E99, N20E89, N31E89, Feature 1)

Heavy Fraction	
Lithic Artifacts	
Chert flakes	10
Jasper flakes	8
Chalcedony flakes	4
Chert shatter	1
Charred seeds	
Unidentified seed	1
Spore	1
Unidentified nut hulls	8
Charcoal	12.0g
Light Fraction	
Charred Seeds	
Pigweed (Amaranthus) unidentified species	1
Lamb's Quarters (Chenopodium) unidentified species	6
Goosegrass (Eleusine indica)	1
Spores	75
Unidentified nut hull fragments	15
Charcoal	6.55g

TABLE 3

Raw Material Frequency: Flotation vs. 1/4-Inch Mesh Screen

Site 7K-C-360 (N9E99, N20E89, N31E89, Feature 1)

	Flotation		**Screen**	
Quartzite	0	0%	332 (71)	16%
Quartz	0	0%	555 (111)	26%
Chert	11	48%	268 (74)	13%
Jasper	8	35%	732 (301)	34%
Chalcedony	4	17%	158 (28)	7%
Rhyolite	0	0%	30	1%
Argillite	0	0%	32	2%
Ironstone	0	0%	2	<1%
Other	0	0%	12	<1%
Total	23	100%	2,121 (585)	100%

KEY: ( ) = cortex

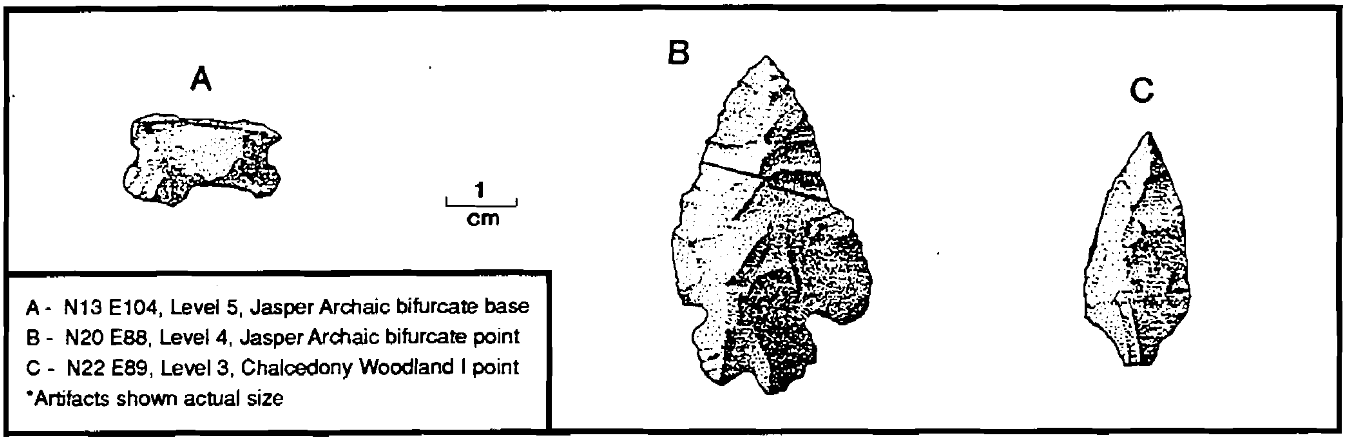
TABLE 4

Summary of Blood Residue Analysis, Site 7K-C-360

Sample type	Number of samples	Number of tests conducted	Number of samples showing Positive reaction	Number of Samples showing Negative reaction
Control (soils, pebbles, gravels)	175	525	0	175
Debitage	207	634	0	207
Tools	115	331	0	115

FIGURE 24

Projectile Points Recovered in Phase II Excavations, Site 7K-C-360



A - N13 E104, Level 5, Jasper Archaic bifurcate base
B - N20 E88, Level 4, Jasper Archaic bifurcate point
C - N22 E89, Level 3, Chalcedony Woodland I point
*Artifacts shown actual size

BLOOD RESIDUE ANALYSIS

Lithic artifacts from the site were subjected to blood residue analysis using the chemstrip testing method as described by Custer, Ilgenfritz and Doms (1988). The results of these tests are summarized in Table 4. The analysis is used to determine the presence of hemoglobin on the tools and the test measures presence or absence of blood but not species. The goal is to use this technique to aid in determining if animal butchering was conducted at the site. Soil, pebble, and gravel samples were tested to control for the possibility of contamination at the site. All of the 525 tests that were conducted on 175 control samples produced negative results, indicating that the soils were free of contamination. One hundred fifteen tools and 207 pieces of debitage were then tested. The tests were applied to several loci on each artifact; thus, a total of 331 individual tests were conducted on 115 tools and 634 individual tests were conducted on 207 flakes. All of the artifacts tested negative for the presence of blood residue. These results only indicate that blood residues are not now present on the artifacts, and no further interpretations are possible.

SITE CHRONOLOGY

Discussions of site chronology will consider both the age of the site and its duration of occupation. Because no organic material suitable for a radiocarbon date was recovered, the site's relative age and placement in regional cultural chronologies will be based on diagnostic artifacts. The only diagnostic artifacts recovered were projectile points; no prehistoric ceramics were found at the site.

A variety of styles of projectile points were recovered from the excavations and are shown in Figures 24 and 25. Five bifurcate points are contained in the assemblage including two (Figure 24-A and B) which were recovered in the Phase II excavations. Two of the bifurcate points (Figures 24-B and 25-C) were recovered from excavation Level 4 (30-40 cm below ground surface). The other three bifurcate points were each recovered from separate excavation levels: Figure 25-A from 10-20 cm below surface; Figure 25-B from 20-30 cm below surface; and Figure 24-A from 40-50 cm below surface. Radiocarbon dates for bifurcate points have been recorded at the St. Albans site at 6210 B.C. +/- 100 years and 6880 B.C. +/- 700 years (Broyles 1966:23-28), and occur no later than 6000-5500 B.C. (Broyles 1971:49; Michels and Dutt 1968). Their appearance in conjunction with the emergence of Holocene environments circa 6500 B.C. marks the beginning of the Archaic Period on the Delmarva Peninsula (Custer 1984a:43-61).

In addition to the bifurcate points, several side-notched and stemmed examples were also recovered (Figures 24 and 25). Kinsey (1972:443-444) has identified a generalized side-notched class in which he includes various point styles commonly found at sites in the Delaware Valley. Kinsey (1972:444) ascribes this generalized class to a time period ranging from the Late Archaic to the Middle Woodland. A radio carbon date of 2350 B.C. was recorded for Brewerton side-notched points at the Sheep Rock site in central Pennsylvania (Kinsey 1972:396).

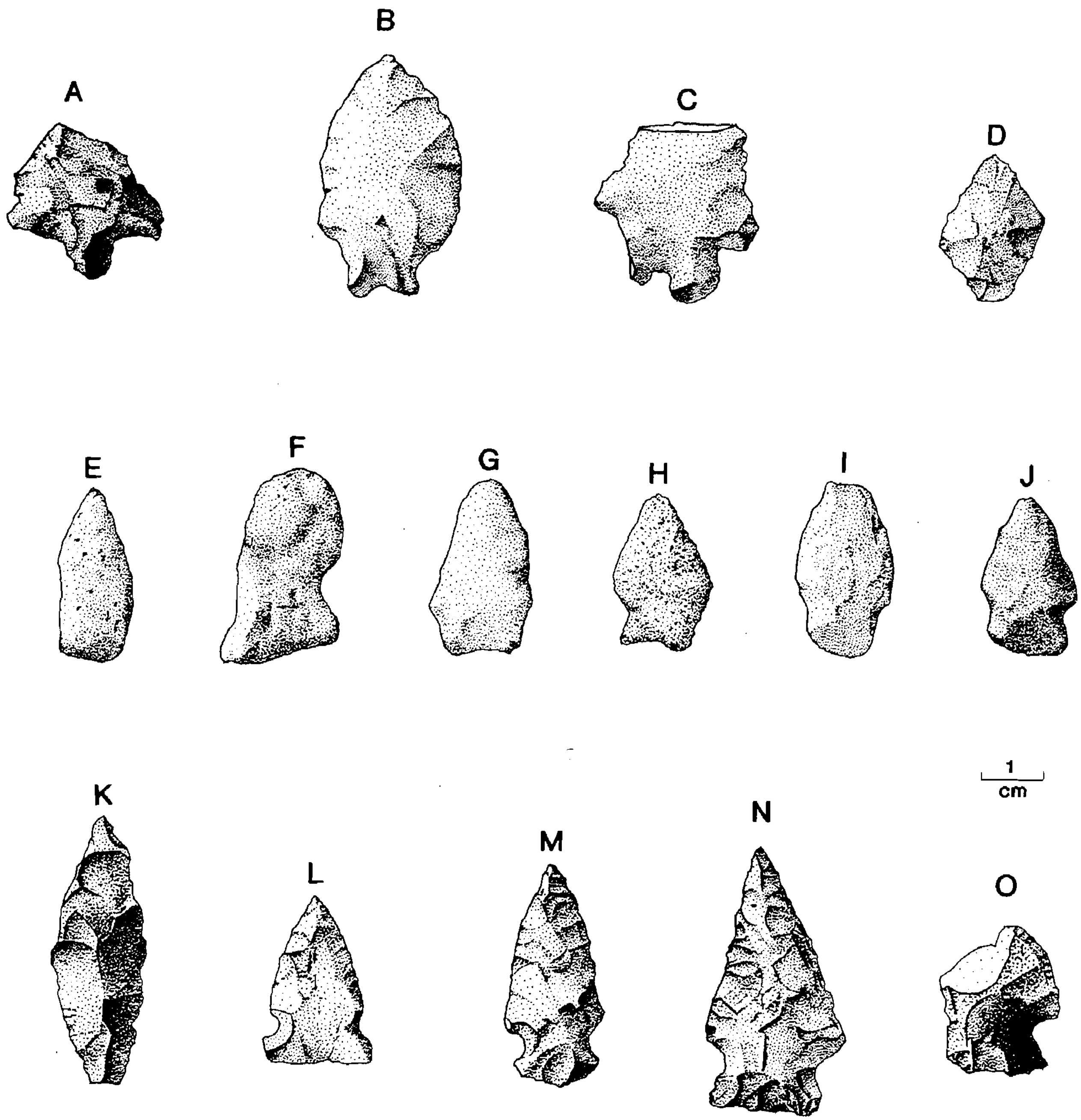
One of the side-notched points in the 7K-C-360 assemblage (Figure 25-M), a narrow bladed variety, resembles the Normanskill- or Lamoka-like points described by Ritchie (1961:29, 37) and Kinsey (1972:414-417). Kinsey (1972:405) notes that these types are commonly found together with Brewerton side-notched points at sites in the Upper Delaware drainage. Radio carbon dates of 1440 B.C. for the Broadhead-Heller site in the Upper Delaware Valley and 2030-1940 B.C. at the Farrell site in western New York have been recorded for the Normanskill-like points (Kinsey 1972:396).

The majority of stemmed points from 7K-C-360 (Figures 25-D, K, R, T, and 24-C) are a small-to-medium, narrow-bladed, contracting stem form, which roughly correspond to the historical types Rossville and Lagoon (Ritchie 1961; Kinsey 1972:435-437). Ritchie (1961:46) assigns a Late Archaic-Early Woodland age to Rossville points, and Kinsey (1972:367) and Custer (1984a:81) have noted a morphological continuity of stemmed point forms for the same period. A radiocarbon date of 480 B.C. has been recorded for Rossville points in the Upper Delaware (Kinsey 1972:436). At the Delaware Park site (7NC-E-41), small, narrow-bladed stemmed points were associated with radiocarbon dates ranging from 730 B.C. to A.D. 640 (Thomas 1981:135-141). In addition, points of this type have been found with Mockley ceramics (Custer 1984a:81), which have been dated to between A.D. 0 and A.D. 600 (Artusy 1976:3-4).

Custer and Bachman (1984) have noted that the normative view of a single point style for one group at one time, used in early typologies, is probably overly simplistic and that distinctions among stemmed point styles most likely have little diagnostic significance. Additionally, the distinctions made between the various base forms may be quite subjective, particularly with bifaces made from highly weathered argillite. Custer (1984a) has also noted that the range of sizes of resharpened Bare Island/Lackawaxen points and Rossville points overlap, further suggesting that a similar projectile point technology existed in the Middle Atlantic region from 3000 B.C. to 600 B.C. Moreover, Custer and Bachman (1984) have suggested that the difference in lengths of the stemmed points in the same morphological tradition more likely result from functional and resharpening attributes than chronological differences.

FIGURE 25

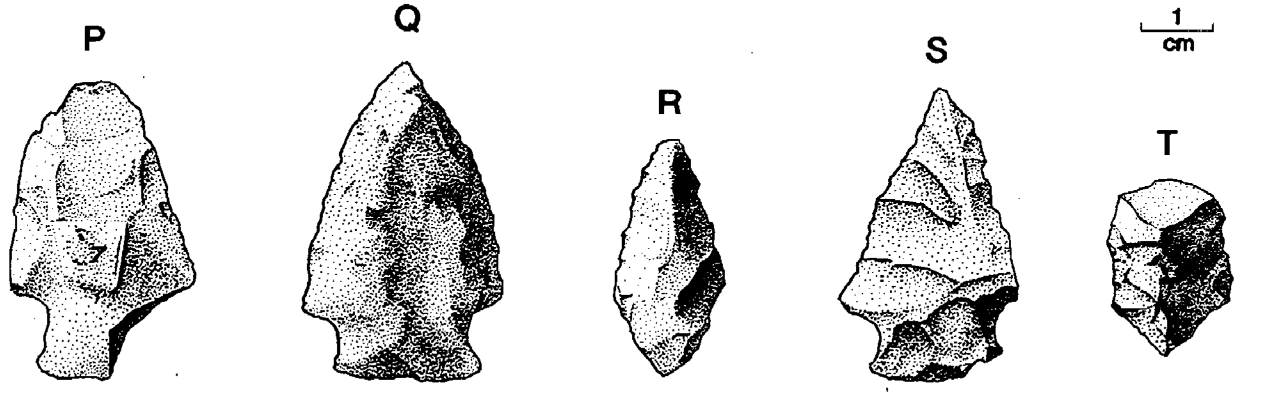
Projectile Points Recovered in Phase III Excavations, Site 7K-C-360



A - N16 E96, Level 2 NE, Chert
B - N17 E95, Level 3 NW, Felsic rhyolite
C - N21 E90, Level 4 NE, Jasper
D - N15 E96, Level 1 SE, Jasper
E - N6 E99, Level 2 SE, Argillite
F - N17 E89, Level 3 SE, Argillite
G - N18 E90, Level 3 NE, Argillite
H - N19 E97, Level 4 NW, Argillite
I - N20 E93, Level 2 NE, Argillite
J - N24 E90, Level 1 SW, Argillite
K - N15 E96, Level 2 SW, Jasper
L - N16 E96, Level 2 SE, Jasper
M - N18 E92, Level 3 NE, Jasper
N - N20 E93, Level 2 NE, Jasper
O - N22 E88 Level 3 SE, Jasper
*Artifacts shown actual size

FIGURE 25 (Continued)

Projectile Points Recovered in Phase III Excavations, Site 7K-C-360



P - N17 E85, Level 5 NE, Chert
Q - N19 E96, Level 3 SE, Quartzite
R - N22 E91, Level 5 SE, Chert
S - N23 E87, Level 3 SW, Chalcedony
T - N15 E87 Level 2 SE, Jasper
*Artifacts shown actual size

TABLE 5

Vertical Distribution of Projectile Point Styles, Site 7K-C-360

Level	Bifurcate base	Side-notched	Stemmed	Total
1	0	1	1	2
2	1	2	3	6
3	1	5	2	8
4	2	1	0	3
5	1	0	2	3

In light of these findings, the assemblage of stemmed points recovered from 7K-C-360 is considered to be diagnostic only of the general period between 3000 B.C. and 640 B.C. based on the projected age of Bare Island/Lackawaxen points (Custer 1981, 1984a; Kinsey 1972) and the association of Rossville points with a radiocarbon date of 640 B.C. at the Delaware Park site (7NC-E-41) (Thomas 1981:135-141).

Table 5 shows the vertical distribution of individual projectile point types. It can be seen that bifurcate base points are most prominent in Level 4 while they also occur in all other levels except Level 1; side-notched points are most prominent in Level 3 while they also occur in all other levels except Level 5; and stemmed points are most prominent in Level 2 while they also occur in all other levels except Level 4.

In sum, the absence of radiocarbon dates at the site and the lack of ceramics forces reliance on diagnostic point types for determining the age of the site. The earliest diagnostic point type found at the site, the bifurcate base form, has been dated at the St. Alban's site to 6300 B.C. (Broyles 1966, Kinsey 1972:331). This point style has been found to occur no later than 6000-5500 B.C. (Broyles 1971:49; Michels 1967; Michels and Dutt 1968). Both notched and stemmed points have been shown to lack the

PLATE 2

Early Stage Bifaces, Site 7K-C-360

temporal "sensitivity" sometimes attributed to them, and can provide only the general time frame of 3000 B.C. to A.D. 1000. At least two distinct occupations are indicated by the span of time represented by the points in the 7K-C-360 assemblage. An Archaic period component dating from the general time span of 6500 B.C. to 3000 B.C. is indicated by the presence of bifurcate points, and a Woodland I occupation dating from approximately 3000 B.C. to A.D. 1000 is indicated by the presence of notched and stemmed points.

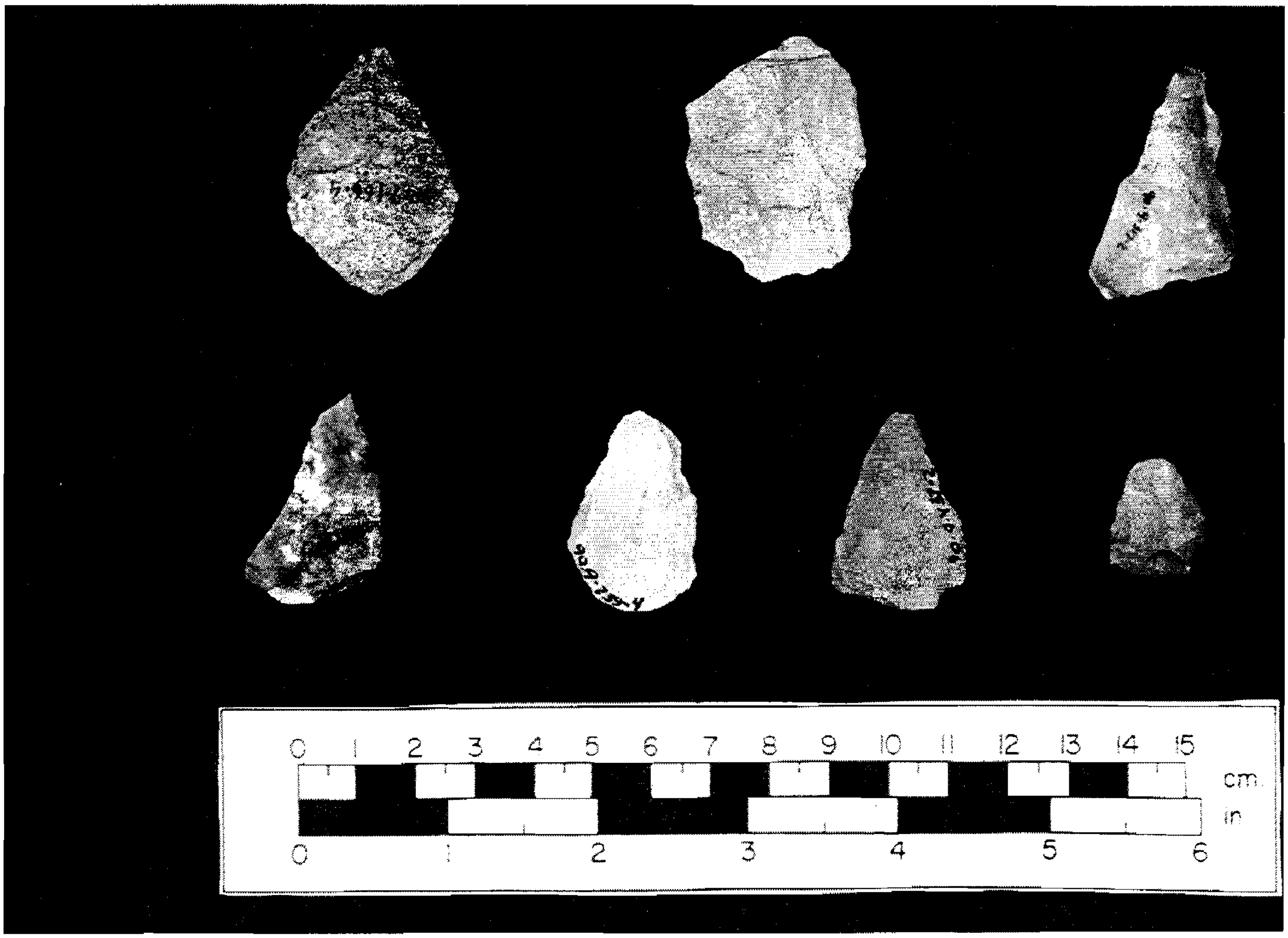
TECHNOLOGIES: STONE TOOL MANUFACTURE AND USE

This section will describe the processes of stone tool manufacture and tool use that took place at Site 7K-C-360. First, the bifaces and projectile points will be considered in light of the tool manufacturing activities that took place at the site. Lithic debitage will also be considered in the context of tool manufacturing activities. Finally, the various functions of artifacts found at the site will be discussed.

Three of the four basic categories of bifaces were noted from 7K-C-360 based on the work of Callahan (1979). The first category includes early stage biface rejects, which are bifaces that never

PLATE 3

Late Stage Bifaces, Site 7K-C-360

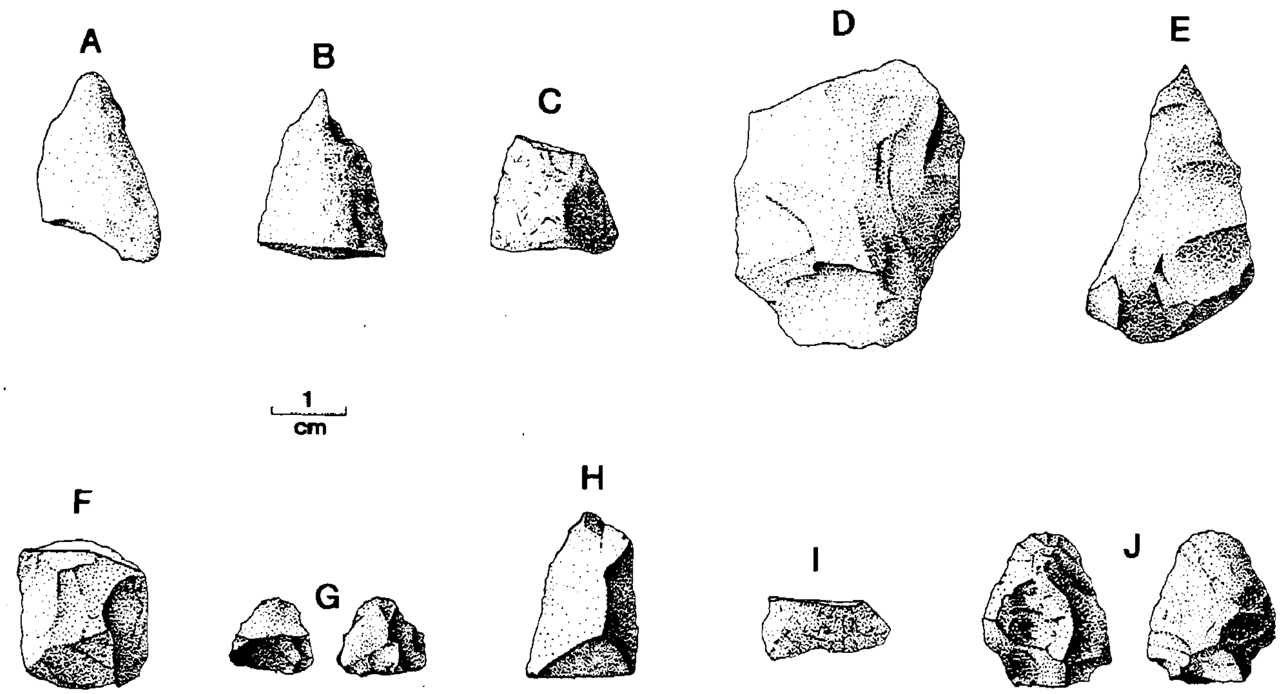


passed beyond the first steps of stone tool production due to either material flaws or manufacturing errors. The second category, late stage biface rejects, includes bifaces broken during the later stages of tool reduction. The final category includes late stage biface discards which are nearly finished bifaces damaged during their use as tools. Plates 2 and 3 and Figure 26 show the bifaces of various categories from the site. Projectile points can also be divided into rejects and discards. It should be noted that several of the points from this site were made of argillite, a material that weathers significantly over time. The cultural modification of artifacts made from this material is thus difficult to distinguish. Since the argillite points from 7K-C-360 appear to be small, thin, and otherwise largely intact, they are here counted as discards rather than rejects that would have been damaged in the course of manufacture or resharpening.

Table 6 shows a summary cross-tabulation of the biface and point manufacturing stages and raw materials as well as the presence of cortex. Table 7 shows a more detailed listing. Early stage bifaces show a higher percentage of cortex (44%) than late stage bifaces (29%) as would be expected; however, cortex is nevertheless well represented among the late stage bifaces, indicating that at least some bifaces were being manufactured from local cobbles. Also, there are many more late stage than early stage tools. This seems to indicate that biface production, especially in its early stages, was not an important focus of activity at the site.

FIGURE 26

Sample of Bifaces, Site 7K-C-360



A - N6 E99, Level 2 SE, Argillite distal fragment
B - N8 E101, Level 3 NW, Ironstone distal fragment
C - N16 E94, Level 1 SW, Quartz distal fragment
D - N18 E97, Level 1 SW, Rhyolite late stage biface discard
E - N28 E88, Level 3 NE, Chert late stage biface discard
F - N15 E95, Level 1 NE, Chert point stem
G - N23 E90, Level 2 SE, Jasper point stem
H - N28 E87, Level 1 NE, Chert biface fragment
I - N26 E93, Level 4 NE, Quartz point stem
J - N24 E88, Level 2 SW, Jasper late stage biface discard
*Artifacts shown actual size

TABLE 6

Summary of Biface/Point Types and Raw Materials, Site 7K-C-360

Tool class	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Chalcedony	Total
Rejects	2	1	2(1)	5(4)	0	0	1	0	11(5)
Discards	1	0	4(1)	13(3)	2	6	0	2	28(4)
Total	3	1	6(2)	18(7)	2	6	1	2	39(9)
Early stage biface	1	1	2(1)	4(3)	0	0	1	0	9(4)
Late stage biface	3	2	4(3)	6(3)	2	3	1	0	21(6)
Points	1	0	3	9(1)	1	6	0	2	22(1)
Total	5	3	9(4)	19(7)	3	9	2	2	52(11)

KEY: ( ) = cortex

TABLE 7

Biface/Point Types and Raw Material, Site 7K-C-360

Tool class	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Chalcedony	Total
Early stage biface reject	1	1	2(1)	4(3)	0	0	1	0	9(4)
Late stage biface reject	1	0	0	1(1)	0	0	0	0	2(1)
Late stage biface discard	0	0	1(1)	3(2)	1	0	0	0	5(3)
Discarded points	1	0	3	10(1)	1	6	0	2	23(1)
Miscellaneous biface fragments (all middle/ late stage)	2	2	3(2)	1	1	3	1	0	13(2)
Total	5	3	9(4)	19(7)	3	9	2	2	52(11)

KEY: ( ) = cortex

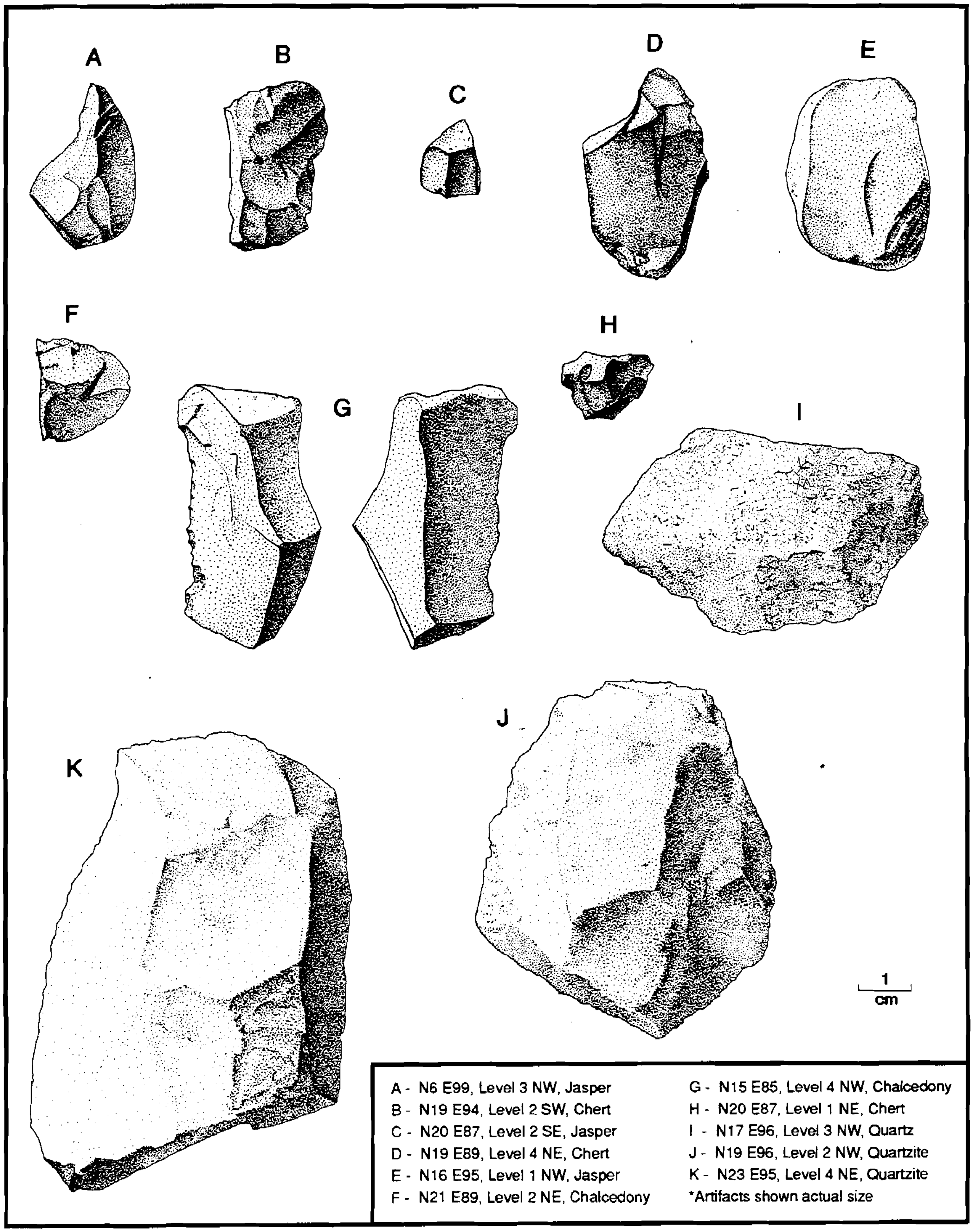
Another pattern emerging from the data indicates that discarded tools were more than twice as numerous as rejected tools among the assemblage. Among the discarded tools were the argillite points previously discussed (Figure 25). In addition to these points among the discards, there was also a bifurcate base point made of felsic rhyolite (Figure 25-B) and a biface made of rhyolite (Figure 26-D), a felsitic material of non-local origin. The felsite bifurcate, like the argillite bifaces, was thin and narrow from frequent resharpening and utilization. The rhyolite biface, which also showed signs of utilization along one of its lateral edges, exhibited a transverse fracture which may have resulted either from its use as a tool or from manufacturing error. Furthermore, these materials, like argillite, are not locally available and therefore must have been brought into the site as part of the prepared tool kit and discarded when their utility had been exhausted.

