CURRENT ARCHAEOLOGICAL RESEARCH IN KENTUCKY

VOLUME TEN

Edited By

Vanessa N. Hanvey
Nicole Konkol
Charles D. Hockensmith
Kenneth Carstens
William A. Huser
and
David Pollack

KENTUCKY HERITAGE COUNCIL

CURRENT ARCHAEOLOGICAL RESEARCH IN KENTUCKY

VOLUME TEN

Edited By

Vanessa N. Hanvey
Nicole Konkol
Charles D. Hockensmith
Kenneth Carstens
William A. Huser
and
David Pollack

2019

KENTUCKY HERITAGE COUNCIL
410 High Street
Frankfort, Kentucky 40601

This publication has been funded in part with state funds and federal funds from the National Park Service, Department of the Interior. However, the contents do not necessarily reflect the views or policies of the Department of the Interior.

Cover Photo: Mr. William A. (Bill) Huser volunteering his time to help University of Kentucky graduate student Ms. Karen Stevens excavate a shell midden in Henderson County, Kentucky, in 2018. (Photo Courtesy of Karen Stevens)

PREFACE

Since its creation in 1966, the Kentucky Heritage Council has taken the lead in preserving and protecting Kentucky's cultural resources. To accomplish its legislative charge, the Kentucky Heritage Council maintains three program areas: Site Development, Site Identification, and Site Protection. Site Development administers the state and federal Main Street programs, providing technical assistance in downtown revitalization to communities throughout the state. It also runs the Certified Local Government, Investment Tax Credit, and Restoration Grants-in-Aid programs.

The Site Identification staff maintain the inventory of historic buildings and are responsible for working with a Review Board, composed of professional historians, historic architects, archaeologists, and others interested in historic preservation, to nominate sites to the National Register of Historic Places. This program also is actively working to promote rural preservation and to protect Civil War sites.

The Site Protection Program staff work with a variety of federal and state agencies, local governments, and individuals to assist in their compliance with Section 106 of the National Historic Preservation Act of 1966 and to ensure that potential impacts to significant cultural resources are adequately addressed prior to the implementation of federally funded or licensed projects. The staff are responsible for administering the Kentucky Heritage Council's archaeological programs; organizing the annual archaeological conference, including the editing and publication of selected papers; and the dissemination of educational materials. On occasion, the Site Protection staff undertake field and research projects.

This volume contains papers presented at the 20th, 22nd, and 35th Annual Kentucky Heritage Council Archaeological Conference as well as contributed papers. The 20th conference was held in Louisville, Kentucky, in 2003. The 22nd conference was held at the University of Kentucky in Lexington, Kentucky, in 2005. The 35th Annual Archaeological Conference was held at Kentucky Dam Village SRP, Kentucky, in 2018, and was co-sponsored by Wickliffe Mounds State Park, Land between the Lakes National Recreation Area, Tennessee Valley Authority, the Kentucky Archaeology Survey and the Kentucky Organization of Professional Archaeologists. The efforts of those in charge of conference organization and details are greatly appreciated.

As in years past, the papers presented in this volume provide a cross-section of archaeological research conducted in Kentucky. Figure 1 illustrates the general locations of major sites and project areas discussed in this volume.

I would like to thank everyone that has participated in the Kentucky Heritage Council Archaeological Conferences. Without your support, these conferences would not have been as successful as they have been. Finally, I would like to thank the many editors that made the publication of this volume possible.

Vanessa N. Hanvey
Kentucky Heritage Council

We dedicate this volume to Mr. William A. (Bill) Huser who was a devoted friend, colleague, and Kentucky archaeologist. We think of and miss him every day.

Figure 1. Approximate Location of Sites Discussed in this Volume: 1) Hedden, Site 15McN81; 2) Fort Campbell, KY-TN; 3) Gladie Creek, Site 15Mf410; 4) Omer Adams, Site 15Hy25; 5) Constant's Station, Site 15Ck461; 6) Armstrong Farmstead, Site 15Fa185; and 7) Allen Brick Yard, Site 15McN115.

TABLE OF CONTENTS

THE COMPILATION OF THIS VOLUME

By

Nicolas Laracuente
Kentucky Heritage Council
Frankfort, Kentucky

It is difficult to assemble a comprehensive list of the people who have worked to compile this volume of Current Archaeological Research in Kentucky. Charles Hockensmith and Ken Carsten began assembling it before Charles's retirement from the Kentucky Heritage Council (KHC) in 2008. At this time, articles had been chosen and most were finalized. After Charles's retirement, KHC's Site Protection Section weathered a rocky period where many staff retired, moved to other jobs, or passed away. At different points between 2008 and 2019, this volume was handled not only by the authors and editors but also by: David Pollack, Lori Stahlgren, Kary Stackelback, Philip Mink, Phillip Johnson, Chris Gunn, Nicole Konkol, and myself.

When William A. (Bill) Huser joined KHC in 2014, he took a special interest in finishing Volume 10. The articles within represent work that has not been published elsewhere and is critical to sharing the wealth of information embodied by Kentucky archaeology with the world. In the midst of the hundreds of Section 106 reviews, phone calls, meetings, and site visits that constitute a "normal" KHC staffer workload, Bill picked up where Charles and Ken left off. He found the finalized chapters and reached out to each author to confirm the versions were up-to-date. This project was put on hold, again, during the Great Office Move of 2016 when KHC shifted from Washington Street to our current location on High Street in Frankfort, Kentucky. It took over a year to recover from the move and get back to Volume 10. Bill refused to table the project and continued to make progress towards its ultimate publication. He was on track to publish the volume in the last quarter of 2018. Then Bill got sick.

Bill left our office on November 1st for a routine surgery to deal with some stomach issues that he joked were likely caused by his "riotous, decadent lifestyle." A few days later, the surgery was cancelled due to the discovery of cancer. Bill died on December 1, 2018.

As KHC Site Protection staff grieved, Volume 10 of Current Archaeological Research in Kentucky sat abandoned. Bill's chair sat empty.

When Vanessa Hanvey joined our staff in May 2019, I introduced the completion of this volume as a project that needs to be done but has no deadline. In her capable hands, Volume 10 is finally being published 10 years after it was first proposed. Even though she never met Bill, Vanessa has learned about him through this work. Our hope is that you will, too. Bill's interests were wide, prompting him to work on everything from the Paleoindian Harney Flats Site in Florida to presenting research papers on the Early Historic Salt Making Industry at Drennon Springs in Henry County, Kentucky. His research was also driven by a sense of ethics and duty, which is exemplified by his two presentations on the Hedden Site at the 2018 Kentucky Heritage

Council Archaeology Conference. For these papers, he compiled and synthesized work that had been abandoned for over 23 years. Bill had worked on the project as a field crewmember, and reached out to his large archaeology family to find photos and notes from the site.

While excavating though Bill's work history at KHC, we found copies of his Hedden Site papers from the conference. Though it was not originally part of Volume 10, Vanessa and I wanted to honor his memory by adding his papers to this volume. We hope his voice is preserved through script version of the paper, which has been published with minor edits in this volume. We know that his work will inspire others to follow in his footsteps, to dust off notes or a collection that may depend on the unique knowledge of an archaeologist who was just a field crewmember at the time of its excavation to fully document the knowledge uncovered years ago.

KHC promises that the completion of Volume 10, one of Bill's last works, will be the first step in continuing the publication of important research presented during the annual Kentucky Heritage Council Archaeology Conferences.

Bill's last words to me shortly after he learned of his diagnosis were, "If this is it, it's been good, brother." While enjoying the articles presented here, check-in with your archaeology family. Archaeology is hard. Sometimes it is lonely. Bill had a gift of providing perspective at just the right time when things seemed overwhelming. Some of our work stalls at the analysis or report writing stage. We all recognize the value of a colleague picking up the phone or chatting over beverages to shake things loose. We honor Bill's and other deceased colleagues' memories by supporting each other and sharing the amazing things that we uncover in our archaeological careers.

REVISITING THE HEDDEN SITE (15McN81), A HABITATION AND MORTUARY SITE IN McCRACKEN COUNTY, KENTUCKY

By

William A. Huser
Kentucky Heritage Council
Frankfort, Kentucky

ABSTRACT

The Hedden Site is a low midden mound situated on an alluvial floodplain a few miles southwest of Paducah, Kentucky. This multicomponent prehistoric site, intensively investigated during the 1990's, yielded abundant and varied information about prehistoric habitation in the region, especially for the Middle and Late Archaic Periods. In this paper, the circumstances and methods of discovery and investigation of the site are explained, artifacts and features found are described, and the analyses and interpretation of data are recounted.

INTRODUCTION

While the Kentucky Heritage Council Archaeological Conference is out here in Western Kentucky I wanted to talk about a site that was investigated 22 years ago and more, especially as it produced some good information but never got written up. Please bear in mind that I haven't seen the artifacts in more than 20 years. I must say that it's not necessarily a good thing to revisit something you did way back when; I have mixed feelings. Be that as it may, here we go!

The Hedden Site is a multi-component prehistoric open habitation and mortuary site, a base camp, in McCracken County, 25 miles northwest of where we are today and six miles west of Paducah, in the lower Ohio River Valley and in the Mississippi Embayment Physiographic Region (Figure 1). It is located 23 miles southeast of the confluence of the Ohio and Mississippi Rivers and is situated on a low rise on a featureless alluvial plain, adjacent to wetlands, at 340 feet above mean sea level. The current channel of Black Branch, part of the Massac Creek drainage system, is located about 660 feet west of the site. Massac Creek has its confluence with the Ohio about four miles northeast of the site. Prior to channelization in the early 1900's, Black Branch came within about 160 feet of the site. Hedden Site soils are Fayala-Collins silt loams, which are Pleistocene and recent alluvium formed mainly from loess (USDA 1976). These are well to poorly drained, highly acidic soils with a seasonal water table of 15 to 61 centimeters.

The Hedden Site was reported to the Office of State Archaeology (OSA) in 1990 by William Black, Jr., an avocational archaeologist from Paducah, who characterized the site as a midden

mound. William Black was a decorated Vietnam veteran and a brother of Paducah businessman Christopher Black, who has served as one of our KHC council members. William Black died in March of 2017 and this paper is presented in his honor.

