Middle Woodland Settlement and Environment in the Chisel Run/Powhatan Creek Drainage

Archaeological Data Recovery at Sites 44JC127 and 44JC850 Associated with the Route 199 Project, James City County, Virginia

VDOT Project: 0199-047-F03, PE103, C501
PPMS: 2038

Prepared for:
Virginia Department of Transportation

Prepared by:
William and Mary Center for Archaeological Research

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Prepared for:
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219
(804) 371-6749

Prepared by:
William and Mary Center for Archaeological Research
The College of William and Mary
P.O. Box 8795
Williamsburg, Virginia 23187-8795
(757) 221-2580

Authors:
Dennis B. Blanton
Stevan C. Pullins
with contributions from:
Dr. Grace Brush
William Hilgartner
Dr. Lisa Kealhofer

Project Directors:
Dennis B. Blanton
Donald W. Linebaugh

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Management Summary

This archaeological data recovery project has resulted in the documentation of significant information from two NRHP-eligible cultural resources, Sites 44JC127 and 44JC850, within the Route 199 corridor. Completion of this report satisfies requirements for cultural resource management activity at these sites. A strength of the project has been explicit development of detailed cultural and environmental contexts that allow for more comprehensive interpretations of the findings at these and other area prehistoric sites. The results are particularly important for understanding Middle Woodland period societies in the lower Chesapeake region. Detailed environmental reconstructions are presented based on analysis of sediments from wetland cores and stratified deposits at 44JC127. Fine-grained evaluation of the Middle Woodland occupation at 44JC850 is described based on the highly controlled, large area excavation there. Interpretations of activity areas are made and compared with those identified at other Route 199 sites. The findings from 44JC850 are combined with those from analogous sites on the James-York peninsula to develop a more comprehensive interpretation of Middle Woodland cultural dynamics in the lower Chesapeake.

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1: Project Background

Introduction

This document presents the results of data recovery for mitigation of effects to Sites 44JC127 and 44JC850 in James City County, Virginia, associated with the Route 199 Project (Figures 1 and 2). It is prepared in accordance with an agreement with the Virginia Department of Transportation (VDOT, Project: 0199-047-F03, PE103, C501).

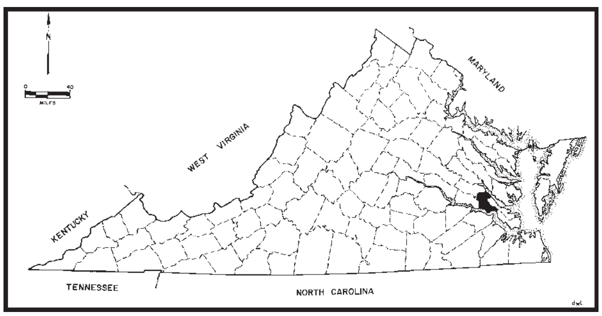


Figure 1. Project area location.

The data recovery was carried out under the general supervision of Dennis B. Blanton, Director of Research. Stevan C. Pullins (Project Archaeologist) and Carolyn Kender (Field Archaeologist) were responsible for the organization and implementation of the field program; Mr. Blanton and Mr. Pullins were responsible for the preparation of the final report. WMCAR staff members Josh Beatty, Debra Cook, Veronica Deitrick, Shelby Downing, Geoff French, Jim Gotheil, Nick Hablenko, Geoff Heard, Brian Huba, Corey Judson, Amy Koser, Anne McGee, Deanna Matthews, Paul Schuster, Ken Stuck, Rob Weidman, and volunteers Bob Vitirelli and Phil DePriest assisted in the completion of the fieldwork. Dr. Donald W. Linebaugh oversaw administrative aspects of the project. Deborah Davenport supervised laboratory processing, and Veronica Deitrick conducted the analysis of prehistoric artifacts. David W. Lewes produced the final report; John D. Roberts and Eric A. Agin prepared the final illustrations. All artifacts and documentation related to this project are stored temporarily at the WMCAR in Williamsburg, Virginia, referenced under project number 96-14.

Sites 44JC127 and 44JC850 were previously identified (or reidentified in the case of 44JC127) in late 1995 during additional archaeological survey of the proposed right-of-way by the William and Mary Center for Archaeological Research (WMCAR) (Higgins et al. 1996). Following evaluation (Higgins and Deitrick 1996a, 1996b) and official review of the results, the prehistoric components at both sites were recommended as eligible for nomination to the National Register of Historic Places (NRHP).

Report Goals and Organization

The project was conducted in a definable research universe, namely the upper reaches of Chisel Run, a headwater drainage in the Powhatan Creek basin. Prior research also associated with the Route 199 project defines the character and significance of the area (Hunter et al. 1987; Hunter et al. 1993). The following report explicitly builds on the earlier work and is strongly "problem-oriented," meaning that only issues (1) left unresolved by the previous studies and (2) relevant to the sites in question are addressed. In this way, the work has avoided duplication of effort and resulted in either wholly new or important additional information. A shift in emphasis from field to laboratory effort was a key element of the research design. The principal problems studied tended to require relatively limited

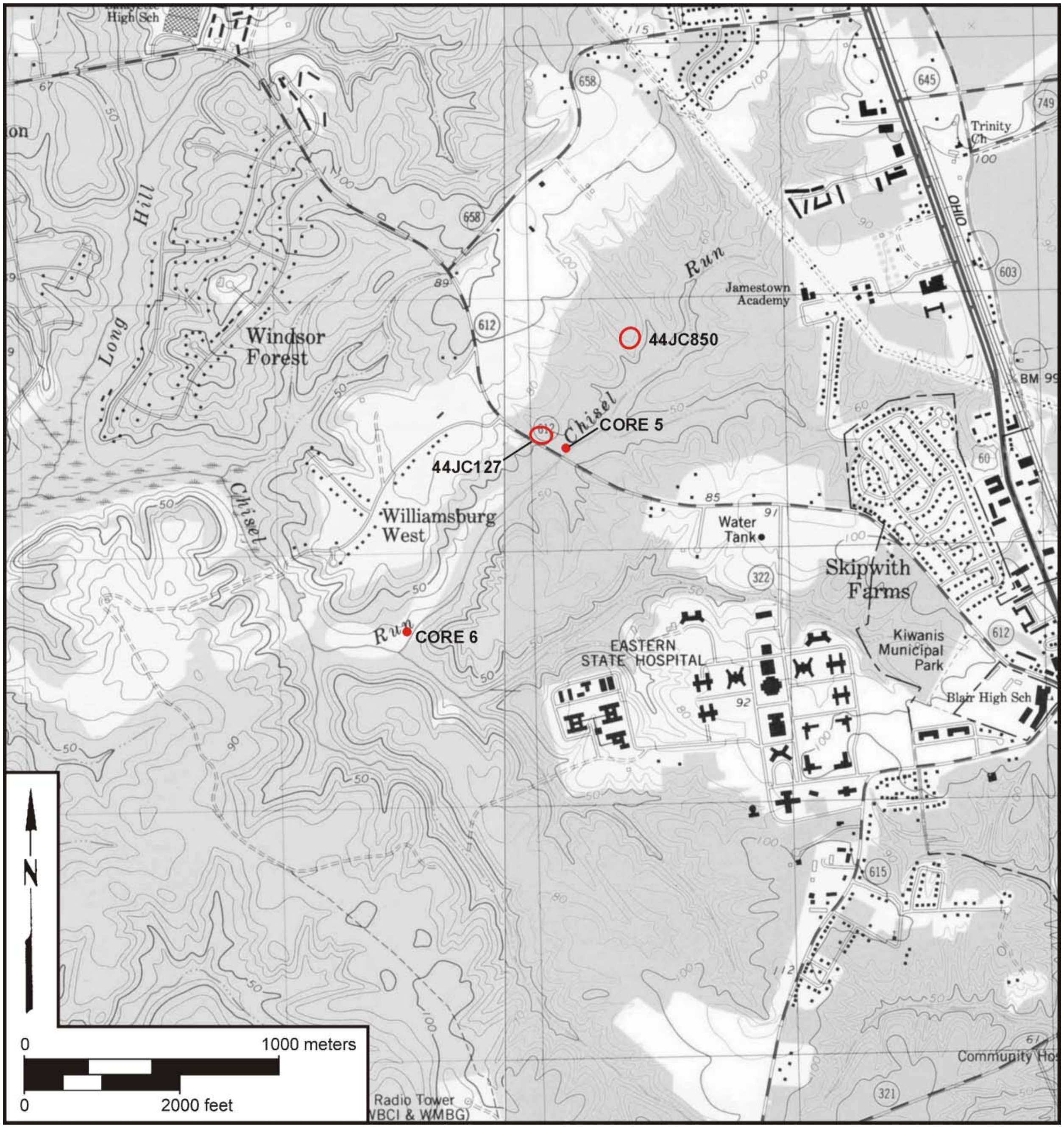


Figure 2. Project area and environs (U.S. Geological Survey [USGS] 1984a, 1984b).

samples from excavation but, instead, demand more intensive analysis by specialists. By building on prior results and taking advantage of advanced but proven analytical techniques, this project has truly advanced knowledge of prehistoric adaptation on the James-York peninsula.

This introductory chapter includes a description of the project area and a summary of previous archaeological research undertaken in the Chisel Run drainage. Chapter 2 describes, in detail, the combined research program implemented for both. This includes a summary of current knowledge of Middle Woodland settlement in the project area, followed by research approaches to environmental, technological, and settlement issues that can be addressed by Sites 44JC127 and 44JC850. Field and laboratory methods are also described in this chapter.

Excavation results for each site are presented in Chapters 3 and 4, including an overview of previous research at each site, a basic physiographic and environmental summary, description of the excavation results, and artifact summaries and descriptions.

Chapter 5 presents the environmental context of the middle/late Holocene in the Chisel Run area. This environmental reconstruction is derived from analyses of pollen, phytolith, and radiocarbon samples obtained from deep soil coring of wetland areas, as well as physical and chemical analyses of terrace soils. This environmental reconstruction includes summaries of both the depositional and resource environments of the Middle Woodland period.

Chapter 6 presents the results of the problem-oriented research approach to the Middle Woodland period in the Chisel Run drainage, focusing on environmental reconstruction and settlement/social organization.

Project Area Description

The VDOT has proposed construction of a four-lane highway in James City and York counties beginning at the intersection of completed Route 199 and Route 5 northward to its terminus at the Interstate 64 interchange. The proposed route is approximately 12.5 km in length. Sites 44JC127 and 44JC850 are located in an approximately 1 km-long section of the proposed corridor, north of Route 612 (Longhill Road) in the upper reaches of Chisel Run. The sites are located on terrace lobes overlooking wetlands.

Site 44JC127 is located at survey station 78+78.22, west of the Route 612 (Longhill Road) interchange. Approximately 65% of the surviving site area will be affected by the proposed project. Site 44JC850 is located to the north, at northbound centerline survey station 283+00 near a proposed stormwater management facility. The entire 555 square meters of this site will be affected by the project.

This project is designed to address research issues relevant to a specific “project universe”, namely the Chisel Run headwaters of the larger Powhatan Creek drainage. This drainage is typical of the interior James-York peninsula, and in many respects of the interior Coastal Plain. The Chisel Run drainage is characterized by rolling topography with elevations ranging from 9 to 30 m amsl. Numerous terrace lobes front large tracts of wooded wetlands. Most of the area is currently wooded but was formerly cleared for agriculture and by logging, sometimes more than once over the past three centuries. The forest is primarily deciduous, with stands of oak, hickory, and pine in well-drained areas. Trees now growing in the wetter areas include yellow popular, beech, red maple, and red gum. Understory vegetation varies from sparse to relatively dense, with holly and dogwood prevalent. Ground cover includes copious amounts of honeysuckle and poison ivy, with a variety of wetland grasses, ferns, greenbrier, and other plants occurring in bottomland areas. Soils range from loamy to clayey, from gently sloping to very steep, and from moderately well drained to poorly drained. In general, however, the elevated terrace margins and lobes tend to be well-drained. These soils are generally classified within the Slagle-Emporia-Uchee, Emporia-Craven-Uchee, and Kempsville-Emporia- Suffolk associations (Colonial Soil and Water Conservation District 1983; Hodges et al. 1985).

Previous Archaeological Research in the Chisel Run Drainage

Archaeological research in the upper reaches of Chisel Run and Long Hill Swamp drainages has been limited primarily to archaeological surveys for residential developments and studies for the proposed Route 199 project. This research has identified 24 prehistoric sites within a one mile radius of Sites 44JC127 and 44JC850 (Figure 3). Fourteen sites were identified by the Tidewater Cultural Resource Center (TCRC) in 1987 during a survey of the Ford's Colony development. Six sites were identified by the Colonial Williamsburg Foundation (CWF) in 1985 during a Phase I survey for the proposed Route 199 project. Site 44JC127 was identified by Howard MacCord during the initial Phase I survey for the proposed Route 199 in 1979, and Site 44JC850 was identified by WMCAR during additional survey for this project in 1995 (Higgins et al. 1996; MacCord 1979). Ten sites contain Archaic components and 15 sites have Woodland components. Most of the Woodland components are Early and Middle Woodland, however, Site 44JC366 also contains a Late Woodland occupation.

The most extensive archaeological research undertaken on prehistoric sites within the project area has occurred on the group of sites identified during the initial Route 199 survey (Hunter and Higgins 1985). Eleven of these sites (44JC79, 44JC359, 44JC363, 44JC365–44JC370, 44JC466, and 44YO15) underwent evaluation in 1987, and six of these sites (44JC359, 44JC363, 44JC366, 44JC367, 44JC369, and 44JC466) underwent Phase III data recovery in 1988 (Hunter et al. 1987; Hunter et al. 1993). Sites 44JC363, 44JC366, and 44JC367 are located in the immediate vicinity of Sites 44JC127 and 44JC850. Site 44JC363 is located approximately 1 km south of Site 44JC127 on a terrace overlooking Chisel Run. This site yielded a small quantity of artifacts (n=649) scattered over an 90 foot by 30 foot area. Artifacts were recovered up to 0.73 m below ground surface. The artifacts consist of pieces of debitage, fire-cracked rock, hafted bifaces, and ceramic sherds. Hafted bifaces represent Early Archaic through Middle Woodland components. Middle Woodland ceramics, represented by Prince George and Varina types, were also found. Several of the Varina sherds were found in association with a bog iron hearth (Hunter et al. 1993:2:13–25)

Site 44JC366, located on a high terrace 300 m east of Site 44JC127, was the smallest and lowest density site investigated at the Phase III level. Two hundred and twenty-six artifacts were recovered from a 15.24 m by 21.34 m area. Ninety-eight percent of the artifacts are from the A-horizon, which measured 18 cm deep. The artifacts include pieces of ceramic sherds, debitage, and fire-cracked rock. The sherds are Middle Woodland Prince George and Mockley types.

Site 44JC367 is located approximately 300 m south of Site 44JC850, and 366 m northeast of Site 44JC127. The focus of the site is on a low and broad floodplain at the convergence of two streams, but extends northeast up a slope to the top of a terrace. Elevations range from approximately 13 to 15 m amsl. A total of 1370 artifacts were found, including 677 ceramic sherds and 703 lithic (including fire-cracked rock) artifacts. Formal tools include five hafted bifaces, and one notched, flaked stone axe. The hafted bifaces range in date from the Early/Middle Archaic through the Middle Woodland periods. The ceramics are Middle Woodland Prince George and Mockley types. Several of these sherds were found in a bog iron hearth.

In summary, archaeological research in the Chisel Run drainage shows that prehistoric sites usually consist of small, short-term, seasonal campsites located on terrace lobes. They have components ranging from the Early Archaic period (8000–6500 BC) to the Late Woodland period (AD 900–1600), but the most intensive occupations are Middle Woodland (500 BC – AD 900). Many sites possess horizontal and vertical separation of components, activity areas, and features (Hunter et al. 1993:107). Features mainly consist of bog iron hearths and small artifact concentrations.

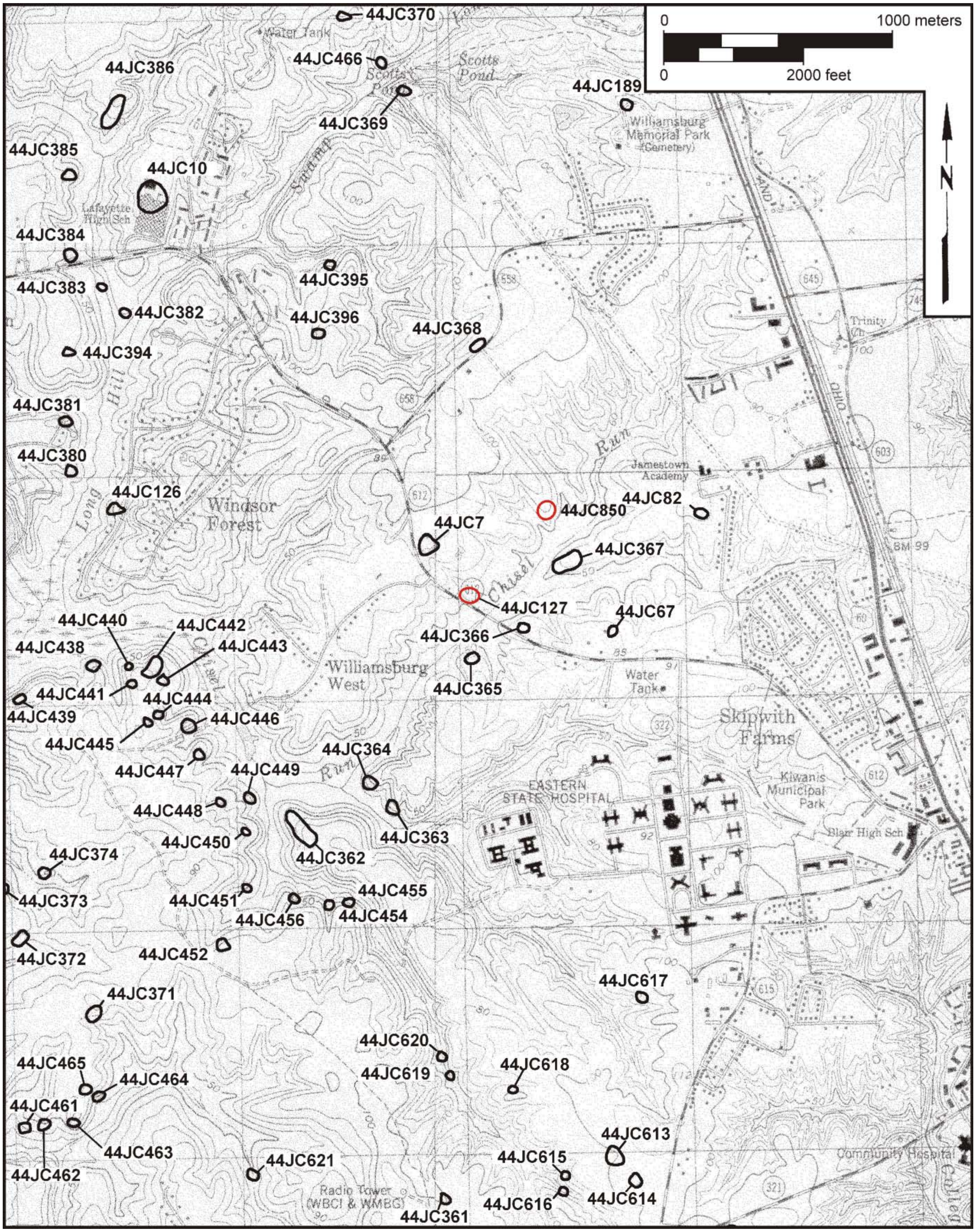


Figure 3. Previously identified archaeological sites in the upper portions of the Chisel Run and Long Hill drainages (USGS 1984a, 1984b).

2: Research Design And Methods

Introduction

Site 444JC127 and 44JC850 were both treated under a single research program. Common features of the sites permitted an integrated treatment of specific issues, drawing on samples from both sites to address research problems. The primary component at both sites dates from the Middle Woodland period and, importantly, this is also true of most other known sites in the Chisel Run drainage. An opportunity was presented to further elucidate important aspects of the human experience at this place and time by examining prior studies of a sample of these sites and picking up where they have left off.

Research Design

The larger context of the research bears reviewing as a backdrop for the specific research goals to follow. The high density of Middle Woodland sites in the Chisel Run drainage and, indeed, the larger Powhatan Creek basin, is rather remarkable. Of the 23 sites within 1.6 km of this research area, at least nine (39%) have this component. A review of all archaeological sites recorded in James City County further indicates that these numbers hold for much of this portion of the James-York peninsula. In fact, Middle Woodland is the most common identifiable prehistoric component in the county.

Current Understanding

We have learned a great deal about the locations and distribution, size and intensity, and the general function of the many Middle Woodland sites from previous Route 199 studies (Hunter et al. 1987; Hunter et al. 1993). The current understanding can be summarized as follows:

1. Essentially all of the sites represent one or more relatively short term encampments;
2. The size of the groups occupying the sites appears to have been small, probably representing foraging parties, nuclear family groups or, at most, extended family groups;
3. The occupations were probably oriented to both specific and generalized subsistence activities within the context of an annual round; and
4. The occupations most often date from the early to middle portion of the Middle Woodland period, between about 500 BC and AD 500, represented by Prince George, Varina and Popes Creek ceramic types.

Research Issues

What we know considerably less about, but that is crucial to understanding these resources, is listed below; these issues will be the emphasis of this research program. The prior Route 199 work and the large county-wide site sample put us on the threshold of answering significant questions.

1. The environmental context these groups operated within is only sketchily known. Clearly, drainages like Chisel Run offered resources sufficient to support these populations at least during part of the annual round. What is not clear is a) just what the available resources were and b) whether intensive Middle Woodland use is linked to a positive change in the local environment or to other factors. For example, when did the extensive wetlands characterizing the stream valleys today first become established? Also, what does the apparent deposition of aeolian (wind-blown) sediment on the terrace surfaces tell us about local conditions?

2. The actual range of normal annual movement for these groups is not clear. We cannot be sure yet whether the larger social bands of this time had a drainage-based settlement range, or whether the band range encompassed several adjacent drainages. For instance, did the groups occupying the Chisel Run sites restrict their normal activities to that drainage, or the larger Powhatan Creek basin, or did they routinely utilize a more extensive area? The answer to this question has important implications for understanding population size and density, social relations, and economy.
3. Beyond stating that the sites are small, subsistence-oriented camps, the details of site function still evade us. The greatest obstacle is very poor/limited preservation of organic, subsistence remains such as bone, shell or plant material. The alternative avenues for pursuing the question rests in indirect measures of the activities represented by artifact density, distribution and types, and in soil chemistry and, perhaps, in palynology or phytolith analysis.

Proposed approaches for addressing these issues through this project are outlined below.

Evaluation of Environmental Context

Understanding the environmental setting of the project area is useful for interpreting the area's long-term human occupation. The importance of the environment for prehistoric groups, where food resources were exploited by hunting and gathering, has long been recognized. Landform evolution, climate and hydrologic patterns have important consequences for settlement location, function, and timing. These can be examined by assessment of depositional history through analysis of soil column samples from test units and deep auger tests on the upland terraces and from cores in adjacent wetlands and floodplains.

Depositional History and Environment of the Upland Terraces. Soil column samples were submitted to the Soils Physical and Chemical Testing Laboratories at Virginia Polytechnic University in Blacksburg, Virginia. The samples were recovered from the columns at 5-cm intervals, extending from the surface to "subsoil." Most of the columns were collected in on-site excavation units, but at least one off-site control column were collected from a small unit beyond the site limits. Radiocarbon samples were collected to establish temporal control over the sequence.

Physical properties analyzed were included relative proportions of sand, silt, and clay, and the fractionation of the sand. Chemical properties included the amount of Fe, Mg, P, K, and Ca in parts per million, as well as the pH and organic content. Results were examined with reference to models of environmental change and compared with results from other recently excavated sandy sites, including Site 44PG185 (Pullins and Blanton 1993), Sites 44SN225 and 44SN226 (Pullins and Blanton 1994a, 1994b) and Site 44KW81 (Pullins et al. 1996), focusing on the role of aeolian deposition in the evolution of site structure. Archaeologists are increasingly recognizing and exploring the widespread veneer of wind-blown sediments over the Mid-Atlantic region (see recent Mid-Atlantic Archaeological Conference and Southeastern Archaeological Conference symposia devoted to the issue). More broadly, these results can be assessed against current models of human adaptive shifts in the Coastal Plain tied closely to climate change and sea level fluctuations (Custer 1986, 1990; Dent 1995).

While it is true that the project area is limited, there is sufficient space encompassed and traversed by the areas of direct impact to allow for representative geoarchaeological sampling. Naturally, the goals of such a study dictate the sample requirements, and in this case the goals are more broadly than narrowly defined. The intention is to examine the middle and late Holocene depositional history of the landform, more so than site-specific, culturally influenced formation processes. The latter issue, based on local experience, has proven to be a great challenge, owing to the generally shallow, sandy (and therefore dynamic) matrix within which the sites exist. Intrinsic to this plan is the correlation of depositional patterns at 44JC127 and 44JC850 with those recorded in the nearby wetlands and on archaeological sites elsewhere in the Coastal Plain. In this regard, the ultimate outcome will be to refine our appreciation of depositional trends within the Chisel Run drainage, and potentially over the James-York peninsula, and how they inform on general environmental patterns.

Depositional and Environmental History of the Wetlands. As noted, an outcome of this facet of the study will be to correlate upland and wetland depositional/environmental data; they clearly will offer complementary information. The source of wetland samples were a series of cores extracted using a portable vibracoring rig. The cores were removed within an 8-cm-diameter casing of PVC pipe and transported to the laboratory for controlled sampling and examination. Virginia Institute of Marine Science (VIMS) geologists experienced with this kind of coring provided equipment and assistance in the field.

Four kinds of samples for special study were taken from each core. Representative sediment samples were removed for particle size and chemical analysis, to be analyzed in the same manner as the column samples from test units on the terraces. These results inform on the rates of sedimentation and local wetland conditions. Radiocarbon samples were taken to establish temporal control throughout the cores. Pollen samples were removed from the cores to reconstruct a history of change in local floral communities. The number of samples from a given core were decided after examination of the sequence, but with the goal of obtaining a relatively continuous, representative record. These were submitted to Dr. Grace Brush at Johns Hopkins University for analysis. Phytolith samples were selected in tandem with the pollen samples. These more durable plant remains can provide an important complement to the pollen results. Dr. Lisa Kealhofer at the College of William and Mary and The Colonial Williamsburg Foundation analyzed these samples.

The series of cores was taken with two goals in mind: (1) to record near-site conditions and (2) to examine drainage-wide change. At least two cores were taken adjacent to each site. At least two other cores will be removed from wetland sites downstream from the project area-proper. These will be crucial for documenting the sequence of events over the longer history of the drainage.

Evaluation of Prehistoric Ceramic Technology and Group Range

The application of sophisticated methods to sourcing archaeological ceramics continues to be refined, with demonstrated relevance to questions of technology and cultural relationships. A common method is petrographic analysis (Rockman 1993; Stoltman 1989, 1991; Stoltman et al. 1992), and the WMCAR has successfully incorporated petrography into prehistoric ceramic studies. However, since qualified consultants are not available in this region and those that are known elsewhere will not commit to firm deadlines, two suitable alternatives were employed in the Route 199 research. Compositional analysis is important for the refinement of associations both within and between ware types, examining the relationship of ware types to potential clay sources, and measuring intersite relationships derived from these associations.