The majority of remaining bifaces and points in the 7K-C-360 assemblage had experienced significant resharpening and were probably also discarded because of their exhausted condition. Four of the points had experienced transverse medial fractures. Fractures of this nature have been associated with the use of bifaces in heavy cutting and butchering activities (Ahler 1971:84, 119-121). Two of these broken points appear to have been further modified into scraping tools. One point, a chert bifurcate base (Figure 25-A), shows signs of microflaking along and perpendicular to the edge of the fracture as would be seen on an end scraper. The second point, a jasper side-notch (Figure 25-0), also shows signs of retouch perpendicular to its remaining lateral edge and appears to have been utilized as a side-scraper. What little evidence exists for staged biface manufacture at the site probably represents efforts to produce replacement tools for those being discarded. The wholesale reduction of prepared bifaces into points and usable tools, however, does not seem to have been a major activity at the site.

In addition to bifaces, there were 28 cores present in the 7K-C-360 artifact assemblage. A sample of these cores is shown in Figure 27-A through M. Eighty-one percent of the cores are of cobble origin, show little or no elaborate platform preparation and appear to have been expediently produced. Some of these cores were sources of elongated blade-like flakes (Figure 27-A, B, and C) while others were sources of wider flakes (Figure 27-D). Moreover, a few samples (Figure 27-E) show evidence of bipolar core technology which Parry and Kelly (1987) have suggested would have been desirable to groups who were situated in areas where there was a scarcity of available lithic materials. Many of the cobble cores were discarded before their utility was exhausted (Figure 27-J, K, L, and M); however, some of the discarded cobble cores were quite small and contained little usable material (Figure 27-C and F). One of the cores (Figure 27-G) which appears to have served as the source of elongated blade-like flakes was later utilized, as indicated by a series of microchips along one of its lateral edges. In addition, a series of striations running parallel to its edge indicates that the core may have been used as a cutting implement. Of the cores which did not contain remnant cortex, two were relatively small and multi-faceted showing extensive reworking (Figure 27-B, and H). Another core made of quartz was medium in size and showed fewer facets (Figure 27-I). The final example was a

FIGURE 27

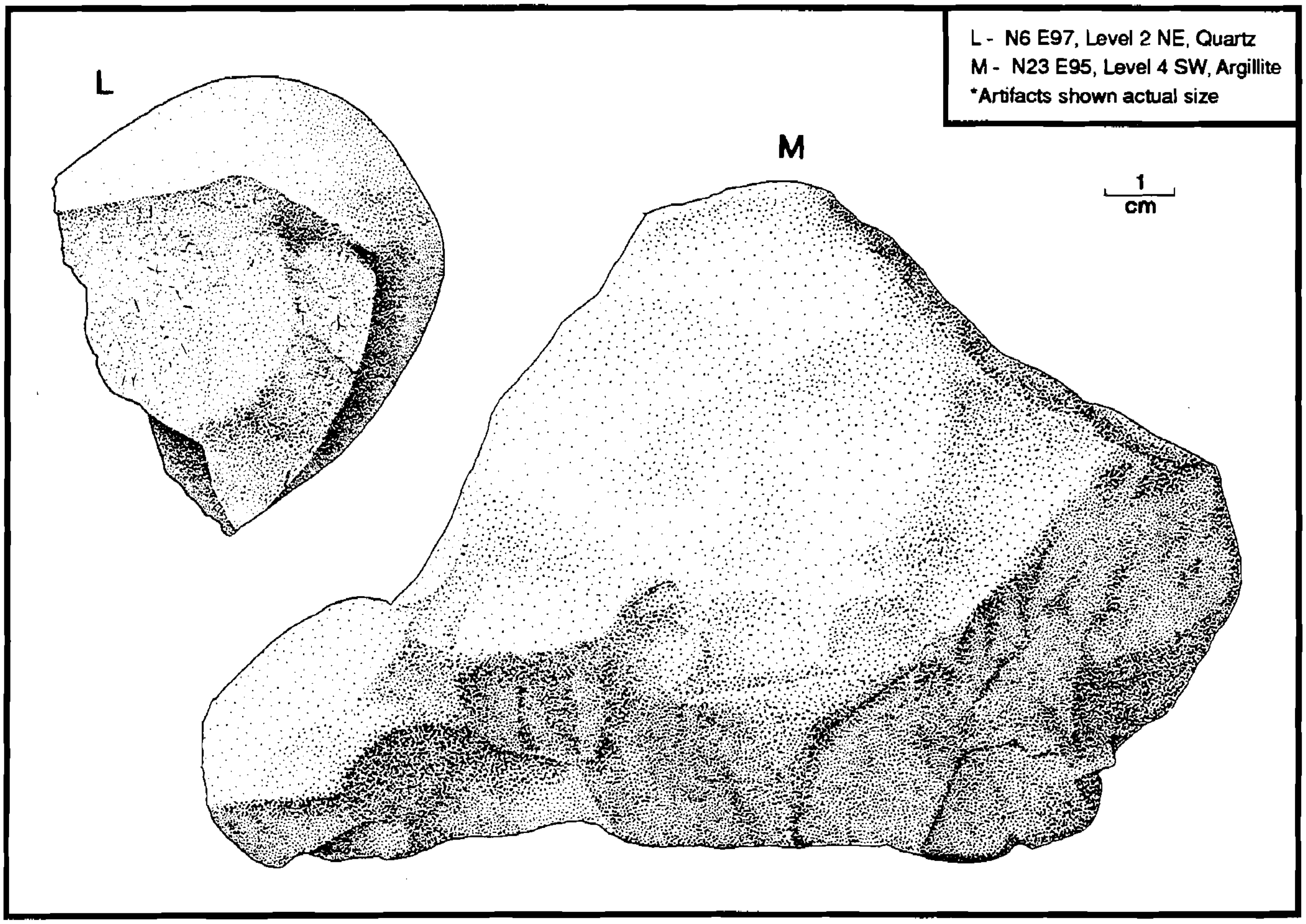
Sample of Cores, Site 7K-C-360



A - N6 E99, Level 3 NW, Jasper
B - N19 E94, Level 2 SW, Chert
C - N20 E87, Level 2 SE, Jasper
D - N19 E89, Level 4 NE, Chert
E - N16 E95, Level 1 NW, Jasper
F - N21 E89, Level 2 NE, Chalcedony
G - N15 E85, Level 4 NW, Chalcedony
H - N20 E87, Level 1 NE, Chert
I - N17 E96, Level 3 NW, Quartz
J - N19 E96, Level 2 NW, Quartzite
K - N23 E95, Level 4 NE, Quartzite
*Artifacts shown actual size

FIGURE 27 (Continued)

Sample of Cores, Site 7K-C-360



large argillite core with sufficient surface area available for further use. It appears, then, that the majority of cores at the site were of cobble origin and were used as expedient sources of a variety of flake types and then discarded along with primary cores that had been carried into the site.

Table 8 shows the distribution of various types of raw materials and the presence of cortex on the debitage from the Site 7K-C-360 assemblage. Cortex percentages are relatively low on quartz and quartzite debitage although the cores present in these materials are largely cobble cores. The flake tools and utilized flakes present in these materials exhibit a relatively high percentage of cortex, whereas the points and bifaces exhibit no cortex at all. These data indicate that the cores were used largely to manufacture flake tools and utilized flakes for expedient use while the flakes represent the byproduct of these activities as well as some reduction and resharpening of bifaces. Cortex percentages for cryptocrystalline debitage, especially jasper, are quite high. The majority of cores in these materials are cobble cores and the majority of flake tools and bifaces exhibit high percentages of cortex, indicating again that numerous expedient tools were being manufactured from these local cobbles. There is no cortex present on argillite and rhyolite debitage or tools, indicating that these artifacts resulted from the import of primary materials, probably in finished tool form.

The differential use of raw materials for various tool classes can be analyzed to see if any lithic raw materials were used for special purposes. Table 9 shows the percentages of raw materials among various tool classes. Numerous patterns can be noted in lithic raw material utilization. Jasper was the most commonly utilized material in all artifact classes, followed by chert in all classes except debitage and cores. Both quartz and quartzite percentages were higher for debitage and cores. Quartzite seems

TABLE 8

Debitage Cortex and Raw Material, Site 7K-C-360

Cortex present/ absent	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Chalcedony	Other
Absent (% of raw material)	250 (78)	402 (81)	185 (71)	421 (59)	30 (100)	32 (100)	2 (100)	130 (82)	9 (75)
Present (% of raw material)	69 (22)	97 (19)	74 (29)	298 (41)	0 (0)	0 (0)	0 (0)	28 (18)	3 (25)
Total (% of raw material)	319 (16)	499 (25)	259 (13)	719 (35)	30 (1)	32 (2)	2 (<1)	158 (8)	12 (<1)

TABLE 9

Summary Percentages of Raw Materials by Artifact Classes, Site 7K-C-360

Artifact class	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Chalcedony	Other
Early stage biface	11	11	22	44	0	0	11	0	0
Late stage biface	4	0	11	48	7	22	0	7	0
Points	4	0	13	43	4	26	0	9	0
Rejected bifaces and points	17	8	24	42	0	0	8	0	0
Discarded bifaces and points	4	0	12	48	7	22	0	7	0
Utilized flakes and flake tools	8	15	21	39	1	0	0	15	0
Debitage	16	25	13	35	1	2	<1	8	<1
Cores	7	32	4	46	0	4	0	7	0

to have been utilized largely in the manufacture of bifaces, and quartz seems to have been used largely for the manufacture of utilized flakes and flake tools.

The absence of early stage and rejected bifaces of argillite or rhyolite at the site and the low incidence of debitage in these material classes supports the inference that artifacts made of these materials were being brought into the site as part of the prepared tool kit and were not being manufactured at the site. Furthermore, non-local raw materials such as argillite, which is found in the Middle Delaware River Valley (Kinsey 1975), are not commonly used for manufacturing flake tools (Custer and Bachman 1984:73-43). These materials are more commonly used for bifaces and projectile points. The relatively high incidence of rhyolite and argillite in the late stage and discarded biface categories and point category indicates that these tools were being discarded at the site, possibly to be replaced by tools made from local cryptocrystalline materials.

As previously discussed, the overwhelming majority of cores at the site, regardless of material, were cobble cores. It can be seen from cortex percentages on flake tools and utilized flakes that these local cobbles provided a source of flakes for use as expedient tools. Thus, the general pattern of lithic utilization seems to be one in which a series of prepared bifacial tools were brought into the site, utilized as tools, broken, and discarded immediately or after an unsuccessful attempt at resharpening. At the same time, local cobbles were probably utilized as core sources for flake tools. Finally, some small amount of early stage stone tool manufacturing took place using local materials, or perhaps early stage bifaces brought into the site were reduced to provide replacement tools. The presence of bifurcated points as well as various notched and stemmed points suggests that this site was visited more than once over time. This inference is further supported by the numerous concentrations of fire-cracked rock (Figure 28) across the site. However, in general, the absence of features and the low number of tools at Site 7K-C-360 suggest that the various occupations were of short duration.

Numerous insights into activities which took place at 7K-C-360 can be gained by considering the functions for which the various tools may have been used. Determination of stone tool use was accomplished by examination of edge wear and tool damage. Low power magnification (20x-40x) studies were undertaken using the techniques described by Wilmsen (1970). High-power magnification studies (e.g., Keeley 1980) were not undertaken.

Projectile points from 7K-C-360 show evidence of a variety of uses beyond those of projectile points. In fact, only three of the points (Figure 25-I, J, and R) show possible tip fractures indicative of their use as spear points. Several other points (Figure 25-B, D, K, L, M, N, P, S, and Figure 24-B) exhibit asymmetrically excurvate edges, indicative of resharpening, as well as considerable rounding and crushing of flake scar ridges along their lateral edges. Some of the scalar microflaking present along the lateral edges appears on both surfaces (Figure 25-B, K, L, M, N, and S) indicating sawing action, while similar microflaking occurs on only one surface of some of the other points (Figures 24-B, C, and 25-D, Q) indicating cutting action (Tringham et al. 1974:188; Keeley 1980:36). In addition, evidence of abrasion and step fractures on the majority of these points indicates that these artifacts were being used as cutting utensils or knives on hard surfaces such as bone or antler (Tringham et al. 1974:188). Six of the points in the 7K-C-360 assemblage (Figures 24-A, B and 25-A, C, O, T) show transverse medial fractures. This type of fracture has been associated with cutting and prying motions employed in butchering activities (Ahler 1971:84, 119-121).

Another interesting pattern emerging from an examination of the various points in the 7K-C-360 assemblage is that of multiple functions for these tools. Two broken points (Figure 25-A and O) appear to have been modified into scrapers, and one point (Figure 25-S) exhibiting the microflaking and step-scarring patterns associated with sawing on a hard material, also showed a short concave area along one lateral edge with scalar flaking on one surface indicative of scraping motion on a soft material such as meat, hide, or wood.

The majority of these points are small, relatively thin, and appear to have experienced resharpening. These points would likely have been discarded due to their exhausted condition. Several others, discussed above, were discarded because of damage from breakage.

An examination of bifaces and biface fragments shows similar patterns of wear, breakage, and discard. Among these artifacts are three damaged biface tip fragments (Figure 26-A, B and C) which may have broken upon impact when, as whole bifaces, they were used as spear or projectile points. Two other late stage bifaces (Figure 26-D and E) experienced transverse medial fractures. As previously discussed, this type of fracture has been associated with the twisting and prying motions involved in butchering activities (Ahler 1971). In addition, three stem fragments (Figure 26-F, G, and I) which appear to have snapped off of bifaces, possibly as the result of the same kind of twisting and prying motions, were also discarded at the site.

A particular tool class prominent among the 7K-C-360 assemblage is that of scraping tools. A sample selection of these tools appears in Figure 29 and they are further described in Table 10. End

FIGURE 28

Distribution of Fire-Cracked Rocks, Site 7K-C-360

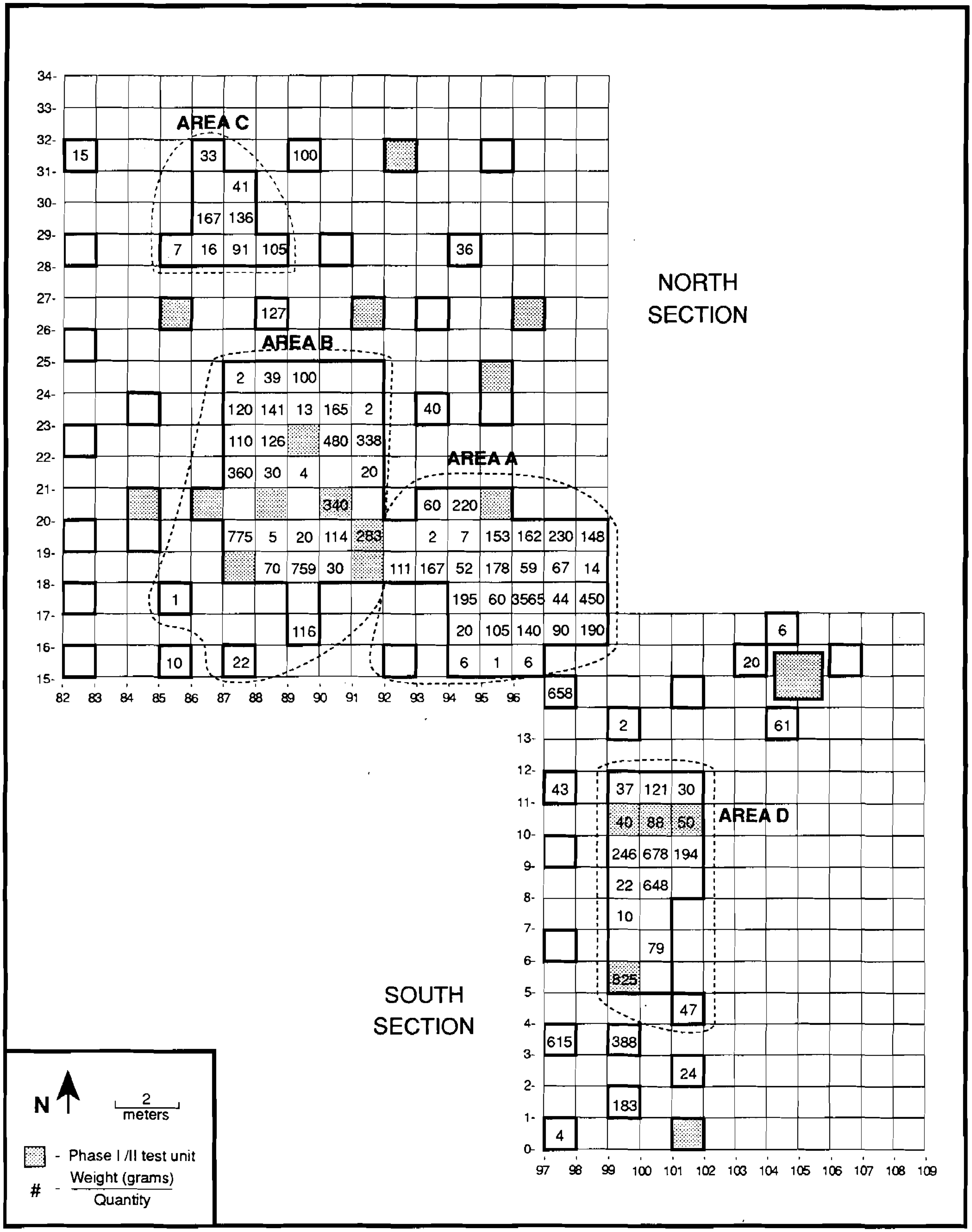
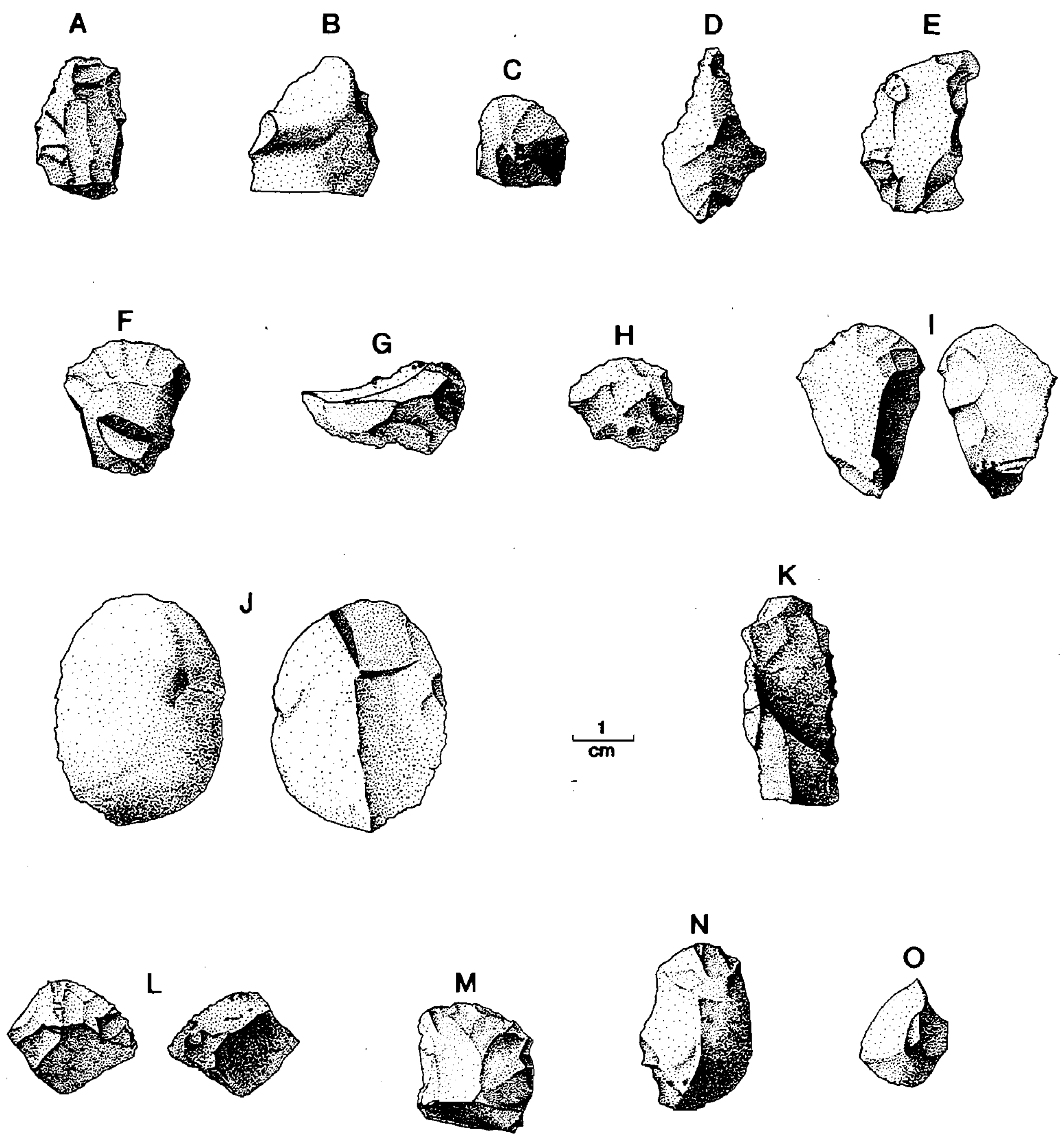


FIGURE 29

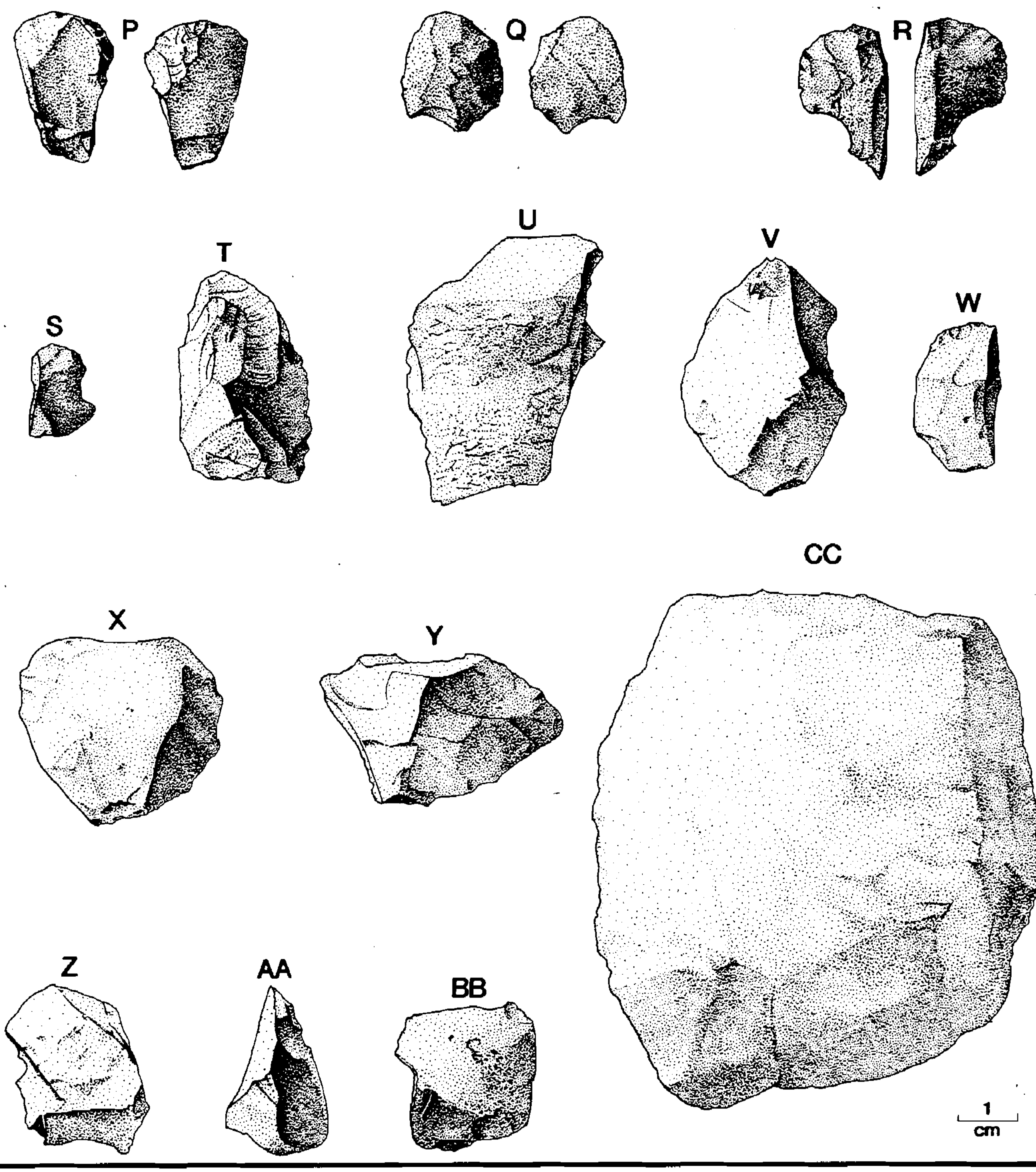
Sample of Flake Tools, Site 7K-C-360



A - N6 E99, Level 5 SE, Jasper
B - N9 E100, Level 5 SE, Jasper
C - N16 E94, Level 3 SE, Chert
D - N18 E89, Level 4 NE, Chert
E - N18 E93, Level 4 NE, Jasper
F - N18 E96, Level 2 NE, Jasper
G - N19E92, Level 3 SW, Jasper
H - N19 E93, Level 6 NW, Jasper
I - N20 E87, Level 1 NE, Chert
J - N20 E91, Level 2 SE, Chert
K - N21 E88, Level 5 NW, Chert
L - N21 E89, Level 2 NE, Jasper
M - N20 E87, Level 3 SW, Jasper
N - N21 E92, Level 4 SE, Chert
O - N22 E91, Level 1 SW, Chert
*Artifacts shown actual size

FIGURE 29 (Continued)

Sample of Flake Tools, Site 7K-C-360



P - N17 E94, Level 3 SE, Chalcedony
Q - N17 E95, Level 3 NE, Chalcedony
R - N18 E96, Level 2 SE, Jasper
S - N19 E95, Level 2 SW, Chert
T - N20 E87, Level 1 NW, Chert
U - N19E87, Level 5 SE, Quartz
V - N19 E94, Level 3 NW, Jasper
W - N20 E93, Level 3 SW, Jasper
X - N17 E95, Level 2 SW, Jasper
Y - N18 E94, Level 5 NW, Jasper
Z - N17 E95, Level 3 NE, Jasper
AA - N20 E94, Level 4 SW, Jasper
BB - N21 E91, Level 4 NE, Jasper
CC - N11 E101, Level 3 NW, Quartz
*Artifacts shown actual size