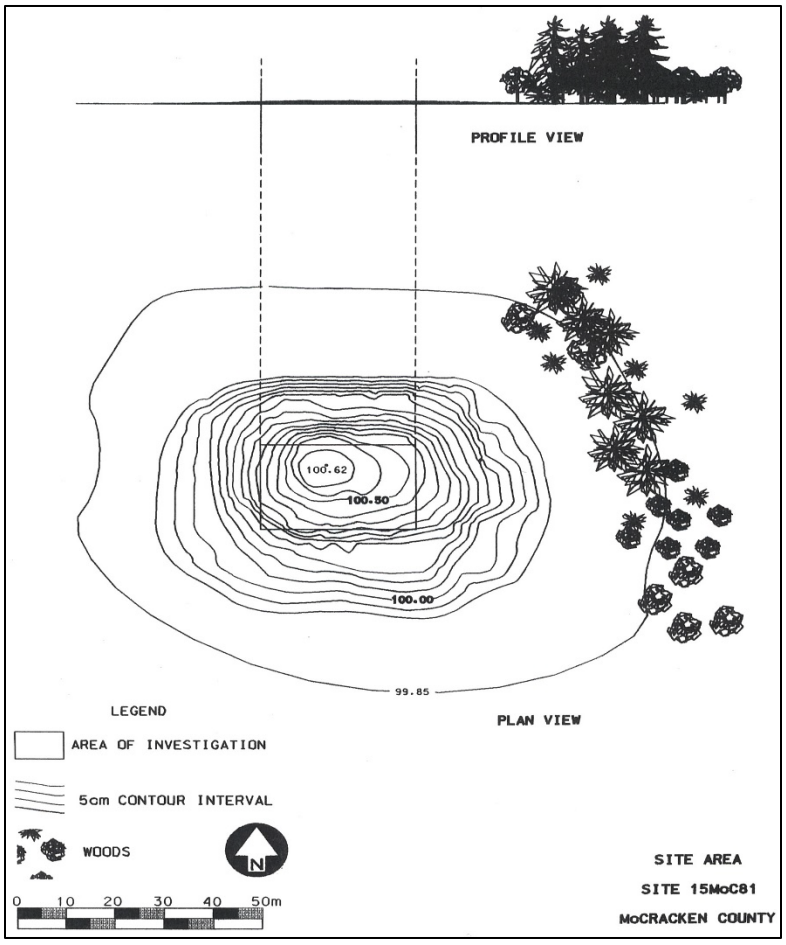

Figure 1. Profile & five-centimeter plan of the Hedden Site.

THE HEDDEN SITE (15McN81)

Black collected surface artifacts from the Hedden Site 40 times between 1982 and 1990. Ken Carstens and Chuck Moffat of Murray State University examined Black's collection and identified Harpeth River, Big Sandy, Benton, Marcos Corner Notched, Saratoga, and Riverton projectile points, indicating occupation of the site during the Early through at least the Terminal Archaic periods. The most abundant point type was Saratoga with 14 examples, emphasizing the intensity of occupation of the site after 2,000 B.C., during the Late Archaic to Early Woodland periods.

At the time of the investigations described herein, the Hedden Site was in an agricultural field that likely had been plowed for decades. A marshy woods was located immediately east of the site. Today, the McCracken County High School is about 600 meters southwest of the Hedden Site, the Paducah Sportsplex is about 150 meters northeast of the site, and the marshy woods is gone. Build

a highway and they will come! The Hedden Site fell within the right-of-way of the Kentucky Transportation Cabinet's (KYTC) proposed realignment of US 60.

In 1991 and 1992, KYTC personnel under the direction of Betty McGraw conducted Phase I and II investigations of the site, which consisted of general and controlled surface collections and the excavation of two test units, a 2 x 3 and a 1 x 2 m. unit that was reduced to a 1 x 1 due to wet conditions. Feature 1, in Unit 1, was a large pit with horizontal dimensions of 170 cm by 178 cm and a depth of 77 cm. Feature 2 was a possible posthole in the base of Feature 1. The size of the Hedden Site within the right-of-way was determined to be about 1,575 square meters and this was estimated to be about half of the total site size. Phase III excavations occurred in the fall of 1994 (Figure 2).

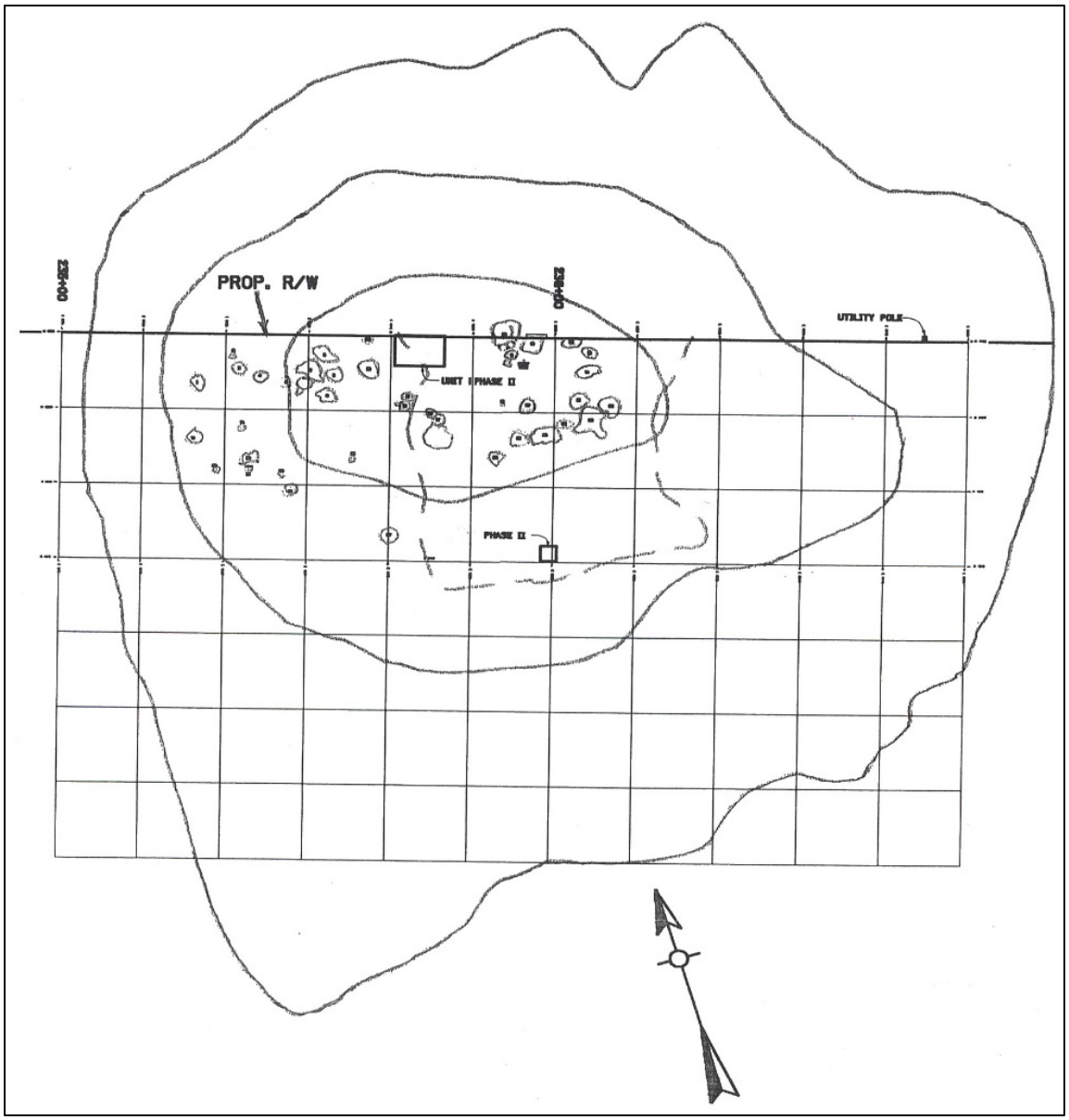

Figure 2. Plan showing Phase II Units 1 & 2 and Phase III features.

The KYTC investigations resulted in the recovery of some 3,800 artifacts, including 15 diagnostic projectile points, cores and bifaces, one uniface, over 3,600 flakes and chunks, burned animal bone fragments, and 100 pounds of fire-cracked rock. Points types recovered reaffirmed the Archaic age of the site and extended its age into the Woodland Period by the recovery of an Adena point and one undecorated, grit tempered body sherd, the only ceramic sherd recovered from the site. Also recovered from Feature 1 were 55 fragments of baked clay objects.

DATA RECOVERY

Data recovery at the Hedden Site was conducted in October and November 1994 through a contractual agreement that Wilbur Smith Associates would provide KYTC with all field equipment and labor, would process the artifacts in the lab, and would arrange to have all specialized analyses done by subcontractors. Responsibility for writing the final technical report of investigations, however, was KYTC's. Unfortunately, Betty McGraw retired from KYTC in the late 1990's and the report was not written. As to the Phase III methods,

1) The 20-centimeter-thick plowzone of the site was removed by a road grader (Figure 3).

Figure 3. Hedden Site overview, looking east, showing northern edge of highway right-of-way.

2) Diagnostic projectile points and other notable objects were collected from the grader back dirt; 239 specimens were collected, including a cannel coal gorget and the only pestle recovered during Phase III (Figure 4).

Figure 4. A two-hole cannel coal gorget (left) and bell-shaped pestle (right) recovered from the grader back dirt.

3) A 45-meter-length of the profile wall along the northern right-of-way boundary was cleaned, drawn, and photographed. Features were observed to extend into the profile wall. The darkness of the plowzone increased with depth but no distinct midden below the plowzone could be identified.

4) The site surface was gridded into five-meter squares and was cleaned to identify features. Thirty-four cultural features were identified, and based on their distribution, the site was determined to be roughly circular in plan (Figure 5). Many of the features had plow scars on their surface, indicating that their upper portions were likely to have been destroyed by plowing.