The first method, and the one emphasized in the sourcing study, is acid extraction as recently advocated by Burton and Simon (1993). The method involves soaking pulverized samples of sherds in diluted acid to produce an analyzable solution. The relative abundance of several elements common to ceramic pastes are then measured to characterize individual samples. Subsequent analyses of the results measure the statistical likelihood that samples are derived from the same or similar clay sources. In this case, "tiles" made from a series of local and regional clay sources were tested for the purposes of "fingerprinting" in terms of their elemental composition. From these initial source-based tests, the series of elements were identified for identification in the archaeological specimens. Dr. Gary Rice in the chemistry department at The College of William and Mary supervised this analysis.

The second method is x-radiography as recently described by Carr and Komorowski (1995); inclusion of this method in our analyses is somewhat experimental and is regarded as a pilot study to determine its usefulness in projects of this kind. An informal, trial effort with Route 199 project and other regional sherd samples showed not only that analyzable images can be made, but also that distinctions in aplastic density and type not readily apparent by unaided inspection are quite clear. The method entails taking x-radiograph images of sherds to reveal the aplastic composition of their pastes. Aplastic particles exhibit different morphological and optical characteristics according to their mineralogy. Researchers have been successful in identifying the proportions of different aplastic minerals with the goal of sourcing clays. The tiles made from known clay sources will be examined first to characterize them before proceeding to the prehistoric sherds. These source samples will minimally represent high terrace clays (above 50 ft. amsl), low terrace clays (less than 50 ft. amsl), and wetland clays.

A minimum of 30 samples, which will include the clay source control tiles, were intensively examined by both the elemental and mineralogical methods; at least 20 of the samples represent distinct prehistoric vessels. Sherds selected for analysis are individual vessels representative of Middle Woodland ceramic types common in the drainage (emphasizing the lithic tempered wares). In this way a level of representativeness and consistency can be achieved so that the results are meaningful to most researchers using the results. Selection of individual vessels was based largely on vessel part. In other words, rim sherds can be more readily identified as representing a distinct vessel than can body sherds. Complete basal fragments can also qualify since they are a unique element of every vessel, but care must be taken to separate them from rims of the same pot.

The analyses examined intra- and intersite standards and variation in paste patterns of Middle Woodland ceramics within one Coastal Plain stream basin. Potentially, low variability in paste characteristics would indicate minimal group movement or ceramic exchange, and greater variability would indicate the opposite. Charting such patterns through time can initiate an assessment of population dynamics within and between drainages during the Woodland periods. Also, variations in paste composition may be reflective of changing vessel functions or at least food preparation techniques linked to dietary shifts. Analysis of results typically involves integration with more traditional qualitative observations concerning taxonomy to refine regional typologies and extend them to address questions of technology, and social and economic relations. The outcome of this analysis will represent a barometer of the potential of acid extraction and x-radiography to ceramic study in this region, and ideally will lead to more expansive studies.

Examination of Small Site Function and Life History

Establishing the precise function and timing of occupations at small sites in the Coastal Plain is difficult at best, due largely to poor organic preservation. This we know as much from attempts during earlier Route 199 excavations as from other cases. Experience gained from those and other studies allows us to offer certain refinements to the approach. Still, the potential for unraveling aspects of the site's history and group size exceeds the potential for refined elucidation of function and activities. Also, under this project only 44JC850 offers reasonable potential for significant findings in this regard; 44JC127 as been compromised with respect to this issue by construction impacts.

The essential refinement over other studies is greater control over artifact provenience and, therefore, evidence of site structure. A large-area excavation was conducted at Site 44JC850, capturing the core and primary fringes of the site, with the basic control being contiguous, 2 x 2 m units. Artifacts were piece-plotted in three dimensions within each unit to augment standard vertical control in natural strata subdivided as needed into 5-cm thick levels. As an added control at least 25% of each unit level was fine-screened (through 0.125-in. or window screen as determined prior to work) to recover "micro" material in support of activity area definition. Finally, soil chemical analysis was conducted on samples from each 2 x 2 m unit in an attempt to identify chemical traces of on-site activities.

Data Recovery Methods: Fieldwork

Site 44JC127

Fieldwork within the boundaries of this site was designed to focus on expanded recovery of significant evidence of environmental (depositional) history relative to the stratified cultural sequence. Large-area excavations were not warranted due to disturbance from earlier construction. The archaeological evaluation results served as an effective guide to the area deserving focused study during the data recovery, namely the vicinity of Test Unit 1 where the stratified Late Archaic–Middle Woodland sequence was documented.

The first step was to reestablish the project boundaries as well as the evaluation grid and datum. Corresponding as closely as possible to the original baseline, a general grid was established for horizontal control and a datum established for vertical control. The latter was assigned an absolute elevation based on VDOT survey data.

The second step involved excavation of the equivalent of a 2 x 8 m block of contiguous 2 x 2 m units in the area of significant artifact concentration, integrity and stratification. The four units were excavated according to natural stratigraphic units, but with the subplowzone strata subdivided into 5 cm arbitrary levels. Entire levels were exposed across the block before excavating an underlying level. This permitted large area plans to be drawn. The excavation continued until sterile subsoil was reached. All unit fill was screened through 0.25-in. mesh. Representative profiles were documented with scale drawings, and black and white photograph and color slide photography. Soils were described using standard Munsell color and U.S. Department of Agriculture (USDA) textural terminology. Special samples were collected as warranted for soils analysis (in columns at 5-cm intervals), flotation and water screening (a 5 liter sample from each excavated level), and radiocarbon assay.

Features were investigated following a standardized procedure where possible. Each first was recorded in plan with scale drawings and photographs. One-half of the feature then was removed to reveal a cross-section profile, which in turn also was recorded. Finally, the remaining feature fill was removed and final drawings and photographs were made. All fill was removed according to natural strata if present and will be screened through 0.25-in. mesh. A portion of the fill, however, was collected for flotation, radiocarbon, or other special samples if warranted.

Site 44JC850

Fieldwork within the boundaries of this site was more intensive and designed to examine site function as well as to recover significant evidence of environmental (depositional) history within the cultural deposit. Large-area excavation was the primary strategy for data recovery. The evaluation results served as an effective guide to the area deserving focused study during data recovery, namely the two loci of Middle Woodland artifact concentration near test units 2 and 3, respectively. Test Unit 2 yielded both lithic and shell tempered ceramics, potentially with some vertical separation, and Test Unit 3 yielded only lithic tempered wares.

The first step was to reestablish the project boundaries as well as the evaluation grid and datum. Corresponding as closely as possible to the original baseline, a general grid was established for horizontal control and a datum established for vertical control. The latter was assigned an absolute elevation based on VDOT survey data.

The second step involved excavation of the equivalent of a 10 x 16 m block of contiguous 2 x 2 m units in the area of significant artifact concentration. The 40 units were excavated according to natural stratigraphic units, but with the subplowzone/logging disturbed strata subdivided into 5 cm arbitrary levels. Strata I, II, and III, representing thin, disturbed A-horizon deposits, first were stripped by hand without formal sampling; artifact density was very low in these strata. All artifacts observed in excavation (beginning in Stratum IV) were piece-plotted in three dimensions. Entire levels were exposed across the block before excavating an underlying level. This permitted large-area plans to be drawn. The excavation continued until sterile subsoil was reached. All unit fill was screened through 0.25-in. mesh. Representative profiles were documented with scale drawings, and black and white photograph and color slide photography. Soils were described using standard Munsell color and USDA textural terminology (Kollmorgen Instruments Corporation 1992). Special samples were collected as warranted for soils analysis (in columns at 5-cm intervals), flotation and water screening (a 5 liter sample from each excavated level), and radiocarbon assay.

Features were investigated following a standardized procedure where possible. Each first was recorded in plan with scale drawings and photographs. One-half of the feature then was removed to reveal a cross-section profile, which in turn also was recorded. Finally, the remaining feature fill was removed and final drawings and photographs made. All fill was removed according to natural strata if present and was screened through 0.25-in. mesh. A portion of the fill, however, was collected for flotation, radiocarbon, or other special samples as warranted.

Finally, off-site activities will focus on coring the adjacent wetlands/floodplain. The two cores near 44JC850 will sample deposits along the stream trunk and nearby tributary/spring settings. An off-site control column for soils testing will also be recovered from a small unit on the upland terrace.

Data Recovery Methods: Laboratory Analysis

As noted previously, much of the emphasis in this project was on the laboratory phase of analysis, the first step of which was to record the standard descriptive parameters of all recovered artifacts. The WMCAR has developed a hierarchical coding system which operates using Paradox data base software. With this system artifacts are coded during analysis on standard data sheets for entry into a data file. Using this file overall project inventories as well as particularistic data reports can be readily generated for inclusion in reports or routine analysis. Basic categories identified are described below.

In addition, soil samples for chemical and physical analysis was submitted for analysis at the Virginia Polytechnic Institute, pollen and phytolith samples were forwarded to respective specialists, and a sample of ceramics was submitted for elemental analysis.

Prehistoric Lithic Artifact Analysis

Beyond the categories described, all lithic debitage and tools will be identified according to raw material type. Basic metric attributes will also be recorded for at least a sample of the diagnostic items.

Debitage. Primary/Reduction Flakes are placed in this category largely by default; in other words, they are identifiable as flakes but do not qualify as secondary/thinning, tertiary/retouch, or bipolar flakes. General identifying characteristics, however, are relatively obtuse platforms without lipping, a pronounced bulb of percussion, and a relatively thick cross section. Flakes in this category are interpreted primarily as the byproducts of early stage reduction, owing largely to their tendency to exhibit simple platforms and pronounced features such as ripples and bulb of percussion.

Secondary/Thinning Flakes are identified most readily by their acute, lipped, and generally multifaceted platforms. Such platforms are segments of biface margins removed on impact. Biface thinning flakes are also relatively thin and flat or slightly curved in cross section. The bulb of percussion is diffuse. Two forms of this flake type commonly occur. One is the better-known, lipped flake with a multifaceted platform. The other resembles a fish scale in plan view; while often lipped, lipping is very slight and the platforms typically are very narrow and curvate or recurvate. These flakes are generally considered to result from thinning and resharpening relatively refined, mid- to late-stage bifaces.

Tertiary/Retouch Flakes are characterized by small, point platforms which usually are lipped, an outline which expands from the platform toward the termination, a thin cross section and small size (generally not more than 5 mm in the longest dimension). Tertiary/retouch flakes are recognized as the byproduct of tool retouch or resharpening.

Bipolar Flakes are distinctive but care must be taken to avoid classifying them as shatter or angular fragments, particularly if they are of quartz. They have virtually no bulb of percussion and often are long and narrow, or wedge-shaped. Another distinctive feature is distinct radial lines below the points of force and many times they exhibit crushing at opposing ends.

Flake Fragments/Shatter are nondiagnostic medial and distal fragments of broken flakes. Virtually any portion of a flake minus a platform should go into this category.

Angular/Blocky Fragments, as the name implies, are angular/blocky chunks of stone which are probably the byproduct of stoneworking but which cannot be identified as flakes or portions of flakes. These fragments are not to be confused with fire-cracked rock. They often occur when blocks or nuclei of poor quality or internally flawed material are struck.

Blade-like Flakes are at least twice as long as they are wide and have long, parallel ridges or arrises on their dorsal surfaces, perpendicular to the platform. Assigning debitage to this category should be done conservatively with the intention of identifying purposefully struck, linear flakes. Some evidence of platform preparation/grinding is a valuable indicator of this.

Prismatic Blades are highly standardized blade flakes with prepared platforms, prismatic cross sections, and a high degree of uniformity in form.

Tested Cobble/Nodules are pieces of raw material which are unmodified beyond the removal of only one or a very few flakes. Presumably they represent pieces which were tested for quality and discarded.

Tools. Utilized Flakes are flakes or flake fragments (shatter) which were utilized "as is" for cutting, scraping, etc. As such, they exhibit no intentional modification for hafting or sharpening. Instead, there will be incidental damage to the edges resulting from use which will appear as very fine flake scars along the utilized edge. These scars are invasive not more than 2 mm from the tool margin. Damage from screening, trampling, etc. can mimic such use damage. To be conservative, all artifacts placed in this category must have regularized rather than intermittent or spotty damage to the edge.

Utilized flakes are subdivided according to the form of the utilized edge. Potential forms are straight, concave, convex, or denticulate. In some instances more than one of the utilized edge forms may be present.

Retouched Flakes differ from utilized flakes only in that they were intentionally modified prior to use. Flake scars on their edges are regularized but will be invasive at least 2 mm from the tool margin. The same subcategories of edge form apply as well.

Other Bifaces are generally regarded as preforms or generalized bifacial tools (i.e., knives). They lack modification for hafting. Following Callahan (1979), bifaces can be classified according to stage in the reduction process. Only the first four stages of his five-part scheme are recognized in the analysis.

Hafted Bifaces are formal tools more commonly known as projectile point/knives. They are bifacial and are modified for hafting. Diagnostic or potentially diagnostic (complete or proximal fragments) examples are coded separately from nondiagnostic pieces such as tips, ears, etc.

Other Formal Tools are formed tools other than hafted bifaces or other bifaces. Items in this category include drills and endscrapers. In most cases they exhibit modification for hafting.

Cores are the parent pieces from which potentially usable flakes are struck. Consequently, they are best recognized by the flake scars left by prior flake removals. Cores are classified here by the nature of the flake scar patterns evident on their surfaces. Random cores exhibit random flake removals. Lamellar cores are marked by regular, linear flake removals leaving parallel or subparallel flake scars. Bipolar cores are usually rather small and exhibit battering at opposing ends. One of the opposing edges is often a narrow, bifacial "crest" while the other is truncated and battered in appearance. Bifacial cores resemble thick, irregular bifaces (see Stage 2 of Callahan 1979). Tabular cores are those derived from plate-like cobbles or nodules. Flake removals are directed from the margins of the piece, which readily serve as platforms.

Other Lithic Artifacts. Formal Groundstone items were modified by pecking and/or grinding rather than by flaking. The degree of modification is extensive and to the point that the original form of the stone from which it was fashioned is obliterated. Typical artifacts include axes, celts, gorgets, steatite bowl fragments, etc.

Informal Groundstone includes artifacts which have been modified by pecking and/or grinding but have not been formally shaped; they retain in large part the form of the piece from which they were made such as a cobble or slab. These artifacts include hammerstones, simple grinding slabs and manos, and artifacts which are only possibly modified by grinding/pecking.

Fire-cracked Rock is recognized as rough, blocky pieces of stone which have irregular fracture surfaces. In some cases the stones may also be reddened from the exposure to intense heat. This material is counted and weighed.

Other/Unmodified Stone represents miscellaneous rock recovered incidental to collection. It bears no evidence of modification. Such material can be also referred to as "manuports". Other stone is counted and weighed.

Prehistoric Ceramic Artifact Analysis

Initially, prehistoric ceramic artifacts were classified primarily by description along the dimensions of temper and surface treatment. Whether the artifact was a vessel or other artifact fragment also was noted and, in the case of vessel fragments, the specific portion was identified. At the initial level of analysis ceramic sherds were not "typed" in the traditional sense but grouped according to temper/surface treatment. Subsequently, their correlation with diagnostic types of the region is discussed. Key references consulted during the analysis are Egloff and Potter's (1982) overview of Coastal Plain ceramics, a similar treatment by Mouer (1986) for Central Virginia, McLearen and Mouer's (1989) discussion of lower James River ceramics, and descriptions in McLearen's (1987) report on riverine sites in Henrico County.

Following their correlation with regional types, a sample of Middle Woodland ceramic wares and samples from on-site and other clay resources was subjected to acid extraction analysis by Dr. Gary Rice of The College of William and Mary chemistry department. Dr. Rice has applied this method to archaeological samples for Colonial Williamsburg archaeologists examining colonial tiles. Sherd samples were selected not only from sites 44JC127 and 44JC850, but also from several other sites sampled in the Chisel Run/Powhatan Creek basin. Efforts were made to represent only distinct vessels in the sample. Ceramic collections from all of the candidate sites are currently stored at the WMCAR.

Also, the same sample of sherds (vessels) was subjected to x-radiography as an independent, alternative means of testing the chemical characterization results. The Radiology Department of the Williamsburg Community Hospital x-rayed and provided prints of the sherds for study. Personnel in this department have previously assisted WMCAR staff in a preliminary exploration of the method. The geology department staff at the College of William and Mary were consulted as needed.

Paleobotanical Analysis

Dr. Grace Brush and William Hilgartner at Johns Hopkins University conducted paleobotanical analyses for two wetland cores. In consultation with Dr. Brush, appropriate samples were extracted from the cores and sent to her laboratory for study. A representative sample of pollen grains, seeds and charcoal were identified from key sections of the cores. These findings are included as Appendix C.

Dr. Brush has devoted much of her career to paleoenvironmental reconstruction in the Chesapeake estuary, with a specialization in pollen analysis. She has recently assisted with similar analyses associated with the Jamestown Assessment Project sponsored by the National Park Service.

Phytolith Analysis

Dr. Lisa Kealhofer of The College of William and Mary and The Colonial Williamsburg Foundation completed phytolith analyses for five soil samples. These findings are included as Appendix D.

Dr. Kealhofer has devoted much of her career to paleoenvironmental reconstruction, with a specialization in phytolith analysis. She has recently established a laboratory for such analyses at the Department of Archaeology, The Colonial Williamsburg Foundation.

Artifact Curation

All materials generated by this project will be curated according to standards outlined in 36 CFR Part 79 "Curation of Federally-Owned and Administered Archeological Collections." All artifacts will be washed and placed in resealable polyurethane bags with labels. These will in turn be logically ordered in acid-free Hollinger boxes for permanent storage. They will ultimately be deposited with the Virginia Department of Historic Resources (VDHR) unless otherwise stipulated by VDOT.

3: Excavation Results: Site 44JC127

Introduction

The primary role of excavations at Site 44JC127 was to document of the geomorphological evolution of the terrace lobes overlooking Chisel Run and the diachronic use of this landform. The site was chosen because of its location, its Middle Woodland and other intact subplowzone components, and the fact that disturbances along the site periphery rendered large-scale horizontal exposures impractical.

Site Description

Site 44JC127 is located on the remnant of a wooded terrace lobe overlooking Chisel Run (Figure 4). The southern one-third of the site is cut by Route 612; it is bounded on the east and northeast by wetlands associated with Chisel Run, on the west by the Regency Apartment complex, and on the south by an unnamed creek feeding Chisel Run. Site soils are classified as Emporia complex. The site is approximately 15 m above mean sea level (amsl), gradually sloping to the west and north. More dramatic slopes are present near the southern and eastern boundaries of the site, in part the result of modern, artificial modifications to the landform. Young oak, pine, and sycamore trees are present, some standing in a borrow pit/old road trace, where a portion of the terrace has been borrowed away for road fill (probably for Route 612).

Previous Investigations

Site 44JC127 was previously investigated at the Phase II level by the WMCAR in 1995 and 1996 (Higgins and Deitrick 1996a). The site was characterized by discrete, low density artifact concentrations in a composite of short-term, seasonal campsites. Its location on a terrace lobe adjacent to Chisel Run Creek is consistent with the type of landform on which other sites have been identified within the project area (Hunter and Higgins 1985; Hunter et al. 1987; Hunter et al. 1993). Artifact densities are highest near the center of the site, suggesting that this was the major activity locus. Artifacts were recovered up to 58 cm below ground surface. Eighty-five percent (n=81) of the artifacts recovered from the test units were found in intact Strata IV and V cultural deposits, dating to the Late Archaic and Middle Woodland periods. Chronological indicators included a Halifax side notched point (Late Archaic, 4000–3000 BC), and Pope's Creek, Varina, and Mockley series ceramic sherds (Middle Woodland, 500 BC – 900 AD).

Soils and Stratigraphy

Strata I, II, and III

These strata were identified as disturbed during Phase II investigations, and were therefore excavated as a single level during Phase III data recovery (Figure 5). Stratum IV was inadvertently included in this level in Test Unit 3. Excavated depth ranged up to 17 cm below the ground surface in Test Units 1, 2, and 4, and about 24 cm in Test Unit 3. Strata I–III contained both prehistoric and historic artifacts in Test Units 1, 2, and 3; no historic artifacts were recovered from Test Unit 4 (see Appendix A). No features were identified. Prehistoric artifact density was highest in Test Units 1 and 4 on the east end of the site at about 50/m^3, declining to the west to only 22 artifacts/m^3 in Test Unit 2 and 36/m^3 in Test Unit 3 (which included Stratum IV) (Figure 6).

The following soil descriptions are taken from the north profiles of the four test units, which were

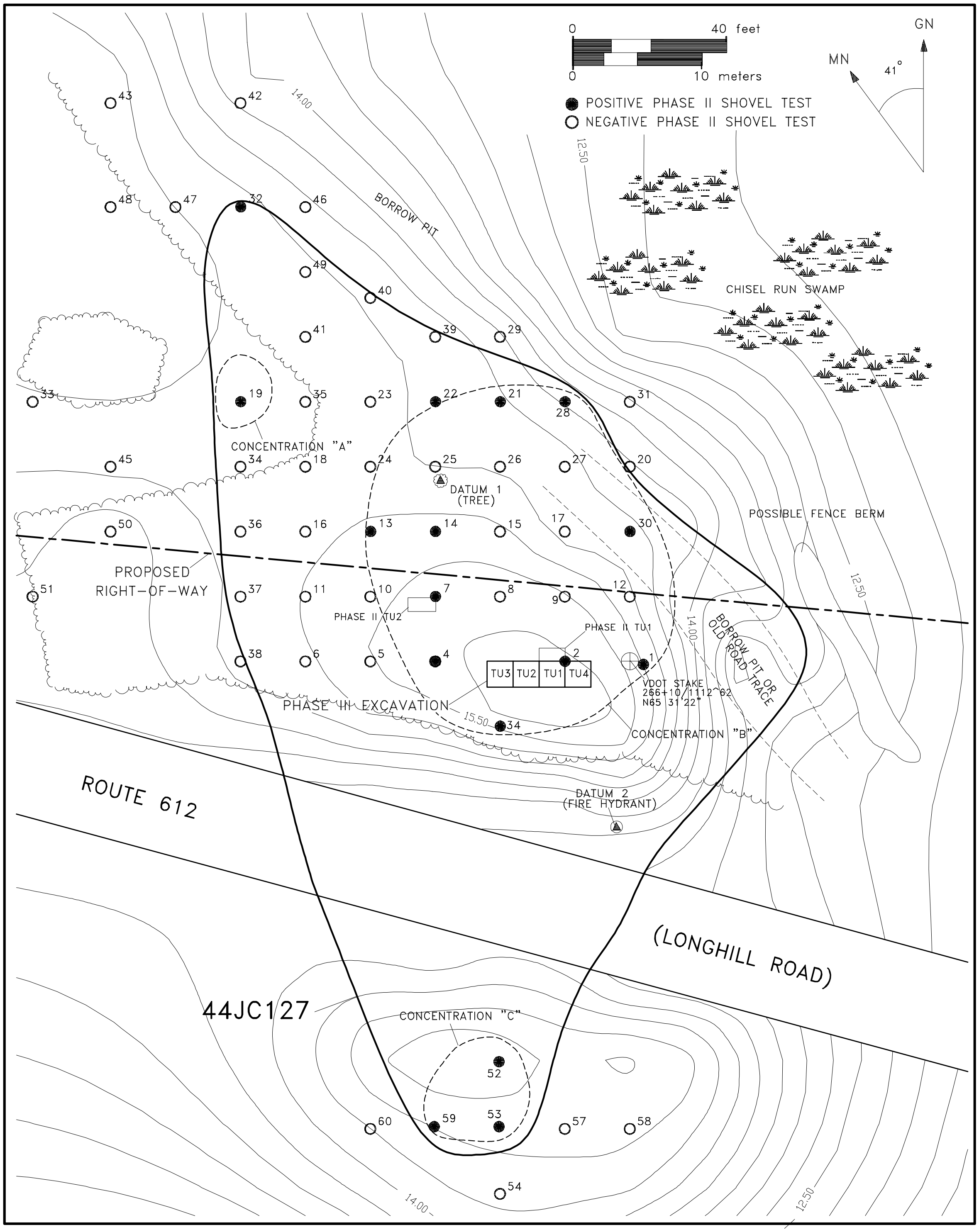
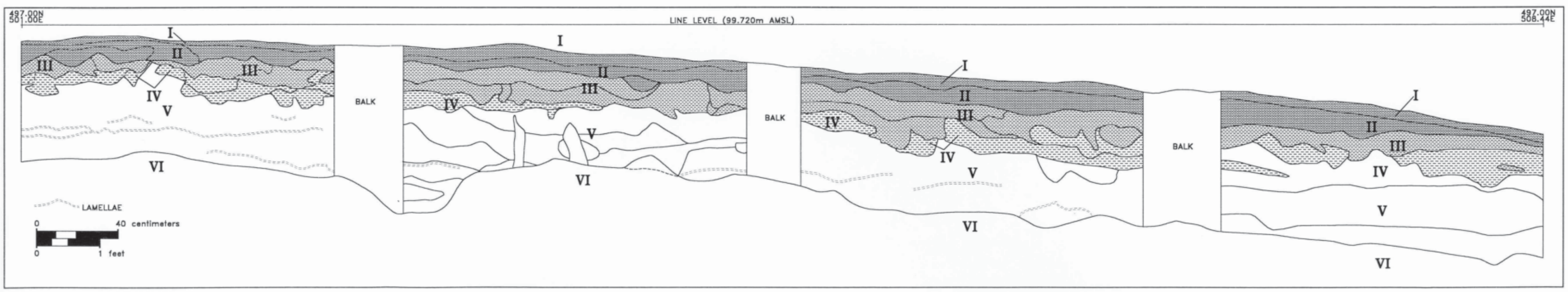


Figure 4. Site 44JC127, plan of data recovery excavations.



I - Olive brown (2.5Y4/4) sandy loam (humus/root mat)
II - Olive brown (2.5Y4/4) sandy loam mottled with light olive brown (2.5Y5/4) sandy loam, occasionally mixed with strong brown (7.5YR5/8) sandy clay subsoil
III - Light olive brown (2.5Y5/4) sandy loam mixed with some light yellowish brown (2.5Y6/4) sandy loam and patches of olive brown (2.5Y4/4) sandy loam
IV - Light yellowish brown (2.5Y6/4) sandy loam, mixed with olive brown (2.5Y5/4) sandy loam and patches of pale yellow (2.5Y7/4) fine sandy loam
V - Pale yellow (2.5Y7/4) fine sandy loam with patches of light gray (2.5Y7/2) sand. Lamellae appear as narrow, discontinuous bands of yellowish brown (10YR5/8) medium sand
VI - 7.5YR5/8 strong brown clay (subsoil)

Figure 5. Site 44JC127, composite north profile of Test Units 1, 2, 3, and 4.