TABLE 10

Flake Tools and Utilized Flakes, Site 7K-C-360

Provenience	Artifact	Description
N21E88, Level 5, NW	1 Chert double side scraper	cortex present, straight sides, made on elongated flake, 34.8 x 15 x 4.1 mm, 60.6 mm of worked edges
N22E91, Level 1, SW	1 Chert end scraper	cortex present, 14.1 x 12.1 x 5.2 mm, 26.8 mm of worked edge
N23E93, Level 3, SE	1 Quartzite end scraper	cortex present, 44.3 x 38.5 x 7.7 mm, 26.3 mm of worked edge
N24E95, Level 3	1 Quartzite end scraper	36.9 x 29.4 x 13.3 mm, 21.3 mm of worked edge
N24E95, Level 3	1 Quartz scraper	cortex present, 45 x 36.1 x 15 mm, 39.9 mm of worked edge
N20E91, Level 1, NE	1 Jasper utilized flake	cortex present, 32.5 x 15.5 x 2.8 mm, 39.7 mm of worked edge
N20E91, Level 1, SE	1 Chert utilized flake	cortex present, 13.1 x 7.3 x .3 mm, 28.8 mm of worked edge
N15E87, Level 6, SE	1 Jasper utilized flake	cortex present, 14.5 x 13.5 x 2.4 mm of worked edge
N19E92, Level 4, SE	1 Jasper utilized flake	cortex present, 33.5 x 13.8 x 4.9 mm, 31.2 mm of worked edge
N21E90, Level 6, SW	1 Chalcedony utilized flake	cortex present, 24.3 x 9.3 x 2.1 mm, 16.2 mm of worked edge
N22E90, Level 1, NW	1 Jasper utilized flake	cortex present, 33.9 x 19.9 x 9.8 mm, 20.5 mm of worked edge
N26E88, Level 4, NE	1 Quartz utilized flake	18.3 x 13 x 6.3 mm, 10.2 mm of worked edge
N26E88, Level 4, SE	1 Jasper utilized flake	cortex present, 16.7 x 13.1 x 3.2 mm, 5.5 mm of worked edge
N26E88, Level 6, SE	1 Quartz utilized flake	18.2 x 16.1 x 2.8 mm, 15 mm of worked edge
N15E92, Level 2, NW	1 Quarzite utilized flake	cortex present, 29.2 x 17 x 6.8 mm, 44.2 mm of utilized edges
N16E94, Level 1, SW	1 Jasper utilized flake	cortex present, 27.6 x 22.5 x 6.9 mm, 30 mm of utilized edge
N16E95, Level 2, NW	1 Chert utilized flake	43.2 x 27.8 x 19 mm, 30.9 mm of worked edge
N16E97, Level 2, SW	1 Chalcedony utilized flake	22.5 x 17.3 x 1 mm, 16.8 mm of worked edge
N17E94, Level 4, SW	1 Chert utilized flake	cortex present, 36.2 x 24.1 x 7.3 mm, 27.3 mm of worked edge
N17E95, Level 3, NE	1 Jasper utilized flake	cortex present, 28.3 x 10.7 x 8.6 mm, 11 mm of worked edge
N17E95, Level 3, NE	1 Chert utilized flake	cortex present, 17.8 x 11 x 4.4 mm, 6.4 mm convex edge
N17E96, Level 4, NW	1 Jasper utilized flake	28.7 x 16 x 3.3 mm, 67.5 mm of worked edge
N18E94, Level 2, NW	1 Jasper utilized flake	cortex present, 26.5 x 23.3 x 9.5 mm, 23.4 mm of worked edge
N18E96, Level 2, NE	1 Quartz utilized flake	15.9 x 12.7 x 4.1 mm, 17 mm of worked edge
N18E96, Level 2, NE	1 Jasper utilized flake	19.5 x 14.7 x 2.5 mm, 16.3 mm utilized edge
N18E97, Level 2, SW	1 Jasper utilized flake	cortex and biface edge present, 23.8 x 13.5 x 3.5 mm, 19 mm concave edge
N19E82, Level 2, NW	1 Quartzite utilized flake	cortex present, 21.7 x 11.4 x 5.2 mm, 14.5 mm of worked edge
N19E92, Level 2, NE	1 Jasper utilized flake	33.5 x 17.2 x 9.8 mm, 15 mm of worked edge
N20E94, Level 2, SW	1 Jasper utilized flake	cortex present, 32 x 23.8 x 4.6 mm, 26.1 mm of worked edge
N20E94, Level 3, SE	1 Chalcedony utilized flake	16.5 x 12.6 x 1.5 mm, 14 mm of worked edge
N15E96, Level 3, NW	1 Chert end scraper	cortex present, 28.5 x 24.6 x 8.1 mm, 23.7 mm of worked edge
N16E94, Level 3, SE	1 Chert end scraper	15.5 x 14.2 x 7.7 mm, 40 mm of worked edge
N16E95, Level 1, SE	1 Quartz end scraper	16 x 13.7 x 5.5 mm, 23.9 mm of worked edge
N17E94, Level 3,SE	1 Chalcedony end scraper	cortex present, bifacially retouched, 23.4 x 16.4 x 6.4 mm, 18 mm of worked edge
N17E95, Level 2, SW	1 Jasper side scraper	cortex present, 33.1 x 30.7 x 10.3 mm, 23.5 mm of worked edge
N17E95, Level 4, NW	1 Chert end scraper	cortex present, acute edge angle, 17.8 x 16 x 4.5 mm, 20.7 mm of worked edge
N17E95, Level 3, NE	1 Chalcedony end scraper	bifacially retouched, 20.3 x 16.2 x 8 mm, 48.5 mm of worked edge
N17E95, Level 3, NE	1 Jasper flake tool	bifacially retouched, 30.9 x 22.2 x 8.6 mm, 13.5 mm of worked edge
N17E96, Level 4, NW	1 Jasper end scraper	cortex present, 27.7 x 21.4 x 13.9 mm, 11.5 mm of worked edge
N18E93, Level 4, NE	1 Jasper denticulate	28.4 x 16.1 x 3.9 mm, 20 mm of worked edge
N18E94, Level 5, NW	1 Jasper flake tool	bifacially retouched, 40.6 x 29 x 8.6 mm, 14 mm of worked edge
N18E96, Level 2, NE	1 Jasper end scraper	cortex present, fairly steep edge angle, 21 x 20 x 8.2 mm, 29.5 mm of worked edge
N18E96, Level 2, SE	1 Jasper end scraper	cortex present, bifacially retouched, acute edge angle, 26.5 x 14.6 x 8.7 mm, 22.3 mm of worked edge
N18E96, Level 4, NW	1 Chert end scraper	cortex present, 16.4 x 14.5 x 9 mm, 19.7 mm of worked edge
N19E92, Level 3, SW	1 Jasper end scraper	cortex present, steep edge angle, 25.8 x 11 x 12.5 mm, 14.9 mm of worked edge
N19E93, Level 6, NW	1 Jasper end scraper	cortex present, 18.5 x 13.7 x 7.5 mm, 51.8 mm of worked edge
N19E94, Level 3, NW	1 Jasper side scraper	cortex present, 39.4 x 26.2 x 7.8 mm, 55.7 mm of worked edge
N19E95, Level 2, SW	1 Chert end scraper	bifacially retouched, compound tool, 15.9 x 61.7 x 4.6 mm, 29 mm of worked edge

TABLE 10

Flake Tools and Utilized Flakes cont.

Provenience	Artifact	Description
N20E93, Level 3, SW	1 Jasper side scraper	cortex present, made on distal flake fragment, 28.9 x 13.2 x 5.2 mm, 11.8 mm of worked edge
N20E94, Level 4, SW	1 Jasper flake tool	cortex present, 27.4 x 16.4 x 10.3 mm, 26.1 mm of worked edge
N20E89, Level 2, NW	1 Jasper utilized flake	26 x 8.9 x 2.8 mm, 23.3 of utilized edge
N21E90, Level 2, SE	1 Jasper utilized flake	20.1 x 11 x 4 mm, 15.4 of utilized edge total
N21E87, Level 2, NE	1 Chalcedony utilized flake	cortex present, 32.4 x 21.9 x 7 mm
N22E88, Level 2, NE	1 Jasper utilized flake	21.6 x 16.2 x 4.1 mm, 33.9 mm for 2 edges
N22E88, Level 2, NE	1 Jasper utilized flake	cortex present, 16.2 x 15.6 x 7.1 mm, 11.5 mm of utilized edge
N22E88, Level 2, SE	1 Chert utilized flake	cortex and biface edge present, 17.3 x 9.6 x 2.8 mm, 9.5 mm of utilized edge
N24E89, Level 2, NE	1 Jasper utilized flake	cortex present, 13 x 12.9 x 5 mm, 10.3 mm utilized edge
N24E90, Level 2, SE	1 Chalcedony utilized flake	cortex present, 32.8 x 18.5 x 9.3 mm, 61.6 mm total utilized edge
N21E88, Level 3, SW	1 Rhyolite utilized flake	29.9 x 24.6 x 3.7 mm, 36.5 mm total 2 edges
N21E88, Level 3, SE	1 Chalcedony utilized flake	cortex present, 16.4 x 11.1 x 1.8 mm, 28.6 mm of worked edge
N22E88, Level 3, NE	1Quartzite utilized flake	cortex present, 53.1 x 43.3 x 14.4 mm, 93.9 mm total edge ware
N21E88, Level 4, SE	1 Chalcedony utilized flake	cortex present, 38.2 x 16.4 x 3.1 mm, 70.2 mm total edge
N23E90, Level 4, SW	2 Jasper utilized flakes	cortex present, 1. 15.9 mm edge- 13.8 x 6.4 x 5.9 mm 2. 23.8 mm edge- 28.1 x 16 x 11.6 mm
N24E91, Level 4, NW	1 Quartz utilized flake	cortex present, 79.1 x 30.3 x 24.6 mm, 79.1 mm long utilized edge
N20E91, Level 2, SE	1 Chert flake tool	cortex present, 39 x 27 x 8.7 mm, 108.4 mm of worked edge
N21E89, Level 2, NE	1 Jasper end scraper	cortex present, bifacially reworked, steep edge angle, 16.8 x 17 x 8.2 mm, 48.5 mm total worked edge
N15W87, Level 3, SE	1 Jasper end scraper	cortex present, 24.3 x 23.8 x 12.4 mm, 24.1 mm total worked edge
N20E87, Level 3, SW	1 Jasper end scraper	steep edge angle, may have been made on a core fragment, 22.4 x 19.1 x 12.8 mm, 70.4 mm total worked edge
N18E89, Level 4, NE	1 Chert drilll	63 mm total edge
N21E91, Level 4, SE	1 Chert end scraper	cortex present, 27.7 x 17.7 x 8.3 mm, 39.9 mm total worked edge
N21E91, Level 4, NE	1 Jasper pebble tool	23.6 x 21.9 x 13.2 mm, 15.7 mm concave edge
N19E87, Level 5, SE	1 Quartz side scraper	cortex present, 40.3 x 29.3 x 14.1 mm, 82 mm multiple edge total
N20E87, Level 1, NE	1 Chert end scraper	cortex present, bifacially retouched along one edge, 29 x 18.2 x 8.6 mm, 50.2 mm total edge worked
N20E87, Level 1, NW	1 Chert side scraper	cortex present, 30.9 x 20.7 x 14 mm, 88 mm total edge worked
N28E85, Level 3, SW	1 Chert utilized flake	cortex present, 48.8 x 13.4 mm, 38 mm long worked edge
N28E88, Level 3, NE	1 Quartz flake tool	distal end of flake, trapezoidal, approximately 14.3 x 14.9 x mm, 15.7 mm worked edge
N29E86, Level 2, SW	1 Jasper utilized flake	cortex present, 29.2 x 15.5 x 9 mm, 27.7 mm on curved edge
N29E87, Level 4, SE	1 Quartz utilized flake	cortex present, 28.7 x 18.5 x 4.2 mm, 27.6 mm worked edge
N29E87, Level 1, SE	1 Quartz utilized flake	30.8 x 11.4 x 5 mm, curved used edge approximately 46.9 mm
N30E87, Level 5, NE	1 Chalcedony utilized flake	thumbnail shaped, 15.1 x 13.1mm, 32.6 mm of worked edge
N31E86, Level 2, NE	1 Quartzite utilized flake	23.8 x 15.7 x 4.9 mm, 30.3 mm of worked edge
N29E87, Level 2, NW	1 Quartz end scraper	cortex present, 21.7 x 38.5 mm, 27.3 mm worked edge
N30E87, Level 3, SW	1 Quartz end scraper	cortex present, 38.6 x 13.6 x 32.5 mm, 2 worked edges, 30.6 and 35 mm
N4E101, Level 5, NE	1 Quartzite utilized flake	41 x 22.5 x 9.9 mm, 11.9 concave utilized edge
N9E100, Level 3, SW	1 Quartz utilized flake	cortex present, 35.5 x 28.5 x 18.8 mm, 28.3 mm worked edge
N13E104, Level 2, NE	1 Quartzite utilized flake	30.7 x 17.3 x 2 mm, 8.7 mm concave edge
N68E99, Level 5, SE	1 Jasper side scraper	22.2 x 13.7 x 11.4 mm, 2 worked edges, 10 and 20.5 mm
N9E100, Level 4, SW	1 Jasper end scraper	cortex present, 19.5 x 16.9 x 8.5 mm, 2 worked edges, 12 and 17.5 mm
N9E100, Level 5, SE	1 Jasper end scraper	cortex present, 22.4 x 19.4 x 8.6 mm, 12.6 mm worked edge
N11E101, Level 3, NW	1 Quartz flake tool	Unifacially worked, 84.7 x 74.7 x 25 mm, 84.7 mm long worked edge

scrapers, which comprise the majority of examples at this site, are defined as unifacial flake tools which have been retouched along either their distal or proximal edges and may also be retouched along their lateral edges (Lowery and Custer 1990:90). This tool class has been associated with the manufacture of tools made from wood, bone, and antler as well as those activities related to the preparation of hides (Wilmsen 1970:71-73; Tringham et al. 1974). Side scrapers, which are also present in the assemblage, are defined as flake tools which have been retouched along either or both of their lateral edges but not along their distal or proximal edges (Lowery and Custer 1990:89). The side scrapers in the 7K-C-360 assemblage are unifacially retouched and likely functioned as cutting and scraping tools.

It should also be mentioned that some of the scrapers from this site have quite steep edge angles (approximately 60-70 degrees) while others have more acute angles (approximately 50-60 degrees). Wilmsen (1970) has suggested that steepness of the angles may be related to the frequency of resharpening. Furthermore, he has observed a relationship between the steepness of the angle and the thickness of the flake. From this observation, he hypothesizes that heavy flakes are intentionally selected for their toughness rather than their sharpness of edge. He further suggests that while these tools have their acute angles, they are useful for heavy butchering and carcass dismembering, and that as their steepness increases, either due to resharpening or because they were intentionally selected for their thickness, they are used in hide preparation and heavy shredding activities.

End scrapers from Site 7K-C-360 show a high incidence of cortex on their dorsal surfaces indicating that they were made largely from local cobbles. Moreover, although a few of these tools exhibit the classic attributes of unifacial retouch and steep edge angles (Figure 29-C, F, G, and I), the majority are simply gross approximations of the classic type, produced from relatively thick flakes of local cobbles for expedient needs. In addition, a few of these scraping tools show the atypical characteristic of bifacial retouch along their proximal or distal edges (Figure 29-L, P, Q, and R).

Wear patterns on these tools indicate that they may have been used for various and even multiple purposes. Some examples show wear on the ventral surface with shallow striations running perpendicular to the distal edge (Figure 29-F). Signs of polish on the ventral surface and the absence of deep step scars, chipping, or crushing along the edges of these tools suggest that they were used on soft materials. Wilmsen (1970:71) suggests that this type of wear may result from the scraping of hair from skins. On the other hand, the presence of deep step fractures on the ventral surface of one example (Figure 29-C) and considerable wear along its distal edge suggests that this tool was pushed along a hard surface such as bone or antler (Tringham et al. 1974). Other examples (Figure 29-G and L) showed micro-chipping and step fractures along their dorsal surfaces above the edges. These artifacts may have been pulled along a material in such activities as heavy shredding or fleshing of hides (Wilmsen 1970:71-73).

Two end scrapers from the assemblage seem to have had multiple functions. One of these tools (Figure 29-S) was retouched to a steep angle but also exhibited a concave notch along one of its lateral edges and appears to have been used to shape wood or bone implements. The other of these tools (Figure 29-I) was also retouched along its distal end in classic end scraper tradition. Its distal edge, however, seems to have been utilized in two different ways. One half of this edge appears smoothed, rounded, and highly polished as might be expected when used on a soft material such as meat, skin, or a soft wood. The other half of the edge appears more angular and has step fractures and deep striations running parallel to the edge on the dorsal surface, which would suggest that it functioned also as a cutting implement on a hard material such as bone or a hard wood. In addition, the ventral surface appears to have been worn into a groove cross-wise from lateral edge to lateral edge with numerous striations running perpendicular to the groove. The tool was later retouched along its lateral edge.

Side scrapers were also present in the 7K-C-360 assemblage, and these tools are shown in Figure 29 and described in Table 10. One of these tools (Figure 29-A) appears to have been previously used as a core source for small elongated flakes, and was then unifacially retouched along both lateral edges. The tool was made of jasper and no cortex was present on its surface. Because of the thickness of the "core tool," it was "keeled" or carinated for use as a scraping implement. Another of these carinated side-scraping tools (Figure 29-T) was made from a very thick flake of chert and exhibits no signs of cortex. This tool has been unifacially retouched along one lateral edge and like many of the end scrapers exhibits steep edge angles. The retouched sides of both of these tools are convex in shape, and the utilized edges are angular with micro-chipping and step fractures present on their dorsal surfaces. This pattern of wear suggests that these tools were used as cutting/scraping implements (Wilmsen 1970; Tringham et al. 1974). Both examples appear to have been intentionally backed so that they could be hand-held rather than hafted and pressure could be applied without causing damage to the hand of the user. Three of the remaining four side-scraping tools (Figure 29-U, V and W) were made on somewhat thinner flakes and possess more acute edge angles. All of these tools contain cortex indicating that they were made from cobble cores and all show unifacial retouch. One scraping tool with bifacial retouch (Figure 29-X) appears to have been made from a small pebble. The worked edge of another of these flake tools (Figure 29-U) has a concave section where the edge has been flattened and worn smooth. Under 40x magnification, striations perpendicular to the worked edge are evident in this convex section, and this area appears highly polished. Such characteristics are common when a tool has been used in a scraping motion on a soft material such as a soft wood. Another of these tools (Figure 29-V) shows similar concavities along both lateral edges. The remaining side scraper (Figure 29-W) was made on a thin flake and shows a slightly more angular edge with micro-chipping on the dorsal surface, indicating that this tool was probably used in a cutting motion. This tool has a transverse medial fracture and was likely discarded at the site due to this damage.

There is one final tool in the side scraper category from the 7K-C-360 assemblage. This tool (Figure 29-K) is made of chert and shows no signs of cortex. It appears to have been made on an elongated flake from a prepared core. This tool has been unifacially retouched along both of its straight lateral edges, and utilization has produced an irregular edge along one side of the blade. In addition to this wear, micro-chipping is present on the dorsal surface as are numerous parallel striations, indicating that the blade functioned as a cutting implement.

Two more tool categories are represented among the assemblage by one artifact each (Figure 29; Table 10). The first of these artifacts (Figure 29-D) is a chert drill which appears to have been made from a biface and has been bifacially retouched along the bit. This artifact appears to have been used for multiple purposes. The top portion of the bit is highly polished and the very tip is broken off. A second projection is also present extending out from one shoulder. Furthermore, highly polished and worn edges at the proximal end suggest that this tool may have also been used as a scraper. The tip fracture and the worn condition of the tool were the likely reasons for the artifact's discard. The second artifact (Figure 29-E) is a jasper denticulate, which was made on a very thin flake and has no signs of cortex. This tool has been unifacially retouched to give it a serrated edge.

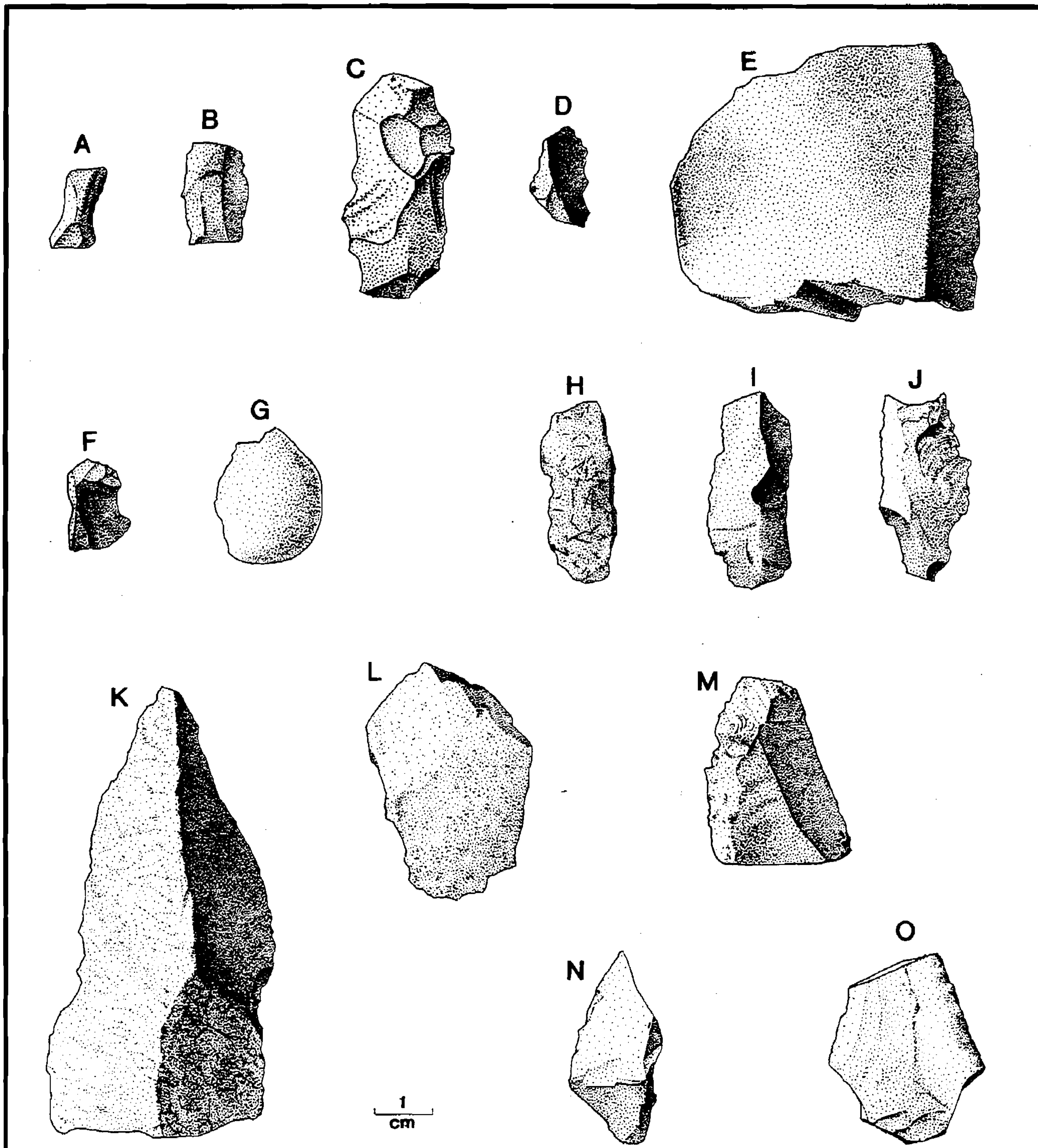
The remaining flake tools consist of flakes which have been retouched but have not been retouched in a systematic or definitive way (Figure 29-J, Y, Z, AA, BB and CC). The entire dorsal surface of one of these tools (Figure 29-J) contains the smoothed cortex of a chert cobble; however, its ventral surface has been retouched, particularly along one portion of its lateral edge. Another of these tools (Figure 29-CC) is made from a very large quartz flake which has been bifacially retouched along one edge. The opposite steep edge contains cortex which may have served as a backing to protect the hand of the user when applying pressure. Approximately eighty-five percent of these tools contain cortex and probably represent expediently manufactured tools which were used briefly and then discarded.

Another artifact class prominent at the site consisted of unretouched utilized flakes. A sample of these flakes is illustrated in Figure 30 and further described in Table 10. Examination of these artifacts reveals a variety of sizes, shapes, raw materials, use-wear attributes and states of curation. This kind of diversity indicates that the flakes originated from a combination of local cobble sources and prepared tool kits and were used in a variety of manufacturing and processing activities.

Fifty-nine percent of the utilized flakes from 7K-C-360 contained cortex, indicating that a major portion of this tool class originated from local cobbles. The preferred raw materials appear to have been

FIGURE 30

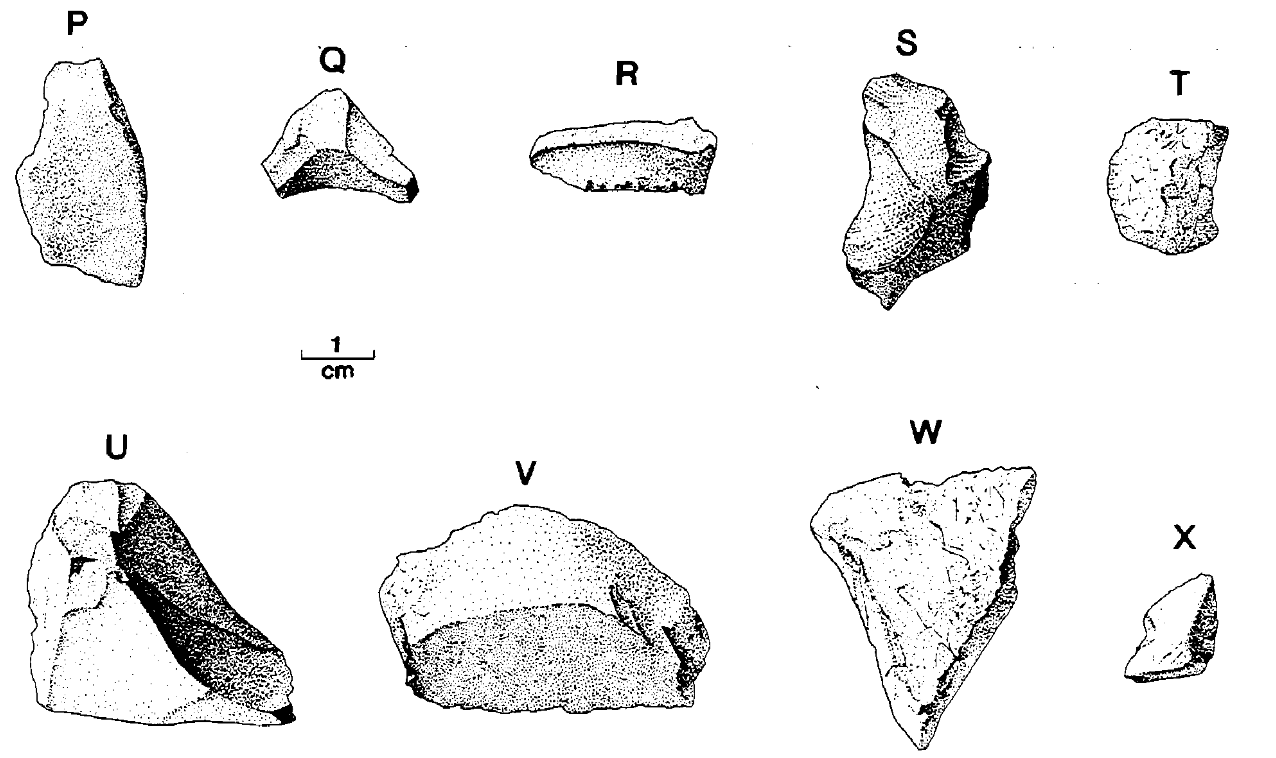
Sample of Utilized Flakes, Site 7K-C-360



A - N20 E91, Level 1 SE, Jasper
B - N20 E94, Level 3 SE, Jasper
C - N21 E88, Level 4 SE, Chalcedony
D - N22 E88, Level 2 SE, Chert
E - N22 E88, Level 3 NE, Quartzite
F - N19 E95, Level 2 SW, Chert
G - N29 E87, Level 4 SE, Quartz
H - N29 E87, Level 1 SE, Quartz
I - N19 E92, Level 4 SE, Jasper
J - N20 E91, Level 1 NE, Jasper
K - N24 E91, Level 4 NW, Quartz
L - N4 E101, Level 5 NE, Quartzite
M - N21 E87, Level 2 NE, Chalcedony
N - N19 E92, Level 2 NE, Jasper
O - N21 E88, Level 3 SW, Rhyolite
*Artifacts shown actual size

FIGURE 30 (Continued)

Sample of Utilized Flakes, Site 7K-C-360



P - N13 E104, Level 2 NE, Quartzite
Q - N18 E96, Level 2 NE, Jasper
R - N21 E90, Level 6 SW, Chalcedony
S - N17 E96, Level 4 NW, Jasper
T - N26 E88, Level 6 SE, Quartz
U - N16 E95, Level 2 NW, Chert
V - N28 E85, Level 3 SW, Chalcedony
W - N9 E100, Level 3 SW, Quartz
X - N17 E95, Level 3 NE, Chert
* Artifacts shown actual size

cryptocrystalline jaspers, cherts, and chalcedonies which comprise 71 percent of the utilized flakes from 7K-C-360. Another 27 percent of the utilized flake assemblage was composed of quartz and quartzite. There was no ironstone or argillite present among the utilized flakes and only one of these artifacts was made from rhyolite. The majority of these flakes show signs of utilization along only one edge, further indicating that these tools were largely used for expedient needs and immediately discarded. Four of these tools (Figure 30-A, B, N and O), however, were utilized on more than one edge and two (Figure 30-A and B) were notably small, indicating that these artifacts were more carefully curated. Interestingly, none of these four tools shows any signs of cortex, further supporting the inference that they were part of a prepared tool kit that was carried into the site. Both of the small jasper flakes (Figure 30-A and B) were thin, narrow blades with elongated flake scars on their dorsal surfaces suggesting that they may have been manufactured from cores. On the other hand, two other utilized flakes of chalcedony (Figure 30-C) and chert (Figure 30-D) contain remnant biface edges indicating that they were produced from the reduction of bifaces. The curated tool kits, therefore, appear to have contained both bifaces and flakes from prepared cores. These tools were then supplemented by expediently manufactured tools from local cobbles available at or near the site. Once used, these tools were immediately discarded while the small, thin, curated flakes were culled from the existing tool kit.

The utilized flakes appear to have functioned as cutting, slicing, and scraping implements in butchering and processing activities similar to the ways in which the flake tools from the site functioned. The large, thick quartzite flakes present in the assemblage (Figure 30-E and L), because of

PLATE 4
Hammerstones, Site 7K-C-360

their toughness and durability, would likely have been used in the heavy cutting and dismembering necessary in the initial stages of the butchering process, and the crushed and somewhat serrated edges support this inference. The smaller, thinner, and sharper cryptocrystalline and quartz flakes (Figure 30-C, G, H, I, J, and M) would likely have been used in the final cutting and slicing stages as evidenced by their convex serrated edges. Of the remaining utilized flakes, those with the smoothed concave or straight edges (Figure 30-A, B, P, Q, R, S, and T), would likely have been used in the scraping of "soft" materials such as wood and hide, while those made from thicker flakes with steeper edge angles, smoothed edges and associated micro-chipping (Figure 30-U and V) would likely have been used on "hard" materials such as bone and antler. Finally, three of these flakes (Figure 30-E, W and X) show small, half-moon concavities along their edges, suggesting their possible use as implements for shaving or smoothing bone or wood shafts.