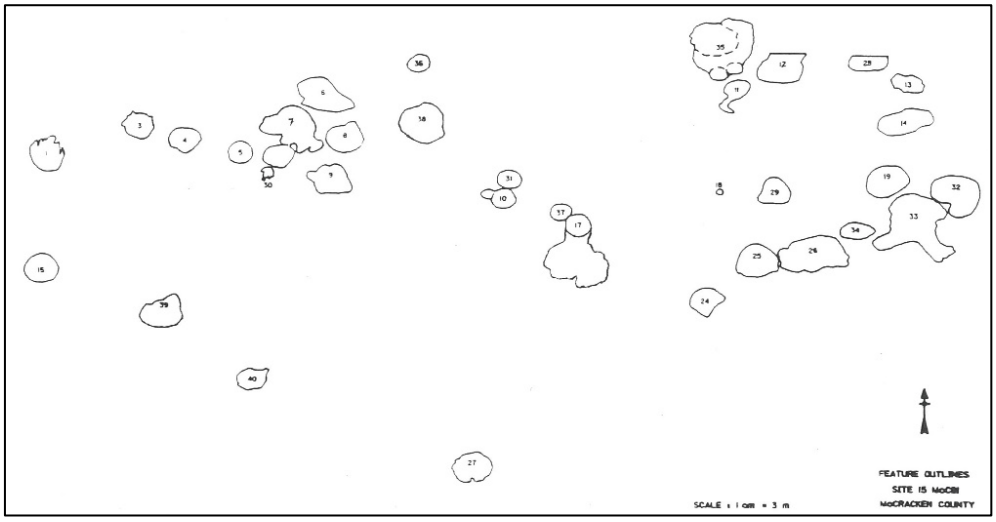

Figure 5. Plan of the 34 cultural features found during Phase III.

5) Each feature was drawn and photographed in plan and then bisected. The half removed first was excavated in ten-centimeter levels within natural layers. The feature profile was drawn and photographed and the remaining feature half was then removed. One hundred percent of the fill of features with a diameter of 30 cm or less and 50% of the fill of features with a diameter greater than 30 cm was bagged for flotation.

6) All feature soil not collected for flotation was dry-screened through 1/8th-inch mesh. Typically, the feature fill was very dark gray to brown silty loam that made up the plowzone, in a matrix of yellowish brown clay loam subsoil. The only significant sources of site disturbance below the plowzone were tree root intrusions and possible tree falls, abundant rodent burrows, and occasional crayfish burrows.

FEATURES AT THE HEDDEN SITE

The features were of variable size and depth, many over a meter in diameter. I'd now like to show some plans of the distribution of various feature types. Three features, 35, 33 and 17, were interpreted to be large amorphous deposits of midden 10 to 20 cm thick (Figure 6). Two of these, Features 35 & 17, were found to cover basin-shaped pits.

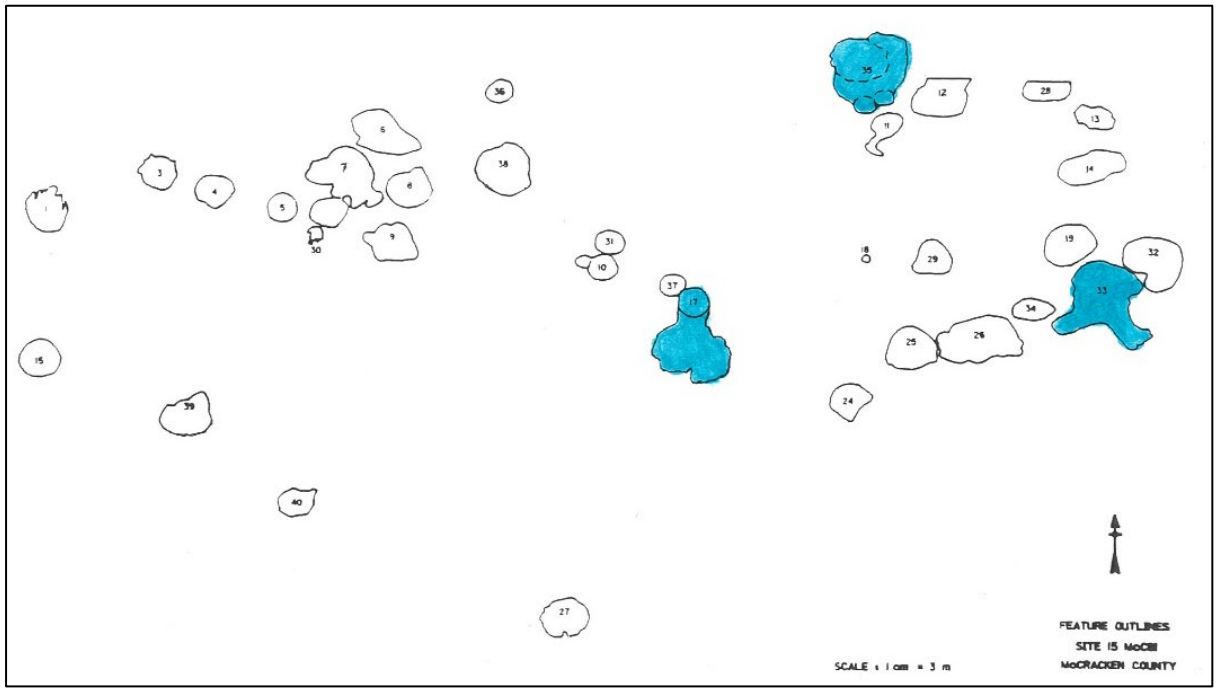

Figure 6. Hedden Site midden deposits, Features 17, 35, and 33 (left-to-right).

Basin-shaped pits made up the majority of the features. Most of them were only one or two levels deep. Ten pits had a lower layer of light charcoal and ash as a basal deposit and were interpreted to be hearths (Figure 7), including a small, steep-sided pit in the southern part of Feature

35 (Figure 8). Eleven additional pits had no discernable ash layer and were perhaps processing pits (Figure 9), including the one in the northern portion of Feature 35.

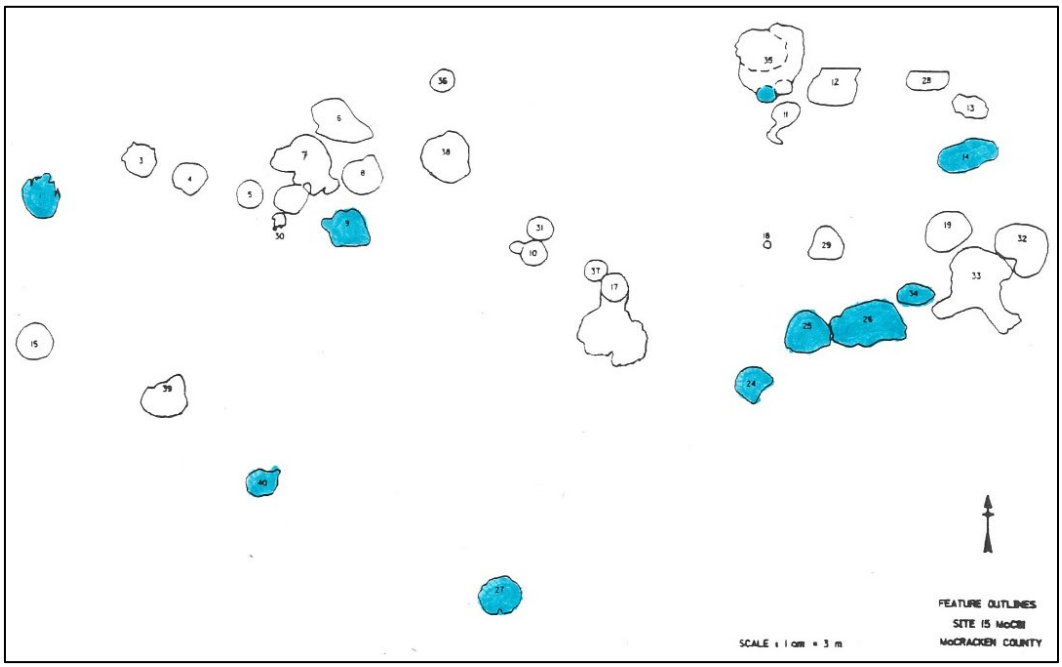

Figure 7. Hedden Site hearth features.

Figure 8. Feature 35 was a hearth feature (in foreground).

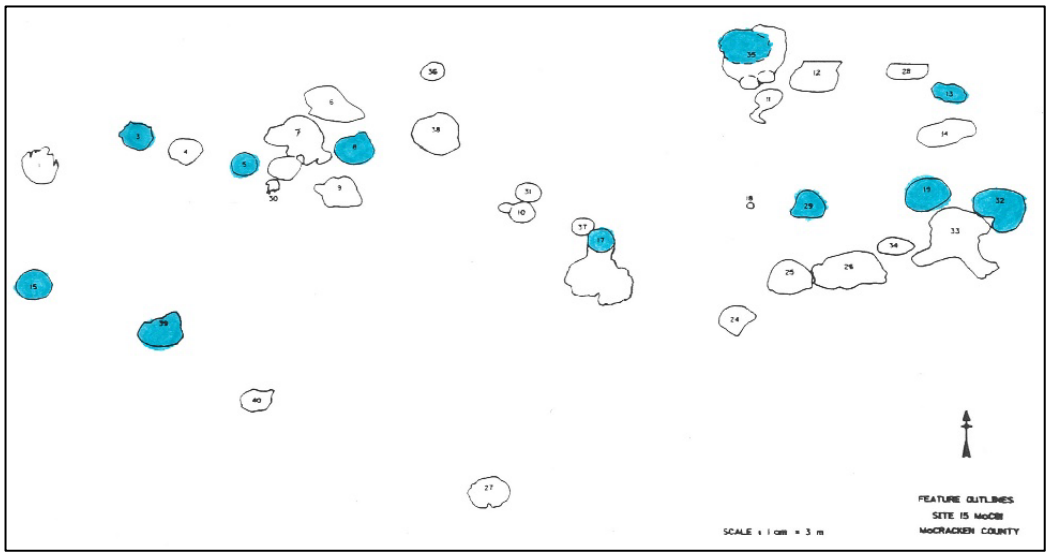

Figure 9. Hedden Site non-hearth basin features.

Two intrusions, Features 30 and 18, were interpreted to be post molds (Figure 10). They were the smallest features found. Feature 38 was the largest pit excavated, probably a storage pit (Figures 11-13). The plowzone covering the feature was riddled with rodent tunnels. The pit was the deepest one excavated, with a depth of 70 cm and its fill was not typical, being mixed brown & brownish yellow clay loam and light gray ash with burrows or root cavities extending through it. Feature 38 contained the largest quantity of artifacts in a feature, as well as the most burned bone fragments and burned plant remains. What did the various analyses reveal about the Hedden Site?