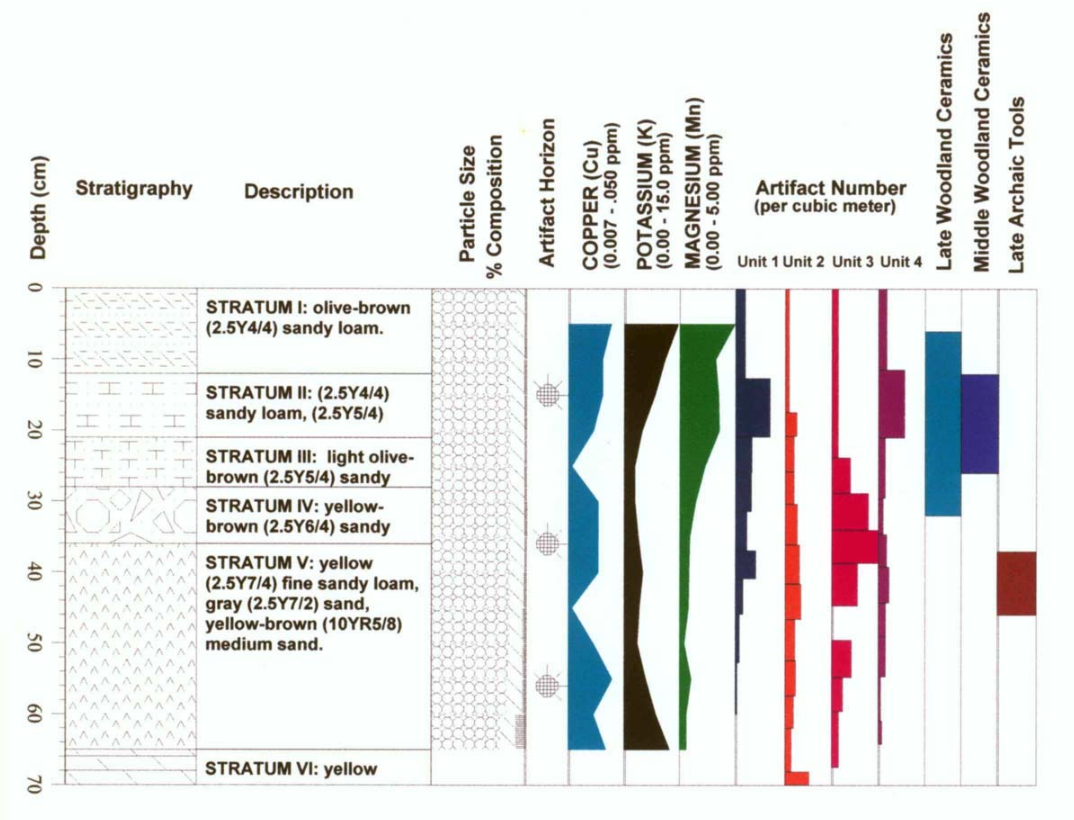


Figure 6. Site 44JC127, tools, diagnostic artifacts, and peak levels of artifact density by level.

drawn with close attention to variation within soil strata as well as between strata (see Figure 5). The division between Stratum I and II was indistinct, and is so indicated with a dashed line. Dashed lines in other strata denote minor but visible variations within the primary soil matrix. In general, soils become lighter in color with depth.

Stratum I consists of soil within the humus/root mat, an olive brown (2.5Y4/4) sandy loam. Stratum thickness was variable, ranging from 1 to 7 cm thick. The soil matrix of Stratum II consists of an olive brown (2.5Y4/4) sandy loam mottled with light olive brown (2.5Y5/4) sandy loam; a strong brown (7.5YR5/8) sandy clay subsoil is occasionally mixed in, suggesting that this context includes disturbed soil deposits possibly derived from logging and/or nearby borrow pit operations for Route 612. The stratum was more uniform in thickness than Stratum I or III, generally about 7 to 10 cm thick except in Test Unit 4, where it thinned to only a couple centimeters thick in the eastern portion of the unit (see Figure 5). Stratum III soils consist of a light olive brown (2.5Y5/4) sandy loam mixed with some light yellowish brown (2.5Y6/4) sandy loam and patches of olive brown (2.5Y4/4) sandy loam. Modern tree root systems were noted in this stratum, especially in Test Units 1 and 2. Stratum thickness was variable, about 5 to 24 cm, and thinned to the west.

Stratum IV

Stratum IV was identified as possibly undisturbed during Phase II investigations, and was therefore excavated as a single level during Phase III data recovery. As noted above, Stratum IV in Test Unit 3 was inadvertently excavated with the disturbed Strata I–III. Stratum excavation began about 14 cm below the ground surface, on average, in Test Units 1, 2, and 4. The base of the stratum excavations was 20 to 24 cm below the ground surface in all four test units. Stratum IV contained only prehistoric artifacts; no historic artifacts were recovered. No features were identified. Prehistoric artifact density was again highest in Test Units 1 and 4 on the east end of the site at 152–178 artifacts/m^3, declining to the west to 66 artifacts/m^3 in Test Unit 2 (see Figure 6).

The test unit profiles show that the Stratum IV soil matrix is a discontinuous layer of mostly light yellowish brown (2.5Y6/4) sandy loam, mixed with olive brown (2.5Y5/4) sandy loam and patches of pale yellow (2.5Y7/4) fine sandy loam (see Figure 5). Small roots are less common than in Stratum III but still occasionally present. The stratum is highly variable in thickness, ranging from 3–17 cm thick.

Stratum V

Stratum V is a clearly undisturbed layer of soil with much more uniform soil colors and well-formed lamellae in the lower portions of the stratum (see Figure 5). Stratum excavation began about 20 to 23 cm below the ground surface and continued to a depth of 62 to 65 cm. Stratum V contained only prehistoric artifacts; no historic artifacts were recovered. No features were identified. The stratum was excavated in a series of eight levels (Va through Vh) each averaging about 5 cm thick. Prehistoric artifact density was greatest on the western portion of the site, where a maximum density of 266 artifacts/m^3 was identified in Level Vc of Test Unit 3, 34 to 39 cm below the ground surface. Peak artifact density for Stratum V in Test Units 1, 2, and 4 averaged 87 artifacts/m^3 (see Figure 6).

Soils in Stratum V consist of a pale yellow (2.5Y7/4) fine sandy loam with patches of light gray (2.5Y7/2) sand. Lamellae appear as narrow, discontinuous bands of yellowish brown (10YR5/8) medium sand beginning about 40 to 51 cm below the ground surface. Soils become increasingly compact with depth. Roots are rare but occasionally appear in the upper portions of the stratum. In profile, the stratum ranges from 24 to 38 cm thick (see Figure 5).

Stratum VI

Stratum VI is the subsoil, consisting of a strong brown (7.5YR5/8) sandy clay. The surface of this stratum is highly irregular and undulating. About 10 cm of this stratum was excavated in Test Unit 4 (Level VIa), recovering no artifacts. Also, the surface of the subsoil dipped significantly in the northwest corner of Test Unit 2; this "dip" was mostly comprised of sandy clay subsoil, but was also interlaced with some Stratum V sandy loams (see Figure 5). This area was excavated in two levels (VIa and VIb), recovering 26 artifacts (about 70 artifacts/m^3), and appears to be related to an old treefall. This was supported by several small pieces of modern root coverings recovered while dry-screening soil samples from these levels through an 0.125-in. geologic sieve. No historic artifacts were recovered, and no features other than the possible treefall were identified.

Results of Soil Chemical and Particle Size Analysis

Soil samples were taken from the north profile of Test Units 1 and 3 at 5-cm intervals. These samples were submitted for particle size and chemical analysis as described in the research design. The results of these analyses are summarized in Tables 1–4 and Figures 7 and 8.

Figures 7 and 8 illustrate changes in the sand fractionation with depth in Test Units 1 and 3. Sands are primarily composed of fine sand throughout both test units, followed by medium sand, very fine sand, coarse sand, and very coarse sand. Fine sands generally comprise more than 44% of the soil matrix throughout both test units, and percentages of fine sand, medium sand, very fine sand, and coarse sand vary little over time. Percentages of very coarse sand are also very consistent below 35 to 45 cm below the ground surface. At 40 to 45 cm below the ground surface in Test Unit 1 and 30 to 35 cm in Test Unit 3, the percentage of very coarse sand drops to zero (see Figures 7 and 8). This drop in very coarse sand is accompanied by an increased clay content, especially in Test Unit 3 where the percentage of clay is more than double the percentage 5 cm above or below the sample (see Table 2). From the base of the test units up to the drop in very coarse sand, clay content had been generally declining, but the percentage of clay rises sharply at or just below the zero-level of very coarse sand. This suggests that a

Depth (cm)	Sand							
	VCS	CS	MS	FS	VFS	Sand	Silt	Clay
0–5	1.3	5.0	28.1	44.0	8.2	86.6	10.9	2.5
5–10	0.1	2.2	25.9	45.1	10.3	83.6	15.4	1.0
10–15	1.2	2.3	20.6	46.6	11.0	81.7	16.9	1.4
15–20	0.2	1.8	22.2	45.5	11.8	81.5	15.9	2.6
20–25	0.2	1.8	21.6	46.6	11.8	82.0	16.7	1.3
25–30	0.3	1.8	21.9	46.0	12.0	82.0	16.8	1.2
30–35	0.1	1.5	20.3	46.6	12.6	81.1	17.4	1.5
35–40	0.1	2.3	22.4	45.1	12.1	82.0	16.9	1.1
40–45	0.0	2.1	21.5	45.7	11.8	81.1	17.5	1.4
45–50	0.1	1.8	22.2	45.0	12.4	81.5	17.1	1.4
50–55	0.2	1.8	20.3	46.2	12.4	80.9	18.4	0.7
55–60	0.1	2.0	23.1	44.4	11.4	81.0	17.1	1.9
60–65	0.2	2.3	22.8	44.1	11.3	80.7	17.1	2.2
65–70	0.2	2.0	22.5	44.0	10.9	79.6	15.4	5.0

VCS=very coarse sand; CS=coarse sand; MS=medium sand; FS=fine sand; VFS=very fine sand

Table 1. Site 44JC127, Test Unit 1 soil column, particle size analysis (percent).

Depth (cm)	Sand							
	VCS	CS	MS	FS	VFS	Sand	Silt	Clay
0–5	4.7	8.0	29.7	39.1	7.1	88.6	10.5	0.9
5–10	0.5	2.6	23.0	45.2	11.2	82.5	15.6	1.9
10–15	0.3	1.5	20.8	46.8	11.7	81.1	15.8	3.1
15–20	0.2	1.6	23.0	46.6	11.5	82.9	15.5	1.6
20–25	0.1	1.8	21.0	48.4	12.0	83.3	16.4	0.3
25–30	0.4	1.7	22.0	48.1	11.4	83.6	14.7	1.7
30–35	0.0	1.7	21.7	48.4	11.2	83.0	14.5	2.5
35–40	0.1	1.6	21.4	48.8	10.9	82.8	16.2	1.0
40–45	0.1	2.0	23.0	47.8	10.3	83.2	14.3	2.5
45–50	0.1	1.4	20.9	47.3	12.3	82.0	14.0	4.0
50–55	0.1	1.8	21.7	47.2	10.8	81.6	14.8	3.6
55–60	0.2	1.7	22.7	44.1	11.0	79.7	16.3	4.0
60–65	0.1	1.6	18.4	40.7	12.3	73.1	16.2	10.7

VCS=very coarse sand; CS=coarse sand; MS=medium sand; FS=fine sand; VFS=very fine sand

Table 2. Site 44JC127, Test Unit 3 soil column, particle size analysis (percent).

Depth (cm)	Chemical Elements (ppm in solution)											
	Ca	Mg	P	K	Mn	Zn	Fe	Al	Cu	B	pH	OM
0–5	54.76	8.455	0.7667	13.65	1.695	0.6045	6.841	37.87	0.0332	0.0301	5.2	3.4
5–10	25.88	3.929	0.3371	7.216	0.9289	0.2234	6.686	50.48	0.0392	0.0264	4.8	2.8
10–15	20.74	2.616	1.573	6.971	1.254	0.1912	3.066	70.15	0.0392	0.0188	4.8	1.9
15–20	11.61	1.962	0.1556	4.038	1.390	0.2167	2.567	87.11	0.0271	0.0188	5.0	1.1
20–25	15.50	1.889	0.1069	4.540	0.9289	0.1489	2.500	57.67	0.0301	0.0188	5.3	0.9
25–30	15.66	1.907	0.2663	3.594	0.6938	0.0914	2.116	42.35	0.0271	0.0151	5.1	0.8
30–35	6.828	1.651	0.0169	1.759	0.5776	0.0863	2.160	28.65	0.0211	0.0151	4.7	0.7
35–40	6.573	1.463	0.2339	1.467	0.4006	0.0727	1.811	25.03	0.0241	0.0151	4.8	0.7
40–45	7.224	1.619	0.1490	1.631	0.3048	0.0541	1.695	20.14	0.0241	0.0151	4.8	0.6
45–50	6.593	1.639	0.1534	1.923	0.3164	0.0490	1.574	18.13	0.0211	0.0151	4.8	0.7
50–55	6.384	1.616	0.1896	1.759	0.3164	0.0456	1.554	17.71	0.0241	0.0038	4.7	0.6
55–60	6.438	1.614	0.0826	1.619	0.3048	0.0660	1.310	17.66	0.0241	0.0113	4.7	0.6
60–65	6.730	1.855	0.0161	2.180	0.3745	0.0524	1.523	22.04	0.0241	0.0075	4.6	0.6
65–70	12.06	3.525	0.0759	3.360	1.071	0.0744	2.034	28.78	0.0362	0.0113	4.6	0.6

OM = organic materials

Table 3. Site 44JC127, Test Unit 1 soil column, chemical analysis (ppm in solution).

Depth (cm)	Chemical Elements (ppm in solution)											
	Ca	Mg	P	K	Mn	Zn	Fe	Al	Cu	B	pH	OM
0–5	48.25	9.860	0.6671	14.00	4.520	0.5232	7.246	31.26	0.0332	0.0301	4.7	3.9
5–10	11.04	3.764	0.1970	7.286	1.356	0.2302	5.241	51.63	0.0241	0.0226	4.6	2.2
10–15	6.279	2.199	0.2154	4.494	1.631	0.1574	3.523	78.98	0.0241	0.0113	4.7	1.5
15–20	5.812	1.335	0.4863	2.379	1.713	0.4978	2.752	88.10	0.0181	0.0151	5.0	0.9
20–25	4.940	1.227	0.2635	1.701	0.7286	0.0897	1.863	47.49	0.0090	0.0113	5.0	0.7
25–30	5.635	1.353	0.3158	1.689	0.4180	0.0761	1.571	31.52	0.0211	0.0038	5.1	0.8
30–35	6.463	1.493	0.3195	1.970	0.2874	0.1303	1.465	23.37	0.0211	0.0075	5.1	0.6
35–40	5.831	1.580	0.2678	2.496	0.2787	0.0728	1.452	20.89	0.0211	0.0075	5.0	0.7
40–45	5.787	1.630	0.1306	2.110	0.2612	0.0626	1.316	16.46	0.0090	0.0075	5.0	0.6
45–50	6.255	1.674	0.1837	1.900	0.2032	0.0609	1.228	14.54	0.0181	0.0000	4.8	0.6
50–55	9.961	2.689	0.3386	2.951	0.3106	0.0609	1.647	17.56	0.0332	0.0113	5.0	0.6
55–60	17.71	4.307	0.2132	4.727	0.2351	0.0711	1.465	17.17	0.0181	0.0151	5.3	0.7
60–65	30.63	9.039	0.2257	9.202	0.2264	0.0829	2.464	27.35	0.0271	0.0188	5.3	0.7

OM=organic materials

Table 4. Site 44JC127, Test Unit 3 soil column, chemical analysis (ppm in solution).

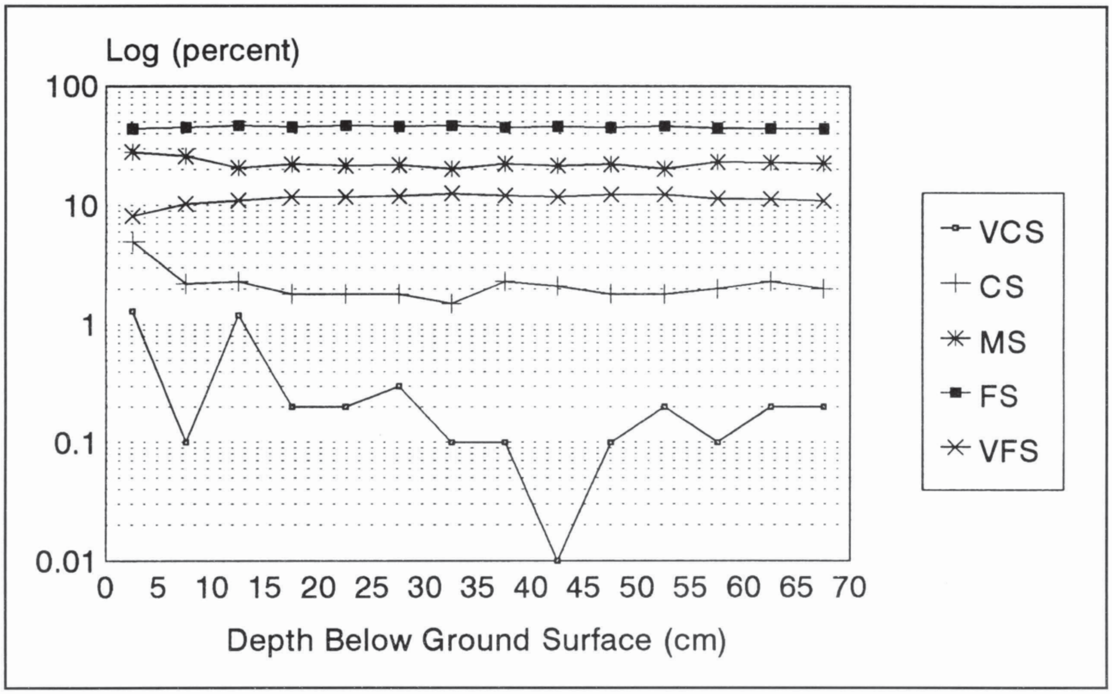


Figure 7. Site 44JC127, Test Unit 1, sand fractionation results by level.

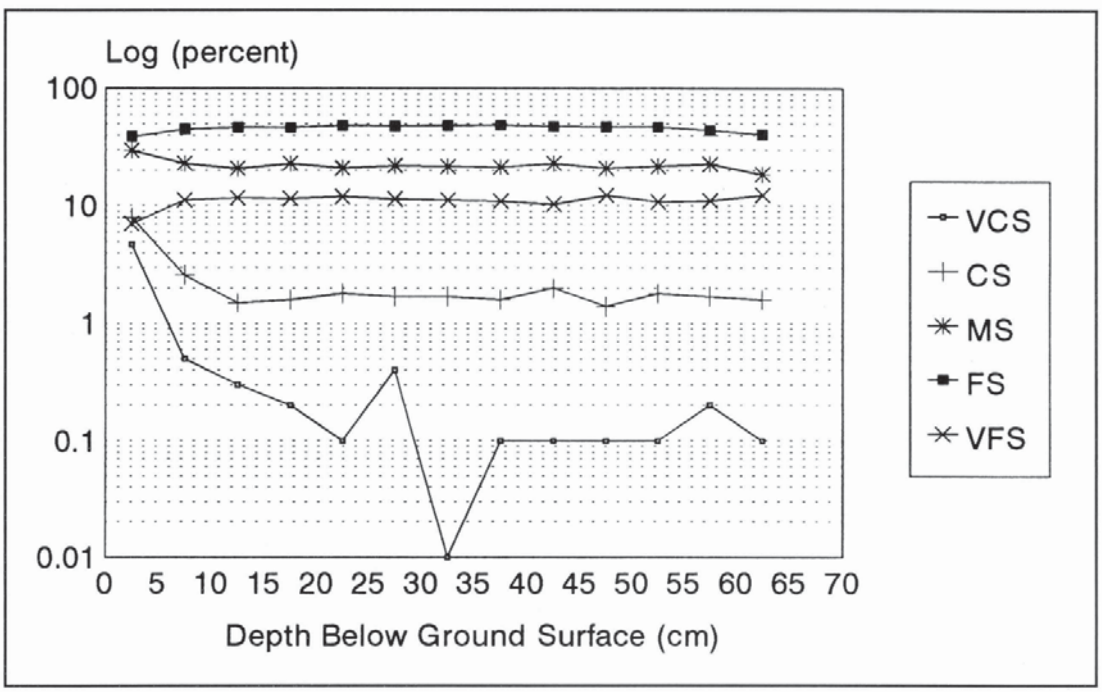


Figure 8. Site 44JC127, Test Unit 3, sand fractionation results by level.

change in the depositional environment occurred around this time. Further support for an environmental change at this level is found in the chemical analysis of soils in Test Unit 3, where peaks in pH value, organic material, phosphorous, potassium, calcium, zinc, and copper all occur either at the same level, 5 cm above, or 5 cm below the level in which the percentage of very coarse sand falls to zero (30 to 35 cm below the ground surface). The chemical results are not as clear in Test Unit 1, where only calcium, potassium, and copper peak with the drop in very coarse sand (40 to 45 cm below the ground surface). Nevertheless, there does appear to be a detectable change in environmental conditions. In Test Unit 3, the percentage of coarse sand begins to increase steadily above 30 cm; Test Unit 1 is better characterized by increased variability in the percentage of very coarse sand above 40 cm rather than a clear trend of percentage increase. Near the surface of both units, the percentage of other, heavier sediments such as coarse and medium sands begins to increase as well, while the lighter fine and very fine sands decrease slightly. There is no evidence of a "fining upward" sequence that usually characterizes alluvial overbank deposits, suggesting that these sandy deposits are primarily the result of aeolian deposition.

In both test units, the most visible environmental change suggested by the soil chemical and particle size results coincides with the Late Archaic occupation of the site (ca. 3000–1500 BC), based on the recovery of a Poplar Island hafted biface and a drill with a Savannah River base from Test Unit 1 (see Figure 6). While this level does not represent the initial human occupation of the site, it does mark the beginning of less transitory and more intense utilization of the site as represented by the increased recovery of tools, fire-cracked rock, bone fragments, and overall artifact density; these results are discussed in greater detail below. From the beginning of human occupation of the landform to present day, however, the only significant changes in soil particle size are related to percentages of very coarse sand. Other sediments display a pattern of minor fluctuation in percent composition over time; in other words, the overall aeolian depositional pattern has been one of relative consistency over the period of prehistoric human occupation.

Excavation Results

Four contiguous 2 x 2 m excavation units were excavated. Strata I, II, and III were removed as a single unit (except in Test Unit 3, where Stratum IV was included). Stratum IV was also excavated as a single unit according to natural stratigraphy. Beginning with Stratum V, excavations were conducted in 5-cm increments within natural strata. Each stratum or level was removed across the entire block of test units before proceeding to the next level. A total of 698 prehistoric artifacts was recovered, including 538 pieces of debitage, 8 tools, 108 pieces of fire-cracked rock, 37 ceramic sherds, and seven small bone fragments (Table 5). A total of 67 historic artifacts was also recovered, including 2 pieces of shell mortar, 51 pieces of modern bottle glass, 3 pieces of modern wall tile, 5 pieces of modern window glass, 3 pieces of iron scrap metal, 1 unidentified nail fragment, and 2 wrought nails. All of the historic artifacts were recovered from Strata I–III; all historic artifacts except the nails and the shell mortar were clearly modern and were discarded.

Artifact Descriptions

Diagnostic Tools and Ceramics. Diagnostic artifacts included 25 ceramics, 2 hafted bifaces, and 1 drill (Table 6). Diagnostic ceramics included 18 sherds of Roanoke ware, a simple-stamped, shell-tempered pottery defined by Blaker (1952:257) (Figure 9). This ware dates to the Late Woodland/Protohistoric period, ca. AD 900 or later (Egloff and Potter 1982). This was the only ceramic type recovered from Strata I–III. Also recovered were seven sherds of a cord-marked, sand and grit tempered pottery similar to Varina wares and dating to the later portion of the Middle Woodland period, ca. AD 100–500 (Mouer 1986:145–148; Egloff 1989:39) (see Figure 9). Varina ceramics are usually distinguished from earlier Pope's Creek wares by the coarser sand and angular crushed quartz temper (Egloff 1989:37–39). Middle Woodland ceramics were recovered only in Stratum IV and the first 5 cm of Stratum V, occasionally in association with the later Roanoke ware in Test Units 1 and 4 (see Figure 6). Strata I–II and IV appear to represent a somewhat compressed chronology of Middle and Late Woodland contexts.

	Debitage	Ceramics	Hafted Bifaces	Bifaces	Informal Tools	Drills	FCR	Bone	Total
TU 1	131	16	1	0	2	1	15	0	166
TU 2	113	1	1	1	0	0	39	2	157
TU 3	194	0	0	1	0	0	46	5	246
TU 4	100	20	0	1	0	0	8	0	129
Site Totals	538	37	2	3	2	1	108	7	698

FCR=fire-cracked rock

Table 5. Site 44JC127, prehistoric artifact classes by test unit.

Artifact	Cultural Period	Date	Site Context
13 sherds of Roanoke Ware	LW/Protohistoric	AD 900–1607	TU 4, L.I–Va (0–29.5 cm bgs)
4 sherds of Roanoke Ware	LW/Protohistoric	AD 900–1607	TU 1, L.IV (12.5–21 cm bgs)
1 sherd of Roanoke Ware	LW/Protohistoric	AD 900–1607	TU 1, L.Vb (26–31 cm bgs)
5 sherds of Pope's Creek/Varina ware	Middle Woodland	500 BC–AD 900	TU 1, L.IV–Va (12.5–26 cm bgs)
Rossville hafted biface	Middle Woodland	500 BC–AD 900	TU 2, L.IV (17.5–21 cm bgs)
2 sherds of Pope's Creek/Varina ware	Middle Woodland	500 BC–AD 900	TU 2, L.Va (21–26 cm bgs)
Poplar Island hafted biface	Late Archaic	3000–1500 BC	TU 1, L.Vd (37–41 cm bgs)
Savannah River (base) drill	Late Archaic	3000–1500 BC	TU 1, L.Ve (41–46 cm bgs)

Table 6. Site 44JC127, diagnostic artifacts, associated cultural periods, dates, and site context.

A Rossville hafted biface, usually considered a Middle Woodland point dating from ca. 500 BC – AD 300, was recovered from Stratum IV (17–21 cm below the ground surface) in Test Unit 2 (Mouer 1986:98–99; Ritchie 1989; Stephenson et al. 1963) (see Figure 9). Two sherds of Varina ware were recovered from the 5-cm level just below the biface. Another hafted biface was recovered from Level Vd (37–41 cm below the ground surface) in Test Unit 1 (see Figure 9). This hafted biface was identified as Poplar Island, dating to the Late Archaic period ca. 3000–1500 BC (Ritchie 1989:44–45). The next 5-cm level below this point contained a drill with a Savannah River–like base; Savannah River hafted bifaces typically date to the Late Archaic as well, ca. 3000–1300 BC. In summary, diagnostic artifacts indicate that Late Woodland, Middle Woodland, and Late Archaic occupations are all present at Site 44JC127.