FIGURE 31

Distribution of Tools, Site 7K-C-360

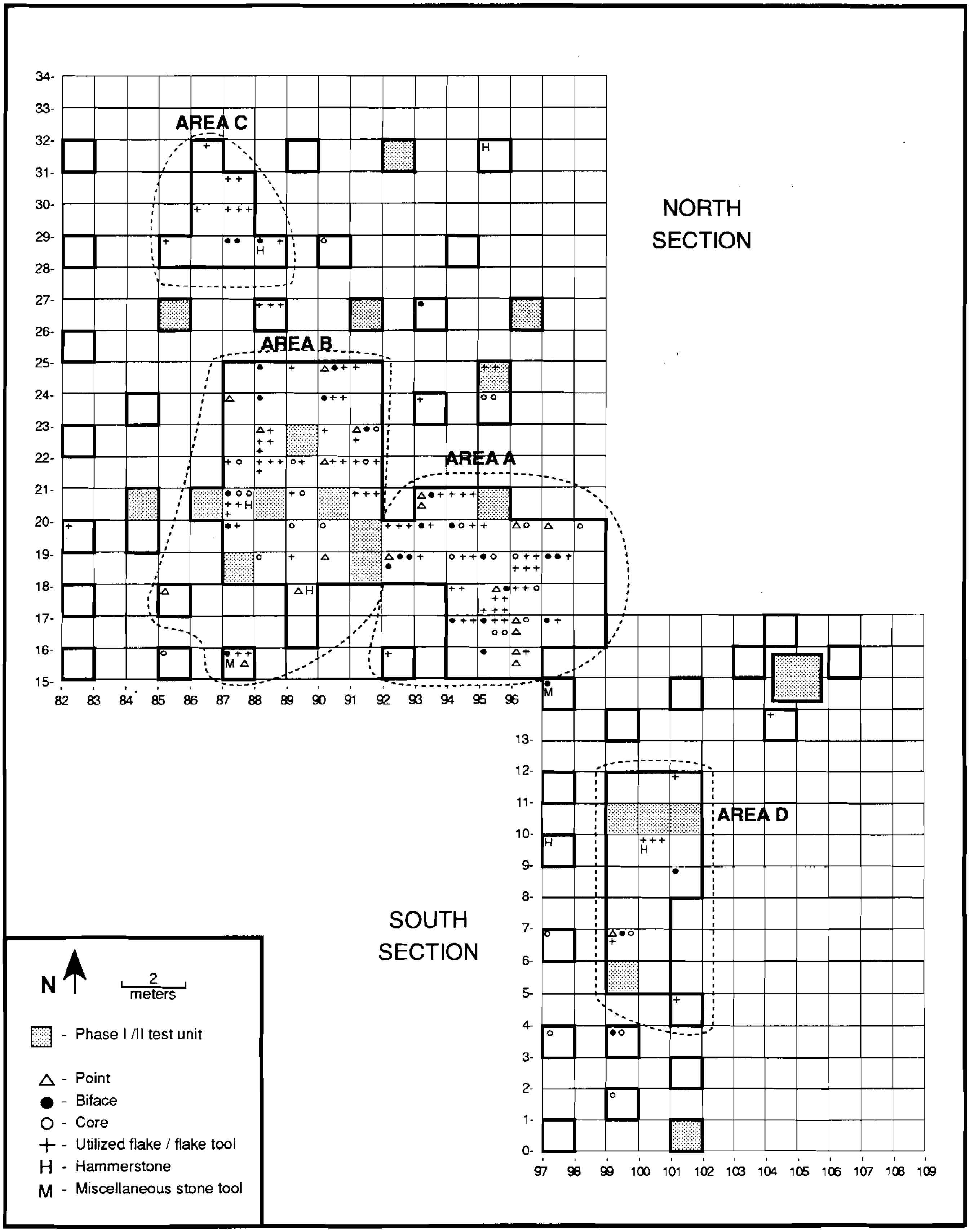


FIGURE 32

Distribution of Total Debitage, Site 7K-C-360

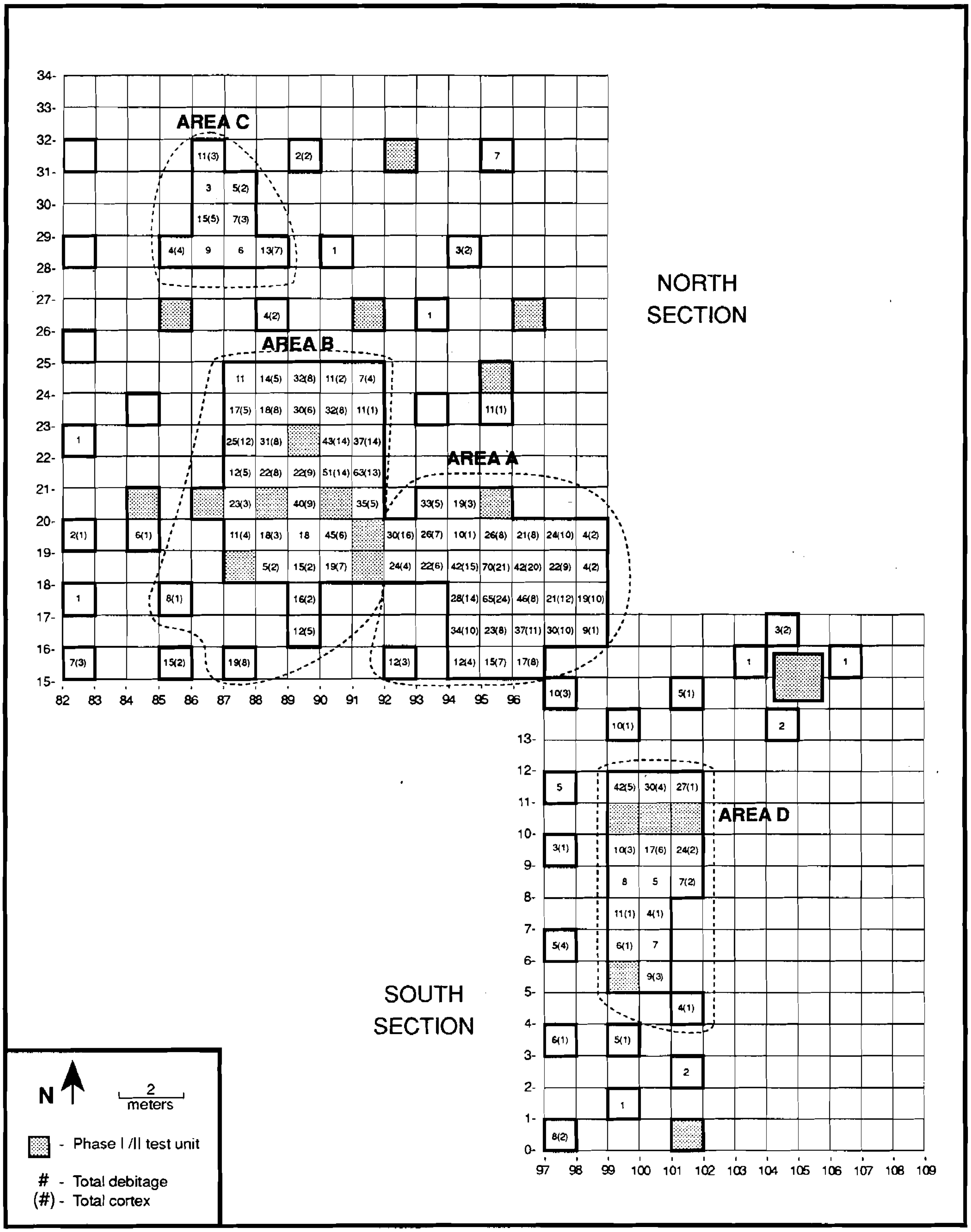
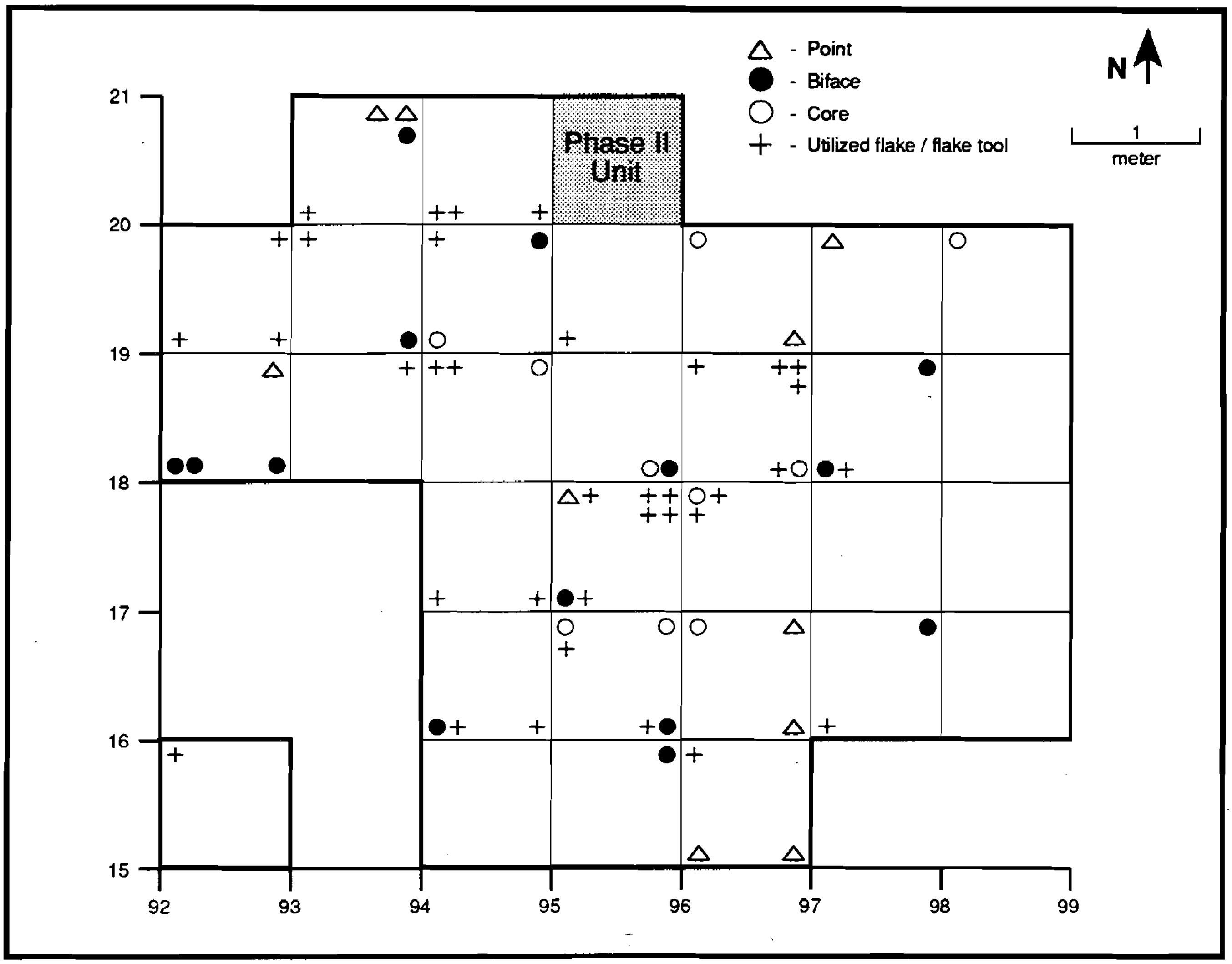


FIGURE 33

Distribution of Tools, Site 7K-C-360, Activity Area A

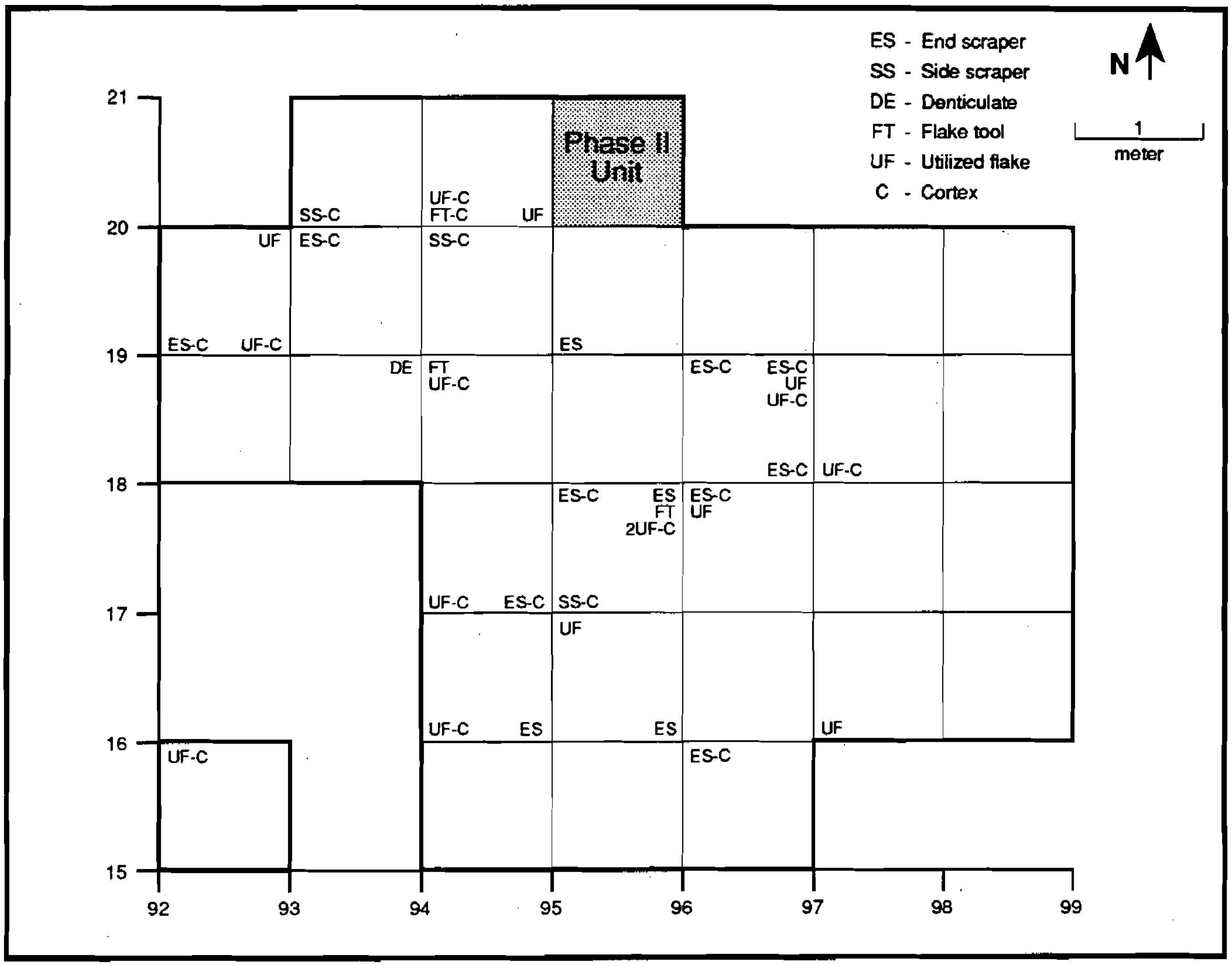


The final artifact class to be discussed is that of hammerstones. There were six hammerstones present in the site assemblage and these are shown in Plate 4. Three of these hammerstones were large oval samples, two were palm-size, and one was a fragment. All showed signs of battering or pecking.

In sum, examination of lithic tools from Site 7K-C-360 indicates that projectile points and bifaces exhausted from resharpening and use were being culled from curated tool kits and discarded at the site, while a low level of manufacture to replace these tools was taking place. Although cryptocrystalline jaspers and cherts were the preferred materials, the sources of a significant portion of the curated tools were outcrops of argillite and rhyolite located some distance from the site. Replacement tools were largely coming from local cobbles of cryptocrystalline materials. Numerous flake tools and utilized flakes were also present in the assemblage. These tools exhibit a high incidence of cortex indicating that they too were being manufactured from local cobbles and were used for immediate needs and then discarded. Micro-wear analysis of these artifacts indicates that they functioned largely as cutting and scraping implements and were likely used on both hard and soft materials in a variety of processing activities. Jasper was the preferred material in all artifact classes, although other cryptocrystalline materials as well as quartz and quartzite were well represented throughout the site assemblage.

FIGURE 34

Distribution of Flake Tools and Utilized Flakes, Site 7K-C-360, Activity Area A

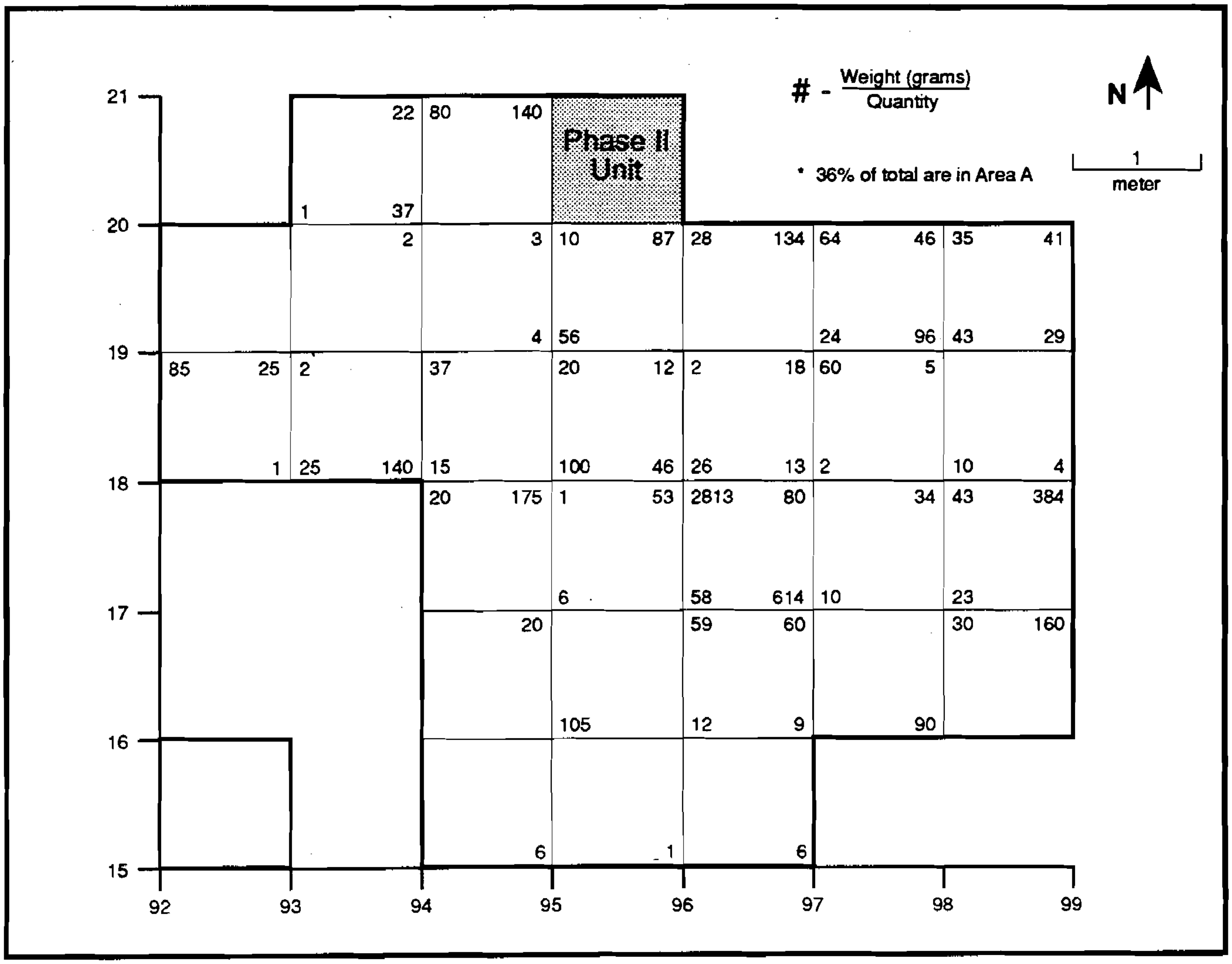


ACTIVITY AREAS

The spatial distribution of the activities noted above can be studied to see if clear-cut activity areas can be discerned. The method used to determine activity areas was to plot the frequencies of occurrence of artifact classes related to the functions noted above. These frequencies were mapped using each one meter square excavation block as a minimum provenience unit. As mentioned in the section on site chronology, the vertical position of artifacts is thought to be disturbed; therefore, artifacts from all levels have been combined together for the analysis of activity areas. The starting point for the delineation of activity areas was the analysis of the distribution of fire-cracked rock, tools, and debitage across the site. These distributions are shown in Figures 28, 31 and 32. Four areas of cultural activity were suggested by the results of this analysis, and these areas have been designated Areas A, B, C, and D (Figure 16). In an attempt to further define the activities engaged in these areas, fire-cracked rock, tools, total debitage, and debitage by raw material type were plotted using each 50 cm square excavation block as the minimum provenience within each designated activity area. The results will be discussed for each area separately.

FIGURE 35

Distribution of Fire-Cracked Rocks, Site 7K-C-360, Activity Area A



Activity Area A

Figure 33 shows the location of all tools recovered from Area A. The ten projectile points (Figure 25-A, B, D, H, I, K, L, M, N and Q), which are largely intact, consist of stemmed, notched, and bifurcate base types, and were dispersed throughout the first four excavation levels (0-40 cm below ground surface). One of the bifurcate base points (Figure 25-A) had experienced a transverse medial fracture and had been retouched along the surface of the fractured area, perhaps for use as a scraping implement. The vast majority of these points have asymmetrically excurvate edges and exhibit use-wear patterns which suggest that they functioned as knives. Bifaces from this area of the site are evenly distributed and are not segregated by either raw material, stage, or completeness. Cores, eighty percent of which exhibit cortex, are spread out over the central portion of Area A. Flake tools and utilized flakes are also prominent in the central core and in the northwestern portion of Area A. The majority of flake tools consist of scraping implements, most of which are end scrapers. Figure 34 shows the distribution of utilized flakes and identifiable types of flake tools in Area A. Sixty-four percent of these tools contain cortex. Figure 35 shows the location of fire-cracked rock. Its largest concentration was in the central portion of Area A, specifically Test Unit N17E96, and probably represents a hearth area.

FIGURE 36

Distribution of Total Debitage, Site 7K-C-360, Activity Area A

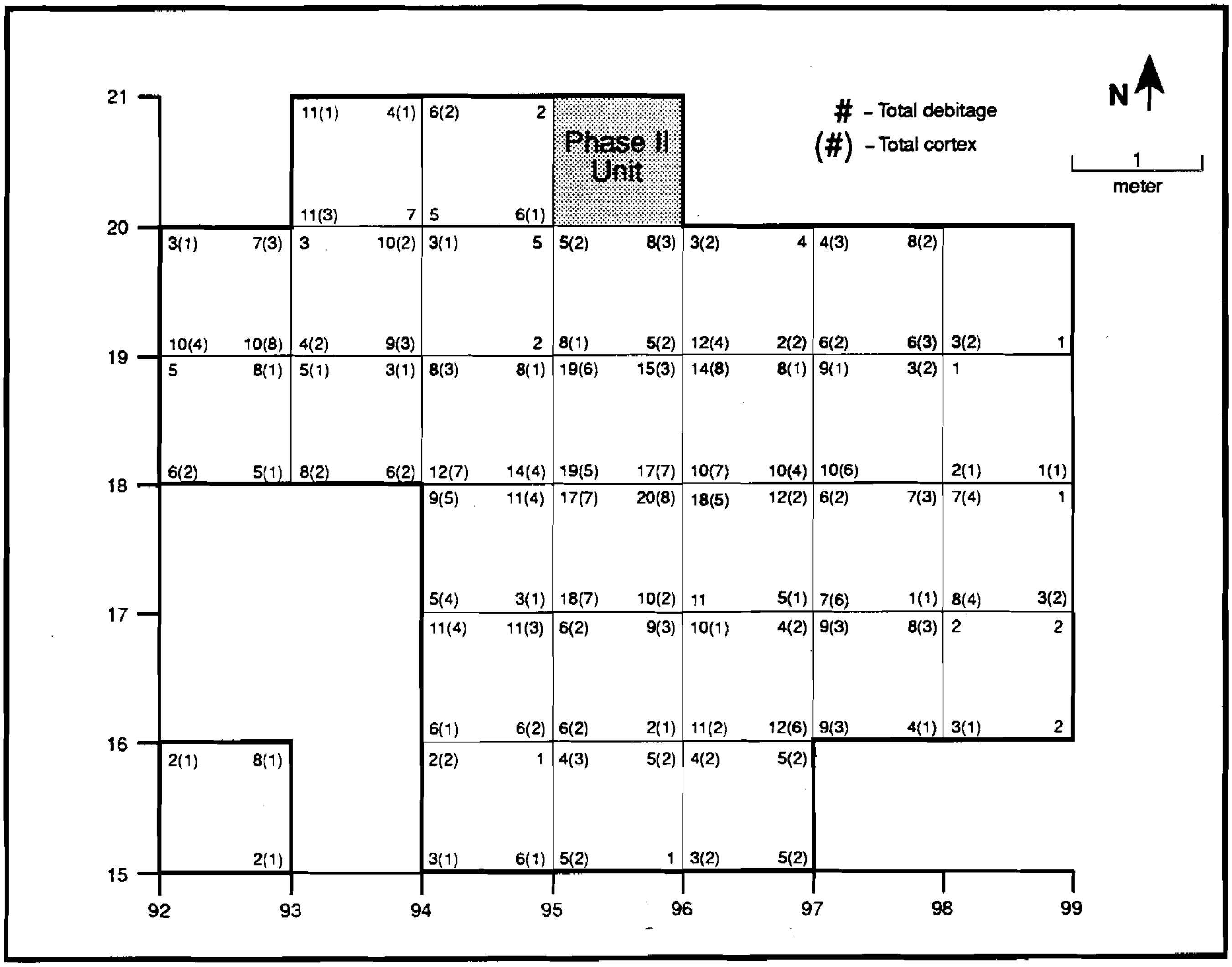


Figure 36 shows the distribution of total debitage, and Figures 37 through 42 show the distribution of flakes by raw material. The highest incidences of debitage occur in jasper and quartz which conform to the distributions of total debitage. Quartzite, chert, and chalcedony are most prominent in the south-central and northwestern portions of Area A, and rhyolite and argillite frequencies in this area were too low to imply any meaningful patterns. Flakes with cortex were fairly evenly dispersed throughout the area, with a somewhat greater frequency in the central section where cobble cores and flake tools with a high incidence of cortex were also located.

An attribute test based on the work of Verrey (1986), Magne (1981), and Gunn and Mahula (1977) was conducted on a sample of 100 flakes from Area A (Appendix II). Table 11 shows the distribution of attributes for the sample. Results of the tests support an inference of mixed biface and cobble core utilization in this area of the site, with an emphasis on cobble resources. In the sample, there was a high percentage of broken flakes (54%), a characteristic normally associated with biface reduction; however, the remaining relatively high percentage of complete flakes suggests the use of cores for the express purpose of producing usable flakes. Cortex was present on 51 percent of the flakes further underscoring the notion that the sources of these flakes were local cobbles. Most flakes (71%) were very small in size indicating that they were derived from either small cobbles or small bifaces, or that they were the by-products of tool edge maintenance activities. The mean values for scar counts and directions counts are more closely aligned with those recorded for bifaces (Appendix II, Table 11).