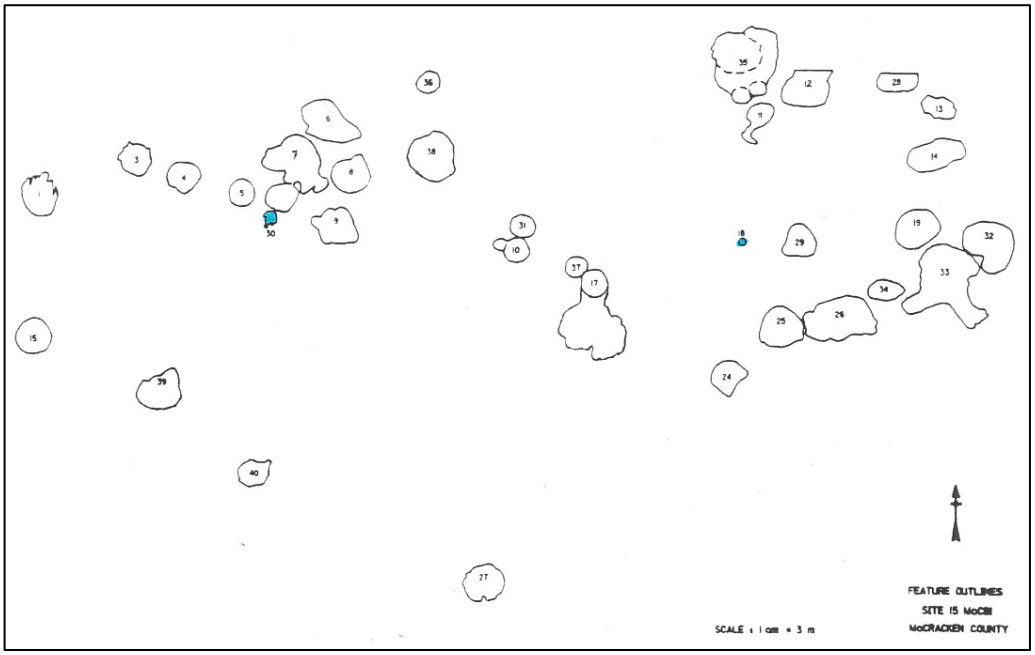

Figure 10. Hedden Site post molds, Features 30 & 18 (left-to-right).

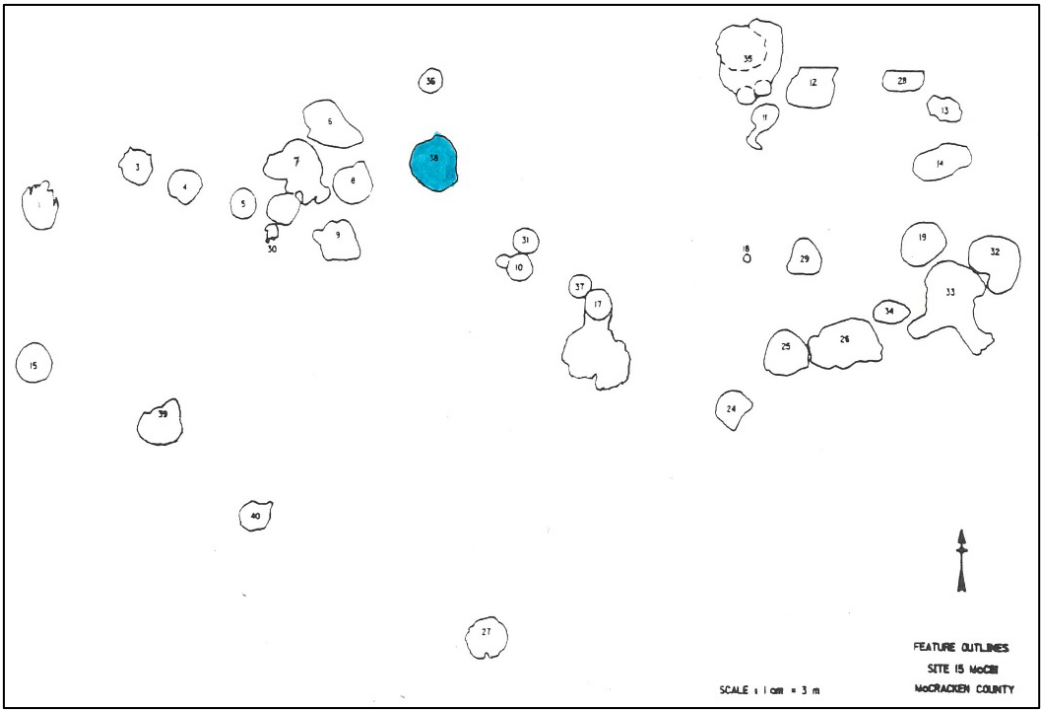

Figure 11. Feature 38 plan.

Figure 12. Feature 38, north profile.

Figure 13. Feature 38 after excavation.

HUMAN REMAINS AT THE HEDDEN SITE

Eight pits contained human remains, all in the western side of the site except for Feature 35 (Figure 14). Valerie Haskins of the Kentucky Heritage Council was hired to supervise removal and analysis of burials. Six burial were excavated on-site, a seventh burial was pedestalled, coated with plaster, and removed as a block for excavation in the lab due to time constraints, and the eighth burial, in Feature 35, was limited to a cranial fragment and a couple of long bone fragments, and was recognized as a burial "after the fact."

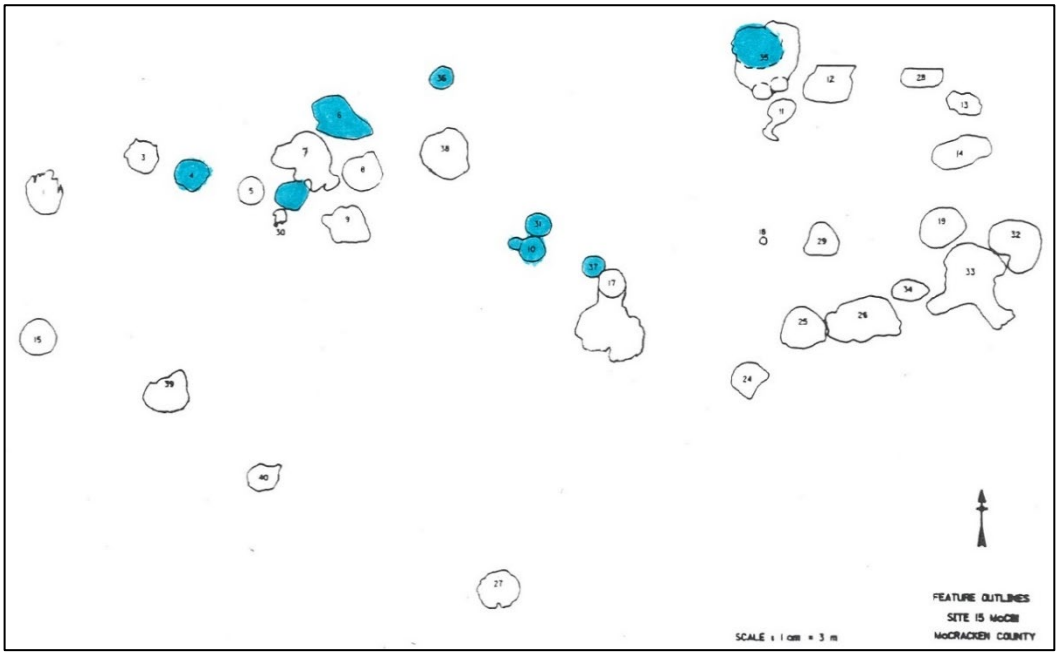

Figure 14. Hedden Site burial features.

The burials were all in very poor condition. Haskins and Wilbur Smith Associates lab director Jo Ann Wilson conducted preliminary analysis of the burials in the field. No multiple burials were identified. All burials seem to have been primary, unburned inhumations in flexed or semi-flexed position. Due to the lack of identifiable elements, estimation of age was confined to broad categories. Six individuals were estimated to be adults, based on general morphology. One individual was estimated to be a young adult of 16 to 18 years based on dentition. Estimation of sex was attempted for only one burial, assessed to be male due to the presence of a narrow sciatic notch.

No grave goods were found in association with the burials. However, stone gorgets were recovered from three features on the eastern side of the site, Features 12, 28, and 19, in which no human bone was recognized (Figure 15). Feature 12 contained two gorgets and Features 28 and 19 had one each (Figures 16-21). All gorgets were found at the base of the feature fill, directly above the floor. It is possible that the gorgets were associated with burials, perhaps those of infants or children, as is common on Late Archaic sites.

Significantly, preliminary analysis indicates there were no baked clay objects in any of the burials suggesting that they pre-dated the use of baked clay objects on the site, unless if one accepts that the three features containing gorgets were burials, because all three of those pits contained baked clay objects. If they were graves, the presence of baked clay objects in their fill may indicate that those three features post-dated the other burials.