Tools. A total of eight lithic tools were recovered, no more than one in any excavation level except Strata I–III (see Table 5). These tools include two hafted bifaces, three unfinished bifaces, two informal tools, and one drill. The two hafted bifaces, a Middle Woodland Rossville and a Late Archaic Poplar Island, were both made from quartzite, as was the drill with a base resembling a Late Archaic Savannah River hafted biface (see Figure 9). An unidentifiable fragment of a Stage 2 hafted biface, made from quartzite, was recovered from Level Vc in Test Unit 2 (30–36 cm below the ground surface). The midsection of a Stage 3 biface, made from quartz, was recovered from Level Vb in Test Unit 4 (30–35 cm below the ground surface). An unidentifiable fragment of a Stage 4 hafted biface, made from quartz, was recovered from Stratum I–IV in Test Unit 3, somewhere between 0 and 24 cm below the ground surface. Both informal tools, a utilized flake of quartz and a retouched flake of quartz, were recovered from Test Unit 1. The utilized straight-edge tool was found in Strata I–III between 0 and 13 cm below the ground surface, and the retouched

Figure 9. Site 44JC127, diagnostic artifacts (a - Poplar Island hafted biface [TU1, L.Vd]; b - Savannah River drill [TU1, L.Ve]; c - unidentified hafted biface fragment; d - Rossville hafted biface [TU2, L.IV]).

	P/R	S/BT	T/RF	FF/S	ABF/C	TC/N	BP	Total
Site Total	37 (7%)	179 (33%)	1 (<1%)	279 (52%)	40 (7%)	1 (<1%)	1 (<1%)	538 (100%)

	Quartz	Quartzite	Argillite	Metavolcanic	Chert	Unident.	Total
Site Total	138 (26%)	377 (70%)	3 (<1%)	16 (3%)	3 (<1%)	1 (<1%)	538 (100%)

	Cortical	Noncortical	Total
Site Total	117 (22%)	421 (78%)	538 (100%)

P/R=Primary/Reduction; S/BT=Secondary/Biface Thinning; T/RF=Tertiary/Retouch; FF/S=Flake Fragment/Shatter; ABF/C=Angular/Blocky Fragment/Core; TC/N=Tested Cobble/Nodule; BP=Bipolar Flake

Table 7. Site 44JC127, debitage class, raw materials, and cortex percentages for the entire site.

straight-edge tool was found in Level Vf, 46–53 cm below the ground surface.

Debitage. Attributes for the 538 pieces of debitage recovered are presented in Table 7. Most of the debitage are flake fragments or shatter (52%), followed by secondary/bifacial thinning flakes (33%) and roughly equal frequencies of primary/reduction flakes and angular blocky fragments/chunks (7%). Single examples of a tertiary flake, a tested cobble/nodule, and a bipolar flake were also recovered. The majority of the debitage is either quartzite (70%) or quartz (26%). A few pieces of metavolcanic materials were recovered (3%), as were three pieces of argillite, three pieces of an unidentified chert, and a piece of unidentified material (see Table 7). Most of the debitage is noncortical (78%).

Definition of Cultural Horizons

The definition of cultural horizons relied on changing artifact density, the presence of diagnostic artifacts, and the vertical distribution of tools, fire-cracked rock, and bone fragments. These definitions were further refined through the use of soil chemical and particle size results.

Figure 6 illustrates the artifactual parameters of the assemblage. Artifact density per cubic meter is shown in graphical form overlain by the symbolic location of tools and peak densities of debitage, fire-cracked rock, and bone fragments. The distribution of diagnostic artifacts from the Late Woodland, Middle Woodland, and Late Archaic are shown in color. Test Unit 3 shows a bimodal distribution of artifacts; it is probable that there is actually a third definable horizon that would appear in Stratum IV, had it been excavated separately as in the other test units. For analytical purposes, Level Vc (34 to 39 cm below ground surface) and Level Vf (50 to 55 cm below ground surface) will be considered the primary cultural levels in Test Unit 3.

Test Unit 2 exhibits a trimodal distribution (see Figure 6). Stratum IV and Level Va comprise the uppermost cultural level (17 to 26 cm below ground surface); Middle Woodland ceramics and a Middle Woodland Rossville hafted biface were recovered in these levels. A second cultural horizon can be defined in Levels Vc and Vd (30 to 42 cm below ground surface), and a lower horizon is present as well in Levels Vf and Vg (47 to 57 cm below ground surface). Test Unit 1 exhibits only a bimodal distribution, with the lower cultural horizon not evident in the artifact distribution. Stratum IV (13 to 21 cm below ground surface) again represents the upper horizon, but contained both Middle and Late Woodland ceramics, obscuring its cultural affiliation. Levels Vd and Ve (37 to 46 cm below ground surface) represent a well-defined cultural level containing both of the Late Archaic tools recovered from the site. Test Unit 4 is again trimodal, with upper, middle, and lower cultural horizons suggested by the artifact distribution. The only diagnostic artifacts in Stratum IV (11 to 21 cm below ground surface) were Late Woodland Roanoke wares. No diagnostic artifacts were recovered from Level Vd (39 to 44 cm below ground surface). The third potential cultural horizon was in Level Vf, 49 to 54 cm below ground surface (see Figure 6). Overall, three cultural horizons are definable based on the artifact recovery patterns; these are summarized in Table 8. The upper level, comprised of Stratum IV, dates from the Middle to Late Woodland periods, sometime after AD 100 based on the Middle Woodland Varina wares recovered. Within Stratum V, the first horizon encountered probably dates from the Late Archaic period, ca. 3000–1500 BC. No diagnostic artifacts were recovered from the deepest horizon, but its stratigraphic position suggests that there was human occupation of this landform beginning about the same time that the deposition of aeolian sands began, sometime prior to the Late Archaic period (before 3000 BC).

The soil chemical and particle size results for Test Units 1 and 3 offer support for defining these levels as the primary cultural horizons. The primary cultural horizons defined above were superimposed upon a series of graphical representations of the soil chemical and particle size results (Figures 10 and 11). The Middle/Late Woodland Stratum IV horizon in Test Unit 1 roughly coincides with peak levels of phosphorous, manganese, zinc, and aluminum, as well as peak levels of very coarse sand, coarse sand, and clay (see Tables 1 and 3). Likewise, the Late Archaic horizon roughly coincides with peaks in calcium, magnesium, phosphorous, potassium, copper, organic materials, coarse sand, and clay (see Tables 1 and 3). The Late Archaic horizon also marks the environmental change discussed in the previ-

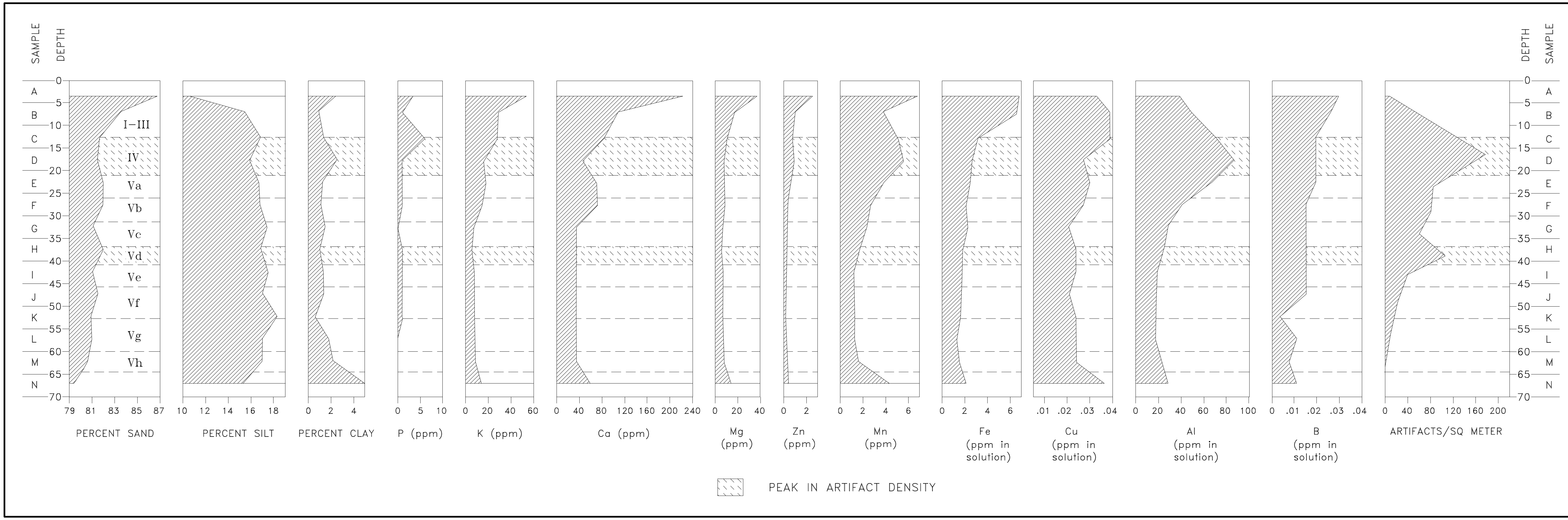


Figure 10. Site 44JC127, Test Unit 1, soil chemical analysis, soil particle size analysis, and artifact density results by level.

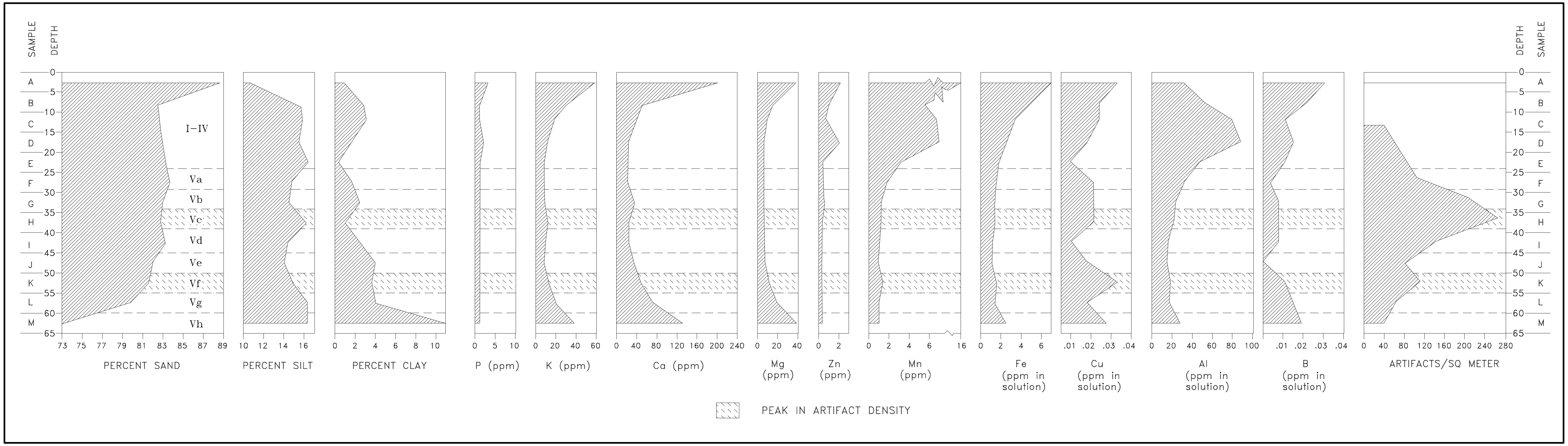


Figure 11. Site 44JC127, Test Unit 3, soil chemical analysis, soil particle size analysis, and artifact density results by level.

ous section where the percentage of very coarse sand is at zero. In Test Unit 3, artifactual information is lacking for Stratum IV, which has represented the Middle/Late Woodland horizon is all other units. The chemical element results are consistent with the results for Stratum IV in Test Unit 1, with peaks in phosphorous, manganese, zinc, aluminum, boron, and clay content present roughly 15 to 20 cm below the ground surface, coinciding with Stratum IV in the Test Unit 3 profile.

Comparative Analysis

The artifacts used in the following comparative analysis of cultural components is based on the above definition of cultural horizons, the archaeological contexts for which are summarized in Table 8. In terms of raw materials, quartz and quartzite were the most commonly used material during all of the cultural periods represented, as shown in the summary of debitage attributes in Table 9. However, quartz comprised a much greater proportion of the raw materials used recovered from the Early/Middle Archaic period than in later occupations. Quartz comprised less and less of the assemblage as time progressed, until it made up only 9% of the debitage during the Middle/Late Woodland period. Along with the declining use of quartz, we see increasing use of quartzite and metavolcanic materials (see Table 9). By the Middle/Late Woodland period, metavolcanic materials were almost as commonly recovered as quartz.

Debitage with cortex comprised nearly a quarter of the debitage assemblage during the Early/Middle Archaic period. As the use of quartz declined, so did the production of cortical flakes (see Table 9). Primary/reduction flakes were also most common during the Early/Middle Archaic period at nearly 20% of the assemblage, but these too became less common with changes to the more consistently and easily reduced quartzite and metavolcanic materials. Overall, changing patterns in the debitage classes recovered appear to be more closely related to proportional changes raw material usage patterns than to identifiable differences in the actual reduction sequence.

The artifact classes recovered within the defined cultural horizons are presented in Table 10. Artifact density increases sharply from the Early/Middle Archaic to the Late Archaic, then more gradually into the Woodland period. Several kinds of tools (including a Poplar Island hafted biface, a drill, and an unfinished biface) and nearly two-thirds of all of the fire-cracked rock were recovered from the Late Archaic cultural horizon, but both artifact classes are less common earlier and later in time. In fact, the ratio of fire-cracked rock to debitage is roughly similar during the Early/Middle Archaic period and the Middle/Late Woodland period, perhaps inferring some degree of functional similarity. Fire-cracked rock comprises a far greater percentage of the artifact assemblage during the Late Archaic, emphasizing the functional distinctness of this occupation. The presence of bone in the two most recent cultural horizons could be due either to on-site preparation of foodstuffs or differential preservation. In general, statements concerning the functional nature of these occupations are difficult to make in such a narrow window, and for this site such comparisons will be restricted to comparisons of similarity and differences.

Cultural Component	Test Unit 3		Test Unit 2		Test Unit 1		Test Unit 4	
	Level	Depth	Level	Depth	Level	Depth	Level	Depth
Middle/Late Woodland	–	–	IV/Va	17–26 cm	IV	13–21 cm	IV	(11–21cm)
Late Archaic	Vc	34–39 cm	Vc/d	30–42 cm	Vd/e	37–46 cm	Vd	(39–44cm)
Early/Middle Archaic	Vf	50–55 cm	Vf/g	47–57 cm	–	–	Vf	(49–54cm)

Table 8. Site 44JC127, cultural components and associated excavation levels used in analysis.

	P/R	S/BT	FF/S	ABF/C	TC/N	Total
Middle/Late Woodland	4 (5%)	38 (51%)	33 (44%)	0 (0%)	0 (0%)	75 (100%)
Late Archaic	4 (5%)	27 (33%)	41 (49%)	10 (12%)	1 (1%)	83 (100%)
Early/Middle Archaic	9 (19%)	16 (34%)	18 (38%)	4 (9%)	0 (0%)	47 (100%)

	Quartz	Quartzite	Argillite	Meta-Volcanic	Chert	Unident.	Total
Middle/Late Woodland	7 (9%)	62 (83%)	0 (0%)	5 (7%)	0 (1%)	1 (1%)	75 (100%)
Late Archaic	14 (17%)	63 (76%)	1 (1%)	5 (6%)	0 (0%)	0 (0%)	83 (100%)
Early/Middle Archaic	17 (36%)	29 (62%)	0 (0%)	1 (2%)	0 (0%)	0 (0%)	47 (100%)

	Cortical	Noncortical	Total
Middle/Late Woodland	13 (17%)	62 (83%)	75 (100%)
Late Archaic	17 (20%)	66 (80%)	83 (100%)
Early/Middle Archaic	11 (23%)	36 (77%)	47 (100%)

P/R=Primary/Reduction; S/BT=Secondary/Biface Thinning; FF/S=Flake Fragment/Shatter; ABF/C=Angular/Blocky Fragment/Core; TC/N=Tested Cobble/Nodule

Table 9. Site 44JC127, debitage class, raw materials, and percent cortex by cultural component.

	Debitage	Ceramics	Hafted Bifaces	Bifaces	Drills	FCR	Bone	Total Artifacts	Excav. Volume	Artifact Density
M/L Woodland	75	29	1	0	0	10	2	117	1.052 m^3	111/m^3
L Archaic	83	0	1	1	1	33	3	122	1.204 m^3	101/m^3
E/M Archaic	47	0	0	0	0	8	0	55	0.872 m^3	63/m^3

Table 10. Site 44JC127, prehistoric artifact classes by cultural component.

4: Excavation Results: Site 44JC850

Introduction

The primary role of excavations at Site 44JC850 was to document the structure and organization of one of the small Middle Woodland occupations found so often on the lobe terraces above Chisel Run. The site was chosen because of its location and the presence of an undisturbed Middle Woodland component suitable for large-scale horizontal exposures.

Site Description

Site 44JC850 is located approximately 612 m north of Site 44JC127 on the southern terminus of a wooded terrace lobe overlooking Chisel Run. The site is bounded on the west, east, and south by wetlands associated with this drainage, and is located approximately 24 m amsl. Site soils are classified as Craven-Uchee complex. A mix of young and mature oak, pine, and beech trees covers the site, with numerous tree stumps present that are indicative of past timbering.

Previous Investigations

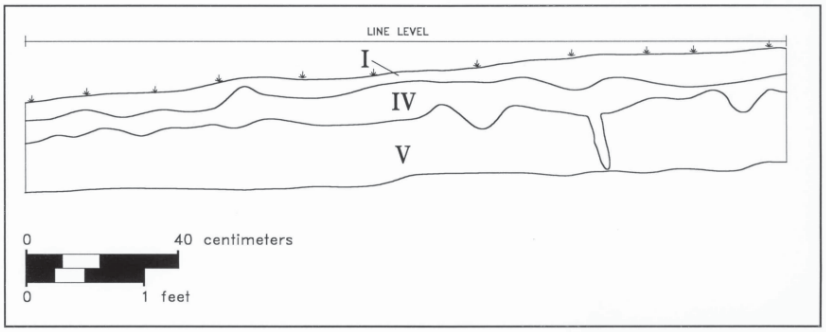
Site 44JC850 was previously investigated at the Phase II level by the WMCAR in 1996 (Higgins and Deitrick 1996b). Artifact densities were highest in Test Units 2 and 3 (n=88 and n=58, respectively); ceramic sherds were clustered in these units (n=61 and n=49). Pope's Creek sherds were concentrated in Test Unit 3 near the southern boundary of the site, and Mockley sherds were concentrated in Test Unit 2 just to the north. The artifact distribution probably was thought to reflect discrete activity areas by different cultural groups during the early and late Middle Woodland periods.

The site was also found to possesses significant vertical integrity. Eighty-eight percent (n=193) of the artifacts recovered from the test units were found in intact, cultural deposits (Strata IV and V) measuring up to 53 cm below ground surface. These deposits dated mainly to the Middle Woodland period, as indicated by Pope's Creek and Mockley ceramics. Overall, the site appeared to be a composite of short-term, seasonal campsites. The site dates mainly to the Middle Woodland period but may have an Archaic component. Chronological indicators consist of Middle Woodland ceramics of Pope's Creek (500 BC – AD 200), Varina (500 BC – AD 200), and Mockley (AD 200–900) ware types. The high frequency of ceramic artifacts suggested that activities focused on food preparation/storage: 54% (n=122) of the artifact assemblage consisted of ceramics and 33% (n=75) were fire-cracked rock. The quantity of debitage (n=24) recovered was low and suggested a focus on tool maintenance instead of manufacture. Overall, artifact density was low, indicating that the site was used sporadically for a limited range of activities. The quantity and diversity of artifacts is consistent with the results of previous Route 199 research.

Soils and Stratigraphy

Strata I–III

These strata were identified as disturbed during Phase II investigations, and were stripped from the site with shovels and discarded without screening (Figure 12). Strata I–III consist primarily of a very dark grayish brown (2.5Y3/2) silty loam beneath thin, heavily organic root mat and humus. Stratum thickness was variable, with the excavated depth averaging about 8.5 cm below the ground surface across the site. No features were identified at the



I - 2.5Y3/2 very dark grayish brown silty loam
IVa - 2.5Y5/4 light olive brown sandy loam mottled with 2.5Y4/2 dark grayish brown sandy loam
V - 2.5Y6/6 olive yellow sandy loam with occasional patches of 10YR8/2 very pale brown sand

Figure 12. Site 44JC850, Test Unit 13, west profile.

base of this level. Modern tree root systems were extensive throughout these strata.

Stratum IV

Stratum IV was identified as possibly undisturbed during Phase II investigations, and was therefore excavated as a single level during Phase III data recovery. Stratum excavation began about 8.5 cm below the ground surface, on average, and continued to an average depth of 13.8 cm below the ground surface. Approximately 8.31 m^3 of soil were excavated as part of Level IV in 40 test units. Stratum IV contained both prehistoric and historic artifacts, and therefore had been at least partially disturbed by historic activities. No features were identified. Prehistoric artifact density was about 38/m^3 in Stratum IV, about the same as in the uppermost strata 0 to 17 cm below the ground surface at Site 44JC127.

The test unit profiles show that the Stratum IV soil matrix consists primarily of a light olive brown (2.5Y5/4) sandy loam occasionally mottled with a dark grayish brown (2.5Y4/2) sandy loam (see Figure 12). Roots are less common than in Strata I–III but very common. The average stratum thickness is 5.3 cm, with a range of 2 to 11 cm.

Stratum V

Stratum V is a clearly undisturbed layer of soil with fewer roots and no historic artifacts. Stratum excavation began, on average, at about 14 cm below the ground surface, and was excavated in four arbitrary levels within the stratum. Level Va was excavated in all 40 test units; excavated volume was about 7.96 m^3, based on an average excavated depth of 5.1 cm. Level Vb was excavated in 28 test units that were selected based on the Level Va results; excavated depth averaged about 6.1 cm, and excavated volume was about 6.73 m^3. Level Vc was excavated in only Test Units 6, 9, 13, 20, and 25; the average excavated depth was 6.0 cm, producing an approximate excavated volume of 1.2 m^3. Level Vd comprised entirely of a 5-cm level excavated in Test Unit 20; excavated volume was 0.2 m^3. Overall artifact density for the 16.09 m^3 of excavated volume in Stratum V is 67 artifacts/m^3.

Soils in Stratum V consist of an olive yellow (2.5Y6/6) sandy loam with occasional patches of very pale brown (10YR8/2) sand. Roots were encountered only occasionally, and primarily in the upper portion of the stratum. Overall, the maximum excavated thickness of Stratum V was about 16 cm (30 cm below the ground surface), to the base of Level Vd in Test Unit 20.

Results of Soil Chemical and Particle Size Analysis

The primary focus of soil chemical and particle size analysis at Site 44JC850 was the horizontal distribution of particle size and chemical values within the primary cultural level. Samples were taken from Level Vb in 24 test units representing the primary activity areas in Level Vb. These samples were submitted for particle size and chemical analysis as described in the research design; the results of these analyses are summarized in Tables 11 and 12.

Figures 13 and 14 illustrate the varying percentages of clay and very coarse sand in Level Vb across the site, with high-density areas of piece-plotted artifacts superimposed upon the distribution. These "artifact zones" will be described in greater detail later in the chapter. Very coarse sand generally com-

Unit/Level	Sand							
	VCS	CS	MS	FS	VFS	Sand	Silt	Clay
5/IVa	1.7	4.3	20.0	34.4	12.3	72.7	21.6	5.7
5/Va	1.0	3.7	20.2	34.8	15.2	74.9	24.6	0.5
5/Vb	1.0	3.8	16.9	20.2	30.0	71.9	25.7	2.4
13/IVa	2.1	6.0	23.2	32.4	11.1	74.8	20.4	4.8
13/Va	2.4	5.1	18.5	29.6	15.3	70.9	24.7	4.4
13/Vb	1.3	5.2	21.9	30.7	13.0	72.1	24.8	3.1
13/Vc	1.0	4.7	19.8	34.2	13.7	73.4	23.5	3.1
25/IVa	1.8	4.8	21.3	33.9	12.7	74.5	20.8	4.7
25/Va	1.3	4.3	20.2	34.9	13.1	73.8	22.4	3.8
25/Vb	1.5	4.9	21.9	33.8	12.5	74.6	20.2	5.2
6/Vb	0.6	2.7	16.8	35.8	16.1	72.0	15.6	6.2
8/Vb	1.5	4.4	19.4	34.0	14.0	73.3	22.7	4.0
9/Vb	0.8	3.8	18.1	35.3	14.2	72.2	25.1	2.7
10/Vb	2.8	4.0	18.4	34.4	13.6	73.2	22.8	4.0
11/Vb	0.8	4.4	21.2	32.6	13.4	72.4	21.7	5.9
12/Vb	1.0	4.9	21.3	33.9	12.8	73.9	21.9	4.2
14/Vb	1.5	4.0	18.6	33.9	12.7	70.7	25.5	3.8
15/Vb	1.1	4.1	17.9	32.9	15.6	71.6	23.2	5.2
16/Vb	0.7	3.8	16.8	33.0	16.2	70.5	25.5	4.0
17/Vb	1.7	4.1	19.1	33.4	14.3	72.6	23.7	3.7
18/Vb	1.1	4.3	18.1	33.1	14.7	71.3	24.3	4.4
19/Vb	1.0	4.6	20.3	33.8	12.2	71.9	24.0	4.1
20/Vb	1.4	5.0	20.1	32.4	13.2	72.1	23.9	4.0
21/Vb	1.0	5.4	22.3	32.3	12.3	73.3	23.8	2.9
22/Vb	0.6	4.7	19.0	33.7	14.1	72.1	23.9	4.0
26/Vb	1.2	4.6	19.7	34.0	13.7	73.2	21.6	5.2
27/Vb	1.5	4.8	19.1	31.3	13.8	70.5	24.4	5.1
29/Vb	1.7	5.7	19.0	29.8	14.0	70.2	26.1	3.7
31/Vb	1.5	5.3	18.6	30.2	14.9	70.5	26.8	2.7
33/Vb	1.3	4.3	17.7	33.5	14.6	71.4	25.8	2.8
35/Vb	0.8	4.3	18.8	32.8	14.0	70.7	26.4	2.9

VCS=very coarse sand; CS=coarse sand; MS=medium sand; FS=fine sand; VFS=very fine sand

Table 11. Site 44JC850, particle size analysis (percent).