FIGURE 37

Distribution of Quartzite Debitage, Site 7K-C-360, Activity Area A

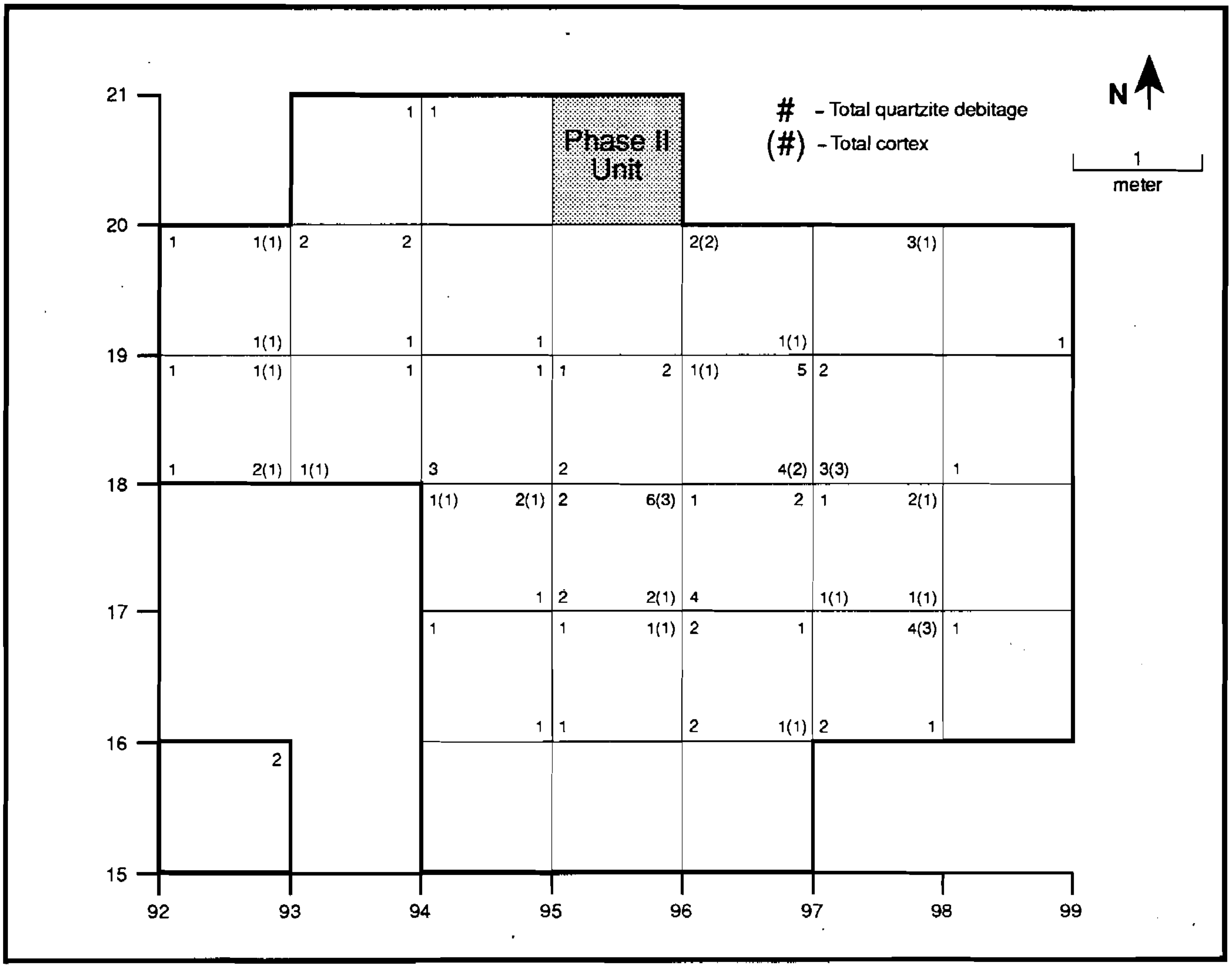


TABLE 11

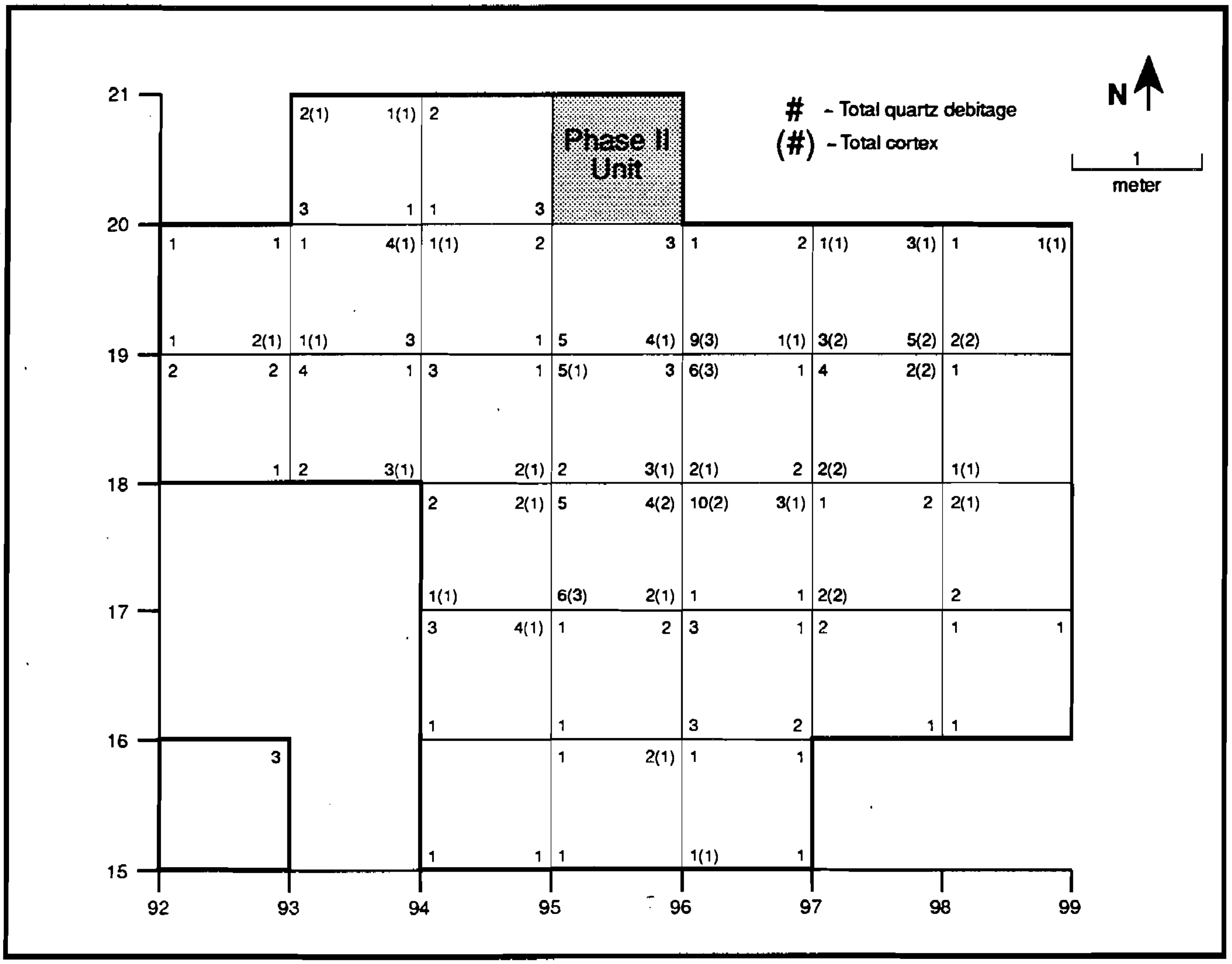
Debitage Attribute Frequencies, Site 7K-C-360, Activity Area A

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	46	< 2 cm	71	Triangular	14	Present	8
Proximal	16	2 - 5 cm	29	Flat	17	Absent	54
Medial	8	> 5 cm	0	Round	31	No observation	38
Distal	30			No observation	38		
		Scar count				**Directions count**	
Cortex		Mean	= 1.82	**Remnant biface edge**		Mean	= 1.64
Present	51	Standard deviation	= 1.27	Present	6	Standard deviation	= 1.28
Absent	49			Absent	94		

*Based on a sample of 100 flakes

FIGURE 38

Distribution of Quartz Debitage, Site 7K-C-360, Activity Area A

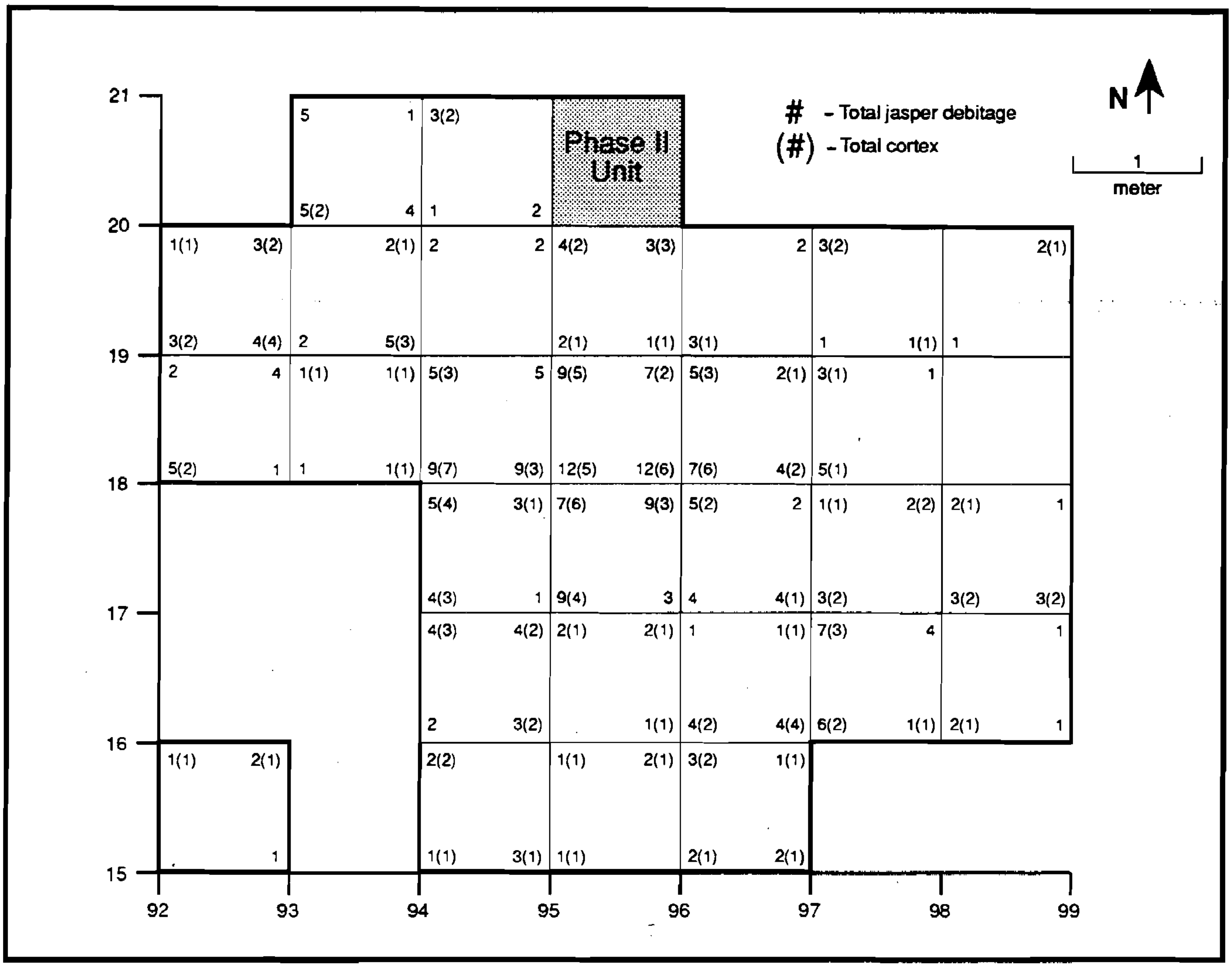


Round platforms, indicative of either early stages of biface reduction or decortication, were present on 50 percent of the flakes that contained observable platforms. Flat platforms, associated with core reduction, were present on 27 percent of these flakes, and triangular platforms, associated with biface reduction, were present on 25 percent. Remnant biface edge and platform preparation, both associated with biface reduction, were present in low frequencies on the sample flakes. In short, the analysis of the flake assemblage indicates that much of the debitage and most of the flake blanks used to produce tools were derived from cobble core reduction.

In sum, core, flake tool, and cortex distributions suggest that expedient manufacture of flake tools was a prominent activity in Area A. In addition, curated projectile points and late stage bifaces were also present in the assemblage. Use-wear analysis of the tools in this area suggest that they served as implements for butchering, perhaps in its final stages, the processing of hides, and the manufacture of bone and wood tools. Once damaged or exhausted, curated tools were culled from tool kits and discarded at the site as were expedient tools that were no longer needed. The presence of early stage bifaces suggests that some small-scale manufacture of replacement tools was also taking place in Area A. Finally, a hearth area is suggested for the central portion of Area A.

FIGURE 39

Distribution of Jasper Debitage, Site 7K-C-360, Activity Area A

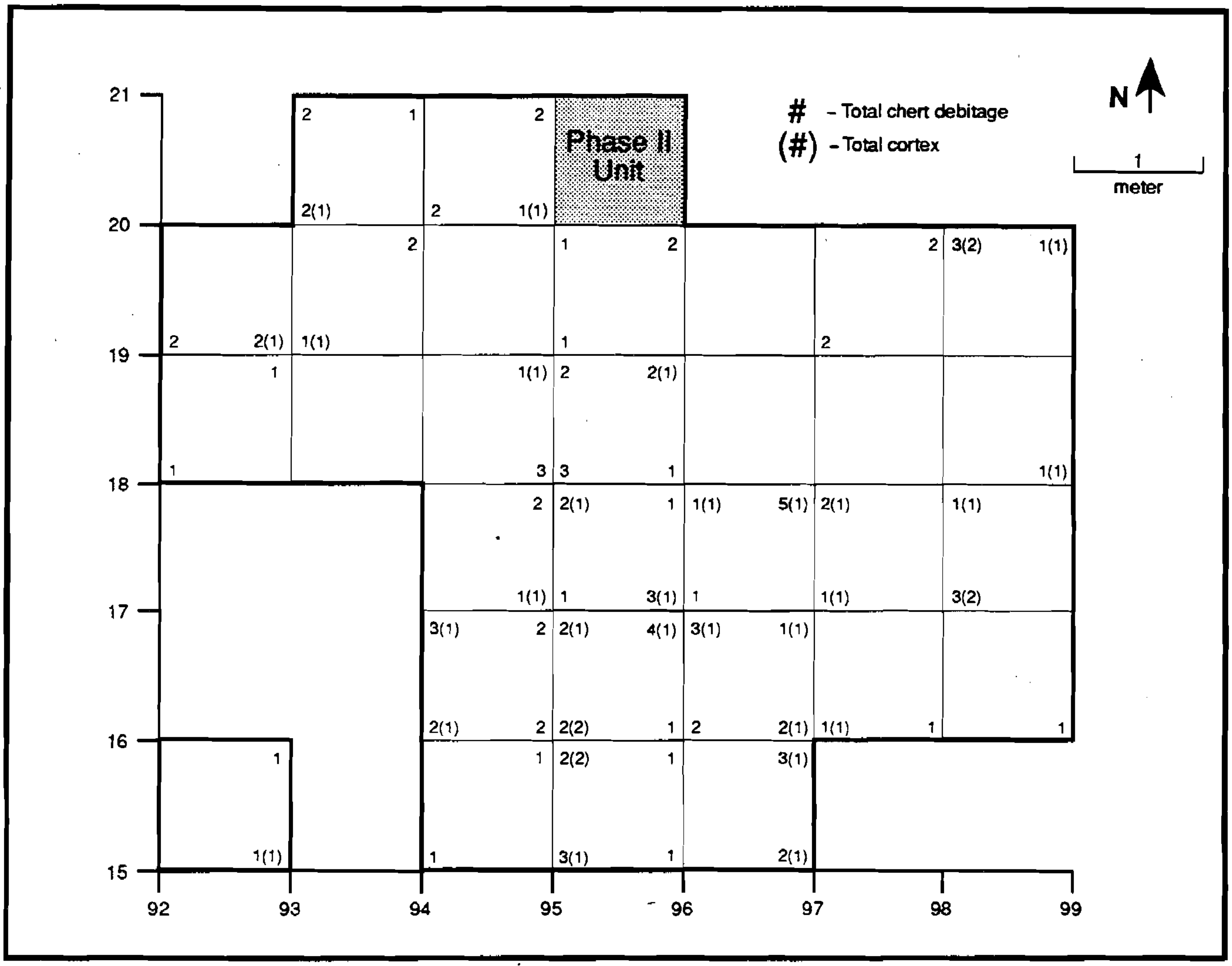


Activity Area B

Figure 43 shows the location of all tools recovered from Area B. Eleven projectile points were located in Area B (Figures 25-C, F, G, J, O, P, R, S, T and 24-B, C), including bifurcate, notched, and stemmed varieties, and were recovered from the first five excavation levels (0-50 cm below surface). Two of the points appear to have suffered impact fractures. One of these points (Figure 25-J) shows a slightly blunted tip; however, since this point is made from argillite which weathers over time, it is difficult to discern whether the blunting resulted from impact or is just a distortion caused by weathering. The second point with a fractured tip (Figure 25-R) was also fractured at the junction of the shoulder and base. This point is a small contracting stem variety made from chert. The area of the tip fracture is smoothed and polished as are the lateral edges at the distal end and the flake scar ridges on the dorsal surface near the tip. Ahler (1971) has associated these characteristics with a point's use as a projectile. Another point (Figure 25-P) also experienced a fracture at the junction of the shoulder and base. Because of the poor quality of the material and the presence of a hump on the dorsal surface as well as numerous step fractures and rounding along the lateral edges, it is not possible to determine whether the shoulder snapped during use as a knife or whether the fracture occurred in the later stages of manufacture or resharpening.

FIGURE 40

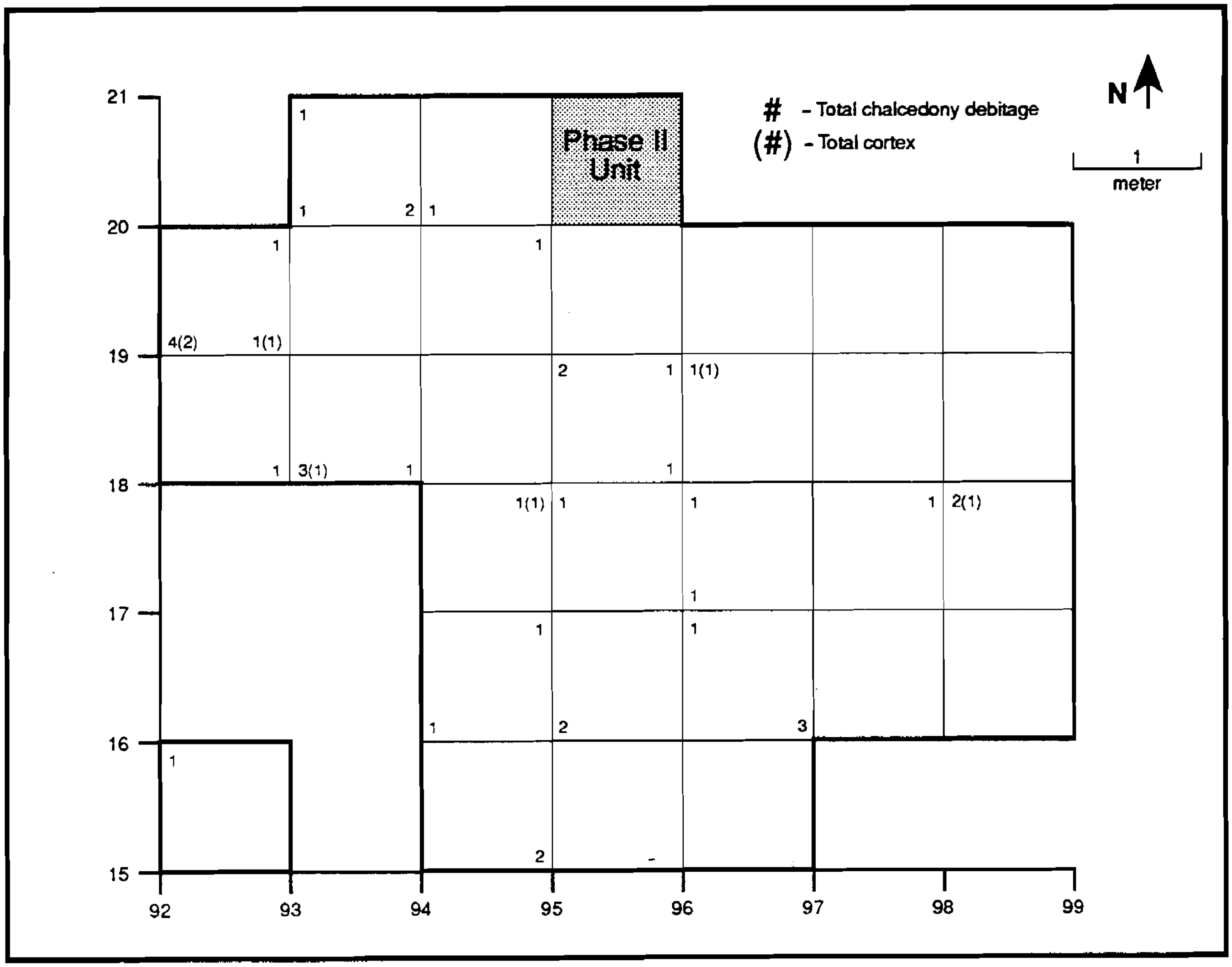
Distribution of Chert Debitage, Site 7K-C-360, Activity Area A



Three of the points from Area B (Figures 25-C, T and 24-B) exhibit transverse fractures. Two of these points (Figure 24-B and Figure 25-C) are bifurcate points recovered from excavation Level 4 (30-40 cm below surface). Although the distal section is missing from one of these points, the portion that remains shows some blunting and rounding along one lateral edge. Both the distal and basal portions of the other point survived, and when mended, appear very asymmetrical in shape and show smoothing and rounding along both lateral edges. These use-wear characteristics are indicative of cutting and scraping activities (Ahler 1971; Ahler and McMillan 1976) and have been associated with transverse fractures (Ahler 1971), indicating that these tools may have been used in butchering and processing activities. The third point in the Area B assemblage with a transverse medial fracture (Figure 25-T) is a long narrow jasper contracting stem variety. The point appears to be extensively resharpened and is pencil-shaped in cross-section. Snapped blades on points of this type have been associated with prying actions that occur in the early stages of butchering (Ahler 1971). One other point in Area B (Figure 25-O) also shows a transverse medial fracture. However, before this notched point was discarded, it was modified into a scraper as evidenced by parallel flake scars on the dorsal surface running perpendicular to the edge. In addition, the edge is worn and shows micro-chipping and step fractures on the surface above the edge as might result from pushing the "scraper" along a hard surface such as bone or antler, suggesting that this area may also have been the site of bone/antler tool manufacture.

FIGURE 41

Distribution of Chalcedony Debitage, Site 7K-C-360, Activity Area A



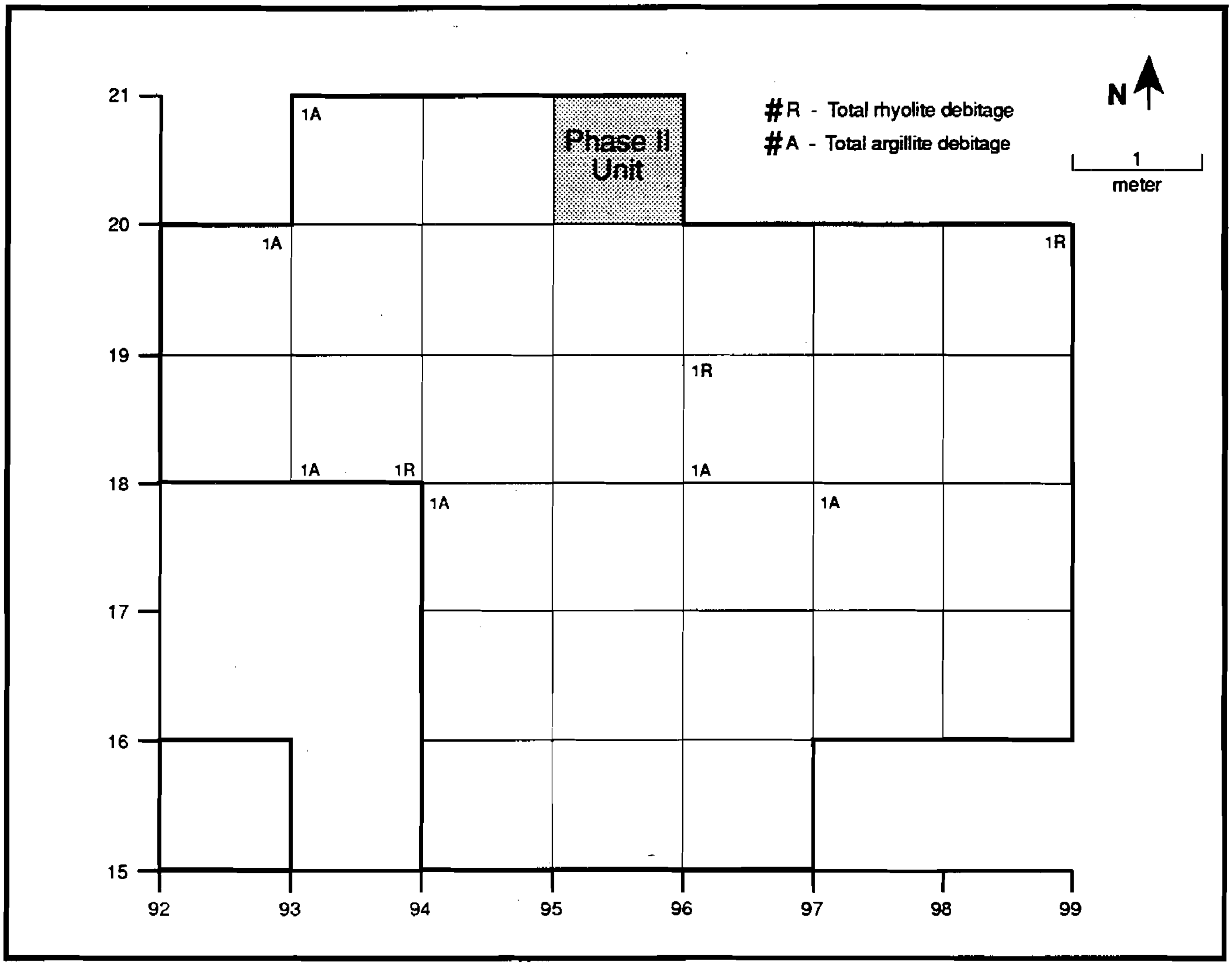
The remaining points from Area B (Figure 25-F, G, S and 24-C) are intact. All of these points have asymmetrically excurvate edges and exhibit use-wear patterns which suggest they functioned as knives.

Very few additional bifaces were located in Area B. One snapped point stem (Figure 26-G) was located in the northeast corner of Area B, which was also the location of two early stage biface fragments that mend. Two late stage bifaces were discarded in the northwestern portion of the area. One of these bifaces (Figure 26-J) is a small thin heavily retouched tool that may have served as a projectile point earlier in its existence. The distal area, however, has been reworked bifacially into a rounded scraper-like tool. The tool appears to have served a variety of functions during its life, and was finally culled from the tool kit and discarded at this site only after its usefulness had been completely exhausted. Finally, one quartzite and one argillite biface fragment were discarded in the southwestern portion of Area B.

Cores, 69 percent of which contain remnant cortex, are spread out over the central portion of Area B. Several utilized flakes and flake tools were also recovered from Area B. Figure 44 shows the distribution of utilized flakes and identifiable types of flake tools in Area B. Flake tools consist of nine

FIGURE 42

Distribution of Rhyolite and Argillite Debitage, Site 7K-C-360, Activity Area A



end and side scrapers, one drill, one pebble tool and one other flake tool of unknown function. Eighty-three percent of these tools contained remnant cortex, suggesting their manufacture from local cobbles of jasper, chert, and quartz. Although a couple of these scraping tools show relatively careful manufacture (Figure 29-I and K), most do not show the systematic modification of classic tool types as discussed by Bordes (1961). Instead, their expedient manufacture results in a rough approximation of the classic shape (Figure 29-U and O). One of the end scrapers in the assemblage (Figure 29-M) appears to be a converted jasper core. The scraper is very thick, contains no cortex, and shows long blade-like flake scars on all surfaces but shows scraper-like modification along one edge. That edge also shows numerous small step fractures on its dorsal surface as would be expected from a scraping tool used on a hard surface such as bone or antler (Tringham et al. 1974). Other scrapers in the Area B assemblage show similar kinds of use-wear; however, still others (Figure 29-L) show use-wear (worn flake scar ridges on ventral surfaces) that is more indicative of use on soft materials such as hide or wood. The chert drill (Figure 29-D), which does not contain cortex, is broken off at the very tip, and the top of the remaining tip area is worn and highly polished as is a second projection extending out from the shoulder area of the drill. In addition, the edges along the proximal end of the drill are smoothed, rounded, and polished suggesting that this implement may have also been used for scraping purposes on soft materials.