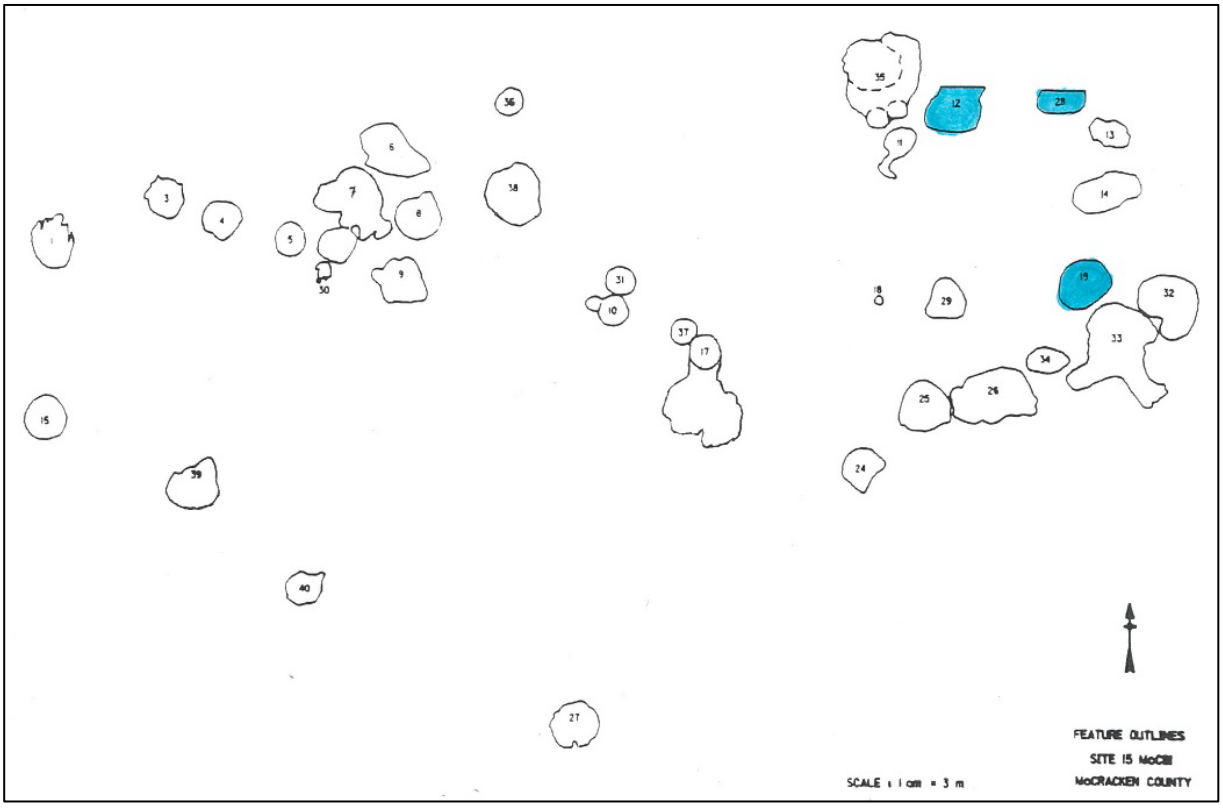

Figure 15. Hedden Site features containing gorgets.

Figure 16. Feature 12 with two three-hole gorgets *in situ*.

Figure 17. One of the Feature 12 gorgets in the lab.

Figure 18. Feature 28 with gorget *in situ*

Figure 19. Feature 28 gorget in the lab.

Figure 20. Hedden Site Feature 19 gorget *in situ*.

Figure 21. Feature 19 gorget in the lab.

FAUNAL SPECIMENS AT THE HEDDEN SITE

Sean Coughlin of the University of Tennessee analyzed over 22,500 faunal specimens from 34 features and Phase II Test Unit One. All specimens were burned or calcined and were quite small. Only 16% of the specimens were identifiable as to class, mammal being the most common class,

followed by mammal or bird, bird, amphibians and reptiles combined, and fish. The remains indicated exploitation of both the terrestrial and aquatic environments, with greater emphasis on the terrestrial. Identified animals included deer, turkey, rabbit, squirrel, shrew, indeterminate raptor, softshell turtle, indeterminate snake, catfish, and freshwater drum. One indeterminate mammal fragment bore cut marks and one bird long bone shaft had been grooved and snapped, interpreted to indicate on-site production of a bone implement. Feature 38 yielded over 14,000 pieces of bone, including remains of large and small mammal, bird, turtle, snake, and fish.

BOTANICAL SAMPLES AT THE HEDDEN SITE

Jack Rossen of the University of Kentucky processed the 2,200 liters of flotation soil collected from contexts that included 27 features (Rossen 2000). Over 83,000 carbonized remains were obtained, one of the largest and most diverse collections of plant remains from a Kentucky Archaic site. Wood charcoal was extremely scarce and the number of species was low, dominated in frequency by hickory, with lesser amounts of oak and beech, and trace amounts of pecan, white ash, poplar, and cane, reflective of both the dominant mixed oak-hardwood forest of the region and of the local wetlands.

Nut specimens dominated the assemblage, indicating a strong focus on nuts as a food source and possibly fuel for fires. Ninety-nine percent of the nutshell specimens were thick-shelled hickory, followed by acorn, black walnut, pecan, hazelnut, and butternut. Carbonized seeds were rare at Hedden, with only 34 specimens recovered, 27 identifiable as to species. More-generalized species consisted of grass, amaranth, bedstraw, grape, oregongrape, persimmon, chenopod, and sunflower. Wetland species included spikerush and bulrush, chufa sedge, flat sedge, and common sedge, pondweed, and hornpondweed. None of the seeds showed definitive signs of domestication, and notably, no squash remains were found.

Feature 38 was the feature that yielded a great variety plant remains, including all the types of nuts found on the site, as well as bedstraw, chenopod, sedge, pondweed, bulrush, grass, amaranth, oregongrape, and persimmon. In total, the botanical evidence showed a strong emphasis on nut processing augmented by the collection of wetland plants, fleshy fruits, and starchy and oily seeds.

LITHICS AT THE HEDDEN SITE

Richard Stallings analyzed the lithic artifacts from the Phase I through Phase III work at Hedden. There was much too much detail to the analysis to relate here, so I'll just touch on the highest points. As to raw material types, although the region is chert rich, having both various chert-bearing bedrock formations and also widespread alluvial-based gravel deposits, the Hedden assemblage is dominated by local Mounds chert, also known as Lafayette Gravel, found in redeposited context in streams draining the uplands and in the gravel bars of the Ohio River. Mounds chert has a water-polished brown cortex and a grainy matrix that ranges in color from beige to yellow to red.

8,400 pieces of debitage were recovered from Phases I through III, including 4,800 flakes and 3,500 pieces of shatter. 95% of the flakes were of Mounds chert, with miniscule amounts of St. Louis Ft. Payne, Dover, Dolgonda, and Mill Creek Knobs, and unidentified cherts. 99% of the cores were made of Mounds chert as were 51% of the bifaces. Other raw materials for bifaces included miniscule amounts of kaolin chert from Union County in southern Illinois and Boyle. Of the 67 temporally diagnostic hafted bifaces and 4 unidentified ones recovered, 46% are made of Mounds chert, 24% are of Dover, 22% are of Dongola, 7% are of St. Louis, with only 1% of Ft. Payne and Muldraugh cherts (Figure 22).

Figure 22. Hedden Site hafted bifaces.

So, analysis revealed that there was heavy dependence on local chert, with an overall catchment range that includes southern Illinois, northern Tennessee, and east past the Mississippi Embayment, as is consistent with the pattern of chert utilization for Middle and Late Archaic sites of the region. As this frequency graph by Stallings shows, there were two peaks in the frequency, during the late Middle Archaic into the Late Archaic period and during the latter Late Archaic into the Early Woodland period (Figure 23).

To summarize Stallings' overarching conclusions about the Hedden lithics, the technology was based on the production of early stage bifaces and expedient-use flakes from amorphous cores of Mounds chert cobbles, and the maintenance of late stage bifaces. Bifaces of non-local chert were brought to the site in finished and nearly exhausted form or as later-stage preforms, and were supplemented by bifaces of Mounds chert brought to the site in finished form. The site occupants

conserved their finished bifaces and recycled them by making them into other tools when the bifaces had been exhausted.

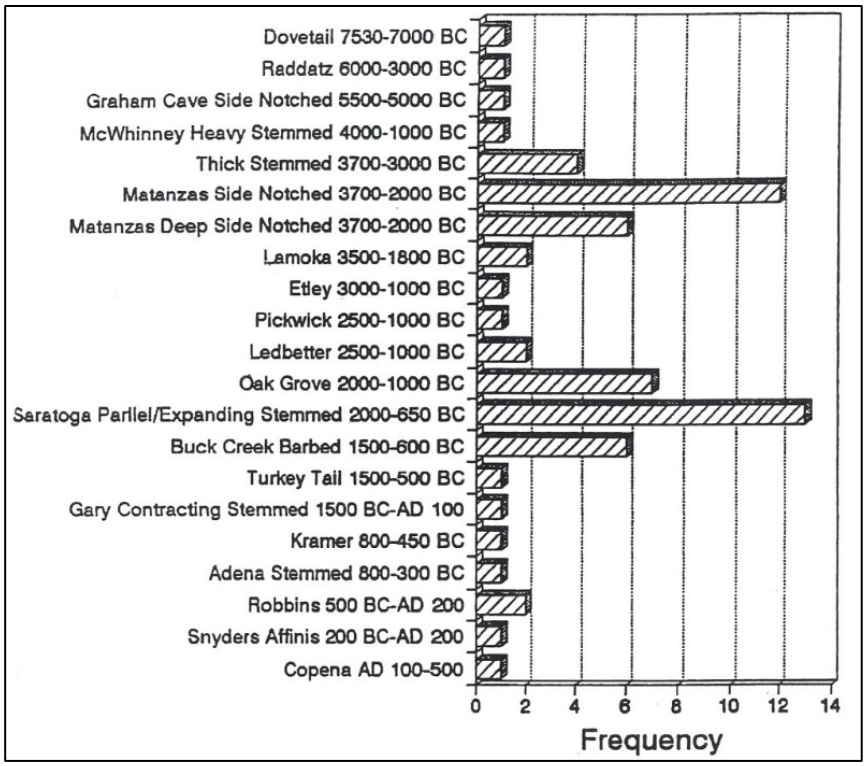

Figure 23. Stallings' Hedden Site hafted biface frequency graph.

The diagnostic hafted bifaces and other lithic data – ratio of shatter to flakes, comparative number of tool types, and flake morphology differences – show there were two different major occupations of the site, which were spatially dichotomous, with an area of overlap in the middle. Stallings concluded that the western cluster of features dates to the Middle Archaic and was the shorter occupation; whereas, the eastern cluster of features is Terminal Middle Archaic/ Early Late Archaic, and was the longer occupation (Figure 24). He believes, however, that both occupations were very similar in nature, consisting of small groups of inhabitants that had the same goals of their knapping industries.

RADIOCARBON DATES

Seven carbon dates were obtained from Hedden Site feature fill (Table 1). I think these dates were all from aggregate samples of hickory nuts although I have not been able to find a record of the precise provenience information about the C-14 samples among the project records curated at the Kentucky Office of State Archaeology. The dates demonstrate that processing of nuts and other plant foods, and burning, were taking place on-site during the Late Middle Archaic but especially during the Late Archaic period.