Depth (cm)	Chemical Elements (ppm in solution)											
	Ca	Mg	P	K	Mn	Zn	Fe	Al	Cu	B	pH	OM
5/IVa	15.70	3.569	0.5623	8.139	0.3019	0.3538	3.305	106.4	0.0392	0.0264	4.6	3.7
5/Va	7.144	1.855	-.0185	3.068	0.3280	0.0948	4.560	170.9	0.0151	0.0264	4.7	1.5
5/Vb	6.662	1.875	-.0340	3.757	0.1045	0.0948	4.630	140.4	0.0181	0.0226	4.8	1.9
13/IVa	9.841	2.455	-.0627	5.347	0.2409	0.1525	8.075	78.87	-.0151	0.0113	4.6	2.6
13/Va	6.780	1.972	-.1520	2.647	0.0755	0.1491	4.176	120.9	-.0121	0.0226	4.5	1.6
13/Vb	7.208	2.036	-.2458	2.297	0.0755	0.1236	3.825	110.3	-.0060	0.0188	4.6	1.5
13/Vc	6.434	1.747	-.0819	1.888	0.0842	0.0948	3.787	82.31	0.0030	0.0075	4.5	0.9
25/IVa	8.056	2.416	-.1336	5.405	0.1074	0.1050	2.845	160.0	0.0030	0.0226	4.8	2.5
25/Va	5.817	1.960	-.1307	3.886	0.0174	0.1033	4.207	103.2	0.0060	0.0113	4.6	1.9
25/Vb	5.878	1.921	-.1092	3.711	0.0174	0.1135	8.172	98.44	-.0060	0.0188	4.5	1.7
6/Vb	6.512	1.770	-.0281	2.858	0.0639	0.0542	4.551	107.4	0.0090	0.0151	4.5	1.2
8/Vb	6.750	1.713	-.0790	1.900	0.0581	0.0728	2.988	85.33	0.0060	0.0113	4.6	1.1
9/Vb	7.677	2.070	-.2089	3.232	0.0493	0.0745	2.882	139.3	-.0060	0.0226	4.6	1.7
10/Vb	5.949	1.754	-.3358	2.612	0.0174	0.1253	2.810	110.4	0.0000	0.0113	4.2	1.5
11/Vb	6.838	2.011	-.2694	2.577	0.0813	0.0830	2.944	141.4	0.0000	0.0188	4.4	1.5
12/Vb	6.649	1.653	-.2421	1.865	0.0813	0.0915	2.484	104.9	-.0060	0.0188	4.6	1.5
14/Vb	7.741	2.125	-.0362	6.643	0.0813	0.1321	3.205	98.85	0.0121	0.0113	4.6	1.5
15/Vb	6.647	1.582	-.1130	1.689	0.1103	0.0728	2.817	107.1	0.0090	0.0151	4.5	1.0
16/Vb	7.455	1.995	-.0650	2.250	0.0987	0.1253	2.844	78.98	0.0090	0.0113	4.5	1.2
17/Vb	14.23	3.269	-.0680	2.986	1.306	0.1269	2.516	99.43	0.0211	0.0226	4.3	1.3
18/Vb	8.520	2.233	-.0599	2.425	0.1626	0.0914	2.679	116.8	0.0181	0.0188	4.6	1.3
19/Vb	7.071	1.756	-.1683	1.374	0.1103	0.1507	2.377	135.8	0.0090	0.0075	4.5	1.1
20/Vb	6.610	1.706	-.1240	1.923	0.0987	0.0914	1.994	100.2	0.0090	0.0113	4.7	1.0
21/Vb	6.262	1.623	-.4297	1.923	0.1132	0.1252	3.424	159.9	0.0211	0.0151	4.6	1.5
22/Vb	6.904	1.855	-.2348	2.531	0.0842	0.1202	1.983	131.2	0.0090	0.0188	4.7	1.5
26/Vb	6.965	1.878	-.1920	3.722	0.0900	0.0711	3.182	131.9	0.0151	0.0188	4.6	1.2
27/Vb	10.06	2.233	-.0784	3.535	0.2148	0.4622	2.178	110.4	0.0332	0.0151	4.6	1.5
29/Vb	6.483	1.665	-.0281	1.537	0.1103	0.0914	1.645	63.09	0.0090	0.0075	4.7	0.9
31/Vb	6.442	1.800	-.1565	3.349	0.1103	0.0863	2.243	99.61	0.0060	0.0113	4.7	1.5
33/Vb	6.694	1.756	-.0266	1.900	0.0522	0.1270	2.185	95.73	0.0181	0.0113	4.4	1.1
35/Vb	6.437	1.651	-.2023	1.409	0.0639	0.0779	2.702	127.5	0.0121	0.0151	4.5	1.2

OM =organic materials

Table 12. Site 44JC850, chemical analysis (ppm in solution).

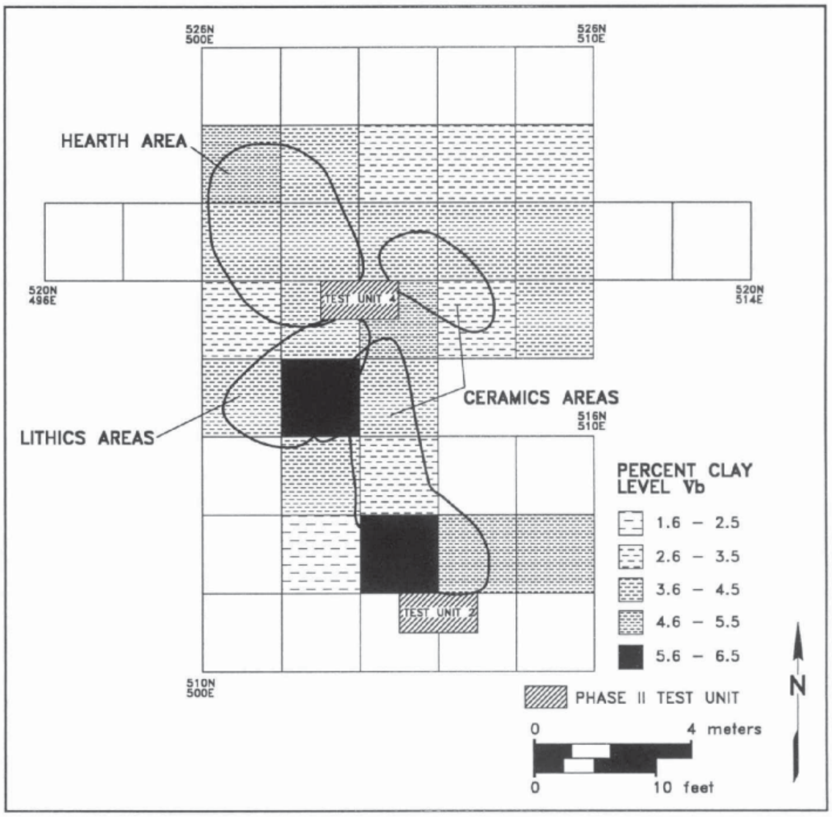


Figure 13. Site 44JC850, map of percent clay content in Level Vb.

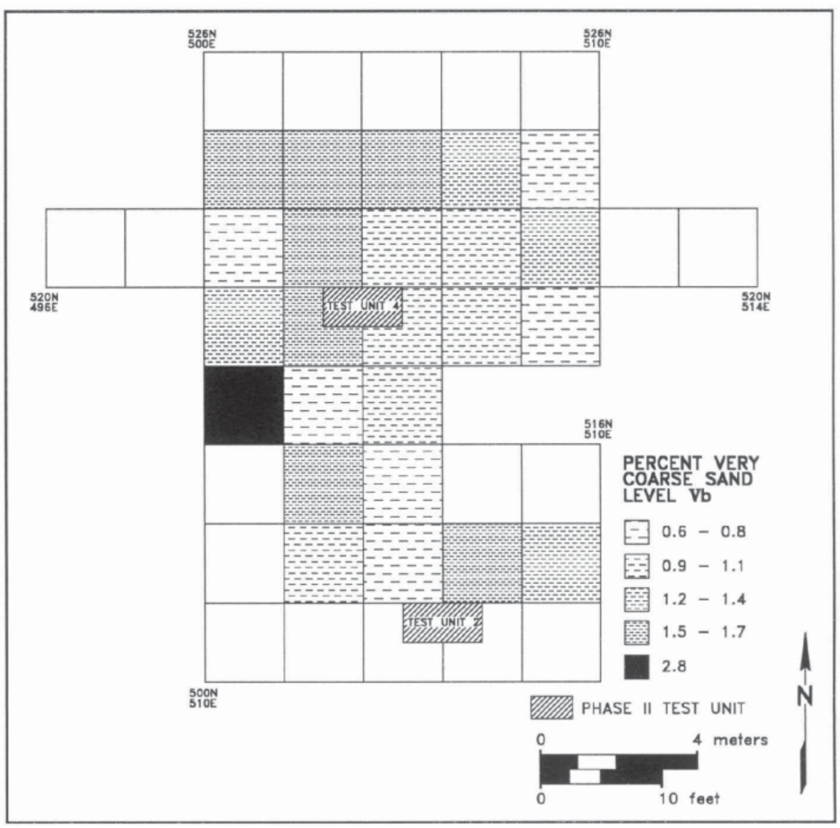


Figure 14. Site 44JC850, map of percent coarse sand content in Level Vb.

prised from 0.6 to 1.7% of the soil matrix in Level Vb; Test Unit 10, in the west-central portion of the block, contained a noticeably greater percentage of very coarse sand (2.8%) than any other tested context on the site (see Figure 14). Other portions of the site with high percentages of very coarse sand are located in the northwest and southeast corners of the excavation block. Similar "hot spots" appear in the illustration of clay content in Figure 13, corresponding closely to those in Figure 14. Neither clay nor very coarse sand appear to be noticeably related to trees or tree-like features. For both very coarse sand and clay, the highest percentages occur in portions of the block where human activities were most intense: around the bog iron hearth (northwest), the lithic reduction area (west central), and the area of ceramic pot caches (southeast). Other particle size results, such as the distribution of silt percentages illustrated in Figure 15, occasionally show partial correspondence to activity areas, but generally display a trend of decreasing (as with silt) or increasing percentages north to south downslope towards the Chisel Run drainage, depending on particle size. This suggests, in the particular environment of Site 44JC850, that it is possible that the particle size composition of the soil matrix has been altered by human occupation primarily in terms of clay and very coarse sand, with other particle sizes maintaining a more "natural" distribution.

Calcium (Ca), manganese (Mn), copper (Cu), and iron (Fe) are typical chemical components of mature or maturing soils, and have been used to identify relict, stable surfaces within archaeological deposits (Pullins 1995; Pullins and Blanton 1994a, 1994b; Shackley 1981). Copper, for instance, has been found to retain its levels in acidic soils by fixing on organic matter (Shackley 1981:36–37). Likewise, manganese is regarded as a "biophile" element that has a tendency to accumulate in zones of relatively higher organic content. Potassium (K) and phosphorous (P) are also common indicators of human activity, typically the result of bone ash, excrement, and food processing (Blanton et al. 1992; Kolb et al. 1990; Schuldenrein 1989). As Table 12 indicates, phosphorous was basically undetectable in nearly every context, including all of Level Vb. Potassium, however, generally corresponds to all three artifact-defined activity areas, especially in the vicinity of the debitage/tool concentration in the west central portion of the block (Figure 16). Concentrations of calcium and manganese are very uniform across the site, but the concentrations of both elements "spike" very strongly in the northwest corner, especially in Test Unit 17 in the vicinity of the bog iron hearth, where concentrations are as much as five times greater (Figure 17; see Table 12). Aluminum occurs in a fairly uniform fashion across the site as well, but the highest concentrations are associated with debitage, the fringe of the ceramic area, and the east central portion of the block, which contained very few artifacts. The magnesium content of the soils is somewhat less uniform than calcium and manganese, but exhibits the same strong presence adjacent to the bog iron hearth. In general, concentrations of copper and zinc increase as one proceeds upslope away from Chisel Run, while iron behaves in the opposite manner, increasing downslope toward Chisel Run; in fact, some of the lowest concentrations of iron on the site are adjacent to the bog iron hearth in the northwest corner of the block. Trends of increasing or decreasing element concentrations within Level Vb are generally gradual across the block, changing only slightly from test unit to test unit. For zinc, copper, and especially iron concentrations, one test unit contains markedly higher concentrations of the element than all of the other units, similar to the "spikes" noted for the more uniformly distributed elements. Iron is present at nearly twice the concentration of any other unit in Test Unit 25, in association with the most intensive ceramic concentrations. The same is true for zinc in Test Unit 27, near the bog iron hearth. The difference is less noticeable for copper, but the highest concentration is also in Test Unit 27 near the bog iron hearth. Overall, potassium is the only element associated with all three types of activity areas (see Figure 16). Calcium, manganese, magnesium, zinc, and (to some extent) copper all have strong, markedly higher concentrations in the vicinity of the bog iron hearth, with otherwise very uniform or gradually trending patterns of concentration (see Figures 16 and 17). Iron also follows a trending pattern, but has a noticeably high concentration in the vicinity of the ceramic vessels (see Figure 16). Aluminum is marginally associated with

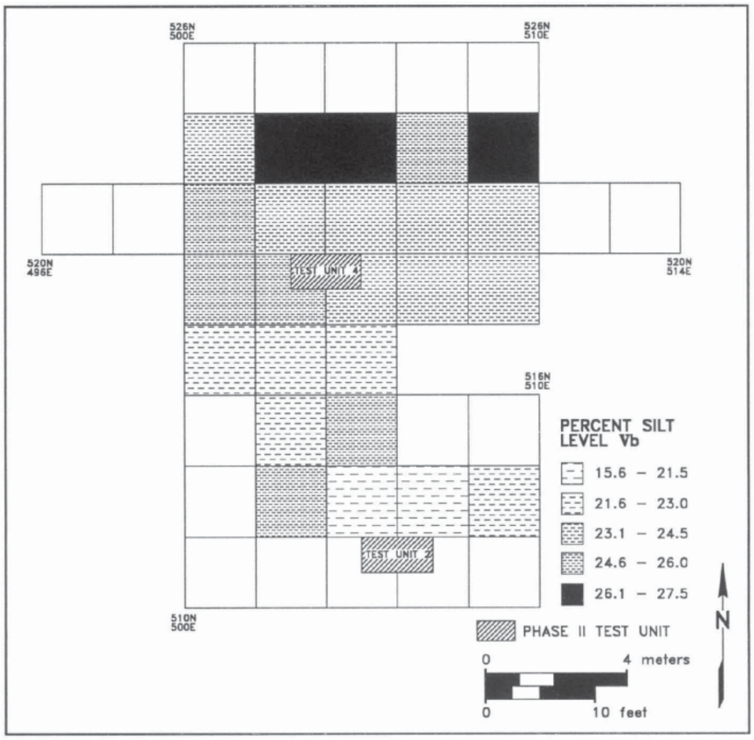


Figure 15. Site 44JC850, map of percent silt content in Level Vb.

the ceramics as well, but peaks most strongly to the northeast, away from the artifact concentrations (see Figure 16). These associations suggest that the chemical signatures of prehistoric human occupation are detectable, and provide the opportunity to develop testable hypotheses that seek not only to confirm such associations in related contexts, but also to explain the causal elements behind them. Without an explanation of the process ("middle range theory"), such patterns remain attributable to chance or other noncultural factors.

Excavation Results

Initially, 18 contiguous 2 x 2 m excavation units (Test Units 1–18) were established in a single block (Figures 18 and 19). Strata I–III were removed as a single unit and discarded without screening. Beginning with Stratum IV, excavation of each unit was conducted by hand with a trowel, and artifacts identified in situ were flagged. Upon completion of Stratum IV in each test unit, all artifacts were mapped and assigned a piece plot number, as well as vertical and horizontal coordinates relative to the site datum (100.0 m) and the site grid. Stratum IV was excavated and mapped across the entire block prior to beginning the next level. The same procedure was followed for Level Va of Stratum V; excavation was terminated at the base of Level Va in Test Units 1–4 and 7 due to the recovery of only eight artifacts from Level Va in these five units. Level Vb was excavated in the remaining 13 units, following the same procedures as before. At this point, the block was expanded to include eight additional test units to the east (Test Units 19–26) contiguous with the original block (see Figure 18). Stratum IV and Level Va were removed across this first block expansion as before. A second block expansion was then begun, this time an additional ten units to the north (Test Units 27–36) contiguous with the original block excavation (see Figure 18). Stratum IV and Level Va were removed as before. Level Vb was then removed from both of the block expansions, except in Test Units 23 and 24 (due to extensive root disturbance from the beech tree adjacent to the north of these two units) and Test Units 28, 30, 32, 34, and 36 (due to a paucity of artifacts). To confirm that the eastern and western edges of the site had been identified, four additional test units (Test Units 37–40) were excavated on the eastern and western sides of the excavation block, between the N520 and N522 gridlines (see Figure 18). Standard procedures were followed for the excavation of Stratum IV and Levels Va and Vb in all of these units.

Level Vc was excavated in only five test units (Test Units 6, 9, 13, 20, and 25). Test Units 6, 9, and 25 were selected for deeper excavation based on the high number of ceramic piece plots in Level Vb; Test Units 13 and 20 were selected precisely because there were few or no artifacts in the preceding level, to confirm that the virtual base of the cultural horizon had in fact been reached, and that there was no evidence of more a more deeply bur-

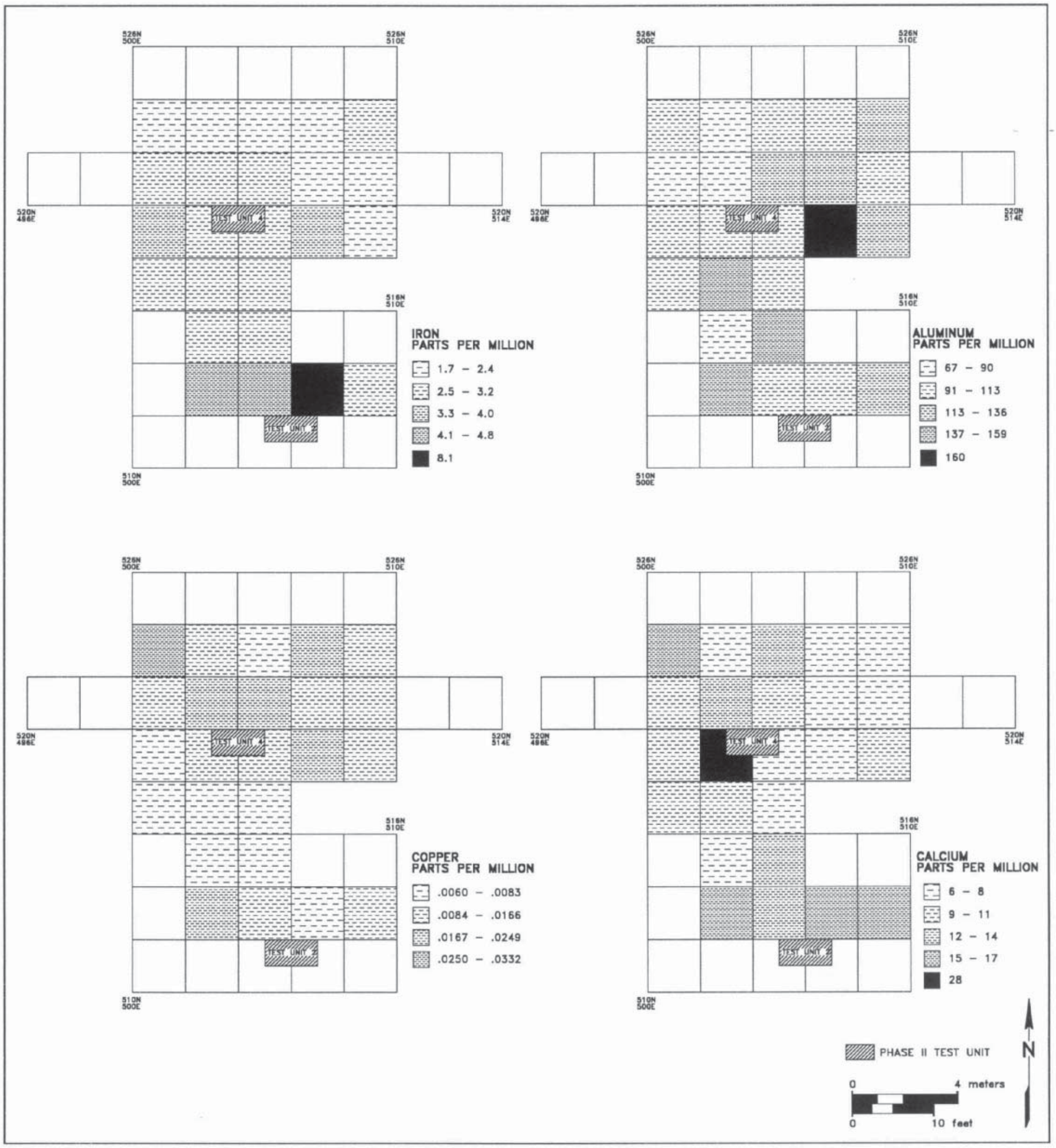


Figure 16. Site 44JC850, potassium, copper, iron, and aluminum content in Level Vb (ppm in solution).

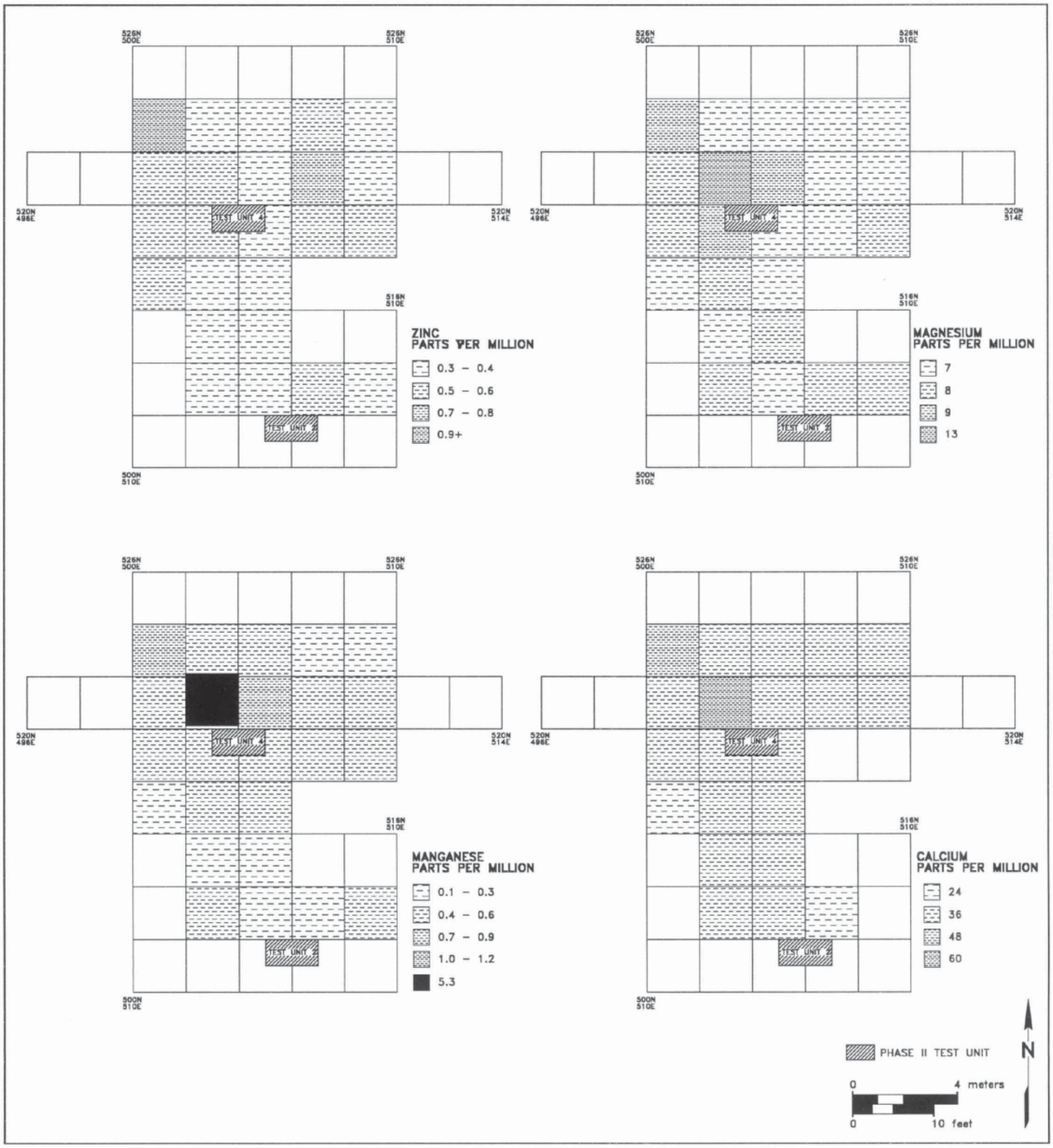


Figure 17. Site 44JC850, calcium, manganese, magnesium, and zinc content in Level Vb (ppm in solution).

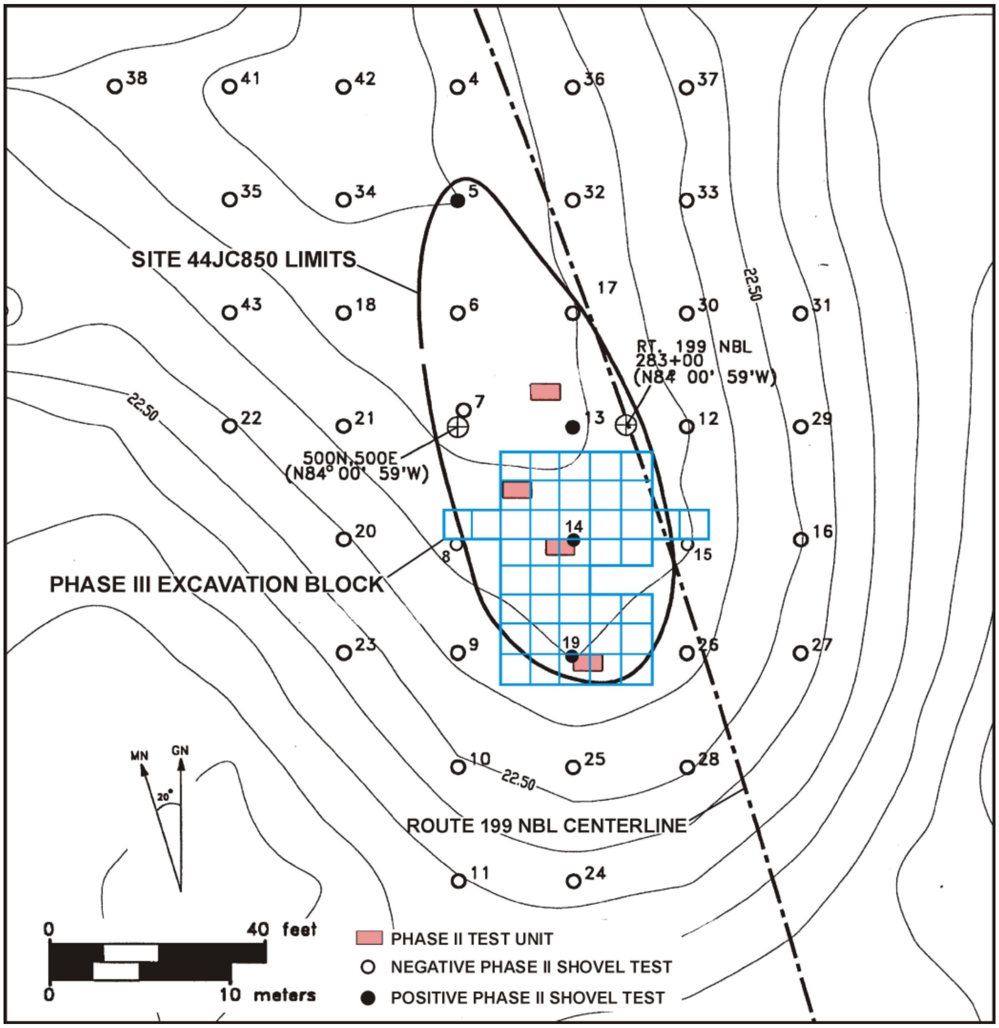


Figure 18. Site 44JC850, plan of data recovery excavations.