FIGURE 43

Distribution of Tools, Site 7K-C-360, Activity Area B

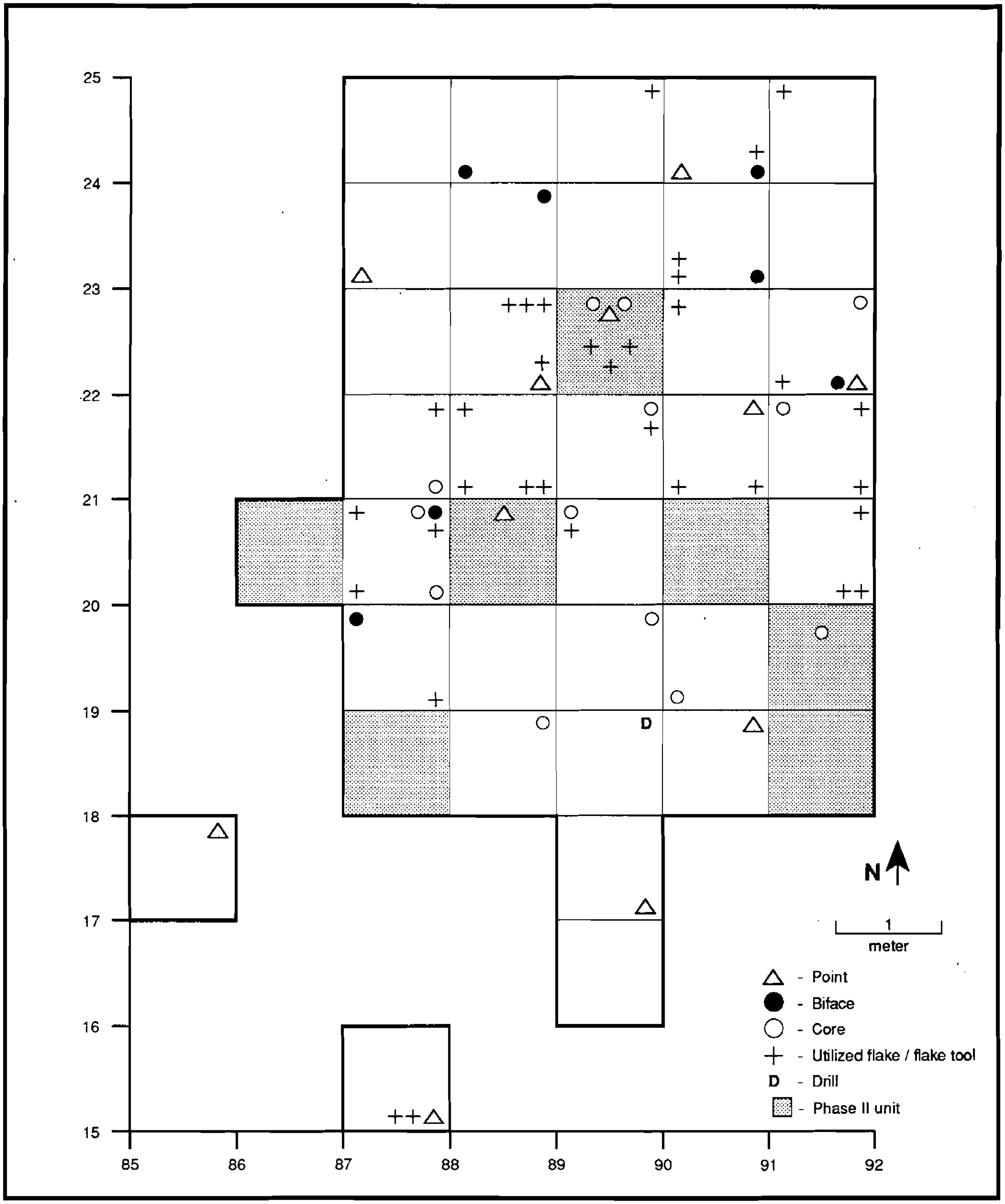


FIGURE 44

Distribution of Utilized Flakes and Flake Tools, Site 7K-C-360, Activity Area B

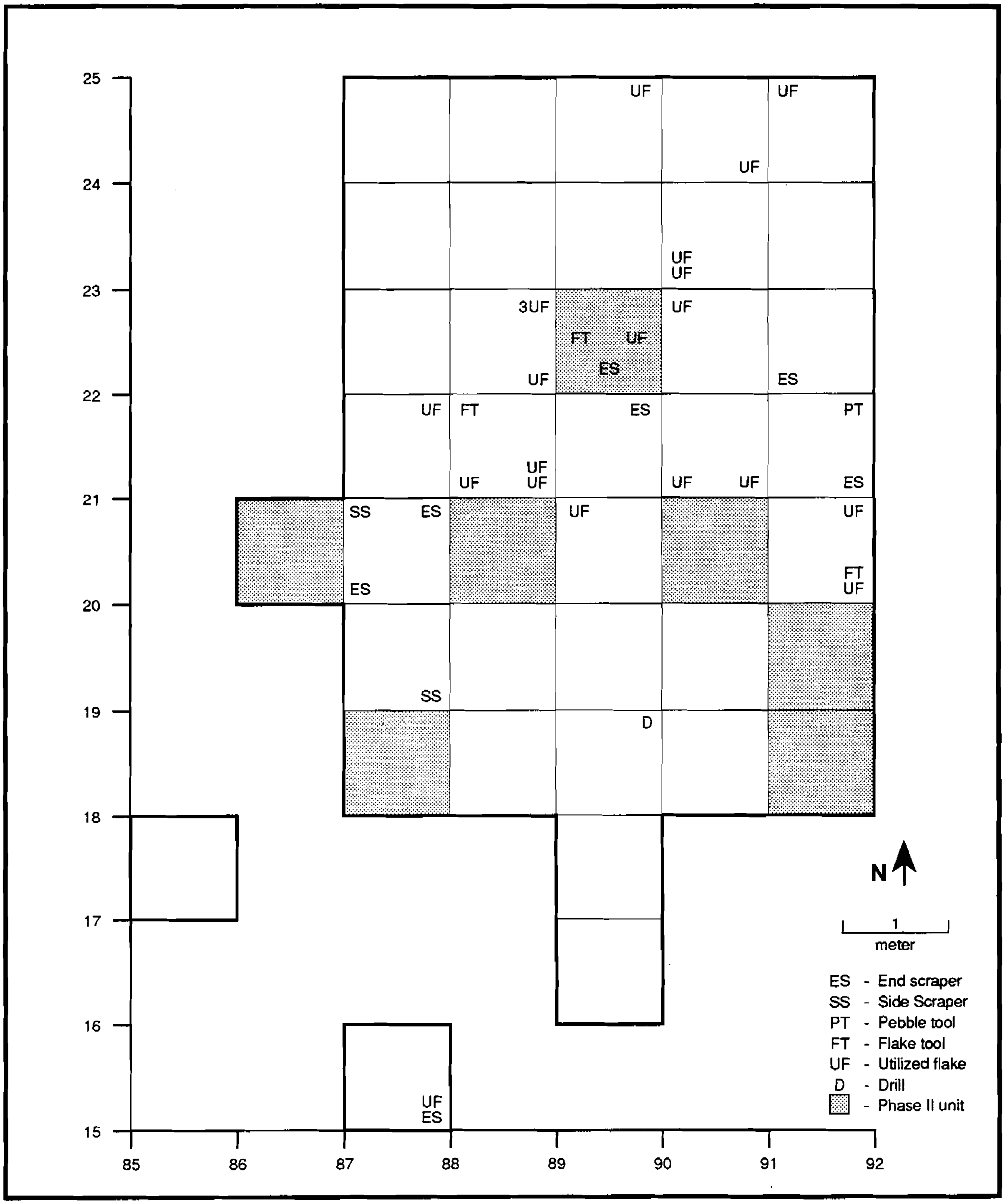
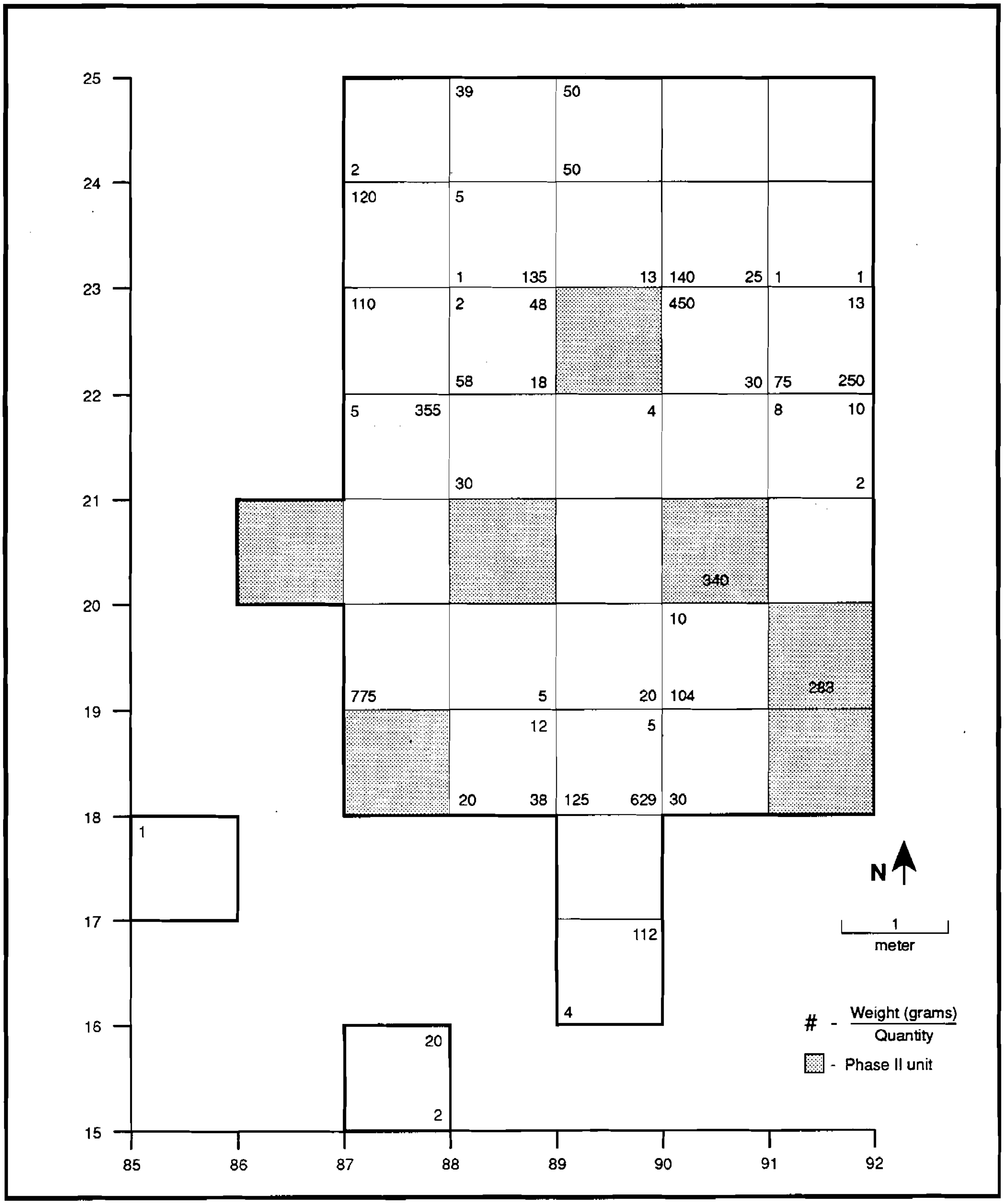


FIGURE 45

Distribution of Fire-Cracked Rocks, Site 7K-C-360, Activity Area B



The utilized flakes in the Area B assemblage show similar signs of expedient manufacture from local cobbles. Seventy percent of these flakes contain remnant cortex, and all but one came from locally available materials. The one exception was a flake of rhyolite material (Figure 30-O). Most of the utilized flakes are concentrated in the northern two-thirds of the area. Unretouched flakes have sharp edges that would be useful in all stages of butchering activities. Their concentrated presence in Area B in association with hafted knives and scraping tools indicates that they were likely used to assist in these butchering activities. Figure 45 shows the location of fire-cracked rocks. Their largest concentrations are in the southwestern, south central and north central parts of Area B.

Figure 46 shows the distribution of total debitage, and Figures 47 through 53 show the distribution of flakes by raw material. The highest incidences of debitage occur in jasper and quartz which conform to the distribution of total debitage. Chert and chalcedony distributions also conform to the pattern of total debitage. Only seven argillite flakes were located in Area B and were largely confined to the southern half. There was also a relatively low incidence of quartzite debitage in Area B, and the concentration of this material was densest in the northwestern portion of the area, although it is present over most of the area. Although the incidence of rhyolite debitage in Area B is generally low, eighty-three percent of the rhyolite debitage from the site as a whole is located in Area B. These flakes are concentrated in the north-central and southeastern portions of the area. The small quantity of flakes probably indicates that they occurred as the result of reducing or resharpening finished tools brought into the site. A late stage biface and a biface fragment of rhyolite were found in test units east of Area B. Rhyolite is seldom seen on sites on the Delmarva Peninsula before approximately 3000 B.C. (Custer 1989:235-244). Custer (1989:239) has observed that rhyolite, along with argillite, was used primarily during initial Woodland I times in Delaware. Because rhyolite is a non-local material, its presence in the assemblage indicates either that it was carried into the site sometime after its procurement from primary sources some distance to the north, or that it was received by way of participation in trade and exchange networks that were operating in central Delaware during Late Archaic/Early Woodland times (Custer 1984b).

An attribute test based on the work of Verrey (1986), Magne (1981), and Gunn and Mahula (1977) was conducted on a sample of 100 flakes from Area B (Appendix II). Table 12 shows the distribution of attributes for the sample. Results of the tests indicate that a mixed technology of bifaces and cores was practiced in this area of the site with the majority of cores occurring in cobble form. In the sample, the majority of flakes were broken fragments, although a significant minority (40%) were complete flakes. Broken flakes have been associated with biface reduction (Lowery and Custer 1990), whereas complete flakes, being the goal of core reduction, are most associated with that technology. Cortex percentages on the sample material (41%) indicate that cobble resources were important to Area B's occupants. Most of the sample flakes (77%) were very small in size indicating that they were derived either from small cobbles or small bifaces, or that they were the by-products of tool edge maintenance activities. Mean values for scar and directions counts on the sample flakes are more closely aligned with those recorded for bifaces (Appendix II, Table 12). Examination of platform shape indicates that round platforms, associated with the early stages of biface reduction or decortication, were most common. The presence of remnant biface edges and platform preparation, though of low incidence, are nevertheless strong indications of biface reduction activities. Therefore, a mixed technology of biface and cobble core reduction appears to have been practiced in Area B.

In sum, use-wear on hafted tools from Area B and the presence of a cluster of discarded utilized flakes suggest that cutting, slicing, and scraping activities took place at this locus. Breakage patterns on points and bifaces further indicate that twisting and prying motions, such as would be involved in the early stages of butchering and disjointing, may have been part of these activities. In addition, scraping tools appear to have been used on both hard and soft materials, perhaps as part of the butchering activities or in the manufacture of bone and wood tools. Furthermore, the presence of impact fractured projectile points suggests the probability that hunting activities took place nearby.