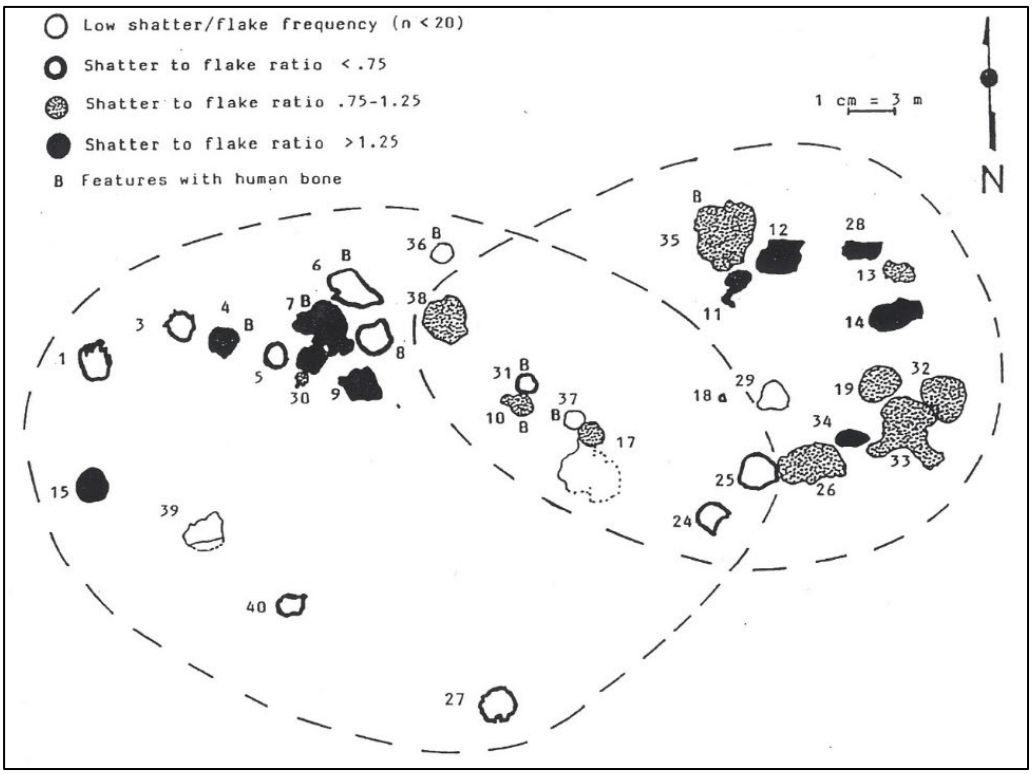

Figure 24. Stallings' Hedden Site plan showing shatter to flake ratios.

Table 1. Hedden Site Radiocarbon dates.

Radiocarbon Dates From The Hedden Site (15Mcn81)		
	Two Sigma Calibrated Age	**Median Age Calib 7.1**
Western Cluster		
Feature 5	4310 to 42190 and 4260 to 4045 B.C.	**4200 B.C.**
Feature 40	4055 to 3775 B.C.	**4000 B.C.**
Eastern Cluster		
Feature 26	3360 to 3035 B.C.	**3300 B.C.**
Feature 19	3335 to 2900 B.C.	**3100 B.C.**
Feature 35	3035 to 2870 and 2800 to 2900 B.C.	**2900 B.C.**
Feature 28	2850 to 2820 and 2630 to 2455 B.C.	**2600 B.C.**
Feature 38	2460 TO 2140 B.C.	**2300 B.C.**

ACKNOWLEDGEMENTS

Warm thanks to Jennifer Barnett, Janice Campbell, Chris Gunn, Nicole Konkol, Cheryl Munson, Nancy O' Malley, Dave Pollack, Christina Sabol, Karen Stevens, and foremost to Nick Laracuente, for their help and encouragement.

REFERENCES CITED

Rossen, Jack
2000 Archaic Plant Utilization at the Hedden Site, McCracken County, Kentucky. In *Current Archaeological Research in Kentucky: Volume Six*, edited by David Pollack and Kristen J. Gremillion, pp. 1-24. Kentucky Heritage Council, Frankfort.

United States Department of Agriculture (USDA)
1976 *Soil Survey of Ballard and McCracken Counties, Kentucky*. U.S. Department of Agriculture, Washington, D.C.

THE BAKED CLAY OBJECTS OF THE HEDDEN SITE (15McN81): INDICATION OF A WIDER ARCHAIC AFFILIATION

By

William A. Huser
Kentucky Heritage Council
Frankfort, Kentucky

ABSTRACT

The Hedden Site in McCracken County is the only extensively investigated Archaic Period site in Kentucky that has yielded baked clay objects. These stylistically uniform artifacts of indeterminate function have a distinct pattern of geographic distribution in the eastern United States, mainly in the Central and Lower Mississippi River valley. Researchers typically associate baked clay objects with the Poverty Point Archaic mound site in northeastern Louisiana; however, discoveries during the last few decades have demonstrated that the production of baked clay objects predated their use at Poverty Point by numerous centuries. In this paper, baked clay objects are described, the geographic distribution and the history of their research are sketched, and problems of dating their use at the Hedden Site are explained.

INTRODUCTION

The Hedden Site is the only intensively investigated site in Kentucky, which has yielded baked clay objects. My goal in this paper is to put the Hedden Site baked clay objects, and the site itself, into a wider context. So, what are baked clay objects? These are un-tempered, solid clay objects that typically range in size from ping-pong balls to tennis balls, as Donald Janzen succinctly put it (Figure 1). They occur in colors ranging from buff, tan and reddish to gray and black, depending on soil type and oxygen supply during firing. They were made in a variety of standard geometric shapes, and can have a variety of surface decorations. Because baked clay objects have been found clustered in fire pits at various sites, they have traditionally been interpreted by researchers to have played a role in food preparation, likely functioning to facilitate roasting or boiling.

As pointed out by Christopher T. Hays, Richard A. Weinstein and James B. Stoltman in a 2016 paper, baked clay objects are known to have been independently invented at a few different, far-flung locations around the world at different times. In Australia, baked clay object were used in earth ovens beginning as early as 2000 B.C. and that technique persisted until the late 1800's A.D. at some locations. Also, in Turkey, at the famous Catalhoyuk Neolithic site, thousands of baked clay objects have been recovered. In the western U.S., Robert Heizer in 1937 reported recovering

baked clay objects from about 250 sites in the Sacramento River Valley of California. How old the California examples are I just don't know.

Figure 1. Baked clay objects from various sites.

But, it was in the eastern United States, in the lower Mississippi River Valley and along the Gulf and lower Atlantic Coast, during the latter Archaic Period, that baked clay objects had their greatest use and diversification, and nowhere more so than at the extraordinary, unique Poverty Point mound and earthwork site in northeastern Louisiana, located on a bluff top overlooking the Mississippi River swamplands (Figure 2).

Figure 2. Artist Martin Pate's view of the Poverty Point Site.

BAKED CLAY OBJECTS AND POVERTY POINT

At Poverty Point, later-Archaic innovations that began elsewhere, such as more-sedentary existence, mound building, pottery making, and manufacture and trade of exotic stones and stone and copper objects, coalesced into what is referred to as the Poverty Point Culture. It's commonly agreed today that the main occupation of the Poverty Point Site dates from 1750 to 970 B.C., as proposed by Robert Connolly (2006), although Jon Gibson (2000) would cut it off at 1300 - 1350 B.C.. During this period, exotic materials from a huge area of the Eastern United States flowed into and perhaps out of Poverty Point and baked clay objects were made and used in the millions there (Figure 3). Baked clay objects are the most abundant and geographically widespread objects associated with Poverty Point Culture. They are so closely associated with the Poverty Point Site that they are often referred to as "Poverty Point Objects." Yet, the manufacture of baked clay objects pre-dated the Poverty Point Site. Research at other locations has shown that production of certain styles of baked clay objects began more than a thousand years earlier, in the Middle Archaic.

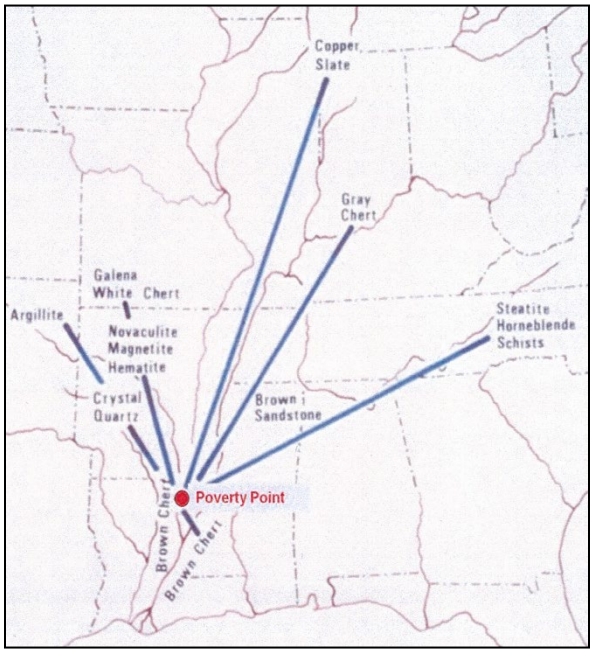

Figure 3. Poverty Point Culture trade network courtesy of Cheryl Munson.

HISTORY OF FINDING BAKED CLAY OBJECTS

Broad scholarly awareness of baked clay objects in the eastern United States seems to have begun in the 1950's. Antonio Waring recovered a number of baked clay objects from the lower level of a Sapelo Island, Georgia, shell ring as reported by James Griffin in 1952. This and other finds in South Carolina and Georgia of baked clay objects in association with fiber-tempered pottery and/or steatite vessels were variously carbon dated to circa 1850, 1820 and 1740 B.C., although those radiocarbon assays were made decades ago. Baked clay objects have been found on sites in the Savannah River Valley up to the Fall Line.

Baked clay objects were first systematically described in American archaeological literature in 1955 by James Ford, Phil Phillips, and William Haag, in the first comprehensive report about the Jaketown Site in northwestern Mississippi. Then, in 1956, the first comprehensive report of the Poverty Point Site was published by Ford and Clarence Webb (Figure 4). In a 1982 report on Poverty Point, Webb identified 79 different styles of baked clay objects from various eastern U.S. sites (Figure 5).