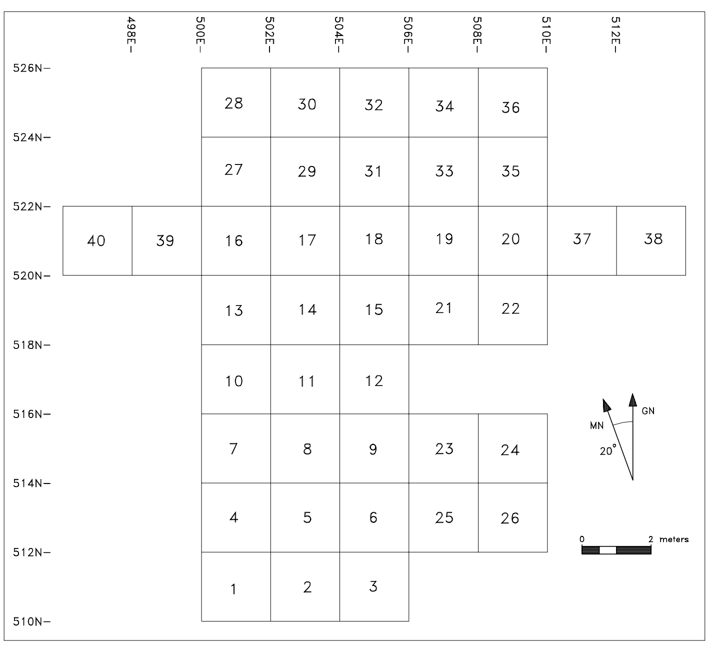


Figure 19. Site 44JC850, plan of units in data recovery excavation block.

ied activity area in these "empty" sectors. The piece plotting procedure was not used in Test Units 6 and 9, which were excavated with a shovel; standard procedures were used in Test Units 13, 25, and 20. Level Vd was excavated only in Test Unit 20, where standard procedures were followed.

A total of 1,421 prehistoric artifacts was recovered, including 376 pieces of debitage, 520 ceramic sherds, 13 tools, 1 lithic core, 492 pieces of fire-cracked rock, and 19 small bone fragments (Table 13). A total of five historic artifacts was also recovered, including 3 pieces of handmade brick, a metal nut, and a white opaque glass button; all of these were recovered from Stratum IV.

Diagnostic Tools and Ceramics

Most of the diagnostic artifacts recovered from Site 44JC850 consisted of prehistoric ceramics, 377 sherds of which could be assigned to a specific ware type. Diagnostic ceramics included 298 sherds of Pope's Creek ware (79%), 78 sherds of Varina ware (21%), and a single sherd of Mockley ware. Pope's Creek wares are thick-walled, sandy paste vessels displaying either cordmarked or knotted-net-impressed exteriors (Egloff 1989:37; Stephenson et al. 1963:92–96) (Figure 20). The ware dates to the beginning of the Middle Woodland period, with radiocarbon dates at other sites ranging from 545 BC to AD 80 (Gleach 1985:187). All but three (99%) of the identifiable Pope's Creek sherds at Site 44JC850 were net impressed; the remaining three sherds are fabric impressed on the exterior. An additional 111 sand tempered sherds that have either an unidentifiable (n=81) or eroded (n=30) surface may represent additional Pope's Creek sherds (Table 14). Varina ware is similar to Pope's Creek ware, except its coarser, rounded sands and angular crushed quartz temper (Egloff 1989:39) (see Figure 20). Mouer's (1986) original definition included only knotted-net-impressed types, which account for 90% of the Varina sherds recovered from Site 44JC850; Egloff (1989) has also recognized a cordmarked type during his study of sites in the fall line transition area, and this cordmarked type accounts for all seven Varina sherds recovered from nearby Site 44JC127 (discussed in the previous chapter). No cordmarked Varina sherds were recovered from Site 44JC850; however, eight sand-and-grit tempered sherds were recovered that are similar to Varina ware, but have fabric-impressed exterior surfaces. In addition, 13 sand-and-grit tempered sherds with unidentifiable (n=12) or eroded (n=1) surfaces were recovered that may also represent Varina sherds (see Table 14). Varina ware dates from the middle to later portion of the Middle Woodland period, ca. AD 100–500 (Egloff 1989:39; Mouer 1986:145–148). Mockley ware, commonly found throughout the Virginia coastal plain, is a shell tempered type with either cordmarked, net-impressed, or plain surface treatment (Egloff 1989:41). Only one sherd of net-impressed Mockley ware was recovered from Site 44JC850, but seven shell tempered sherds with unidentifiable (n=6) or eroded (n=1) surfaces may also be Mockley ware (see Table 14). Radiocarbon dates for the pottery from other sites encompass the latter part of the Middle Woodland, ca. AD 200–900 (Gleach 1985:186).

	Debitage	Ceramics	Hafted Bifaces	Bifaces	Other Tools	Informal Tools	Cores	FCR	Bone	Total
Level IVa*	144	105	3	0	1	1	1	64	0	319
Level Va	125	169	2	1	0	0	0	204	0	501
Level Vb	81	214	2	2	0	0	0	204	14	517
Level Vc	23	32	0	0	1	0	0	20	5	81
Level Vd	3	0	0	0	0	0	0	0	0	3
Site Totals	376	520	7	3	2	1	1	492	19	1421

* also contained historic artifacts

Table 13. Site 44JC850, prehistoric artifact classes by level.

Figure 20. Site 44JC850, selected Varina and Pope's Creek vessels (top - Vessel 3, Varina net-impressed; bottom - Vessel 1, Popes Creek net-impressed).

Temper	Surface Treatment				Total
	Fabric-Impressed	Net-Impressed	Unidentifiable	Eroded	
Level IVa					
Shell	0	0	4	1	5
Sand	1	47	25	10	83
Grit	0	1	0	0	1
Sand/Grit	2	5	4	1	12
Total	3	53	33	12	101
Level Va					
Shell	0	1	2	0	3
Sand	1	81	32	13	127
Grit	0	1	0	0	1
Sand/Grit	6	19	7	2	34
Total	7	102	41	15	165
Level Vb					
Sand	1	149	20	7	177
Sand/Grit	0	35	0	1	36
Total	1	184	20	8	213
Level Vc					
Sand	0	18	4	0	22
Sand/Grit	0	9	1	0	10
Total	0	27	5	0	32
Site					
Shell	0	1	6	1	8
Sand	3	295	81	30	409
Grit	0	2	0	0	2
Sand/Grit	8	68	12	1	89
Total	11	366	99	32	508

Table 14. Site 44JC850, ceramic surface treatment and temper by level.

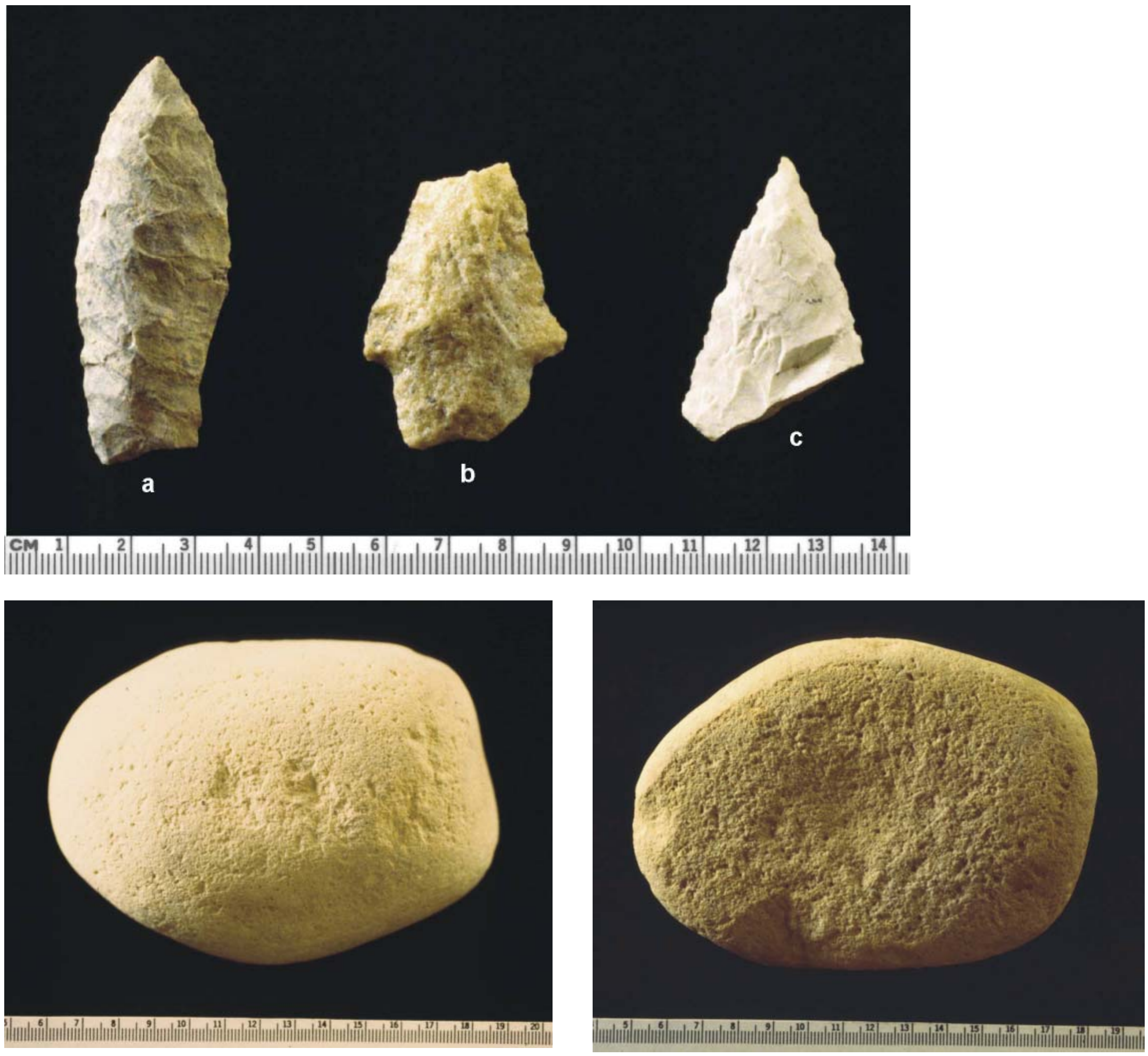


Figure 21. Site 44JC850, selected lithic tools (a - possible Paleoindian hafted biface of rhyolite [TU31, L.Va]; b - Savannah River hafted biface of quartzite [TU23,L.Va]; c - non-diagnostic distal hafted biface fragment of chert [TU19,LVb]; lower photographs - two sides of a pitted cobble/mano [TU20, L.Vc]).

Only two diagnostic hafted bifaces were recovered from Site 44JC850 (Figure 21). One is the basal fragment of a quartzite Savannah River hafted biface, recovered from Level Va of Test Unit 23. Savannah River hafted bifaces typically date to the Late Archaic, ca. 3000–1300 BC. The second piece is a distal fragment of an unidentified hafted biface, made from rhyolite. This point was lanceolate in shape and waisted towards the proximal end, but it is not fluted. Based on the shape, characteristics of manufacture, and raw material, this point is thought to date from the Paleoindian period, prior to 8000 BC. The only other rhyolite recovered from the site was a piece of debitage and a projectile point.

In summary, diagnostic artifacts indicate that the site dates primarily to the Middle Woodland period, ca. 545 BC – AD 500; isolated hafted bifaces from the Late Archaic and Early Woodland periods were also recovered.

Tools. A total of 13 lithic tools were recovered, eleven of which were recovered in situ and piece plotted (see Figure 21). Over half of the tools were hafted bifaces (n=7); most were fragmentary, consisting of the distal portion (n=4) or the midsection (n=1). Two of the distal portions were made from quartzite, one from chert, and one from rhyolite; the midsection was made from quartzite. Another of the hafted bifaces is a basal fragment of a quartzite Savannah River hafted biface, piece plotted in Level Va of Test Unit 23. The remaining hafted biface was a distal fragment of what is probably a rhyolite Paleoindian hafted biface, piece plotted in Test Unit 31. Only three unfinished bifaces were recovered: two from Test Unit 6 and one from Test Unit 11. The bifaces in Test Unit 6, near an intense concentration of ceramics, are both unidentifiable fragments of Stage 4 bifaces, one quartzite and one quartz. The remaining biface is an unidentifiable fragment of a quartzite Stage 2 biface, piece plotted in Test Unit 11 in the midst of the densest area of debitage. The only informal tool recovered is a quartz retouched flake with a concave edge, piece plotted in Test Unit 10 near the Stage 2 biface.

Debitage

Attributes for the 376 pieces of debitage recovered are presented in Table 15. Most of the debitage are flake fragments or shatter (45%), followed closely by secondary/bifacial thinning flakes (38%). Angular/blocky fragments comprised 11% of the debitage assemblage, with primary/reduction flakes accounting for only 6%. A single example of a tertiary flake was recovered; no tested cobble/nodules or bipolar flakes were identified. The majority of the debitage is either quartzite (70%) or quartz (24%), percentages that are nearly identical to the overall percentages at Site 44JC127. However, quartz is far more common at Site 44JC850 than in the Middle/Late Woodland horizon at Site 44JC127, where quartz accounts for only 9% of the debitage assemblage. Chert was more common at Site 44JC850 as well, with 21 pieces (6%) recovered. Two pieces of metavolcanic material were recovered, in addition to a single piece of rhyolite debitage. Most of the debitage is noncortical (72%), again similar to the overall composition of the Site 44JC127 assemblage but quite different from the Middle/Late Woodland horizon.

Faunal Remains

A total of 19 pieces of small, burned bone fragments were recovered from Levels Vb and Vc (see Table 13). Fourteen of these were recovered in Test Unit 6, in the vicinity of Feature 3 (described below). Four more were recovered from the adjacent Test Units 5 and 9, with the remaining bone fragment in Test Unit 11; all fragments were very small and unidentifiable.

Site Structure

Features. Three features were identified that were not associated with trees, roots, or other noncultural disturbances. Feature 1 is a hearth comprised of 210 pieces bog iron, fire-cracked rock, and (primarily) burned bog iron (Figure 22). No discoloration of the soils in or around the hearth could be identified, so the hearth was defined based on the concentration of artifacts. The main portion of the hearth is about a meter in diameter.

Feature 2 consists of a pot drop or cache in Test Unit 18 (Figure 23). Again, no soil stain exists for the feature, which relies on its artifact distribution for definition. The eleven ceramics recovered from this feature are all Pope's Creek sherds, and are probably related to Vessel 4 and the activity area known

	P/R	S/BT	T/RF	FF/S	ABF/C	Total
Level IV	7 (5%)	63 (44%)	0 (0%)	64 (44%)	10 (7%)	144 (100%)
Level Va	4 (3%)	50 (40%)	1 (1%)	56 (45%)	14 (11%)	125 (100%)
Level Vb	7 (9%)	22 (27%)	0 (0%)	44 (54%)	8 (10%)	81 (100%)
Level Vc	3 (13%)	6 (26%)	0 (0%)	6 (26%)	8 (35%)	23 (100%)
Level Vd	2 (67%)	0 (0%)	0 (0%)	1 (33%)	0 (0%)	3 (100%)
Site Total	23 (6%)	141 (38%)	1 (<1%)	171 (45%)	40 (11%)	376 (100%)

	Quartz	Quartzite	Rhyolite	Metavolcanic	Chert	Total
Level IV	33 (23%)	106 (74%)	1 (<1%)	2 (1%)	2 (1%)	144 (100%)
Level Va	25 (20%)	92 (74%)	0 (0%)	0 (0%)	8 (6%)	125 (100%)
Level Vb	24 (30%)	54 (67%)	0 (0%)	0 (0%)	3 (4%)	81 (100%)
Level Vc	7 (30%)	8 (35%)	0 (0%)	0 (0%)	8 (35%)	23 (100%)
Level Vd	0 (0%)	3 (100%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)
Site Total	89 (24%)	263 (70%)	1 (<1%)	2 (<1%)	21 (6%)	376 (100%)

	Cortical	Noncortical	Total
Level IV	33 (23%)	111 (77%)	144 (100%)
Level Va	38 (30%)	87 (70%)	125 (100%)
Level Vb	20 (25%)	61 (75%)	81 (100%)
Level Vc	12 (52%)	11 (48%)	23 (100%)
Level Vd	2 (67%)	1 (33%)	3 (100%)
Site Total	105 (28%)	271 (72%)	376 (100%)

P/R=Primary/Reduction; S/BT=Secondary/Biface Thinning; T/RF=Tertiary/Retouch; FF/S=Flake Fragment/Shatter; ABF/C=Angular/Blocky Fragment/Core

Table 15. Site 44JC850, debitage class, raw materials, and cortex by level.

as Area F (described below). Feature 3 is also a pot drop or cache, but far more dense and concentrated than Feature 2 (Figure 24). Most of the ceramics recovered were Pope's Creek, specifically Vessels 1 and 2, but also including part of Varina Vessel 3. Feature 3 forms part of the activity area defined as Area C, discussed below.

Eight other features (Features 4–11) were also excavated, but were all determined to represent natural disturbances from old trees and roots. The only artifacts recovered from any of these features were two pieces of bog iron from Feature 6, located in Test Unit 16 near the bog iron hearth (which probably represents the source of the cultural material).

Artifact Distribution. The block excavation was conducted so that the full vertical and horizontal extent of the Middle Woodland occupation would be exposed and documented (see Figure 18). A total of 160 m^2 (40 2 x 2 m test units) was opened to the base of Stratum IV. Artifact density in this level was about 38/m^3. The same area was opened to the base of Level Va, where the artifact density increased to about 63/m^3. A total area of 112 m^2 (28 test units) was opened to the base of Level Vb, where artifact density peaked at about 77/m^3. Artifact density began to decline in Level Vc to about 48/m^3, excavated in five test units (20 m^2). The artifact density in Level Vd of Test Unit 20 was only 15/m^3. From a vertical perspective, the Middle Woodland horizon is distributed over approximately 27.5

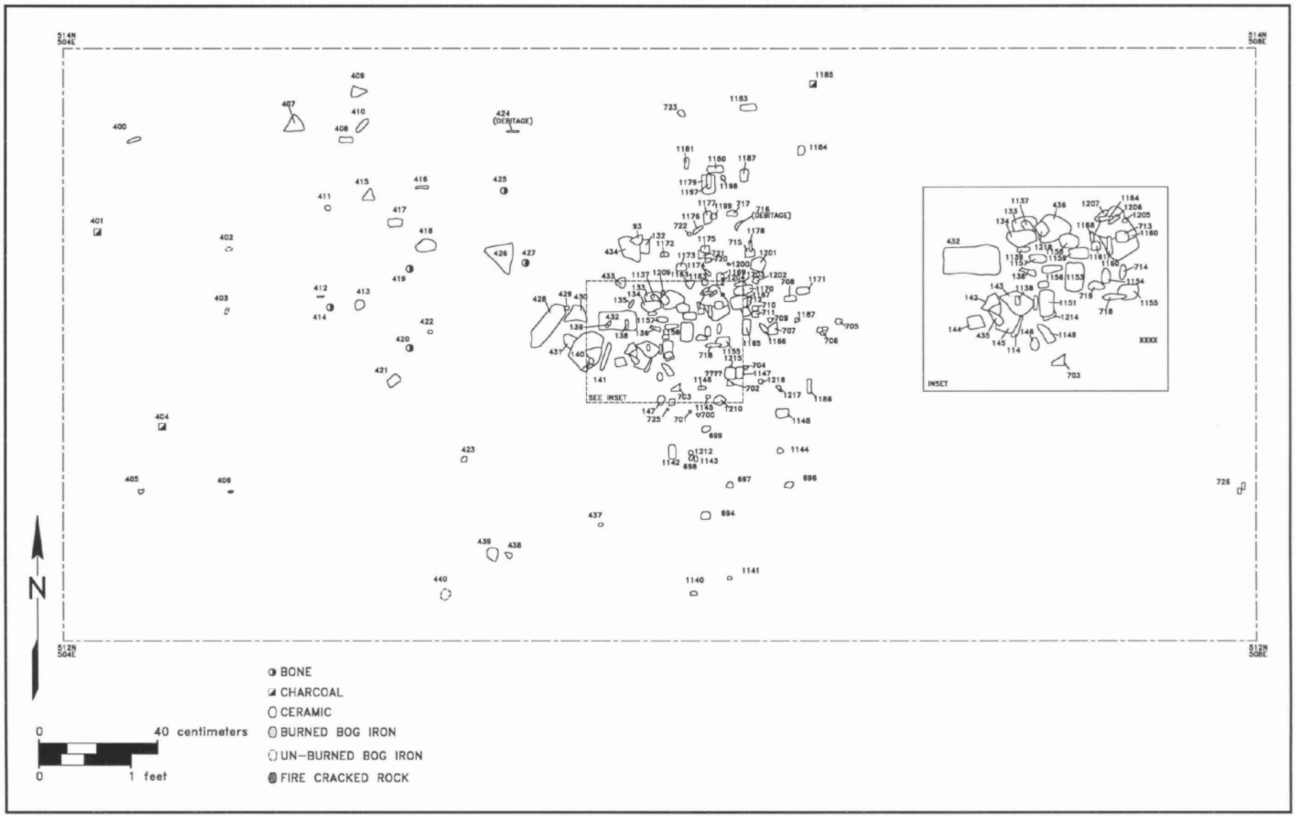


Figure 22. Site 44JC850, Feature 1, plan view.

cm, from about 8.5 to 36 cm below the ground surface, with the most artifactually dense deposits in Level Vb 19 to 25 cm below the ground surface. This demonstrates that the full vertical extent of the Middle Woodland occupation is encompassed within the excavations.

Figure 25 illustrates the distribution of total artifacts in Levels IV, Va, and Vb for those test units excavated to the base of Level Vb. This map defines the basic limits of the Middle Woodland occupation, also shown in Figure 25, and demonstrates that the full horizontal extent of the Middle Woodland occupation is encompassed within the excavations. The core of the Middle Woodland occupation measures about 18 m northwest-southeast and 8 m northeast-southwest.

Hand-troweling and piece-plotting every artifact encountered *in situ* allowed for the production of detailed, three-dimensional maps of artifacts in the Middle Woodland occupation. These piece plot results were examined both from a two-dimensional perspective, as presented in Figures 26–28, and on three-dimensional plots created using VRML and examined directly on the computer screen. Figure 26 shows the distribution of piece plotted debitage and flaked stone tools from all excavated levels. These results describe three general areas of lithic reduction activities (A, B, and C). Area A is the most densely packed zone of lithic debitage, and corresponds to one of the areas of high overall artifact concentration described in Figure 25. When examined on a three-dimensional plot, the debitage and tools in Area A also exhibit a greater variation in elevation, extending further below the densest artifact horizon. Four tools were recovered in association with the debitage in Area A, three of which were piece plotted (see Figure 26). These tools include two hafted biface tips and a fragment of a Stage 2 hafted biface, all made from quartzite. The remaining tool is a quartz retouched flake.

Area B is a more diffuse scatter of debitage and tools encompassing much of the eastern portion of

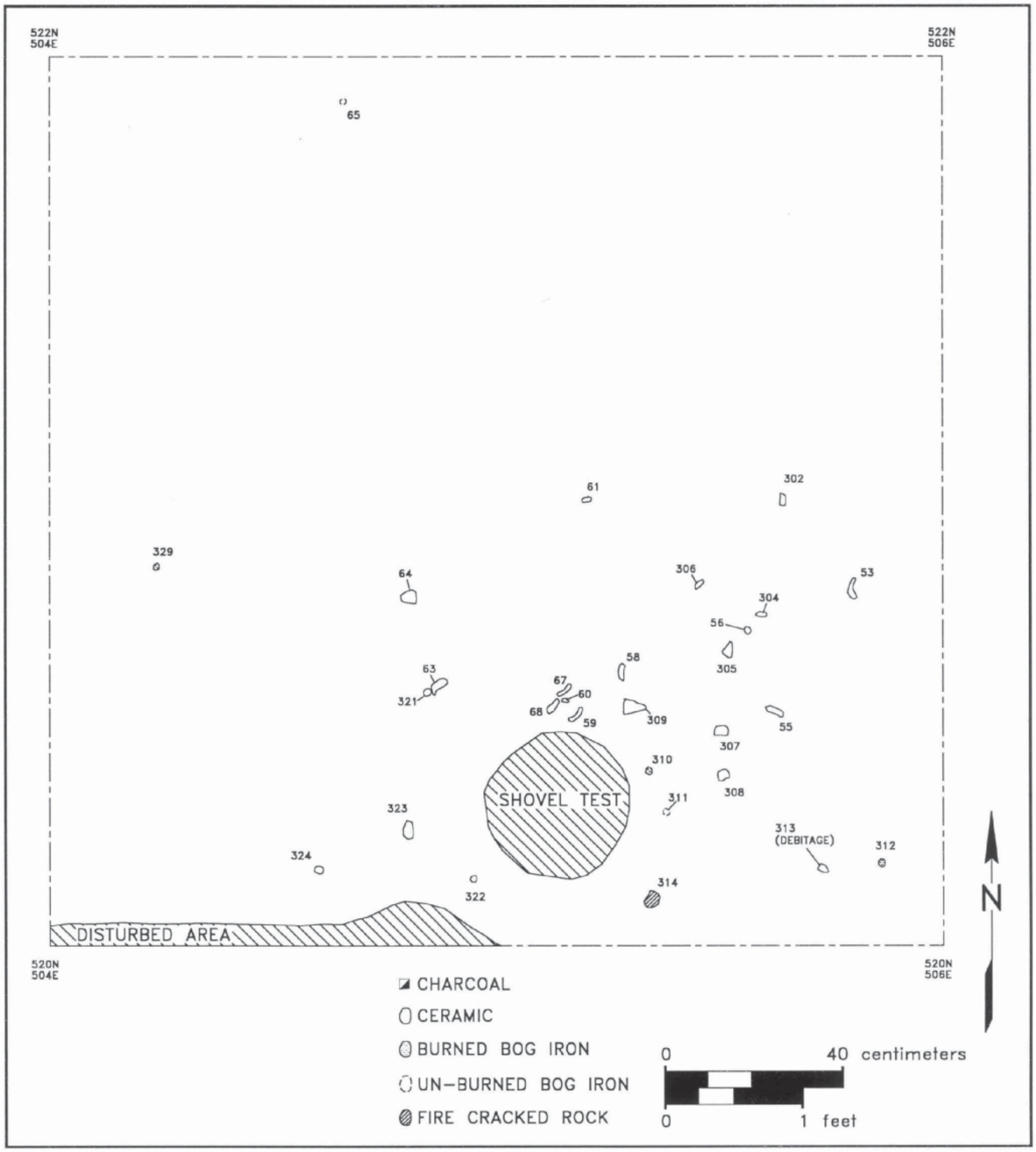


Figure 23. Site 44JC850, Feature 2, plan view.