FIGURE 46

Distribution of Total Debitage, Site 7K-C-360, Activity Area B

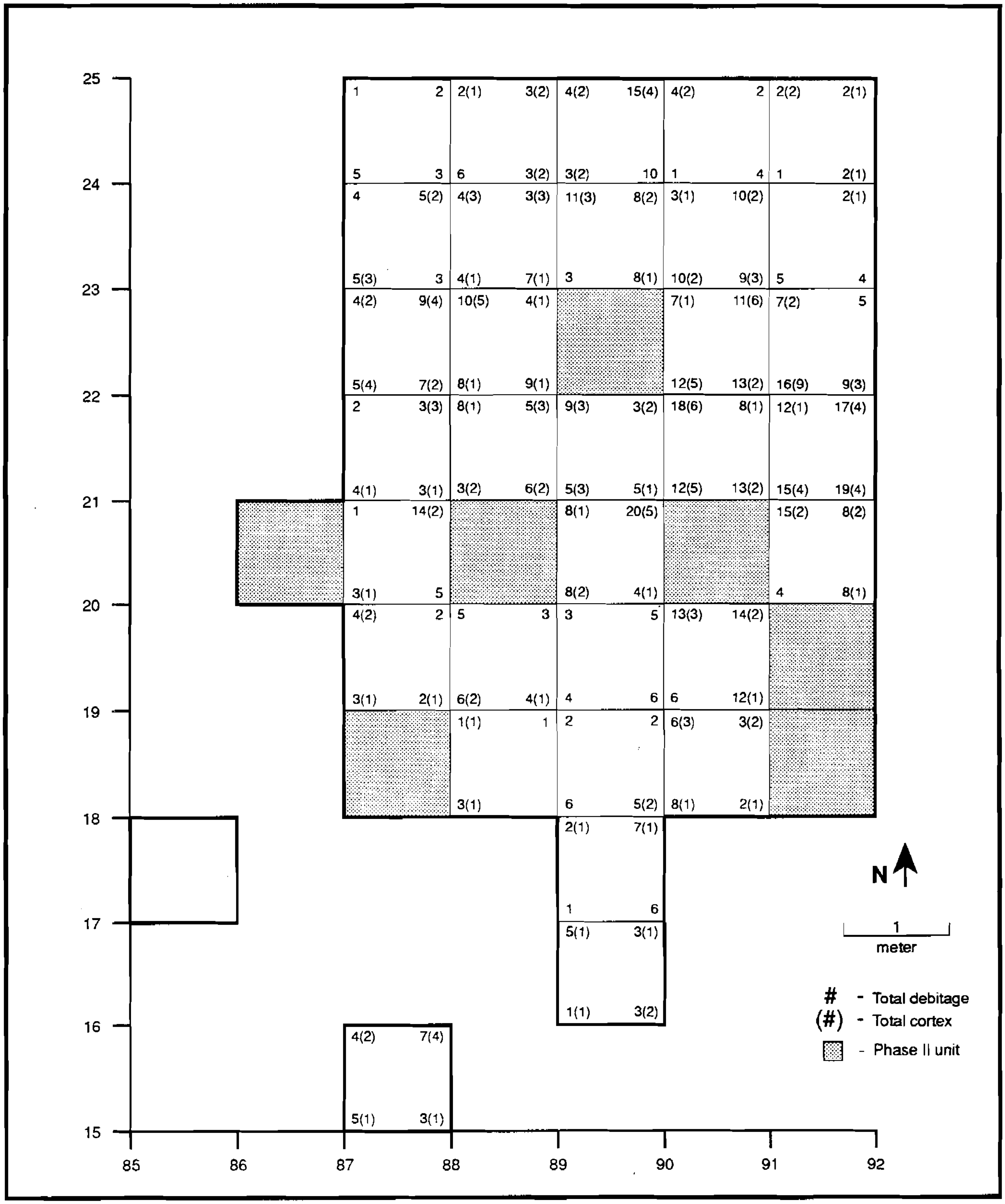


FIGURE 47

Distribution of Quartzite Debitage, Site 7K-C-360, Activity Area B

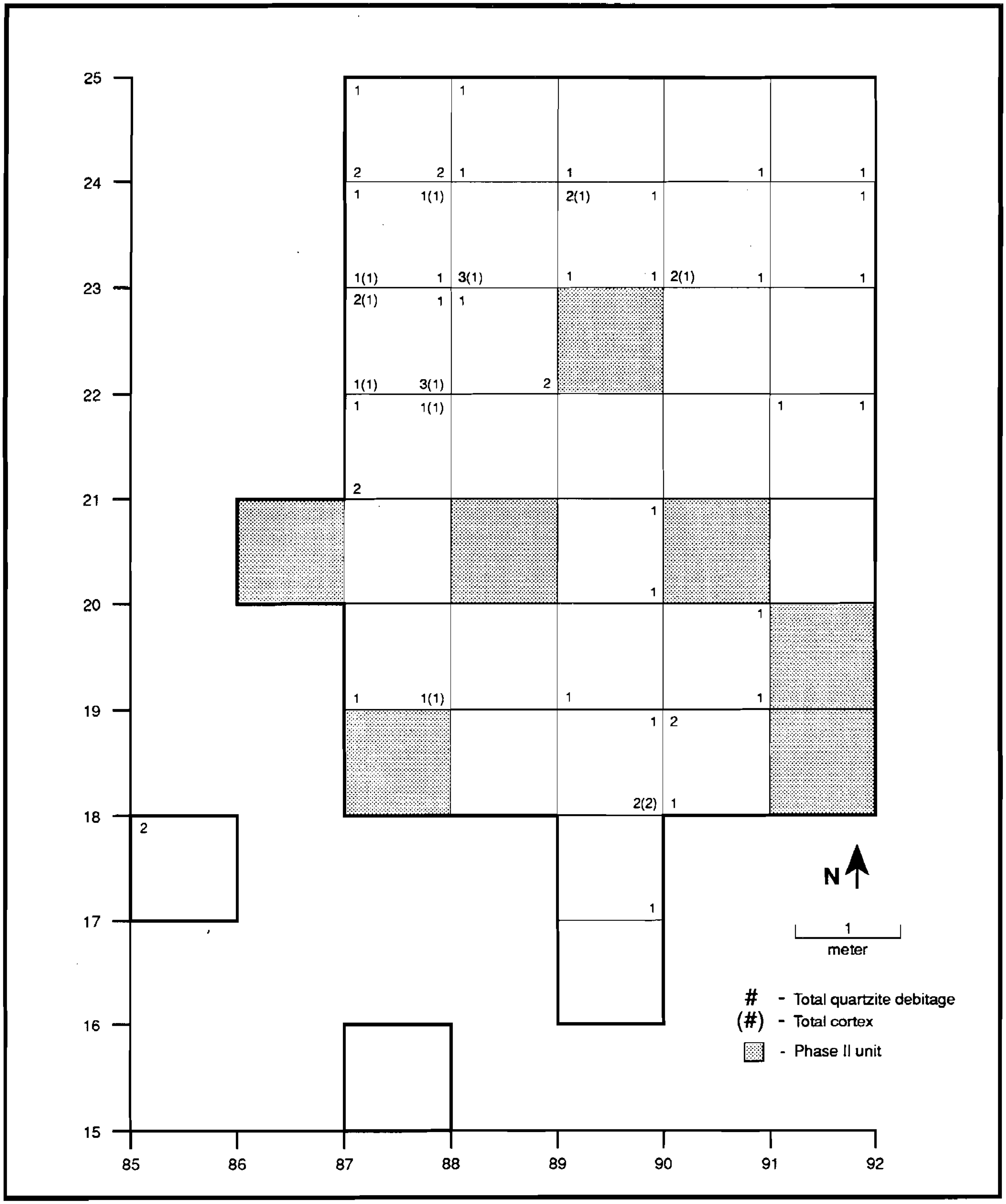


FIGURE 48

Distribution of Quartz Debitage, Site 7K-C-360, Activity Area B

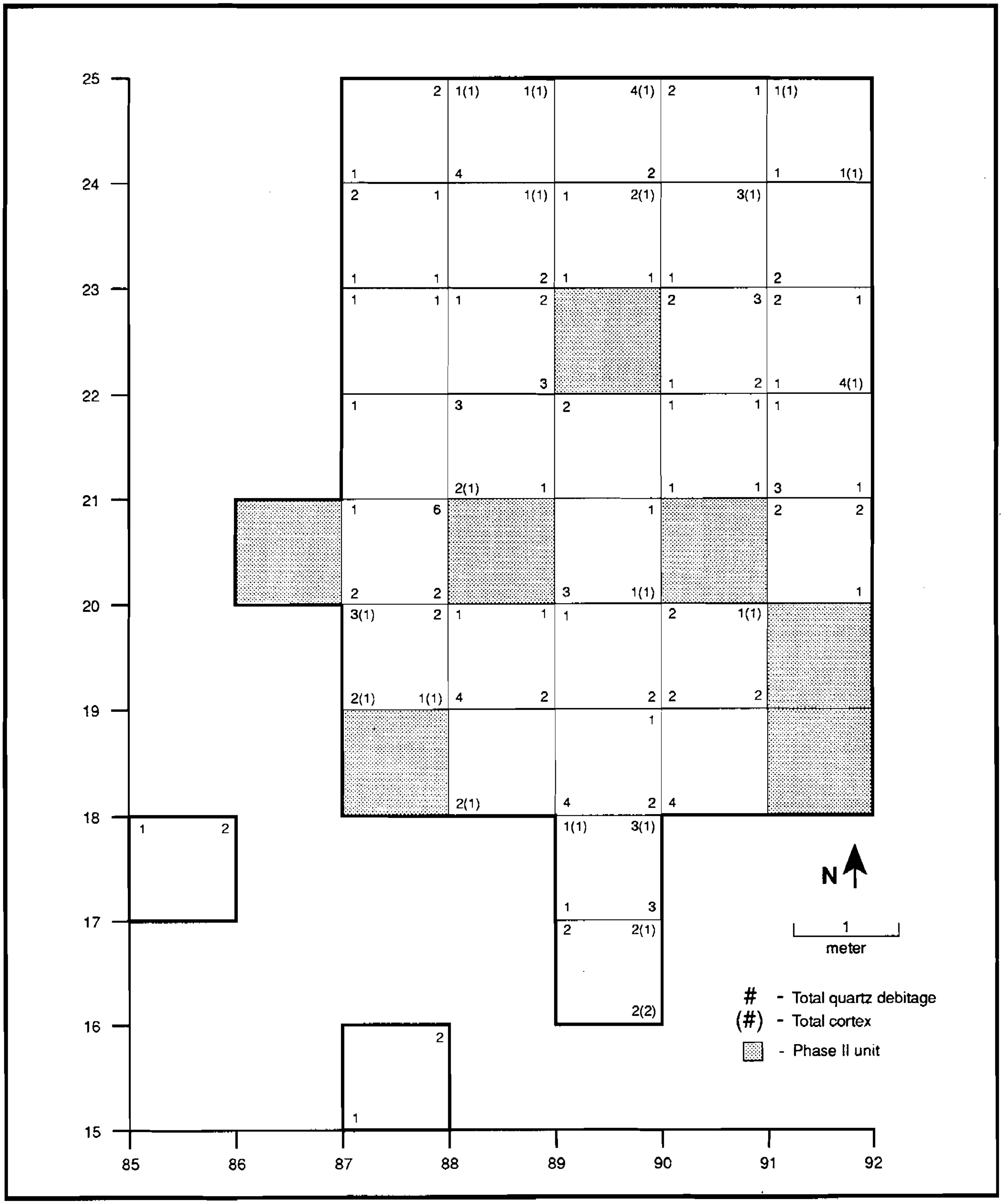


FIGURE 49

Distribution of Chert Debitage, Site 7K-C-360, Activity Area B

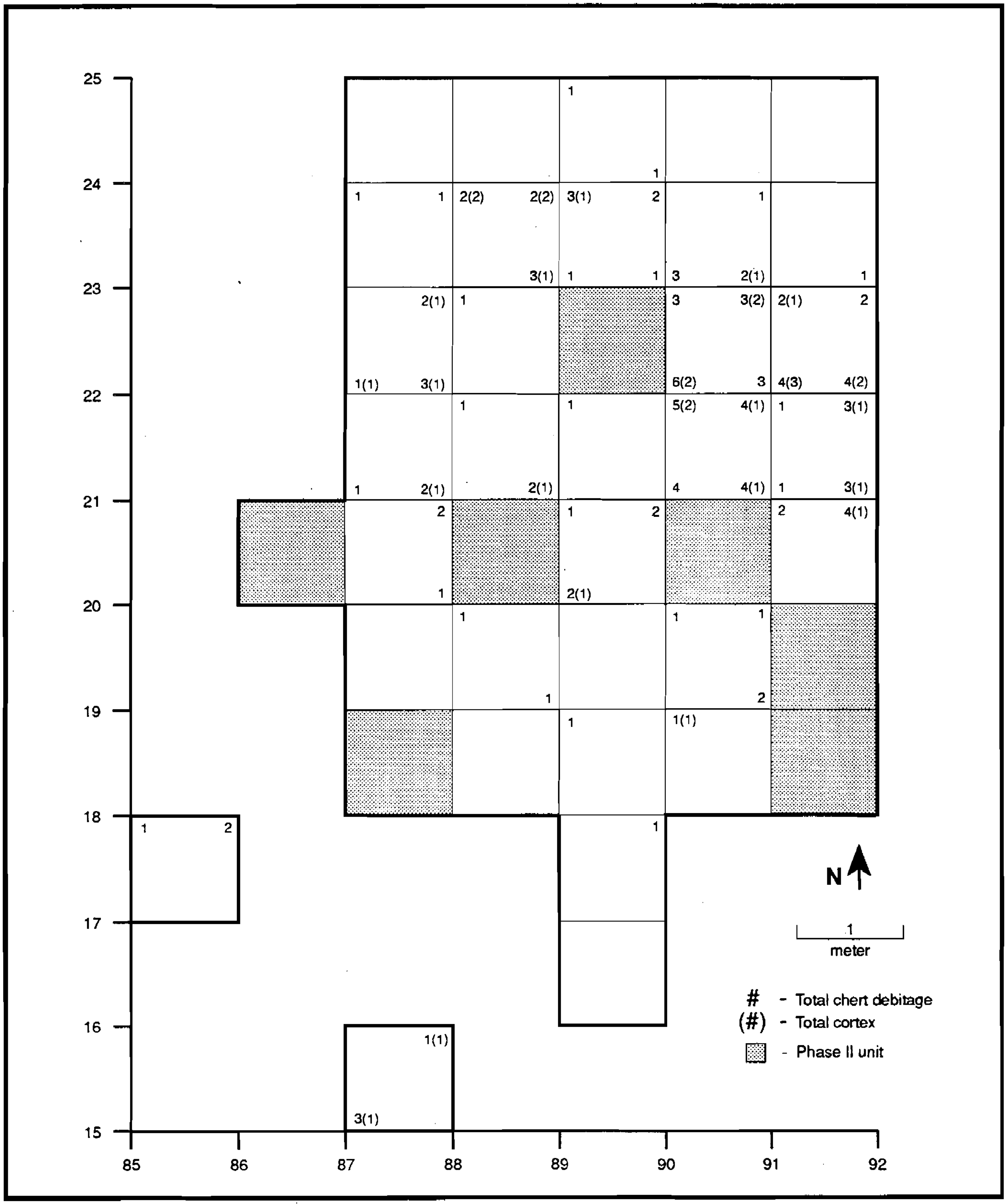


FIGURE 50

Distribution of Jasper Debitage, Site 7K-C-360, Activity Area B

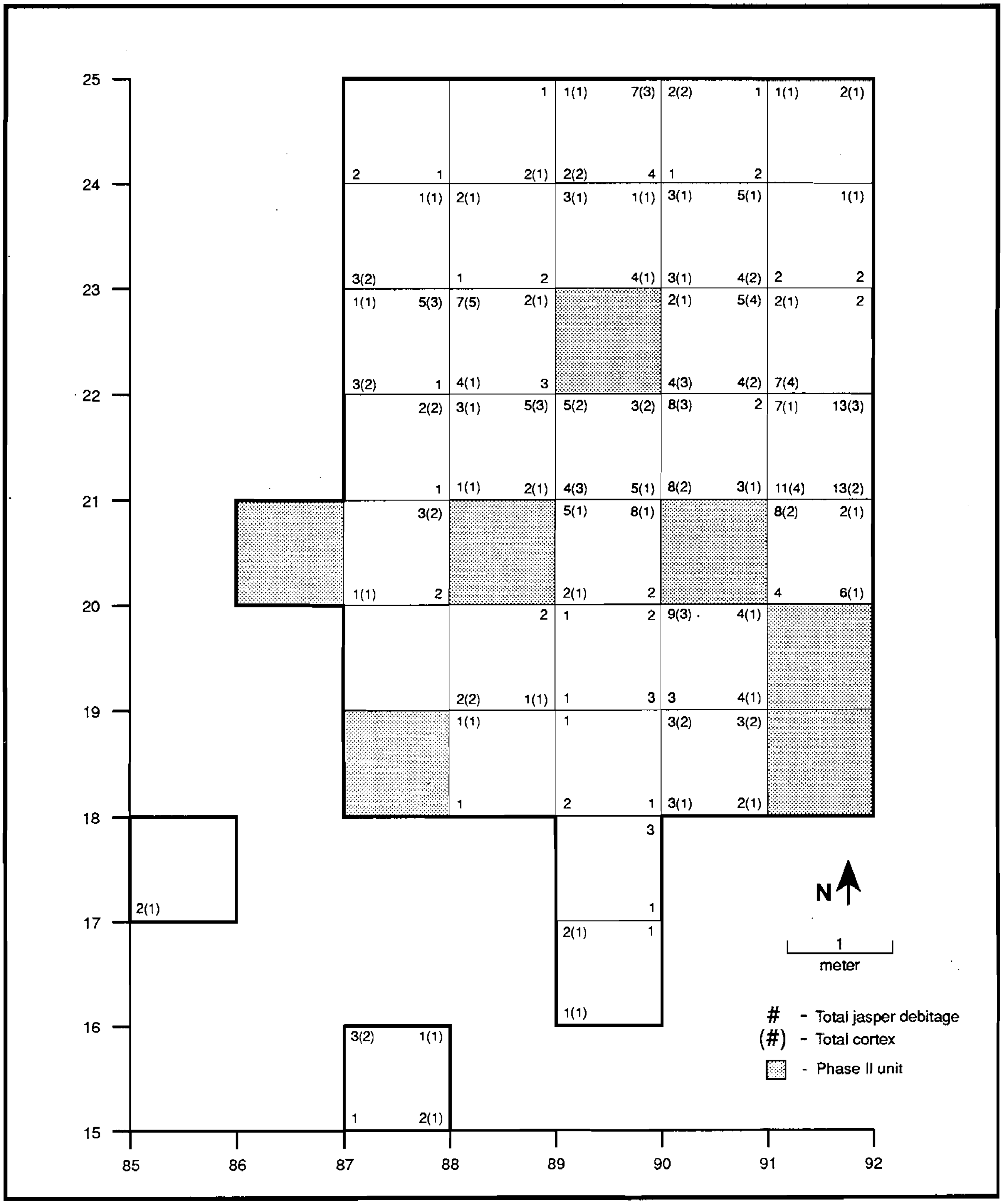


FIGURE 51

Distribution of Chalcedony Debitage, Site 7K-C-360, Activity Area B

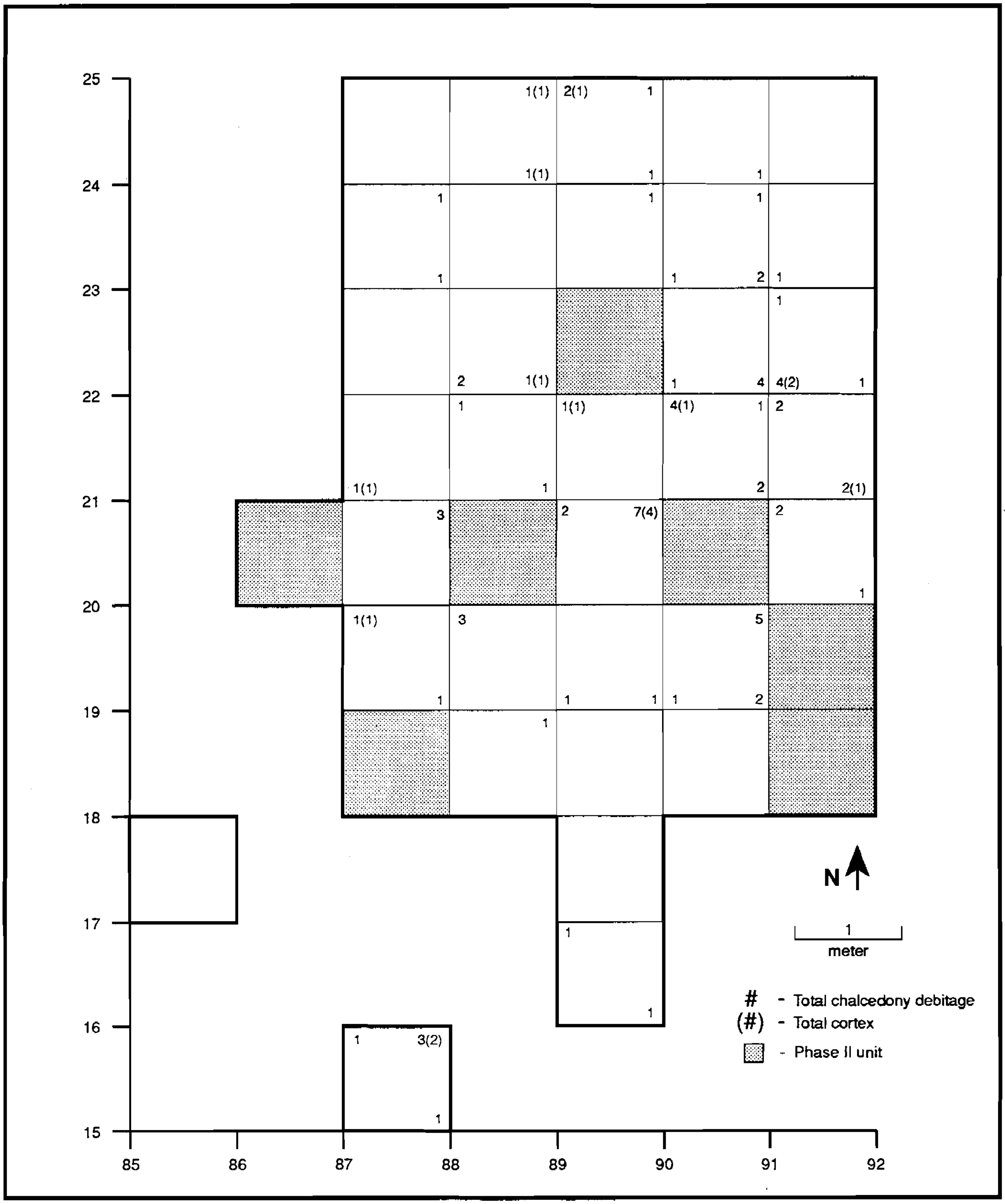


FIGURE 52

Distribution of Argillite Debitage, Site 7K-C-360, Activity Area B

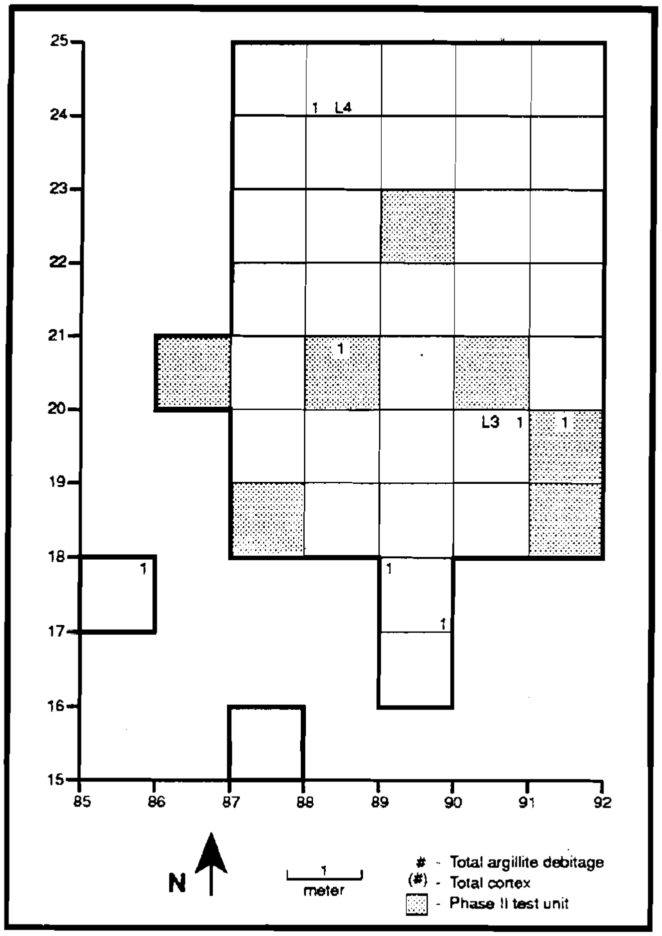
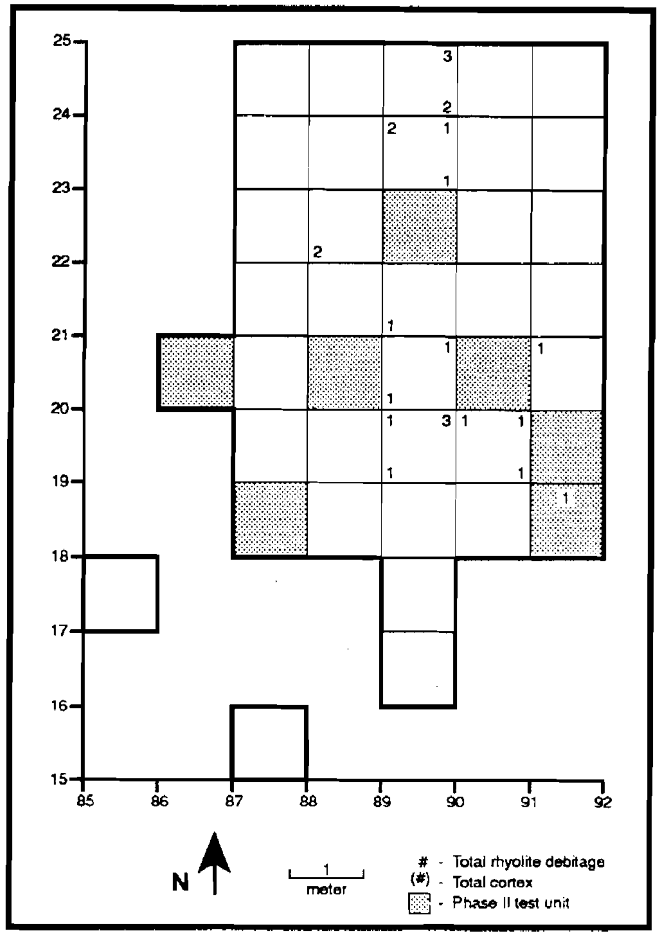


FIGURE 53

Distribution of Rhyolite Debitage, Site 7K-C-360, Activity Area B



In addition to these activities, the presence of numerous cores and cortex-bearing debitage, utilized flakes and flake tools suggests that some degree of expedient tool production took place in Area B. Fire-cracked rock concentrations suggest that small hearth areas were also present at this location. It is also possible that the presence of discarded hafted tools in this area indicates retooling activities.

Finally, the presence of projectile points diagnostic of both the Archaic and Woodland I periods as well as a small and relatively isolated concentration of rhyolite debitage suggests that Area B was occupied at various times throughout a long period of prehistory. However, the absence of storage or habitation features, storage containers, and large hearth areas suggests that the occupations were of short duration.

Activity Area C

Figure 54 shows the location of all tools recovered from Area C. No projectile points or cores were found in this area of the site. Three biface fragments were found in the southeastern corner of Area C. Two of these fragments (Figure 26-E and H) were from a single chert late stage biface. Examination under low power magnification showed crushing and wear along the lateral edge of the biface, particularly in the distal section, suggesting that it may have been used as a cutting implement. The larger fragment of the biface, which was found in Level 3 of Test Unit N28E88 and appears to have been made from a flake (Figure 26-E), experienced a longitudinal fracture. A fragment that was detached from the biface (Figure 26-H) was found in Level 1 of an adjoining test unit (N28E87). When

TABLE 12

Debitage Attribute Frequencies, Site 7K-C-360, Activity Area B

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	40	< 2 cm	77	Triangular	14	Present	17
Proximal	18	2 - 5 cm	23	Flat	18	Absent	41
Medial	17	> 5 cm	0	Round	26	No observation	42
Distal	25			No observation	42		
		Scar count				**Directions count**	
Cortex		Mean	= 1.90	**Remnant biface edge**		Mean	= 1.62
Present	41	Standard deviation	= 1.37	Present	13	Standard deviation	= 1.11
Absent	59			Absent	87		

*Based on a sample of 100 flakes

this fragment was refitted with the larger biface fragment, it showed that the smaller fragment was somewhat thinner. The damage to the biface, then, could have occurred either as the result of its use as a knife or in the process of thinning or resharpening the biface. The remaining biface fragment from Area C was made of quartzite. This biface experienced a fracture, but because the material does not exhibit modification clearly, it is not possible to determine whether the damage might have resulted from use or whether it occurred in the course of thinning or resharpening. All of these fragments do appear to have been discarded because of damage.

In addition to the biface fragments in the southeastern portion of Area C, a hammerstone was also found. The hammerstone (Plate 4-A) is a small and oval shaped sandstone cobble with evidence of battering or pecking at both ends. The absence of cores and early stage bifaces in Area C and the low incidence of debitage indicates that tool manufacture was not an important activity in this area; therefore, the hammerstone may have functioned as a percusor in the later stages of biface reduction. Two end scrapers are present in the Area C assemblage. Both appear as rough approximations of classic end scrapers expediently manufactured from local quartz cobbles. In addition to these flake tools, several utilized flakes in a variety of materials were also recovered from Area C. Forty-three percent of the utilized flakes contained cortex.

Figure 55 shows the distribution of total debitage, and Figures 56 through 59 show the distribution of flakes by raw material. The highest incidence of debitage occurs in quartz and this conforms to the distribution of total debitage. Quartzite and jasper are also well represented, although quartzite is more prominent in the eastern part of Area C and jasper is more prominent in the western portion. There is a complete absence of argillite and rhyolite among the Area C debitage. Flakes with cortex are spread fairly evenly across the site although the incidence is lowest in the south central portion of Area C. Overall, 33 percent of the debitage from Area C contains cortex, indicating that even though no cobble cores are present in the assemblage from this area, evidence from tools and debitage suggests that cobble cores were nevertheless being used in Area C for the manufacture of expedient tools.

An attribute test based on the work of Verrey (1986), Magne (1981), and Gunn and Mahula (1977) was conducted on a sample of 50 flakes from Area C (Appendix II). Table 13 shows the distribution of attributes for the sample. Results of the tests show that the occupants of Area C relied on a mixed technology of bifaces and cores for their tool needs. In the sample, broken flakes account for 66 percent of the assemblage indicating that they were likely derived from biface reduction. Cortex is present on a significant minority of the sample debitage (46%) indicating that these flakes were derived from local cobbles. Most flakes were small and most likely represent the by-products of tool edge maintenance activities and the reduction of small cobbles. Mean values for scar and directions counts are more closely aligned with those recorded for bifaces (Appendix II, Table 13). Round platforms, associated with early stage biface reduction and decortication activities, are most prominent among the debitage sample with the remaining flakes closely split between flat platforms, associated with core reduction, and triangular platforms, associated with biface reduction. There was no presence of remnant biface edge in the sample and a very low incidence of platform preparation which would be typical of

FIGURE 54

Distribution of Utilized Flakes and Flake Tools, Site 7K-C-360, Activity Area C

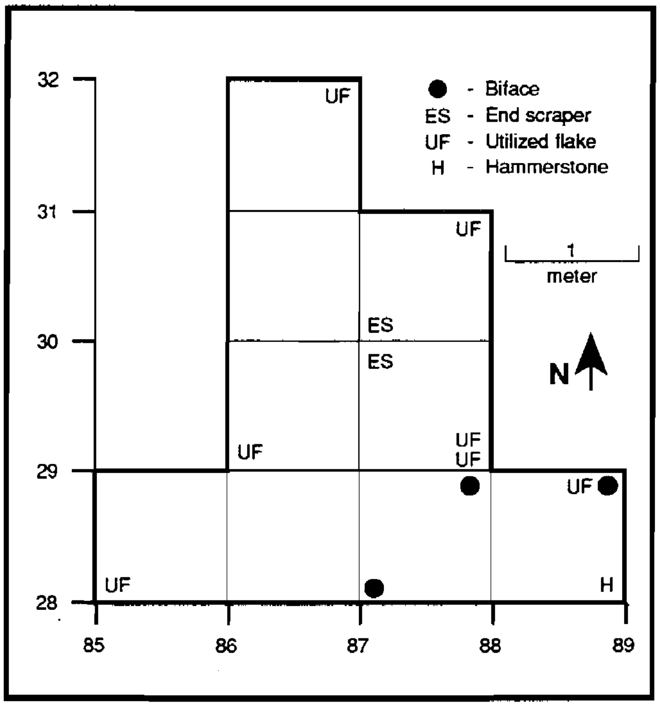


FIGURE 55

Distribution of Total Debitage, Site 7K-C-360, Activity Area C

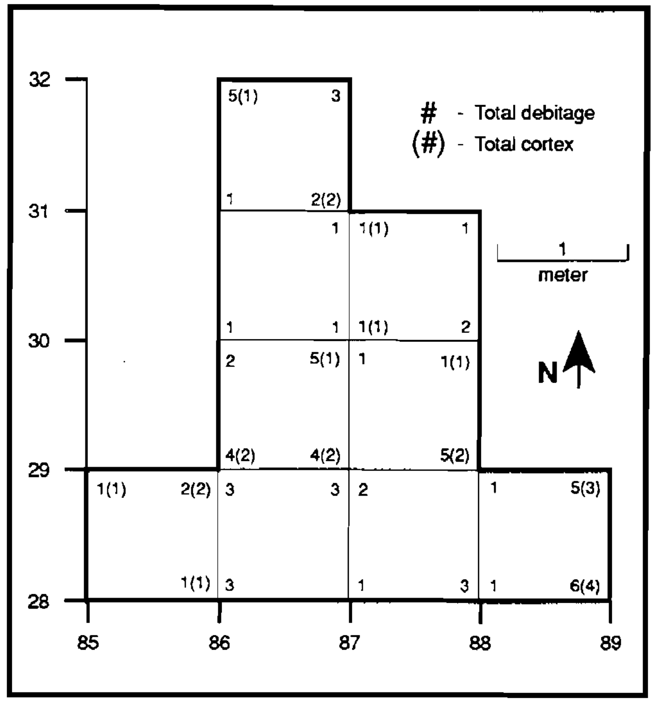


FIGURE 56

Distribution of Quartzite Debitage, Site 7K-C-360, Activity Area C

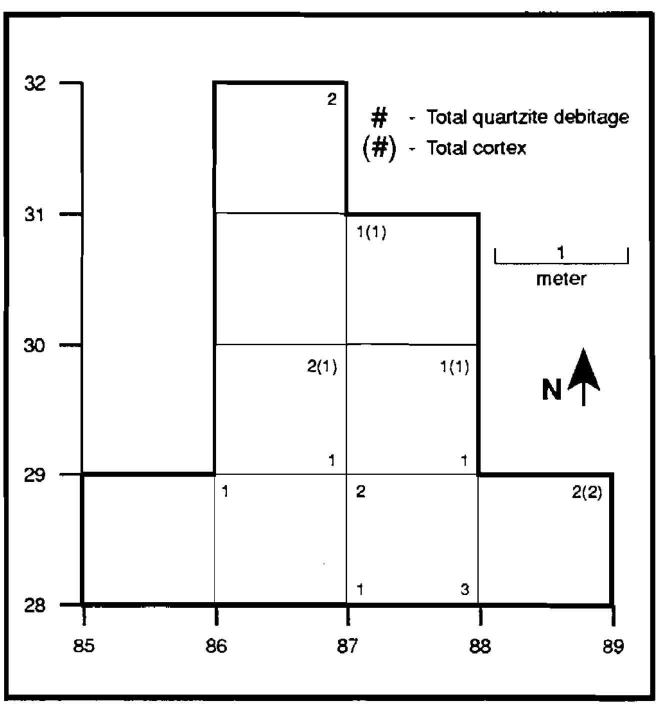


FIGURE 57

Distribution of Quartz Debitage, Site 7K-C-360, Activity Area C

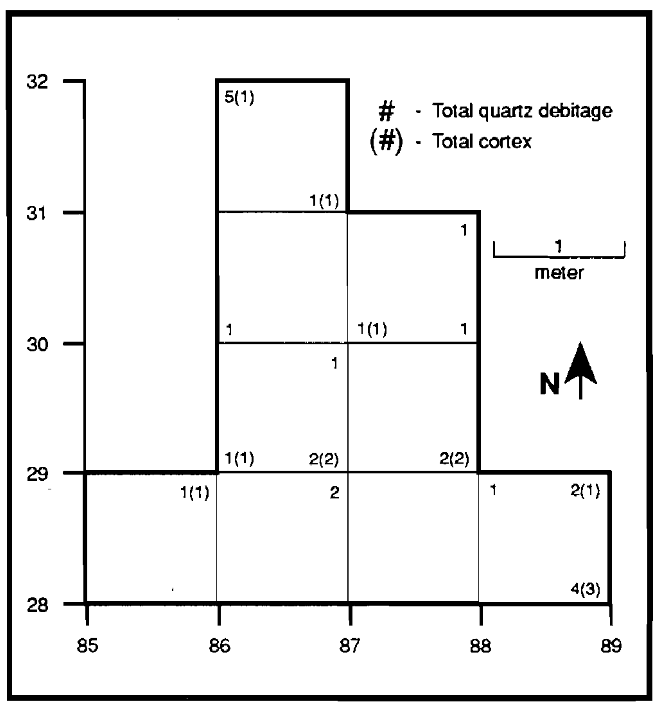


FIGURE 58

Distribution of Jasper Debitage, Site 7K-C-360, Activity Area C

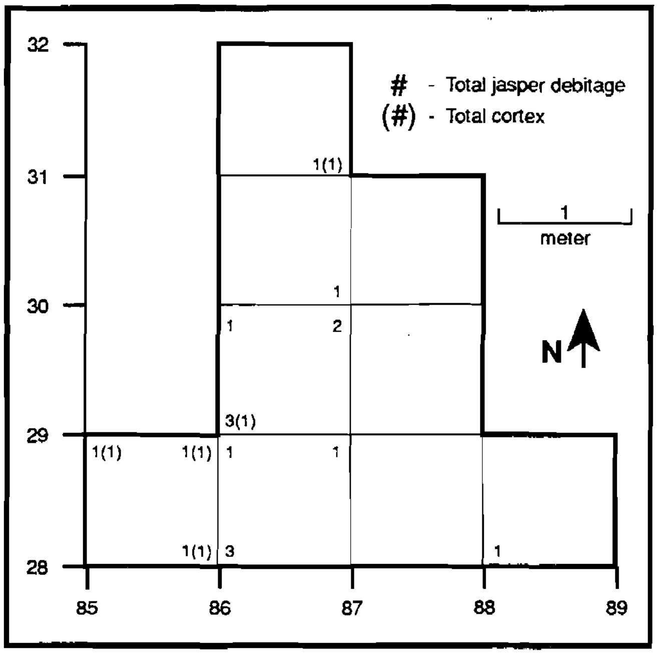


FIGURE 59

Distribution of Chalcedony Debitage, Site 7K-C-360, Activity Area C

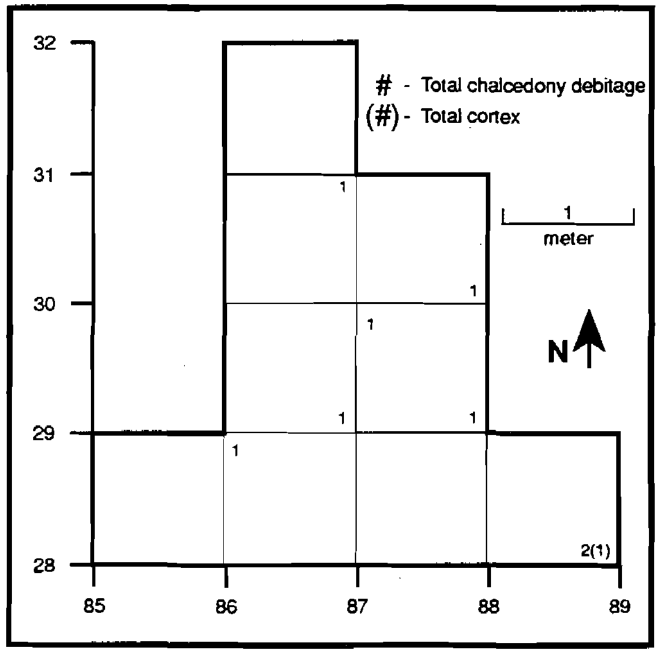


FIGURE 60

Distribution of Fire-Cracked Rocks, Site 7K-C-360, Activity Area C

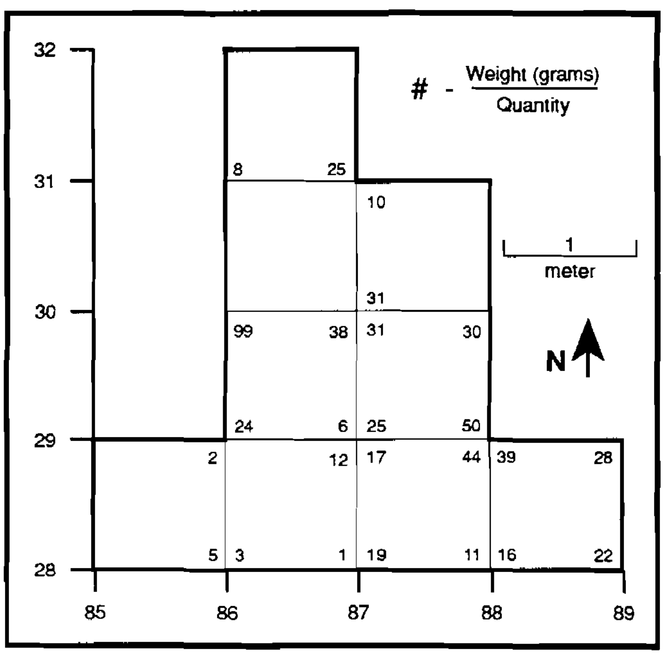


TABLE 13

Debitage Attribute Frequencies, Site 7K-C-360, Activity Area C

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	17	< 2 cm	39	Triangular	5	Present	3
Proximal	9	2 - 5 cm	11	Flat	7	Absent	23
Medial	4	> 5 cm	0	Round	14	No observation	24
Distal	20	**Scar count**		No observation	24	**Directions count**	
Cortex		Mean	= 1.80	**Remnant biface edge**		Mean	= 1.70
Present	23	Standard deviation	= 1.26	Present	0	Standard deviation	= 1.20
Absent	27			Absent	50		

*Based on a sample of 50 flakes

biface reduction. Therefore, the analysis of the flake assemblage indicates that a mixed technology of core and biface reduction was practiced in this area of the site and that cores used in these activities were largely derived from local cobbles.

Figure 60 shows the location of fire-cracked rock in Area C. Thirty-one percent of the total number of fire-cracked rocks recovered from the site as a whole were found in Area C. The greatest density of fire-cracked rocks in this area occur in Test Units N29E86 and N29E87 although they are present in several other test units.

In sum, the density of fire-cracked rocks in Area C indicates that this locus may have served mainly as a hearth area. The absence of early stage bifaces and cores as well as the low incidence of debitage in this area indicate that tool manufacture was not an important activity in this part of the site. The presence of damaged bifaces, however, may indicate that secondary thinning or resharpening of bifaces may have taken place at this locus, and the presence of flake tools and utilized flakes may indicate either that small scale cobble reduction was practiced in Area C for expedient needs or that these artifacts, along with other damaged or exhausted tools, were simply discarded in the hearth area.

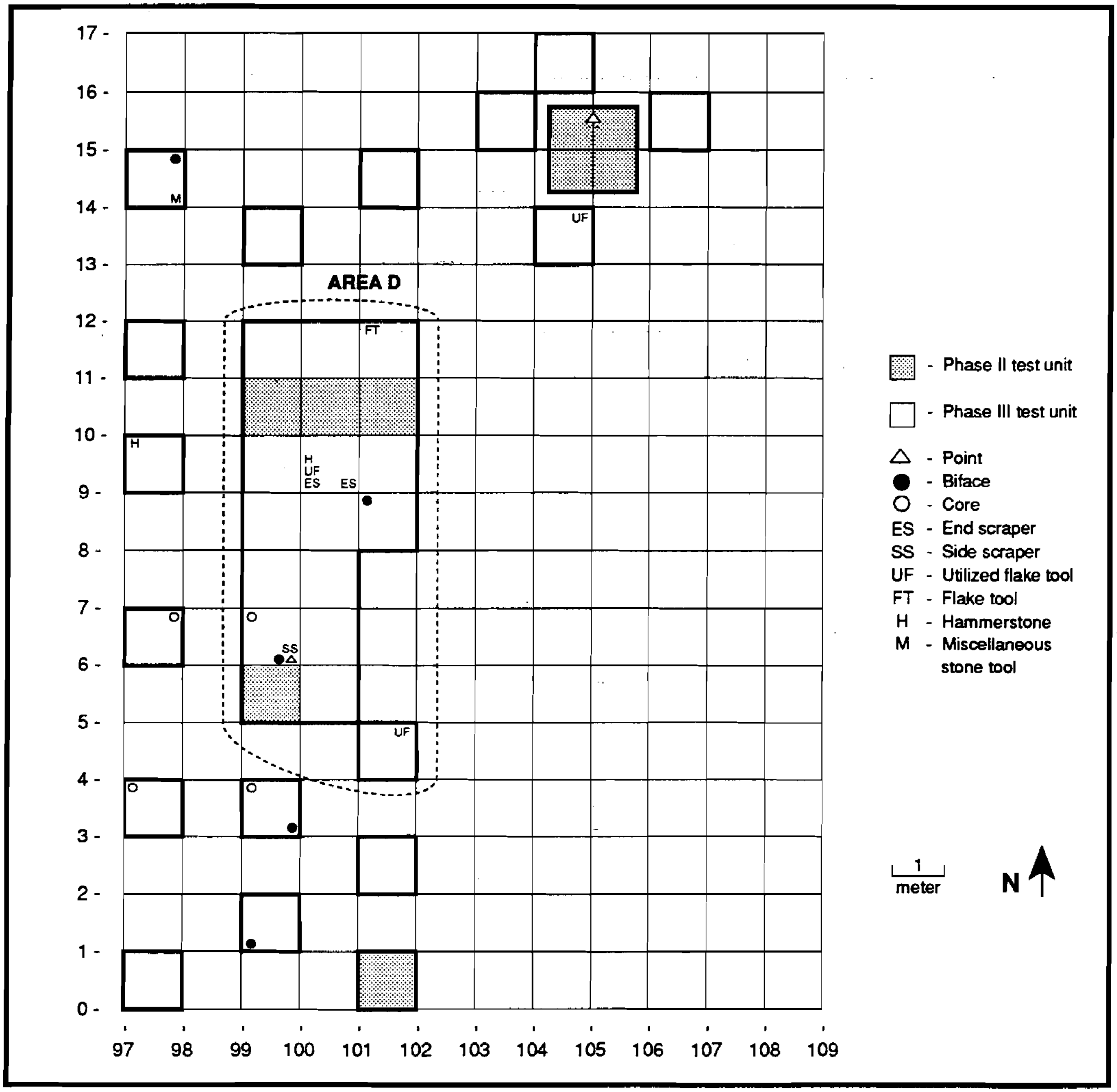
Activity Area D

Figure 61 shows the location of all tools recovered from Area D. The single projectile point recovered in the Phase III excavations (Figure 25-E) is an argillite stemmed point that was located in arbitrary excavation Level 2 (10-20 cm below surface). Although argillite weathers over time and thereby masks evidence of cultural modification, this point nevertheless appears to be relatively intact. Its general shape appears to be asymmetrically excurvate indicating that it may have experienced resharpening on its lateral edges. It does not appear to have been damaged in any way and was likely discarded because its usefulness had been exhausted. During Phase II, Test Unit N14.25E104.25 was excavated outside of the main excavation area. The base of a jasper bifurcate point (Figure 24-A) was recovered from arbitrary excavation Level 5 (40-50 cm below surface). During Phase III, four additional units were excavated around this unit (N13E104, N15E103, N15E106, and N16E104). No additional diagnostic artifacts were located, and only one utilized flake, three pieces of shatter, four fire-cracked rocks (148 g), and eight flakes were recovered from these units. Only two flakes were found as deep as Level 4 (30-40 cm below surface) and no artifacts were recovered from below Level 4.

Bifaces from Area D include one ironstone, one quartz and one chert early stage biface reject, one argillite distal fragment of a biface (Figure 26-A), and one ironstone distal fragment of a biface (Figure 26-B). Two of the early stage bifaces (Plate 2-A and C) experienced fractures in the course of their manufacture and were probably discarded because of this damage. The remaining early stage biface (Plate 2-B) shows no signs of damage but is relatively small and quite thick through its mid-section. It appears that further successful thinning would have been precluded because of a thick hump remaining on one face, and the biface was therefore discarded without further attempt at reduction. The argillite distal biface fragment is small and thin and may have been damaged as the result of resharpening or in use as a projectile point. The ironstone distal fragment also seems to be a projectile

FIGURE 61

Distribution of Tools, Site 7K-C-360, Activity Area D



point tip, the very point of which is damaged, and may have suffered its damage in the course of manufacture or in use as a projectile point. Interestingly, only one of the bifaces, the chert early stage biface, contains cortex.