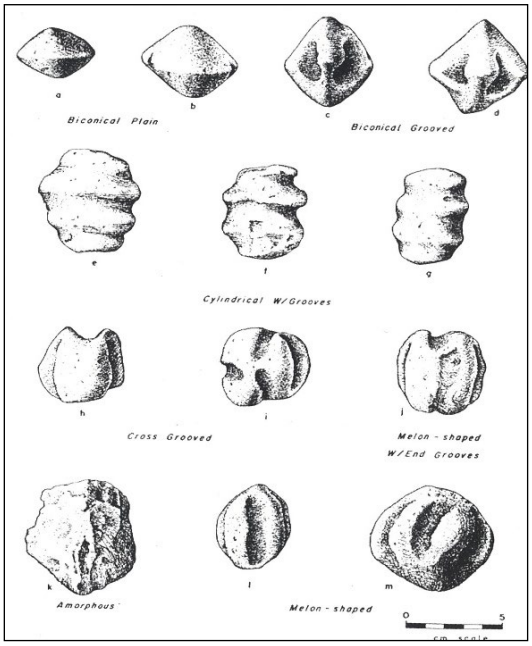

Figure 4. Baked clay objects illustration in Ford and Webb (1956).

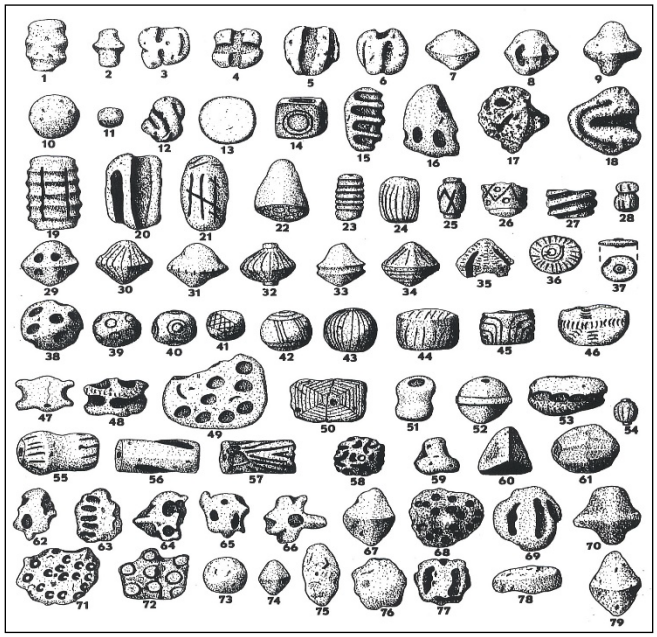

Figure 5. Baked clay objects illustration in Webb (1982).

As noted by Hays and Cheryl Munson in a 2016 paper, in 1951, Glenn Black, of Indiana University, had learned of the existence of baked clay objects at the Clarksville-Kelly Site on the Ohio River across from Louisville and had communicated that fact to Haag, Phillips, and Webb. As you recall, Cheryl Munson brought some of the baked clay objects from the Clarksville-Kelly Site as well as identical ones from Poverty Point to the Kentucky Heritage Council Archaeological Conference in Louisville last year (Figure 6). Hayes and Munson (2016) also note that in the 1960's, Ripley Bullen in Florida recognized the similarity of baked clay objects from the Tick Island locality of northeastern Florida to ones from Poverty Point.

In 1967, the Claiborne Site on the Gulf Coast of Mississippi was discovered during the construction of a port facility (Smith 1985). Claiborne has yielded so many exotic objects that today the site is viewed as having been a clearinghouse of sorts for goods flowing in and out of the Poverty Point Site. Claiborne and Jaketown have each yielded at least 12,000 baked clay objects, the largest quantities recovered outside of Poverty Point, and are seen as the sites most closely linked to Poverty Point.

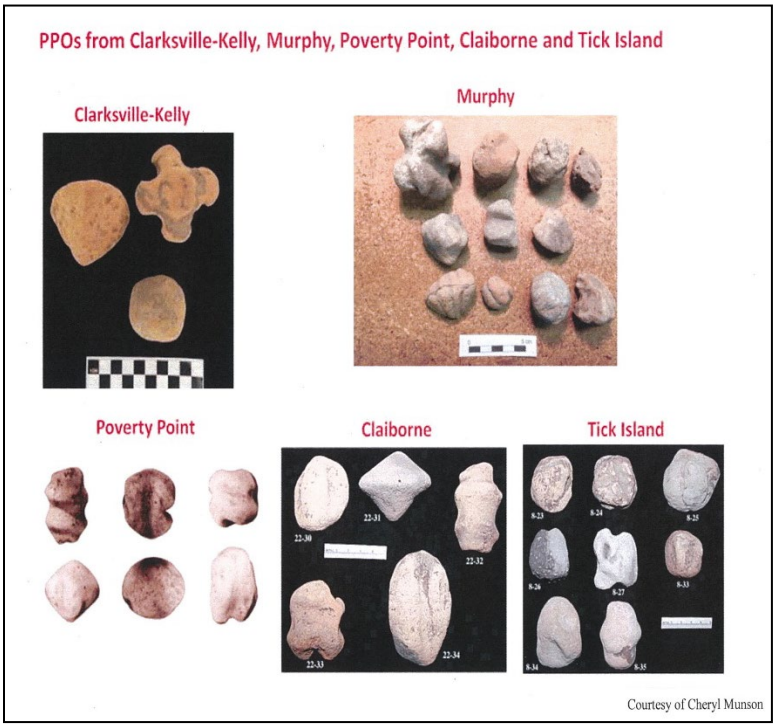

Figure 6. Baked clay object illustration courtesy of Cheryl Munson (Hays and Munson 2016).

In 1968 and 1969, Stanley South (1969) found numerous baked clay objects in association with a Morrow Mountain projectile point, steatite sherds, and fiber-tempered and Deptford ceramic sherds at the Charles Towne Site of coastal South Carolina (Figure 7). Many of the objects from Charles Towne are perforated and some are as large as 10 cm in length and 7.5 cm in thickness, similar to ones in Texas in being larger than ones of the Mississippi River Valley. Between 1974 and 1994, Gerald Smith (1998) and Robert Mainford (1994) reported the presence of baked clay objects on 32 sites in the Obion and Forked Deer River drainages in western Tennessee.

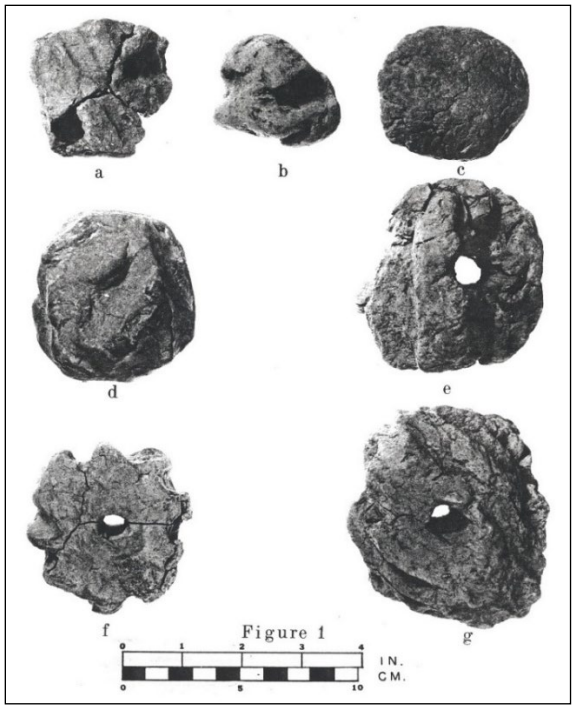

Figure 7. Baked clay objects from the Charles Towne Site, South Carolina.

In 1997 through 2001, Cheryl Munson recovered baked clay objects from the Murphy Site, located on a terrace overlooking the confluence of the Wabash and Ohio Rivers, in extreme southwestern Indiana (Hays and Munson 2016). Evansville avocational archaeologist Charles Lacer also recovered baked clay objects from Murphy during the 1960's. Munson and Lacer's surveys also recovered hematite and magnetite plummets, an object type associated with Poverty Point Culture, from the Murphy Site (Figure 8). One plummet was found at Hedden, in Feature 19, which also contained baked clay objects and a gorget (Figure 9).

Figure 8. Illustration of plummets courtesy of Cheryl Munson (Hays and Munson 2016).

Figure 9. Plummet from Feature 19 at the Hedden Site.

In a 2005 article, Joseph Saunders reported that 75 pounds of baked clay objects had been recovered from the Middle Archaic Watson Brake mound site in northeastern Louisiana (Figure 10). These were mainly cuboidal, about 3 to 4 centimeters on a side, but also rounded cubes, and spherical and cylindrical ones, likely dating to ca. 3350 B.C. Saunders noted that there are six other Middle Archaic mound sites in that locality which also have baked clay objects on them. Also in 2005 & 2006, Prentice Thomas Associates reported on their mid-1990's research of the Burkett and Weems Sites in extreme northeastern Missouri, both of which contained baked clay objects (Prentice and Campbell 2005, 2006).

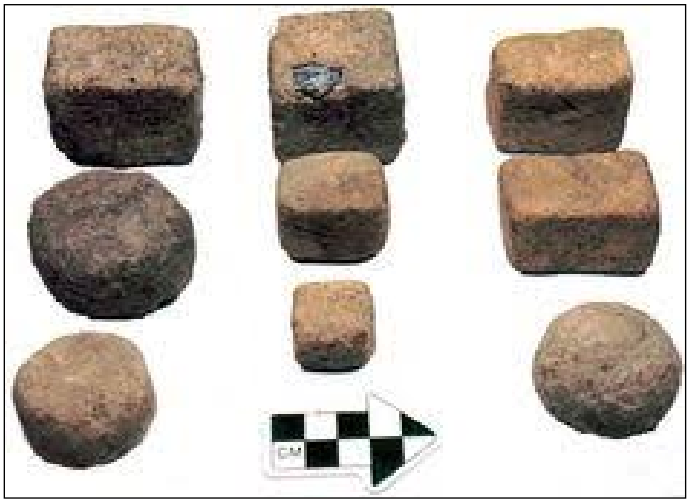

Figure 10. Baked clay objects from the Watson Brake Site, Louisiana.

Those sites are among at least 30 or 40 sites in eastern Missouri that have yielded baked clay objects. The Burkett and Weems Sites, located about 25 miles to the west of Hedden, are the geographically closest sites to Hedden that have yielded baked clay objects, to my knowledge. Prentice Thomas Associates obtained a radiocarbon date range for the Late Archaic occupation of Burkett of 2,830 to 2,210 B.C. The Weems Late Archaic occupation was even older, carbon dated to 3350 to 2480 B.C. Thus, it is evident that Burkett and Weems pre-date the fluorescence of the Poverty Point Site by at least 400 years and are antecedent, and contributory to Poverty Point culture. Notably, baked clay objects continued in use in eastern Missouri into the Woodland Period in small quantities.