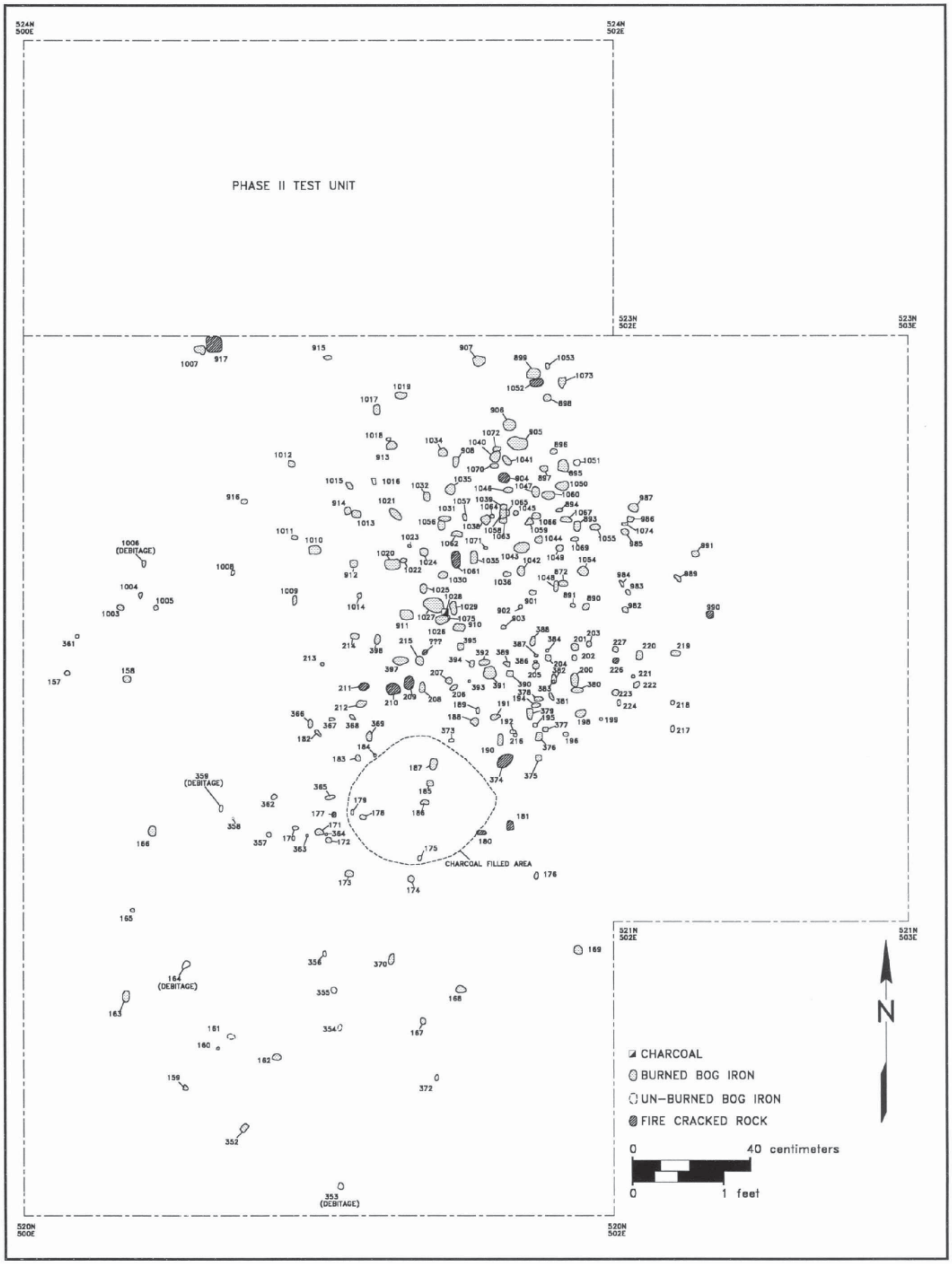


Figure 24. Site 44JC850, Feature 3, plan view.

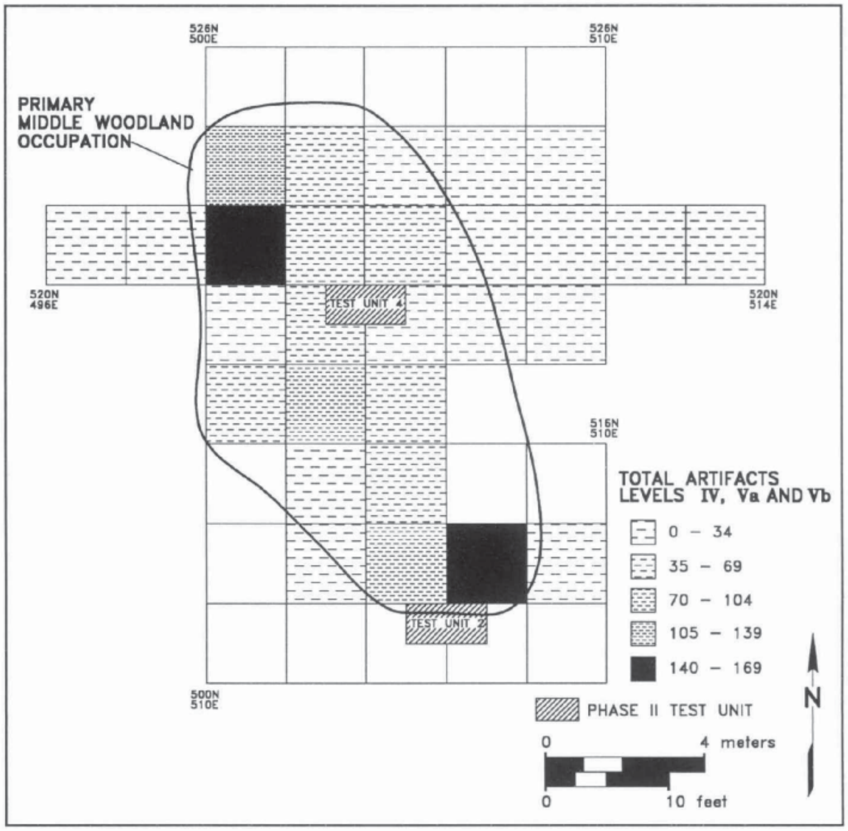


Figure 25. Site 44JC850, map of total artifact distribution for Test Units with excavated Levels IV, Va, and Vb.

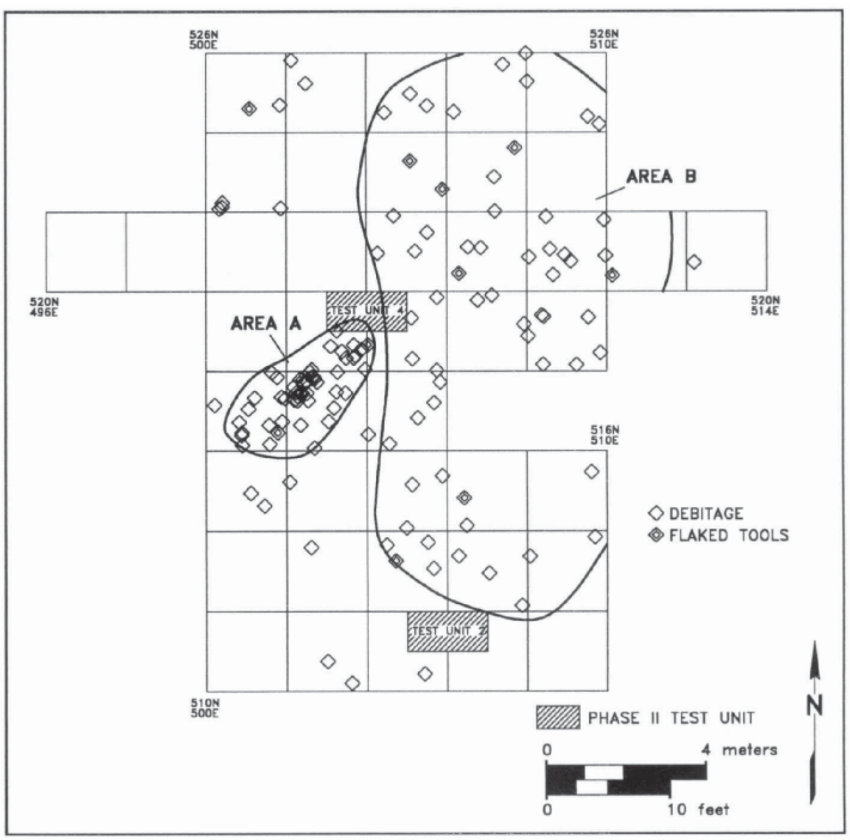


Figure 26. Site 44JC850, map of piece plotted debitage and flaked stone tools.

the site (see Figure 26). Tools were recovered primarily in two groups in the southern and northern portions of Area B. Three tools were recovered in the southern portion of Area B, two of which were piece plotted; these include two fragments of Stage 4 bifaces, one made from quartz and the other from quartzite, and the base of a quartzite Savannah River hafted biface. Four tools were recovered in the northern portion, including the rhyolite Paleoindian hafted biface, the rhyolite hafted biface tip, a chert hafted biface tip, and the midsection of a quartz hafted biface. A quartz core fragment was also recovered in Area B east of the northern tool group. The tools, raw materials, and organization of Area B appear to differ from the highly focused Area A, and probably represents an earlier occupation of the site sometime during the Archaic period. Another flaked tool of unknown function was recovered in a more isolated situation in the northwest corner of the block excavation. This oval to diamond-shaped tool was small, only about 2.5 cm in length, and probably made from a quartz flake. It is located just north of the bog iron hearth, described below, and probably belongs to the Middle Woodland occupation.

Figure 27 shows the distribution of all piece plotted ceramics, including Pope's Creek, Varina, and untyped wares. These ceramics group very clearly into four areas (C, D, E, and F), based on ware types. Area C is the densest concentration, and is comprised mainly of the Pope's Creek vessel in Feature 3 (Test Units 6 and 25), but also includes some Varina sherds. Most of the bone fragments recovered (74%, n=14) were found in Test Unit 6 in Area C as well. Area E is a small but well-defined group of Pope's Creek sherds in the same area as the dense lithic concentration (Area A) described above. Both of these groups of Pope's Creek ceramics partially overlap with Area D, comprised primarily of Varina sherds (see Figure 27). A third area of Pope's Creek ceramics can be defined in Area F part of which was previously defined as Feature 2. Area F is relatively isolated from the other ceramic concentrations. From a three dimensional perspective, these ceramic concentrations appear to all belong to the same cultural horizon, with none consistently deeper than the rest, suggesting that they are contemporaneous. Area C, the densest concentration, does encompass a greater vertical distribution, but all of the other areas are at about the same level of the densest portion of the concentration. Ceramics that are not part of these four areas are generally scattered to the east, with a few pieces appearing around the bog iron hearth.

Crossmending of ceramic artifacts resulted in the definition of at least seven distinct vessels, four of which are Pope's Creek (Vessels 1, 2, 4, and 5) and three of which are Varina (Vessels 3, 7, and 8) (Figure 29; see Figure 20). Area C contains at least three distinct vessels: Pope's Creek Vessel 1, Pope's Creek Vessel 2, and part of Varina Vessel 3. Mends for Vessels 1 and 2 are closely grouped within Area C; mends for Vessel 3 show two separated portions associated with Area C and Area D. Pope's Creek Vessel 4 is well separated from the other vessels, associated with Area F. Pope's Creek Vessel 5 and Varina Vessels 7 and 8 have not been identified as part of any concentrated area of ceramics, but appear to be fragments of discarded vessels scattered about the site. No clearly distinct vessel was defined for the Pope's Creek ceramics in Area E. Overall, it appears that Pope's Creek Vessels 1, 2, and 4 may have been crushed in situ, while Varina vessels are more scattered. If the in situ ceramic concentrations represent cached vessels, then it appears that Pope's Creek ceramics are more likely to be cached than Varina wares, which were more scattered across the site.

Figure 28 shows the distribution of bog iron, burned bog iron, and other fire-cracked lithic materials. Feature 1, a hearth consisting mainly of burned bog iron, clearly dominates the distribution and is concentrated in Area G along with a few pieces of fire-cracked rock. Unburned bog iron is scattered about the site in an unpatterned fashion, as are a few pieces of burned bog iron. There appear to be two additional areas of scattered fire-cracked rock that may be associated with the earlier component of the site. Areas H and I occur within the scatter of lithic debitage and tools earlier defined as Area B (see Figure 26). The fire-cracked rock in Area H appears in the vicinity of the three tools in the southern portion, and Area I encompasses the same area as the four tools in the northern portion of Area B.

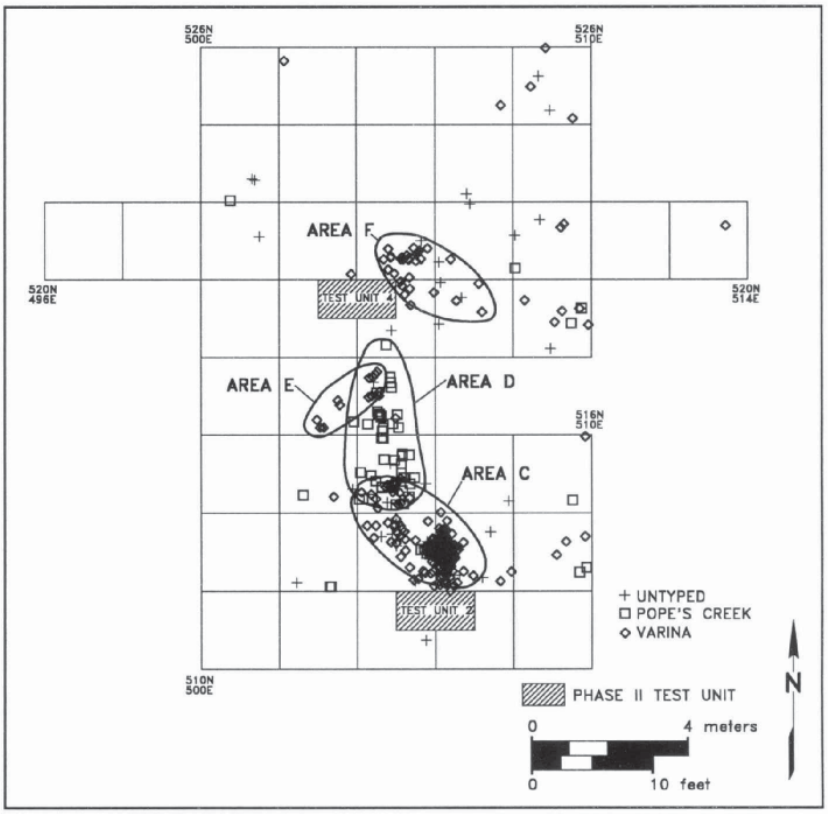


Figure 27. Site 44JC850, map of Pope's Creek, Varina, and untyped ceramics.

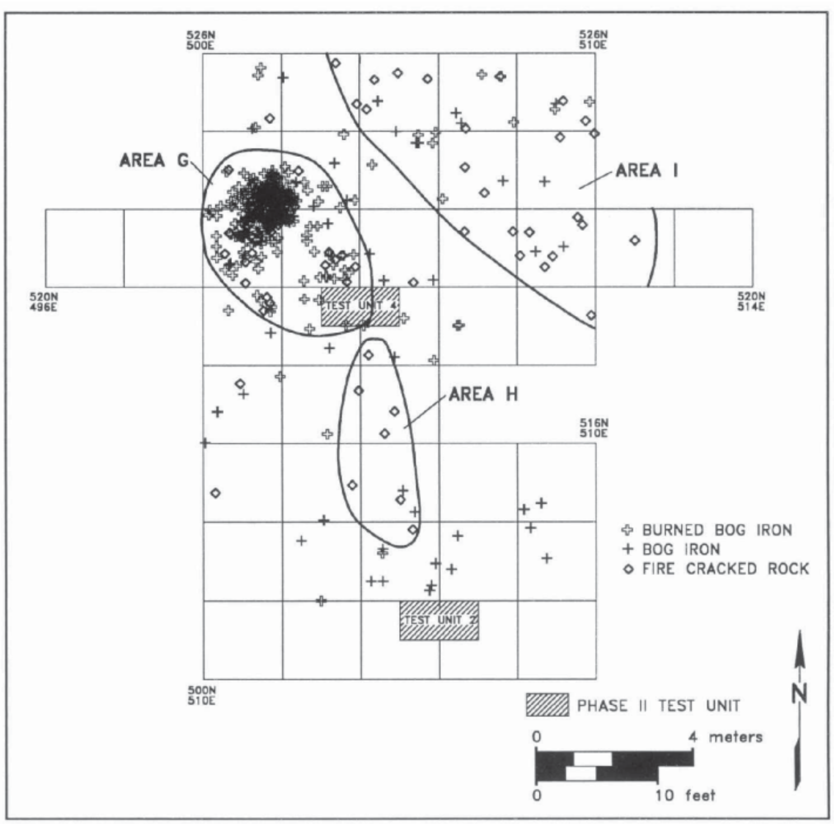


Figure 28. Site 44JC850, map of bog iron, burned bog iron, and fire-cracked rock.

Summary. Figure 30 illustrates the composite structure of the Middle Woodland component at Site 44JC850, based on overall artifact density. Activity areas, as defined by the distribution of ceramics, debitage and tools, and hearth materials, are for the most part discrete, well defined, and linearly arranged northwest to southeast. The hearth is in the northernmost portion of the site, with few artifacts other than bog iron and fire-cracked rock recovered nearby. One formal tool and a few pieces of debitage and ceramics (including Varina Vessel 8) were scattered about the hearth and appeared somewhat separated from the primary concentrations of these artifacts, but otherwise the area around the hearth had very few artifacts other than those from the hearth itself. The ceramic concentrations overlap somewhat with the lithic debitage and tools, but the densest and most patterned distribution of ceramics occurs to the southeast of the lithic activity area. The site appears to have at least three areas where distinct, exclusive, and non-redundant activities were carried out with minimal overlap and with no indication that the site was organized around a central area.

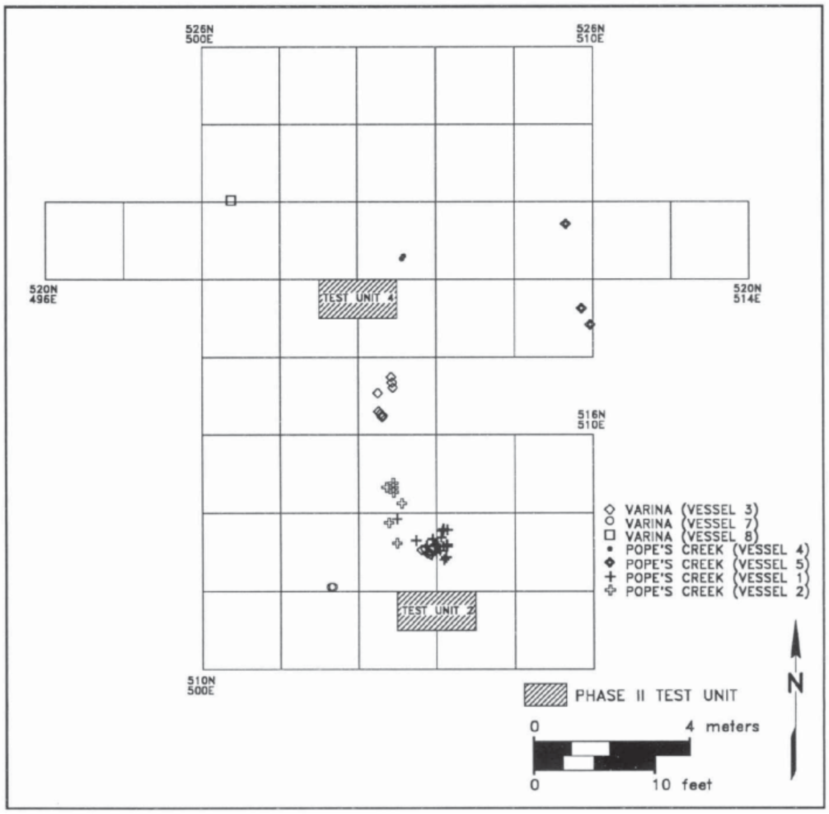


Figure 29. Site 44JC850, map of individual vessels.

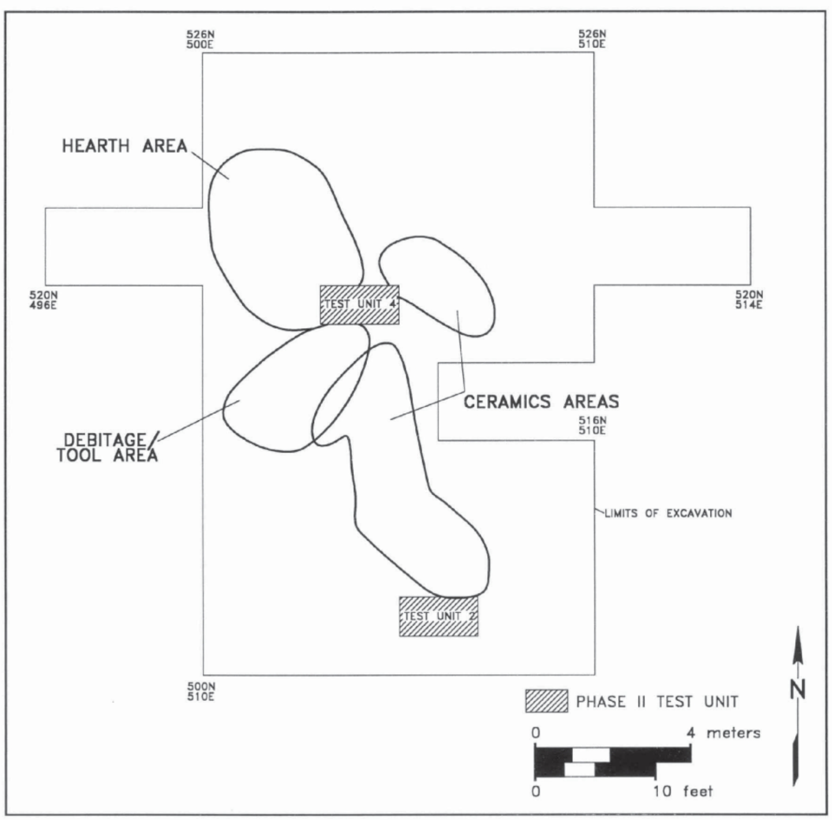


Figure 30. Site 44JC850, map of Middle Woodland site structure.

5: Chisel Run Middle to Late Holocene Environmental Context

Better definition of the local environment is a central goal of this project. Simply put, the intention is to outline in more detail than was previously known just what the environmental parameters, or limiting factors, were for the populations operating in the Chisel Run-Powhatan Creek basin. The principal time of interest is after about 1000 BC, effectively bracketing the entirety of the Middle and Late Woodland cultural periods. This segment of time matters most given the emphasis placed elsewhere in the report on the expansion of settlement in the interior uplands during the Middle Woodland. The findings of the project extend to earlier periods, too, and they will be addressed but with less emphasis. The results will be presented separately depending on whether they pertain to the upland or wetland settings, since the methods to obtain them and their physical nature are different. It is important to add that the samples obtained are from locations contained within the project right-of-way and, thus, are most representative of that area.

The main issues that this work was intended to address are outlined in the Chapter 2, Research Design, but can be summarized for convenience here:

1. What subsistence and other resources were available for prehistoric human populations in the Chisel Run basin, and how did their availability change over time?
2. Does the relatively intensive Middle Woodland settlement trend correspond wholly or in part to a positive change in the local environment, such as expansion of interior wetlands or emergence of new plant communities?
3. What does the depositional context of the terrace sites tell us about climatic trends such as shifts from more to less xeric conditions?

Depositional History and Environment of the Upland Terraces

Though limited by the project's spatial extent, the information recovered is expected to be generally representative of terrace settings over most the drainage basin. The depositional contexts in the project area are variable across a limited distance, ranging from rather deep and sandy at one site to more shallow and silty at the other, a situation observed elsewhere along the drainage. The deeper ones, in particular, are of interest given the regional literature which proposes a period of active aeolian deposition in some areas (Custer 1989:179–181). Part of this discussion will include results from other project areas to expand the scope. The methods used in the field and lab to obtain depositional information are described in Chapter 2.

Some repetition of information in Chapters 3 and 4 is required to address these issues more fully, and this chapter begins with a review of the characteristics of the upland deposits at 44JC127 and 44JC850. A review of stratigraphic information reported from other sites in the vicinity will follow. An interpretation of the local record with reference to prevailing models will conclude the section.

Record of Upland Deposition at 44JC127

Deposits at 44JC127 are distinctive from those at 44JC850, since at 44JC127 artifact-bearing deposits are twice as deep (averaging 60 cm thick above subsoil) and are noticeably sandier. The origin of the sediment and depositional processes at 44JC127 are of strong interest with the understanding that they may be of an aeolian nature. The contrasting deposits at these sites is even more curious given the fact that both occur at roughly 18 m amsl, both are situated on low terrace lobes, and both lie a similar distance to the present stream valley margin (see Figure 2).

A consistent depositional record was revealed in contiguous units 1–4 at Site 44JC127. The major trends observed are as follows:

1. Throughout the column, fine sands generally comprise more than 44% of the sediment in a given level, and percentages of fine sand, medium sand, very fine sand, and coarse sand vary little from top to bottom.
2. Percentages of very coarse sand are steady deeper than 35–45 cm below the ground surface and at these depths in Test Units 1 and 2 the percentage of very coarse sand drops to zero (see Figures 7 and 8).
3. The decline in very coarse sand is accompanied by an increased clay fraction (see Table 2). The clay fraction increases sharply at or just below the zero-level of very coarse sand, indicating a change in the depositional environment at that point in the column.
4. Soil chemistry appears to corroborate the depositional change at this level. In Test Unit 3, for example, peaks in pH value, organic material, phosphorous, potassium, calcium, zinc, and copper all occur either at the same level, 5 cm above, or 5 cm below the point where the percentage of very coarse sand falls to zero (30 to 35 cm below the ground surface).
5. There is no evidence of the "fining upward" sequence that usually characterizes alluvial overbank deposits, a characteristic which may indicate an aeolian origin for at least a portion of the deposits.
6. The observed change in soil chemistry and particle size coincides with the level of the Late Archaic occupation of the site (ca. 3000–1500 BC), which itself represents an increase in the density of tools, fire-cracked rock, bone fragments, and other artifacts.
7. Silty lamellae have formed in the lower portion of Stratum V, deeper than about 25 cm below surface. Lamellae form beneath relict ground surfaces and are characteristic of fairly stable deposits (Anderson and Schuldenrein 1985).

Record of Upland Deposition at 44JC850

Artifact-bearing deposits at 44JC850 average only 25–30 cm thick, yet the total thickness of soil above clay subsoil is deeper than at 44JC127, reaching to 65–75 cm below surface. Only the upper, undisturbed strata were systematically excavated during data recovery, representing Strata IV and V as defined during the evaluation (Higgins and Deitrick 1996a). The maximum depth of the data recovery excavation corresponds to the sharp decline in artifact frequency at about 30 cm below surface. Notable characteristics of the deposit are as follows:

1. This entire sediment package is finer in texture than that at 44JC127, as the percent sand tended to fall at less than 73% in contrast to 44JC127 where sand never comprised less than 80% of the column. Concomitantly, the percent silt is higher at 44JC850 where it ranges from about 21–35%; at 44JC127 silt ranges through the column from 14.5 to almost 16%.
2. Fractionation of the sand particles in the column provides a similar distribution as seen at 44JC127, with fine sand dominating. Sand fractions tend to be comparable through all levels.
3. Very coarse and coarse sand fractions decline significantly 20–30 cm below the surface (Stratum V), as the percent of very fine sand and clay rise. This peak in the proportion of clay and, to a lesser extent, fine sand at 20–40 cm below surface corresponds to the level of greatest artifact concentration in Stratum V.
4. At this same point in the column (20–40 cm bs), peaks in the chemical elements calcium, and aluminum are particularly notable, as is a corresponding drop in the amount of phosphorous. There is no increase in organic matter.