The presence of argillite and ironstone among the finished and broken bifaces probably indicates a curated tool kit. The closest known primary outcrop of ironstone is located on Herring Island on a tributary of the Upper Chesapeake (Ward and Doms 1984), and the closest outcrops of argillite are located in southeastern Pennsylvania and west-central New Jersey (Custer 1984b). The presence of artifacts made from these materials at 7K-C-360 may indicate that the group or groups occupying the site were engaged in trade and exchange networks, or that they had previously visited these outcrops, acquired the materials and made the tools, used them over a period of time and travel, and then discarded them at this site when they became damaged or exhausted. The ironstone early stage biface in the assemblage is a poor quality iron cemented sandstone with a coarse grainy texture and contains pebbles of other materials within the ironstone matrix. These characteristics indicate that this material probably originated in a gravel or cobble deposit. Such deposits are known to occur on the Delmarva Peninsula (Custer 1989:237-239). The ironstone point tip in the assemblage, however, appears to be made of a higher quality material and probably originated from a primary source.

Although the quartz early stage biface in the Area D assemblage contains no cortex, three quartz cores, all containing cortex, were present. A jasper core containing cortex was also present. In addition, several flake tools and utilized flakes, including those made from cobble quartz and jasper, were among the artifacts recovered from Area D. The flake tools consisted of one jasper side-scraper, two jasper end scrapers, and one very large thick quartz flake with one worked edge. The side scraper and one of the end scrapers show signs of utilization; the other end scraper was so roughly made it is difficult to determine whether or not the tool was used. Two of the utilized flakes were made of quartzite and one was made of quartz. Fifty-seven percent of the flake tools and utilized flakes contained cortex. The high incidence of cortex on these tools indicates that although curated tools appear to have been brought into the site as part of prepared tool kits, expedient tools manufactured from local cobbles were important for activities at the site and were immediately discarded after use.

Figure 62 shows the distribution of total debitage, and Figures 63 through 67 show the distribution of flakes by raw material. These distributions include data from the Phase II excavations. The highest incidence occurs in quartzite, which is largely concentrated in six contiguous test units running from N9 to N11 and E99 to E101 (Figure 63). There is a modest representation of quartz debitage in this area of the site and its distribution generally conforms to the distribution of total debitage. The incidence of cryptocrystalline debitage in Area D is quite low. Chert debitage is present in only the northernmost and southernmost test units; jasper is more evenly spread across the site; and chalcedony debitage in this area was too sparse to plot for any meaningful purpose. The lowest incidence occurs in rhyolite which is confined to the northwestern corner of Area D. Although the incidence of argillite is low compared to other materials in Area D, 69 percent of the argillite debitage recovered from the site as a whole was located in Area D, largely in the same loci as the quartzite debitage. Argillite, a non-local material that is uncommon on sites in central Delaware prior to approximately 3000 B.C., has been associated with the Clyde Farm and Barker's Landing complex sites in Delaware's Coastal Plain which date to the initial Woodland I period (Custer 1989:235-247).

The lowest incidence of cortex on debitage occurred in test units from N7 to N11, the general location of the quartzite and argillite concentrations. The highest incidence of cortex occurred on the cryptocrystalline debitage, particularly jasper which was spread fairly evenly across the area. The incidence of cortex was approximately 25 percent in the area from N3 to N6 where the cobble cores were located.

An attribute test based on the work of Verrey (1986), Magne (1981), and Gunn and Mahula (1977) was conducted on a sample of 50 flakes from Area D (Appendix II). Table 14 shows the distribution of attributes for the sample. Results of the tests show that a mixed technology of bifaces and cores with an emphasis on bifaces, supplemented by local cobbles, was practiced in this part of the site. In the sample, broken flakes account for 62 percent of the assemblage indicating that these flakes most likely derived from biface reduction. There is a modest presence of cortex on the sample indicating that local cobbles served as supplementary sources of raw material for the manufacture of tools. The majority of the flakes in the sample were small and the remainder were medium sized indicating that they were not derived from either large cores or large early stage bifaces. The statistical value for scar count relates most closely to that for core debitage (Appendix II:Table 51), while the value for directions count is closer to that of early stage bifaces. Triangular platforms, indicative of biface reduction, were present on 43 percent of the flakes that had observable platforms. Flat platforms, often associated with core reduction, were present on 33 percent of these flakes, and round platforms, associated with early stage biface reduction and decortication, were present on 24 percent. There was a very low presence of remnant biface edge among the debitage sample and there was no evidence of

FIGURE 62

Distribution of Total Debitage, Site 7K-C-360, Activity Area D

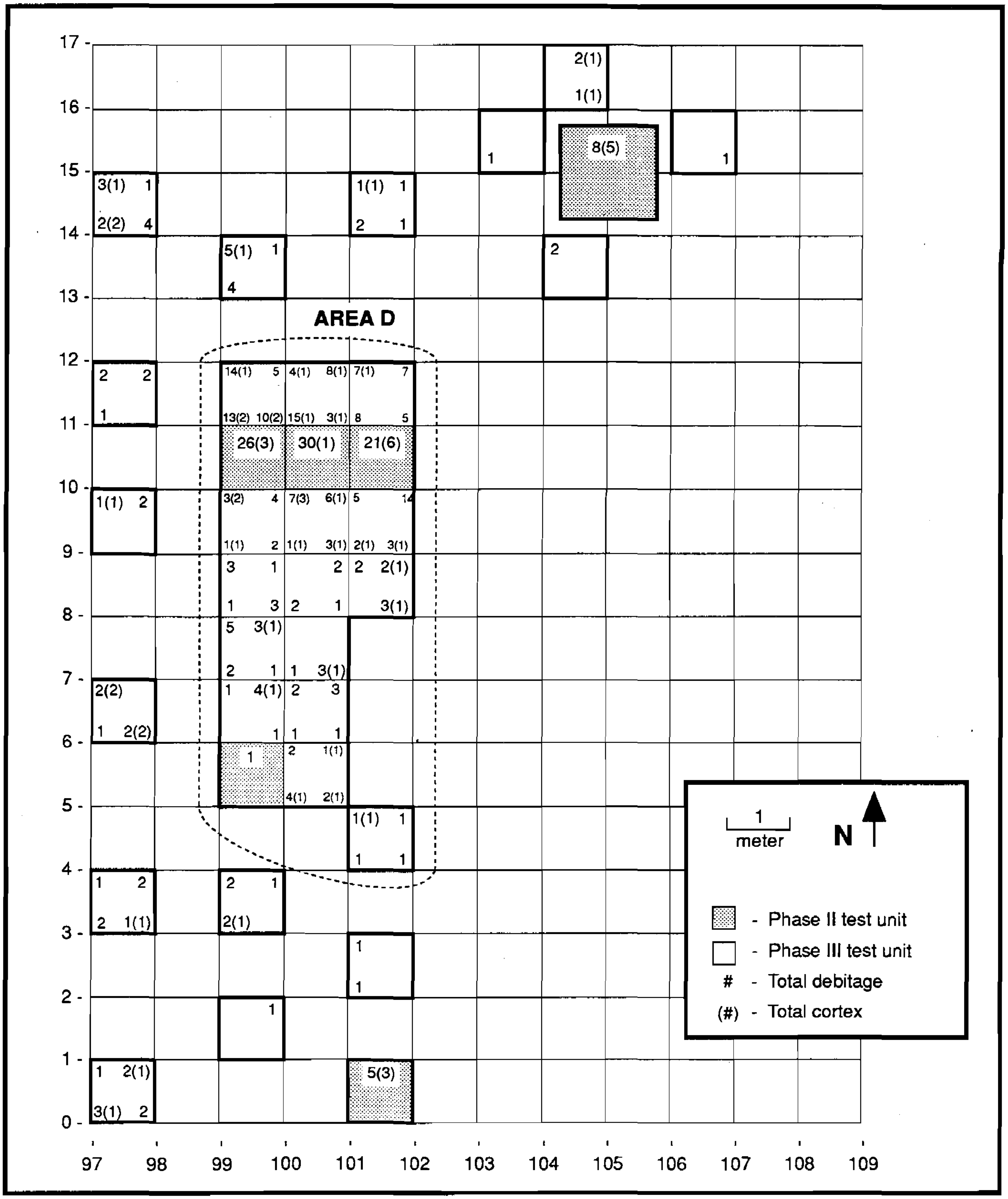


FIGURE 63

Distribution of Quartzite Debitage, Site 7K-C-360, Activity Area D

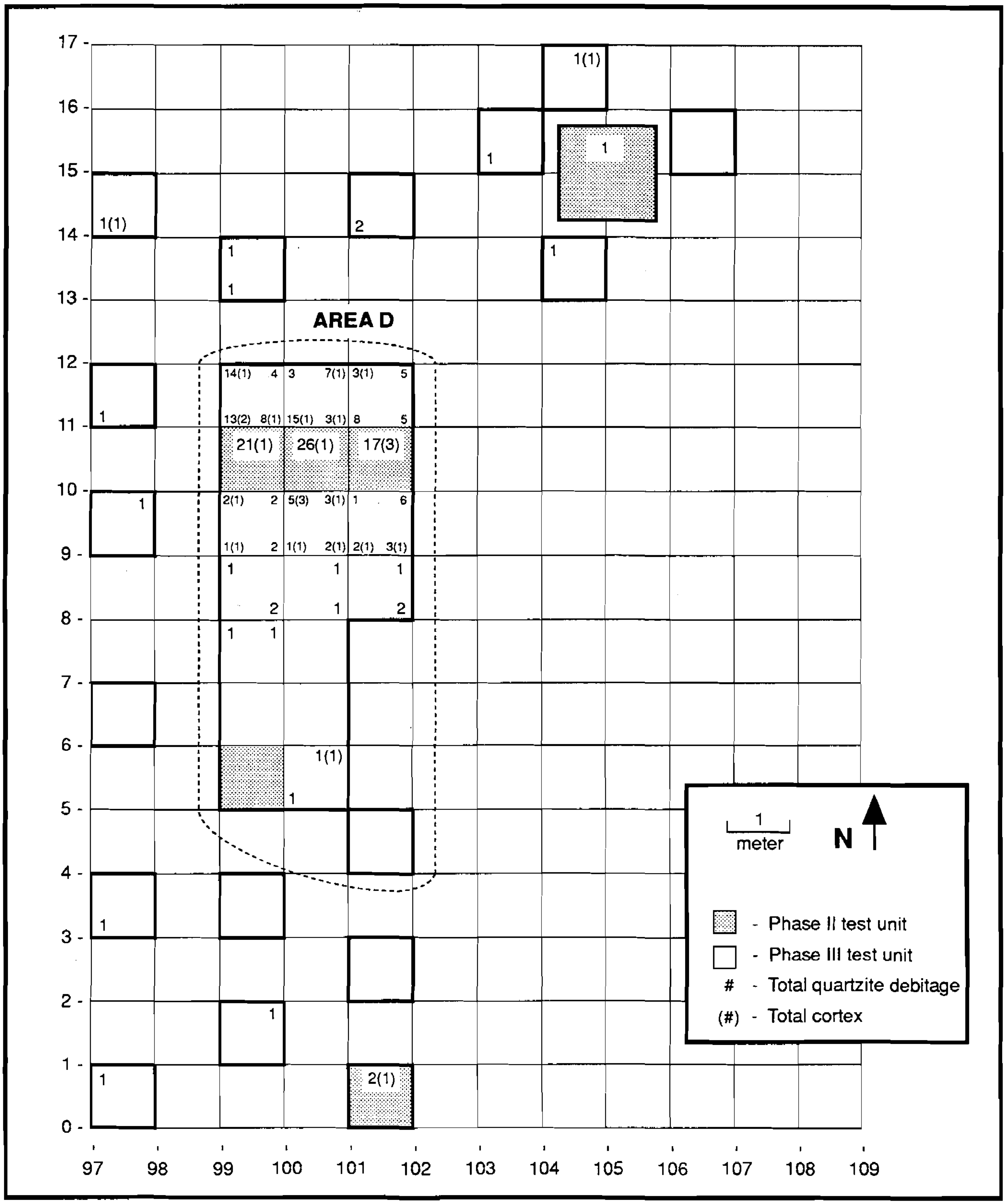


FIGURE 64

Distribution of Quartz Debitage, Site 7K-C-360, Activity Area D

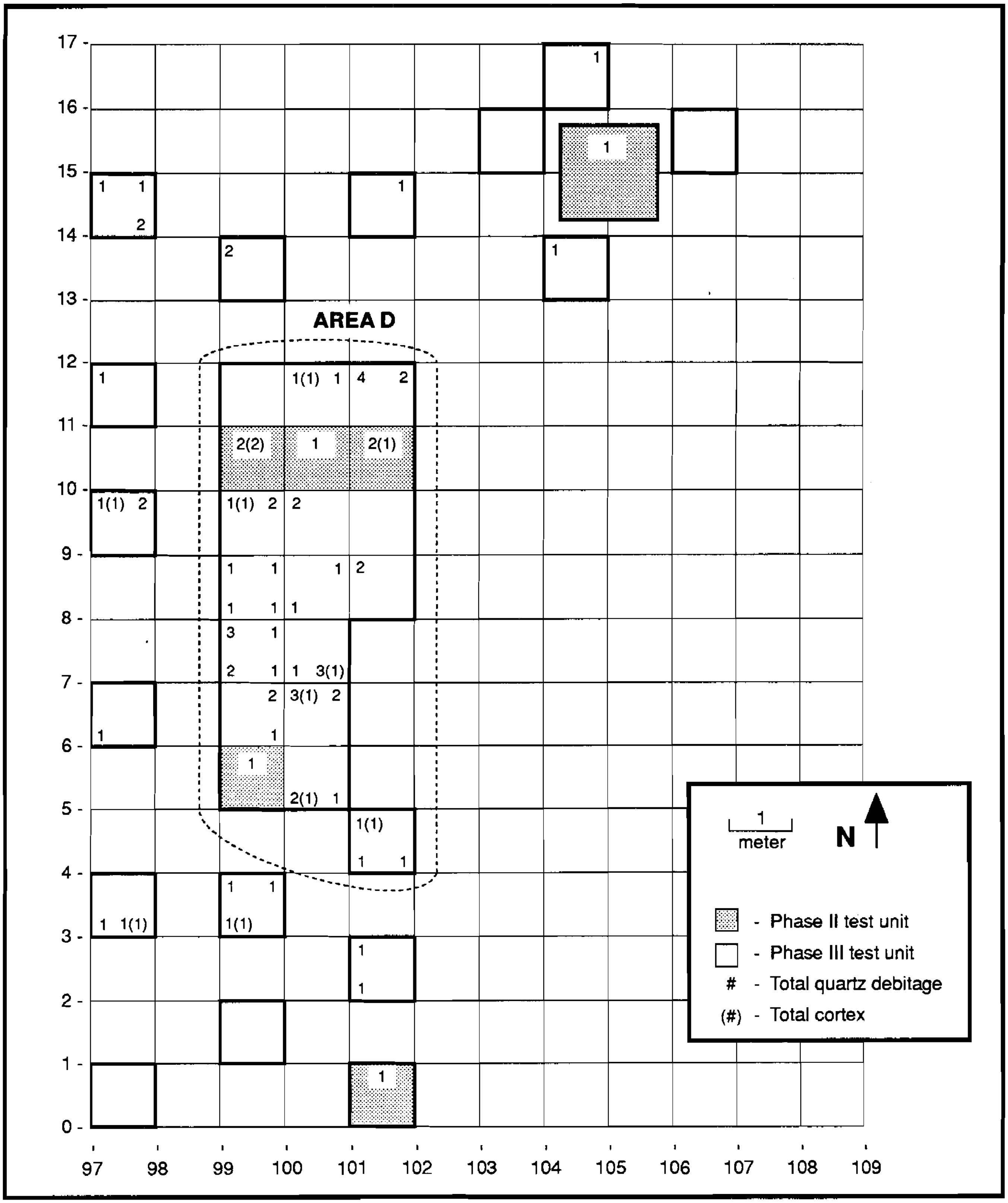


FIGURE 65

Distribution of Chert Debitage, Site 7K-C-360, Activity Area D

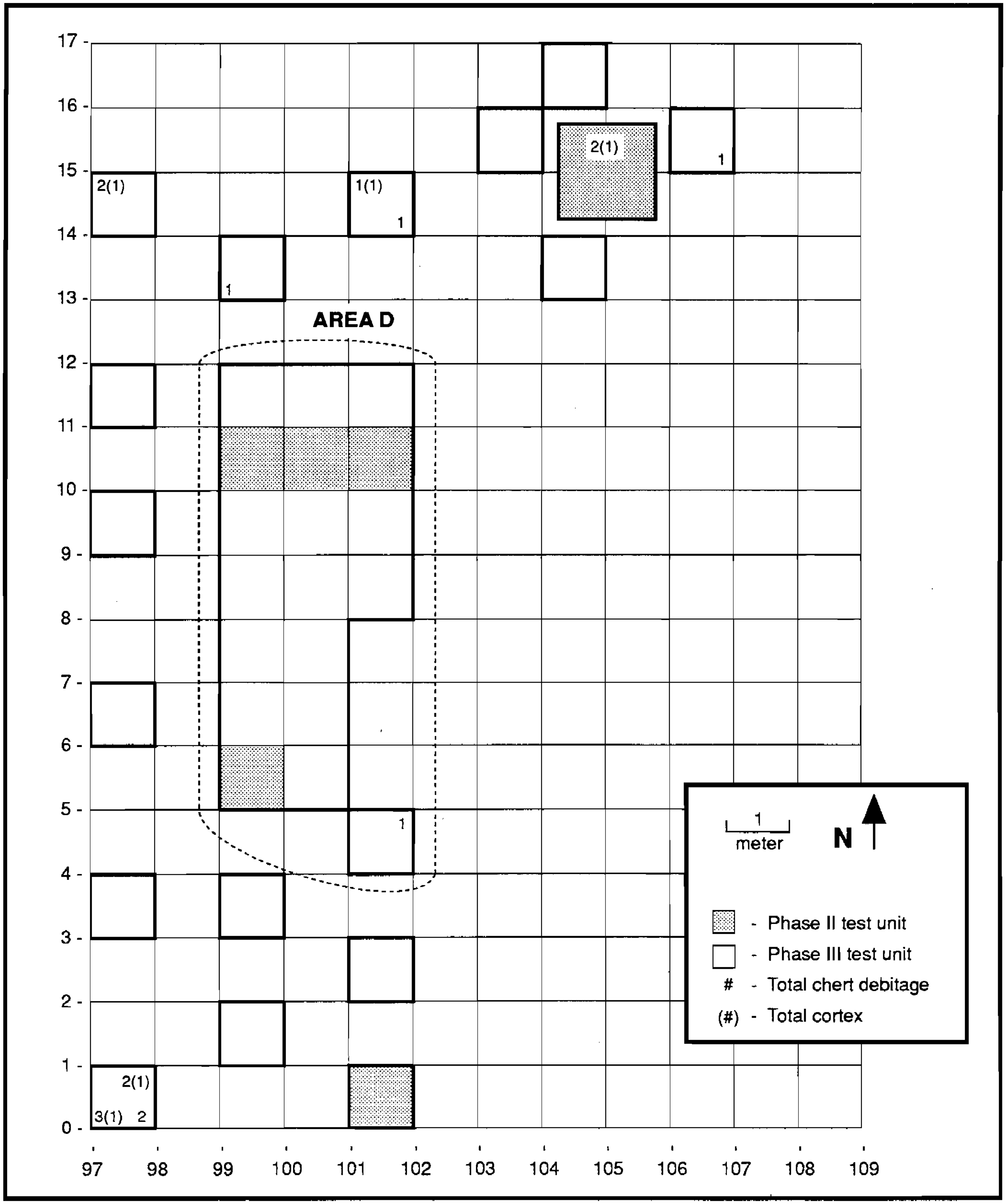


FIGURE 66

Distribution of Jasper Debitage, Site 7K-C-360, Activity Area D

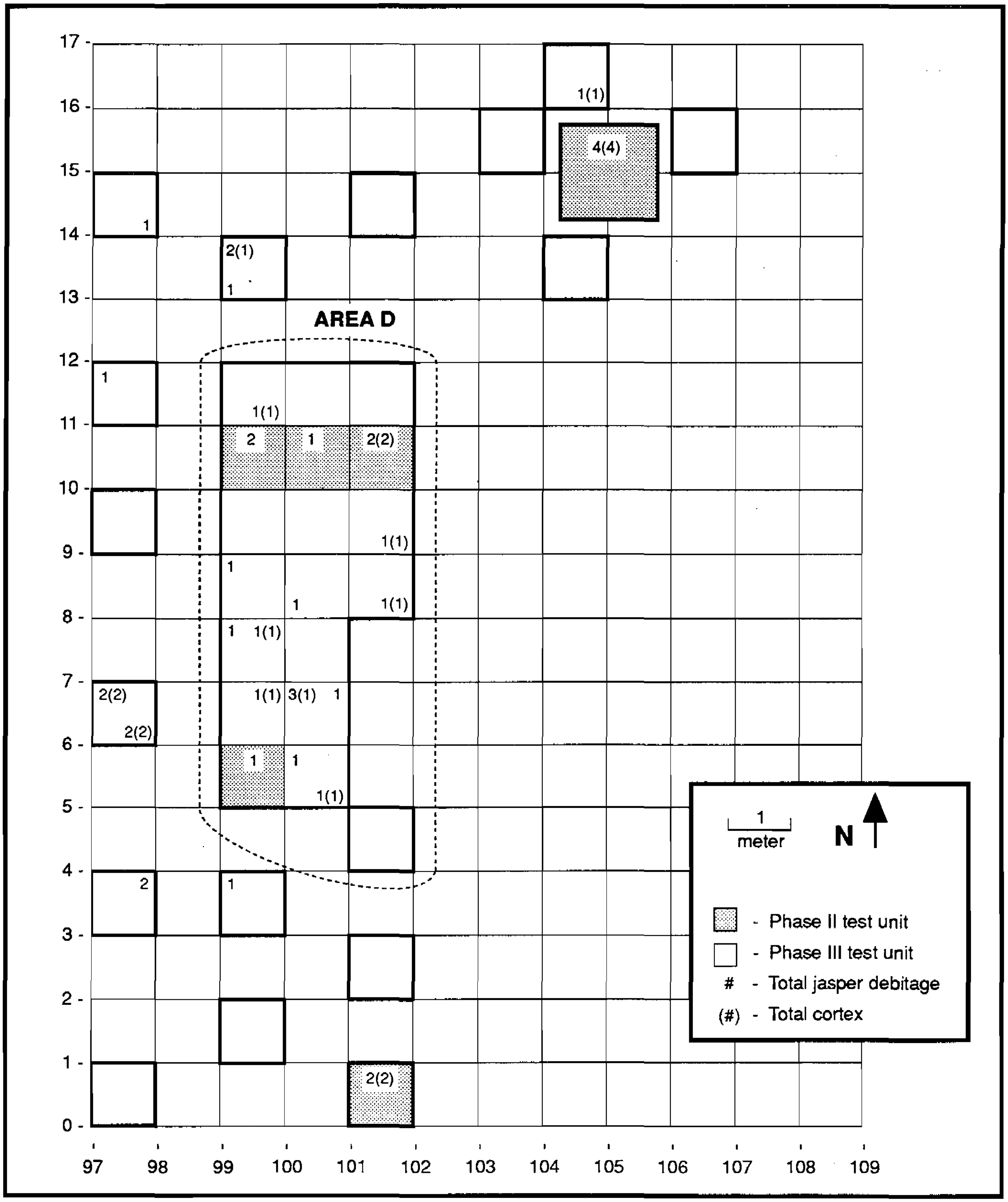


FIGURE 67

Distribution of Argillite and Rhyolite Debitage, Site 7K-C-360, Activity Area D

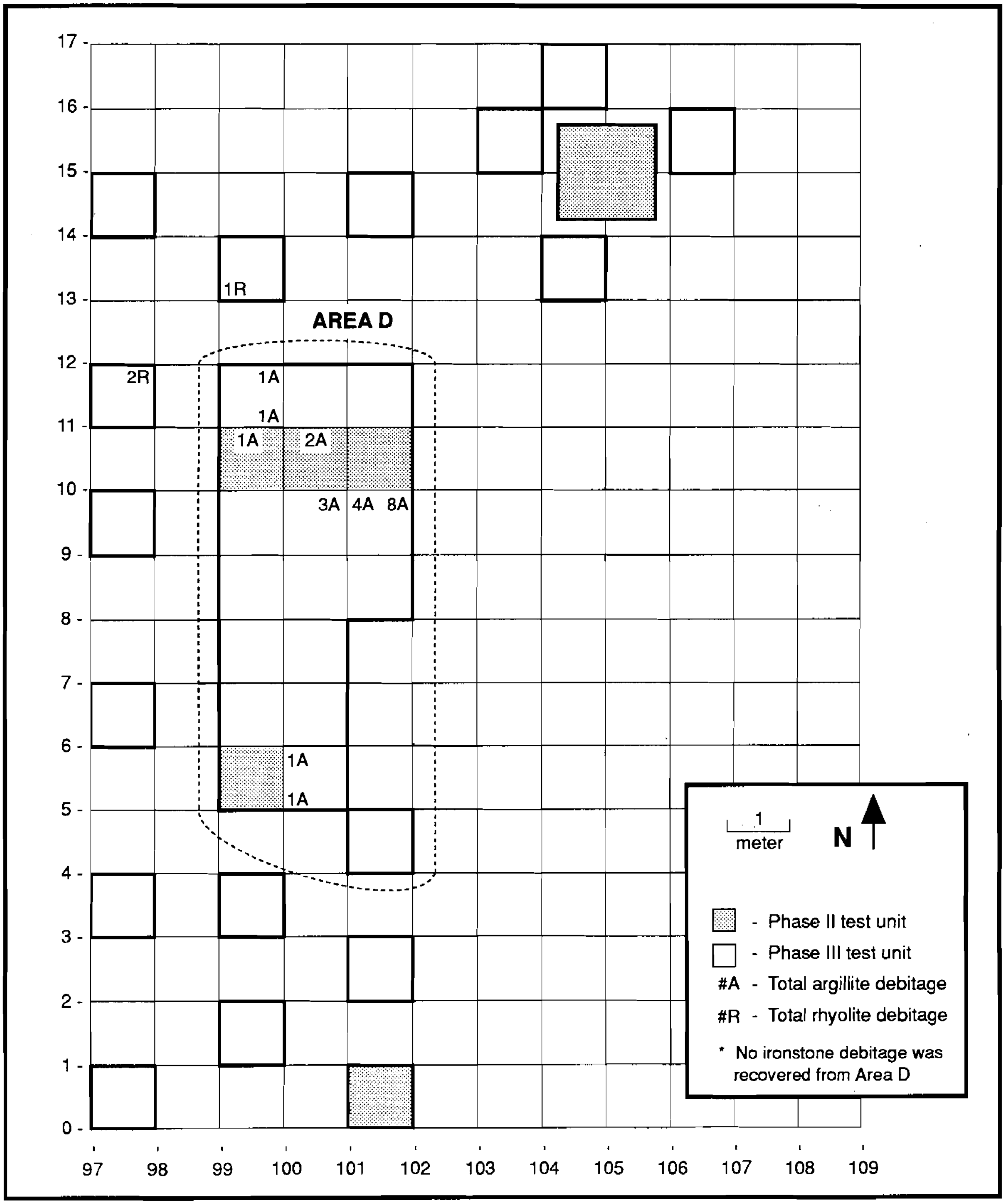


TABLE 14

Debitage Attribute Frequencies, Site 7K-C-360, Activity Area D

Flake type		**Size**		**Platform shape**		**Platform preparation**	
Complete	19	< 2 cm	31	Triangular	9	Present	0
Proximal	2	2 - 5 cm	19	Flat	7	Absent	21
Medial	5	> 5 cm	0	Round	5	No observation	29
Distal	24			No observation	29		
		Scar count				**Directions count**	
Cortex		Mean	= 1.34	**Remnant biface edge**		Mean	= 1.22
Present	17	Standard deviation	= 1.32	Present	2	Standard deviation	= 1.08
Absent	33			Absent	48		

*Based on a sample of 50 flakes

platform preparation, which would be more typical of biface reduction. In short, a mixed technology of bifaces and cores supplemented by local cobbles is indicated by the test results. Figure 68 shows the location of fire-cracked rocks from both Phase II and Phase III excavations. Pockets of fire-cracked rock concentrations exist in various parts of Area D, including the area of quartzite chipping activity.

In sum, Area D appears to have functioned as a quartzite chipping area and possibly a locus for the reduction or refurbishing of curated tools made of argillite. It further appears that these activities took place in the vicinity of a hearth. The low level of cortex present on the quartzite flakes suggests that either bifaces of primary quartzite were carried into the site and reduced into finished tools which were then carried away from the site and used elsewhere, or that cores of cobble quartzite had the majority of their cortex removed at an earlier time and were carried into the site where decortication was completed and the manufacture of flakes for tools commenced. Additional activities in this part of the site included the expedient manufacture of flake tools and utilized flakes which were used and immediately discarded. The manufacture of new tools to replace discarded tools also seems to have taken place in Area D. The presence of diagnostic artifacts dating to both the Archaic and Woodland I periods indicates that the site was occupied more than once over time, but the absence of features and the low number of artifacts suggests that the occupations were of short duration.

All of the data indicates that Site 7K-C-360 functioned primarily as a procurement/processing site. Diagnostic artifacts dating to both the Archaic and Woodland I periods and several small hearth areas suggest that the site was occupied more than once over the span of time. However, the absence of habitation and storage features indicates that the duration of these occupations was relatively short.

EXCAVATION RESULTS AND INTERPRETATIONS - DOVER DOWNS SITE, HILL A (7K-C-365A)

Circumstances similar to those at 7K-C-360 appear to have existed at the Dover Downs Hill A (7K-C-365A), which is located south of 7K-C-360 on Muddy Branch. Hill A also seems to have been favored by prehistoric populations for procurement/ procurement/ processing activities throughout the long span of Delaware prehistory. A discussion of the archaeological investigations at Dover Downs follows.

SITE STRATIGRAPHY

The following section will discuss the soil types and soil formation processes observed at 7K-C-365A, and will consider the relationship of the soil types to the vertical distribution of artifacts at the site. The implications of the site's stratigraphy on site chronology and the vertical separation of the Paleo-Indian through Woodland II occupations will also be addressed. Figure 69 shows the location of the north/south and east/west composite profiles of the site. Figure 70 is the east/west profile, and Figure 71 shows the north/south profile. The analysis of soils at Dover Downs Hill A will focus on the five major horizons observed at the site. These soils are present across the entire site area, but each has