5. As at 44JC127, there is no evidence of a clear fining-upward sequence indicative of alluvial deposition.
6. The tandem textural and chemical changes 20–40 cm below surface coincide with the level of highest artifact density, most of which date from the Middle Woodland period (AD 200–900).
7. Silty lamellae have formed in the lower portion of Stratum V, deeper than 50 cm below surface. Lamellae form beneath relict ground surfaces and are characteristic of fairly stable deposits (Anderson and Schuldenrein 1985).

Phytolith Record at 44JC850

Phytoliths are relatively durable, siliceous components of plants that not only can be recovered from archaeological sites but can be diagnostic of particular plant families or species. Their recovery and analysis is not yet a routine element of research on sites in the Mid-Atlantic region but interest in their usefulness is growing. As a pilot investigation, five samples from 44JC850 were submitted to Dr. Lisa Kealhofer for phytolithic analysis, and her complete report can be found in Appendix D. The five samples were all derived from Level Va in the block excavation, and the three from Units 6, 16, and 18 also correspond with Features 3, 1, and 2, respectively.

Phytoliths were scarce only in Unit 9. Overall, grasses are dominant in the samples as is to be expected, but arboreal types do occur, especially in the Unit 6/Feature 3 (Activity Area C) sample. Among the grasses, Panicoid types are dominant; these are species which tend to thrive in disturbed settings in warmer and wetter climates. The Unit 11, 16, and 18 samples share similar Panicoid characteristics, while Unit 6/Feature 3 had relatively little evidence of these grasses. Kealhofer notes that the grass phytoliths tended to be from leafy parts of the plants and, thus, were probably not used for food. If they were brought to the site by humans, perhaps they were used for shelter, textiles, etc.

It is noteworthy that probable Cucurbitaceae (i.e., squash, gourd, pumpkin) phytoliths were recovered in the Unit 9 and 11 samples. Although fragmentary, Kealhofer indicates that gourds or squash are the most likely sources.

The Unit 6/Feature 3 (Activity Area C) sample is the most unique. Recall that this was the densest concentration of ceramic and fire-cracked rock on the site and it is associated with the Middle Woodland occupation. This was the one sampled location without relatively common Panicoid grasses, but it was the location with by far the greatest abundance of arboreal phytolith evidence. Oak is the only arboreal species yet recognized in the diverse sample, however. Also, Unit 6 is the only site where Pooid grass seed phytoliths were identified, representing potential foodstuffs. All told, the Feature 3 locus is the most likely to have included intentionally deposited vegetable food residue. The Unit 9 sample is somewhat similar, too, having a lesser but still uniquely diverse representation of dicot and arboreal forms.

In sum, the pilot analysis of phytolithic evidence on a small, interior prehistoric site has generated encouraging results. Likely food-related vegetal evidence was recovered and the evidence further suggests spatial segregation of disposal. More rigorous, systematic sampling and analysis of this nature is likely to be productive on similar sites where other plant-related evidence is lacking.

Discussion of Upland Deposition

Upland deposits at sites 44JC127 and 44JC850 are similar in thickness, both being characterized by sandy loam soils 60–65 cm thick above clayey subsoil. This implies a comparable rate of net, upland accretion since the late Pleistocene.

Close similarity ends there, however, as each site exhibits evidence of cultural deposition and natural soil formation at different points in the column. To wit, these two neighboring sites, at comparable elevations and on equivalent settings, do not share a uniform depositional character that necessarily exemplifies a "typical" upland context. Instead, the present evidence indicates that highly localized and potentially subtle differences in factors such as vegetation, level and timing of human activity, etc. will combine to create myriad depositional contexts across short distances.

Localized variability in natural formation processes is inferred from contrasting textural qualities throughout and at specific points within the two columns, as well as from chemical evidence. More broadly, the overall texture in the 44JC127 column is coarser than at 44JC850. Exactly what may account for the difference is uncertain. What it does not support is evidence of a sustained xeric interval which led to extensive aeolian deposition in the wooded uplands.

Evidence of soil formation survives in the visually unremarkable deposits. It consistently occurs as a textural fining combined with peaks in chemical elements. Specifically, the relative percent silt and clay climbs within the 10–20 cm thick segments of the column with densest artifacts, and the proportions of calcium and various metallic elements increase with it. The timing of the human occupations on these relict soils varies, however, with the principle evidence at 44JC127 being Late Archaic while at 44JC850 it is Middle Woodland.

Depositional History and Environment of the Interior Wetlands

Unlike the body of information available about upland contexts through several archaeological projects, there was none before this project concerning wetland/fluvial deposition over the last 12,000 years along interior tributaries. The effort to obtain it was motivated by a need a) to acquire a complementary record from potentially deeper and more detailed wetland deposits adjacent to the uplands, and b) to obtain palynological and other environmental data not ordinarily recoverable in other contexts. The ultimate goal was to compare the upland and wetland records in a way that a more comprehensive view of environmental history could be generated.

Six different locations were chosen for coring along a length of Chisel Run between archaeological sites 44JC850 and 44JC848. The first three cores were extracted from the vicinity of 44JC850 but each was relatively shallow (<2 m) and potentially affected by sewer line construction and other modern disturbances. Two other cores from near 44JC127 were 2–3 m in length and Core 5 from this location was chosen for detailed study. A sixth core from near 44JC848 also contained a deeper record and it was selected for analysis, as well.

The cores were obtained by driving 3-in.-diameter PVC pipe into the soft wetland deposit. The most effective method involved driving the 15-ft. lengths of pipe with a portable, gas-powered fence post hammer from a scaffold erected over the core site. The pipes were capped after driving them to create a vacuum, and extracted with a come-along jack attached to the scaffold. Attempts to join two lengths of PVC and reach deeper into the sediment failed due to the forces exerted on the joint. The cores were transported to the WMCAR lab and sectioned lengthwise to expose the interior (Figure 31). Plastic sleeves were placed over the cores to maintain moisture and protect them until sampling and other records were completed. Pollen and sediment samples were removed from every other 5 cm section for the length of the core. Radiocarbon samples were removed selectively from particular sections.

Three cores were considered for detailed analysis but only two were chosen based on the longer and more detailed records they contained. These two cores, Cores 5 and 6, were taken from the Chisel Run wetland adjacent to archaeological sites 44JC127 and 44JC848, respectively (Figures 32 and 33). Each was sampled for radiocarbon dating, palynological, and soil texture studies. The results of these kinds of analysis are summarized in this section. The complete palynology report by Dr. Grace Brush is provided in Appendix C, and radiocarbon reports are found in Appendix D.

Core 5 Description

Core 5 was taken from the Chisel Run wetland just southeast of archaeological site 44JC127, about 10 m west of the present main channel of the stream and about 20 m north of Longhill Road (see Figure 4). The sediment record in this core was 230 cm deep, not taking into account at least 45 cm of compaction. Thirty-eight samples were removed at regular intervals from the entire length for pollen analysis and 46 for particle size analysis. Three samples were submitted for radiocarbon dating, from depths of 75–80 cm, 115–120 cm, and 220–230 cm (see Figure 32). The radiocarbon age obtained from the deepest section of the core is 14,280±280 BP (see Appendix D).

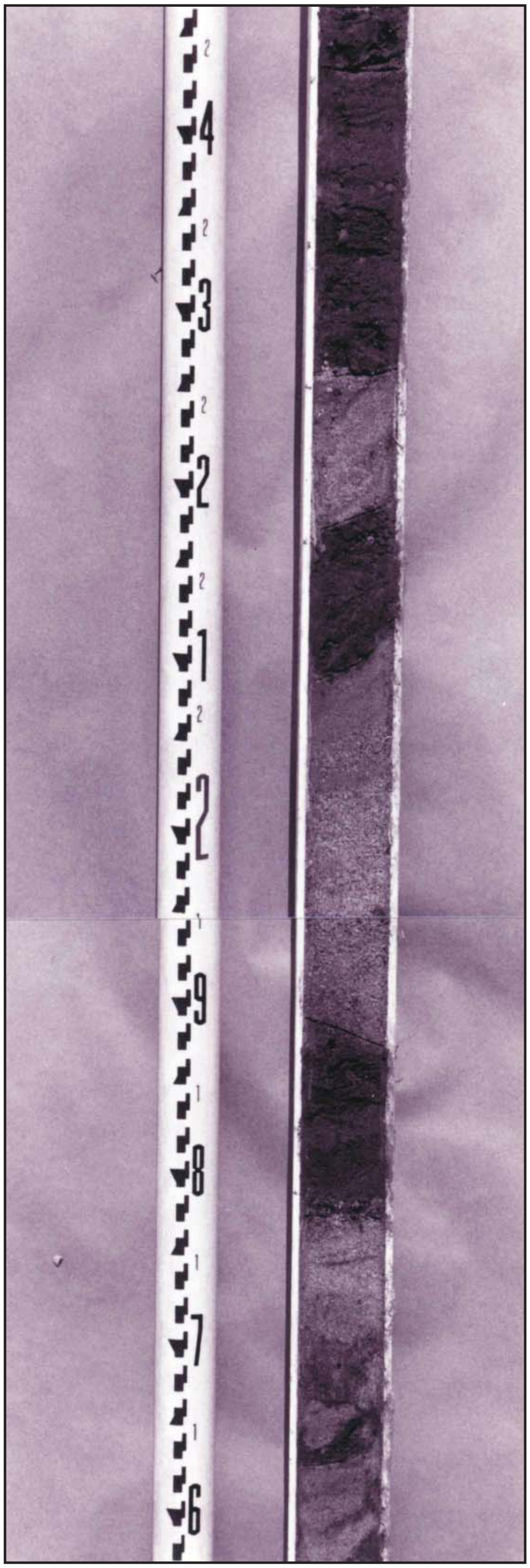


Figure 31. Site 44JC848, Core 6, cross section view of representative segment.

From top to bottom, 23 visibly distinct strata were contained in Core 5 (see Figure 32). They ranged from very peaty, organic, dark strata to very coarse, sandy, light-colored strata, clearly representing different depositional environments and, in some instances, probably individual events. Detailed, qualitative description of each stratum is provided in Table 16.

Depositional and Environmental History. Fully the lower half of this core represents late Pleistocene deposition, as indicated by a 10,440±80 BP radiocarbon date from 115–120 cm deep. The upper third of the deposit postdates AD 1278 as indicated by a 770±80 BP radiocarbon date from 75–80 cm deep. Therefore, the 35-cm-thick midsection, between 80 cm and 115 cm deep, potentially represents about 9,670 years of accretion over most of the Holocene.

Twelve of the visible strata are within the lower Pleistocene-age section. Together they represent a fairly regular, alternating sequence of coarser, sandy strata and finer, silty or loamy strata. The coarser strata are, on average, thicker than the finer ones. The coarser deposits are interpreted as higher energy and possibly shorter term events, while the fine deposits are regarded as lower energy accumulations which imply more stable, longer term accretion. The upper and lower radiocarbon samples in this portion are from strata with finer sediments which also tend to contain more organic matter.

Overall, the thick, late Pleistocene sediments contain a pollen record indicative of vegetation in a sedge marsh surrounded by boreal forest (Figure 34). Spruce, pine (probably jack pine based on small pollen grain size), and fir are prominent among tree species. The forest community also included more familiar species like hickory and oak. The northern conifers dominated during this period and abruptly disappear from the column with the onset of the Holocene after about 10,500 BP. The sedge marsh present at this time had a very different species composition from the sedge marsh present during the latest period. The late Pleistocene marsh was composed of a variety of sedges unique to this portion of the core and other unique species like St. John's wort, buttercup, and burreed, species which all disappear at the close of this interval.

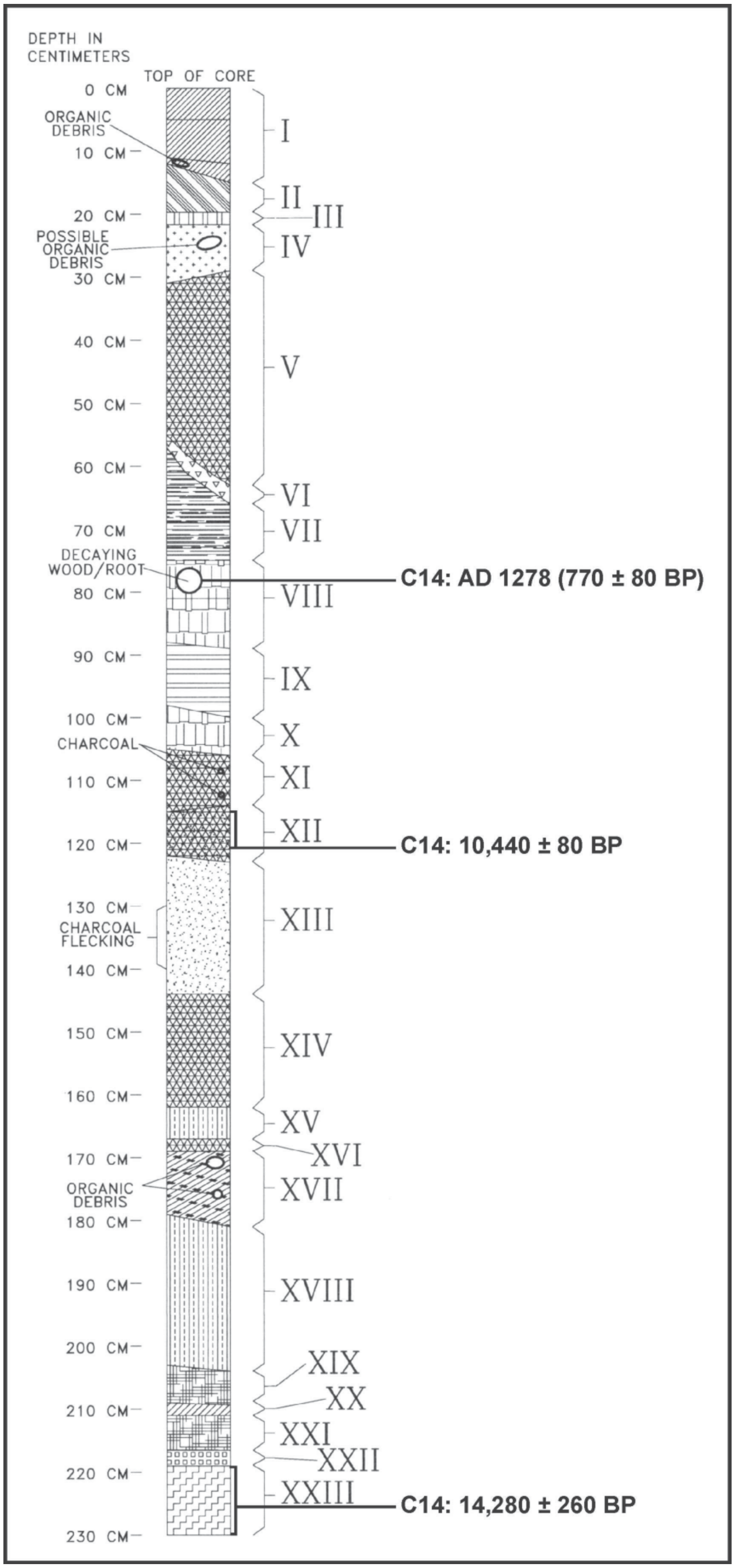


Figure 32. Site 44JC127, profile of Core 5 (see Table 16 on facing page for key).

Horizon	Description
I	Fine sand-silt-clay horizon, probably associated with modern beaver pond, 10YR4/3 brown silt loam at top and mixed/laminated 10YR4/3 dark brown – 10YR5/6 yellowish brown below; rootlets, etc. common and some charcoal and organic debris in lower portion
II	Primarily 10YR6/3 pale brown – 10YR4/3 dark brown medium-fine sand with some iron/oxidation streaking
III	10YR3/2 very dark grayish brown – 10YR4/2 dark grayish brown silt to sandy loam
IV	Same as II above, but without oxidation streaking
V	2.5Y3/1 very dark gray silt with common organic debris and charcoal in upper 5 cm
VI	Generally 2.5Y6/2 light brownish gray medium sand
VII	2.5Y2.5/1 black fine sandy loam/silt (peaty)
VIII	2.5Y3/1 very dark gray silt-fine sand with large piece of wood in upper portion (fining upward?)
IX	Generally coarse sand, mixed 2.5Y6/1 gray – 2.5Y3/1 very dark gray, with subtle boundaries with horizons above and below
X	Same as VIII above
XI	Same as V above
XII	Gradual transitional horizon between XI above and XIII below
XIII	Highly mixed zone, 2.5Y3/1 very dark gray – 2.5Y4/1 dark gray fine sandy loam, to 2.5Y5/2 grayish brown – 2.5Y6/2 light brownish gray medium-fine sand
XIV	Same as V and XI above; slightly finer (siltier) in upper portion; some organic debris present
XV	Fine sand, mottled 2.5Y3/2 very dark grayish brown – 2.5Y6/2 light brownish gray
XVI	Same as V, XI, and XIV above
XVII	2.5Y4/1 dark gray silt/clay with common organic debris (wood pieces)
XVIII	Similar to XV above, but may represent a horizon of ***two*** fining upward sequences (lighter colored in lower portion)
XIX	2.5Y4/1 dark gray – 2.5Y5/1 gray fine sand, but with thin silty layer at top (fining upward?)
XX	2.5Y5/1 gray medium sand
XXI	Same as XIX above without silt at top
XXII	2.5Y7/1 light gray medium-fine sand
XXIII	2.5Y4/2 dark grayish brown fine sandy loam with some charcoal flecks, probably fining upward

Table 16. Site 44JC127, Core 5 stratum descriptions.

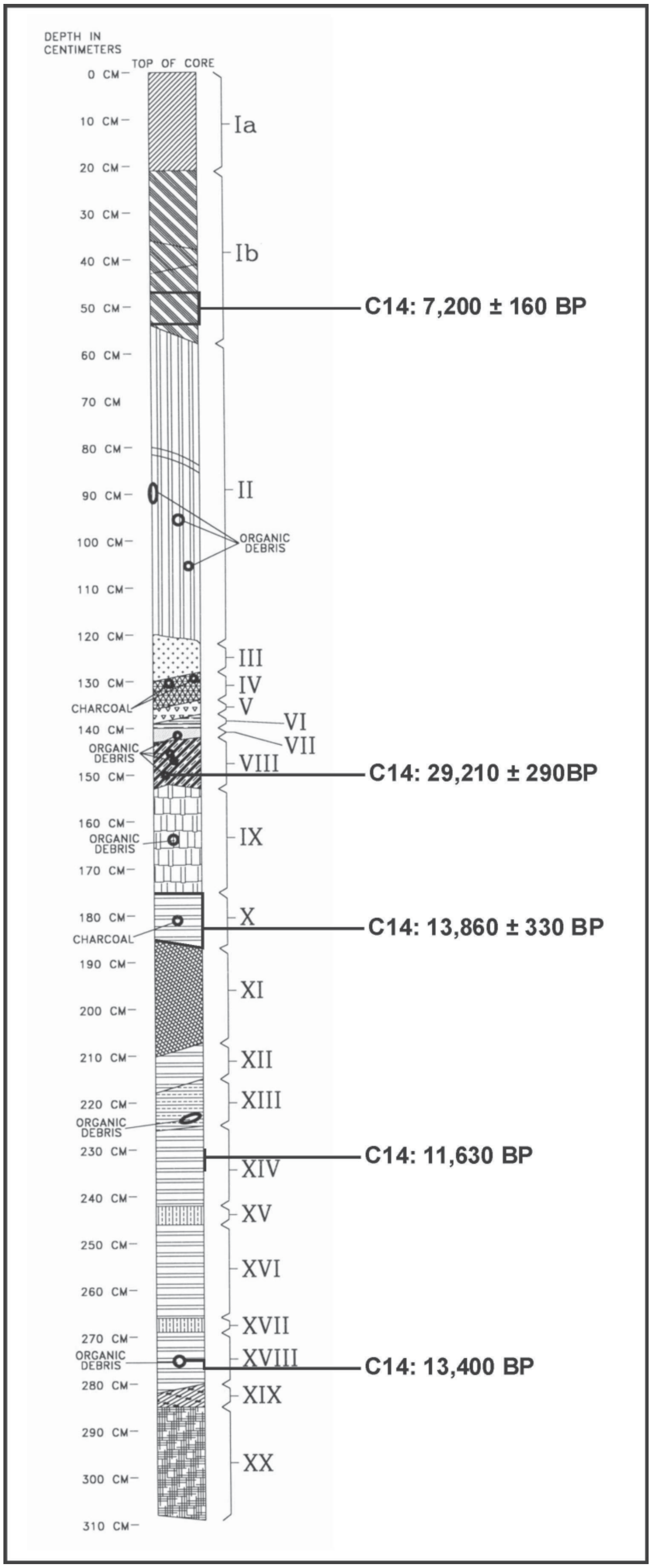


Figure 33. Site 44JC848, profile of Core 6 (see Table 17 on facing page for key).

Horizon	Description
Ia	10YR3/2 very dark grayish brown silt/silty loam, appears organically rich but w/ rare to no wood/macrofossils; * this section is represented separately in part b/c it pulled apart during sectioning of core
Ib	Also 10YR3/2 silt/silt loam but approx. 13 cm from upper boundary becomes faintly more organic (peaty) and gradually darkens to 10YR3/1 very dark gray at bottom
II	Highly mixed/finely layered horizon; ranges from dark, peaty/silty patches of 10YR3/1 very dark gray – 10YR4/2 dark grayish brown, to lighter patches/lenses of med.-fine sand of 10YR5/2 grayish brown – 10YR7/1 light gray; occasional charcoal flecks and wood pieces (small)
III	Homogenous 10YR4/3 brown – 10YR4/2 dark grayish brown sandy loam
IV	Homogenous 10YR5/2 grayish brown – 10YR4/2 medium sandy loam; slightly coarser than III above; also occasional charcoal flecks
V	10YR3/2 very dark grayish brown silt/silt loam
VI	10YR5/1 gray at top – 10YR4/1 dark gray at bottom, all fine sandy loam
VII	10YR4/1 dark gray fine sandy loam to silty loam
VIII	Lightly mottled/patchy 10YR4/1 dark gray – 10YR4/2 dark grayish brown sandy loam w/ some wood/macrofossils (?)
IX	Patchy, relatively coarse horizon, Primarily 2.5Y7/1 light gray – 2.5Y5/1 gray medium to coarse sand, but with patches/lenses of 10YR4/2 dark grayish brown – 10YR3/2 very dark grayish brown sandy/peaty loam with some wood pieces; * there is a thin, dark band of mineral sand (?) near bottom boundary
X	2.5Y4/2 dark grayish brown – 2.5Y3/2 very dark grayish brown fine sandy loam changing to silt at bottom (fines upward?)
XI	Sandy, fining upward horizon, Color range from 2.5Y7/1 light gray – 2.5Y5/1 gray with about upper three-fourths coarse sand and lower quarter fine sand
XII	Same as X above
XIII	2.5Y7/1 light gray – 2.5Y5/1 gray medium sand with band of dark mineral sand (?) at near lower boundary (possibly fining upward)
XIV	Same as X and XII above
XV	2.5Y3/2 very dark grayish brown silt
XVI	Same as X, XII, and XIV above
XVII	Same as XV above
XVIII	Same as X, XII, XIV and XVI above
XIX	2.5Y4/1 dark gray – 2.5Y5/1 gray medium sand
XX	Mixed, vertically structured horizon, ranging from 2.5Y5/2 grayish brown medium sand to 2.5Y3/2 very dark grayish brown sandy loam/peat

Table 17. Site 44JC848, Core 6 stratum descriptions.

Only four distinct strata comprise the long, middle period of deposition, dating roughly between 10,000 and 800 BP. Three of the strata consist of relatively fine silt and fine sand (Strata VIII, X, and XI) which are consistent with an extended period of rather gradual accretion. Stratum IX in this portion, however, is a distinct coarse deposit which interrupted this trend.

This long middle interval of minimal deposition is characterized in the pollen record as a riparian forest. Oak and hickory are present and in the upper portion walnut is more common, as is medium-sized pine pollen probably indicative of pitch or Virginia pines. Particularly telling of the new forest setting is a prominent spike in the occurrence of cinnamon and wood fern. A significant increase in the amount of charcoal, which persists through the end of the column, begins in the upper part of this section.

The upper portion of the core contains seven visible strata, one of which (Stratum V) is the thickest in the entire sequence. These strata present a perfectly alternating sequence of coarser sand and finer silt and clay. The lower sandy strata (IV and VI) are thinner than the adjacent silty deposits, indicating that they may represent sudden, dramatic shifts, perhaps related to storm events, that interrupt and otherwise steady trend of accumulation in a low-energy setting.

With the onset of more rapid deposition in the upper part of the column, after about AD 1270, vegetation in the wetland returns to a shrub-sedge marsh community, surrounded by a forest composed mainly of southern pines, oak, hickory, and holly. The marsh community was entirely different from the late Pleistocene counterpart, being uniquely composed of a separate suite of sedges, as well as plants like smooth alder, nut sedge, spike rush, rice cut grass, and smartweeds. It is during this final interval that human activities become more apparent. As mentioned, the incidence of charcoal increases, and the presence of ragweed is a sign of extensive, European forest clearance.

Sediment from the pollen sample sites in Core 5 was analyzed to measure relative fractions of sand, silt, and clay (Figure 35). The purpose of this analysis was to measure sedimentation rates in the Chisel Run basin over many millennia. As noted above, it turned out that the depositional record in this core is most informative of the late Pleistocene and post–AD 1000 periods.

The clearest pattern is a more active depositional environment in the upper portion of the core, or that section corresponding to the last one thousand years. This is reflected in more frequent swings from higher to lower energy deposits, as signified by more and less sand, respectively. It is also indicated by the relative thickness of this final thousand year period, a measure of higher sedimentation rates, compared to that for the Pleistocene record. Shifts in stream energy and depositional rate occur throughout the core, but the frequency was apparently lower before 10,000 BP.

It is suggested that the variability and high rate of sedimentation in the more recent section of the core are related in part to human activity. It was in the last one thousand years that indigenous groups began to experiment more aggressively with native and tropical plant husbandry, and populations were at new peaks as well. Some credence is lent to this suggestion if charcoal fractions in the samples are considered (see Table 16). There is a distinct upturn in the amount of charcoal in the upper section, probably due in part to more human activity including intentional burning of the forest floor. Almost certainly much of the new sediment load in the upper deposit is derived from sheet erosion occurring with the onset of colonial farming. Finally, aspects of this trend may be attributable to as yet unrecognized climatic and stream valley dynamics.

Core 6 Description

Core 6 was taken from the Chisel Run wetland just west of archaeological site 44JC848, less than 10 m west of the present main channel of the stream (see Figure 33). The sediment record in this core was 310 cm deep, not taking into account at least 30 cm of compaction. Forty-nine samples were removed at regular intervals from the entire length for pollen analysis. Five samples were submitted for radiocarbon dating, from depths of 50 cm, 148 cm, 175–185 cm, 230–235 cm, and 275 cm (see Figure 33). The radiocarbon age obtained from the lower section of the core is 13,400±50 BP (see Appendix D). From top to bottom, 20 visibly distinct strata