So, a picture emerges today of the production of baked clay objects starting in the Middle Archaic, at least by ca. 3,350 B.C.. Then, through the Terminal Archaic, that trait diffused over hundreds of miles along the waterways of the Eastern United States, from South Carolina to Texas and from the mouth of the Mississippi River to the Falls of the Ohio (Figure 11). We also see the standardization and diversification of form in the manufacture of these objects, a grammar, if you will, for yet-undetermined reason, functional or symbolic. The Poverty Point Site was not the beginning but rather the culmination of that experimentation with clay. I think it's important to properly see the Poverty Point Site in that context in order to property appreciate baked clay objects. Just because baked clay objects occur on a given site doesn't mean that the site dates to the Terminal Archaic nor does it necessarily indicate any association with the Poverty Point Site.

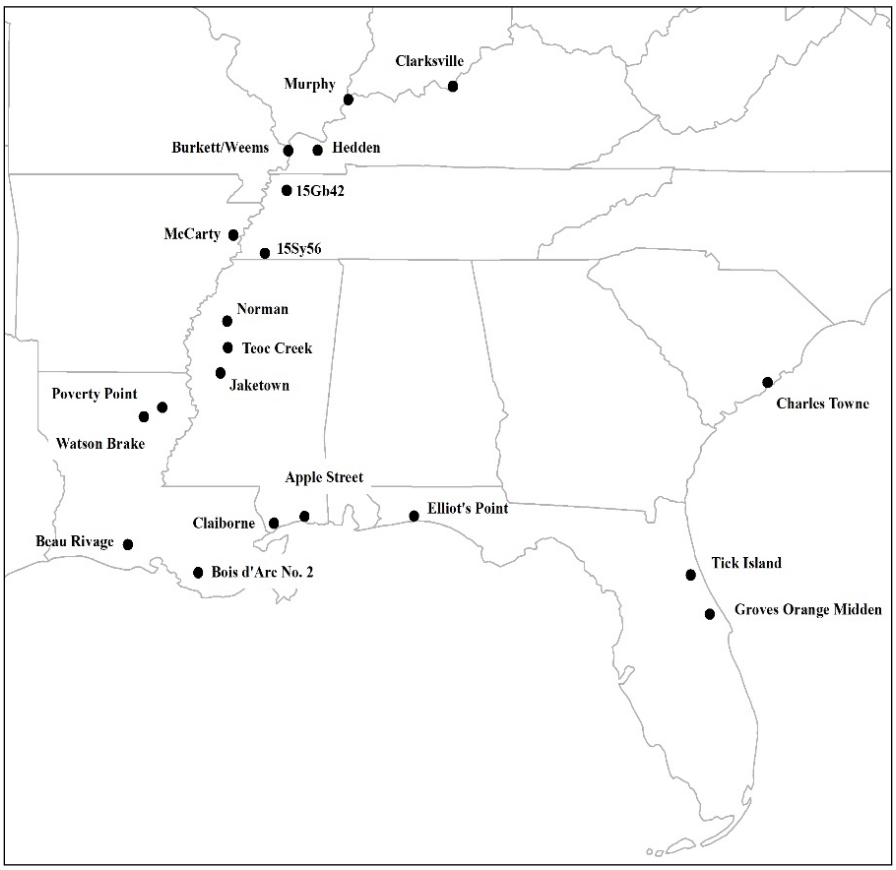

Figure 11. Notable sites with baked clay objects.

THE HEDDEN SITE (15McN81)

At the Hedden Site, in addition to the 50 fragments of baked clay objects recovered from Phase II Feature 1, 158 baked clay objects were recovered during Phase III from 20 features, not including objects of this type which are undoubtedly present in the heavy fractions of the flotation samples (Figure 12). They typically are small, eroded fragments, some with clearly recognizable exterior surfaces (Figure 13 and 14). They are mostly yellowish brown to reddish brown in color, although a few are gray. They occasionally have inclusions of charcoal, tiny water polished gravel, tiny iron concretions, or chert flakes. At least two standard types, cylindrical grooved and spheroidal, are present. I'm sorry I don't have better photographs of the objects from Hedden; I just didn't have time to go through the artifact collection and make new photographs of them.

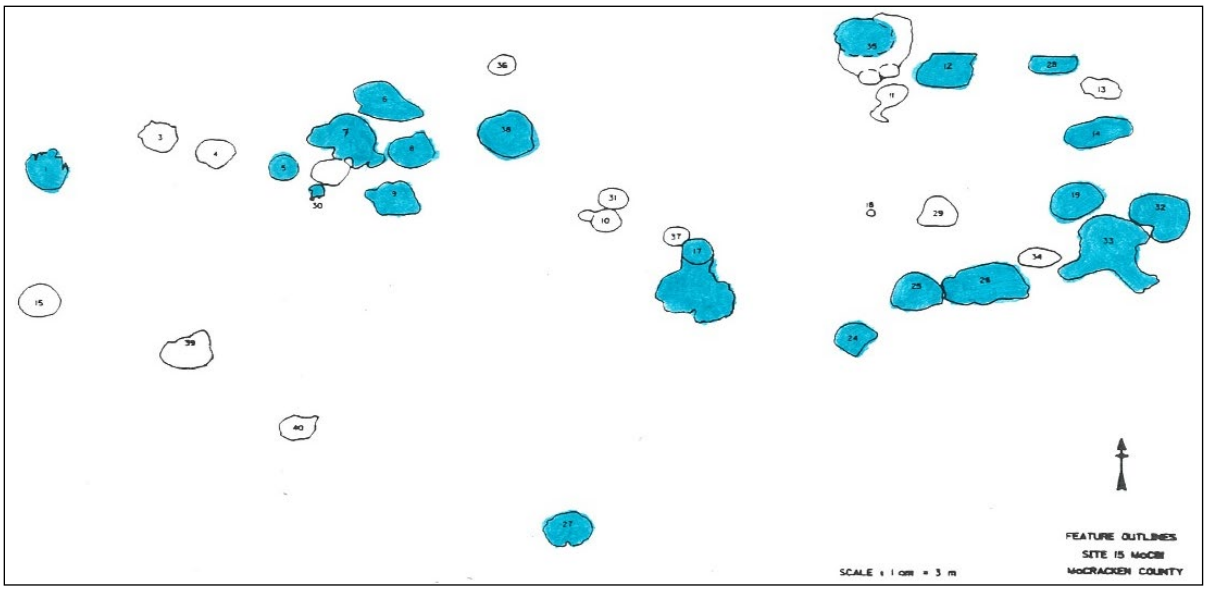

Figure 12. Hedden Site features with baked clay object fragments in the fill.

Figure 13. Selected baked clay object fragments from the Hedden Site.

Figure 14. Conjoining baked clay object fragments from the Hedden Site.

So how old are the baked clay objects of the Hedden Site? When I undertook this study, I thought there was a good chance of answering that question. There were seven features that had carbon dates and six of those contained baked clay objects. Three of the carbon dated features also contained diagnostic hafted bifaces! Then, after considering the facts more closely, I came to the disappointing realization that I couldn't answer the question due to the nature of the features. I came to understand that, when a pit feature is dug through midden into subsoil and then is filled in, either soon after its creation or more-gradually, it gets filled with midden containing intermixed objects of different time periods. The carbon dates indicated when a lot of burning of hickory nut shells took place on-site and the hafted bifaces indicated broad periods of time during which the site was occupied, but those two lines of evidence, separately or in combination, do not indicate when the baked clay objects were deposited on the site (Table 1). They only indicate the *terminus post quem*, the date after which a feature had to have been be filled.

Table 1. Hedden Site radiocarbon dates.

Radiocarbon Dates and Diagnostic Hafted Bifaces From The Hedden Site					
	Baked Clay Objects Present	**Two Sigma Calibrated Age**	**Median Age Calib 7.1**	**Diagnostic**	**Date Range**
Western Cluster					
Feature 5	Yes	4310 to 4290 and 4260 to 4045 B.C.	**4200 B.C.**		
Feature 40	No	4055 to 3775 B.C.	**4000 B.C.**		
Eastern Cluster					
Feature 26	Yes	3360 to 3035 B.C.	**3300 B.C.**	Snyders Affinis	**200 B.C. to 200 A.D.**
Feature 19	Yes	3335 to 2900 B.C.	**3100 B.C.**		
Feature 35	Yes	3035 to 2870 and 2800 to 2760 B.C.	**2900 B.C.**	Saratoga Expanding Stem	**2000 to 650 B.C.**
Feature 28	Yes	2850 to 2820 and 2630 to 2455 B.C.	**2600 B.C.**		
Feature 38	Yes	2460 to 2140 B.C.	**2300 B.C.**	Saratoga Expanding Stem	**2000 to 650 B.C.**

For example, Feature 38 had a median carbon date of 2300 B.C. But it also contained a Saratoga Expanding Stem point with a date range of 2000 to 650 B.C. The best that it tells you is that the feature was backfilled at some time between 2000 B.C. and 1994 A.D. when the site was mitigated. The worse instance was Feature 26, which had a median carbon date of 3300 B.C. However, it contained a Snyders Affinis point dating from 200 B.C. to 200 A.D., during the daggone Early Woodland Period! Bummer, man!

Unfortunately, we didn't find a hearth feature or earth oven that had a concentration of baked clay objects *in situ* with burned hickory nut shells among them. The nearby Burkett and Weems Sites demonstrate that Archaic peoples living at the confluence of the Ohio and Mississippi Rivers were making baked clay objects well before the fluorescence of the Poverty Point Site. Therefore, it is quite possible that the Hedden Site inhabitants were, too, but can't be proved.

CONCLUSION

With the investigation of Hedden Site, Kentucky, joined all of the other states of the Central and Lower Mississippi Valley that possess this peculiar Archaic Period trait that became part of the Poverty Point Culture. More work is needed in Kentucky on sites with baked clay objects on them to better put this phenomenon into clearer, more-detailed context. As David Pollack made me aware, in Betty McGraw's 1981 report of the survey for the Great River Road, she stated that a total of either 11 or 19 [two different totals in the same report] spherical "baked clay globs" were recovered from three sites, combined, in Fulton and Hickman Counties in extreme southwestern Kentucky, 15Hi1, 15Fu1 and 15Fu4. Those assemblages need to be re-examined to determine what exactly was found at those sites. In the 22 years since the Hedden Site was mitigated, however, not a single additional site with baked clay objects on it has been reported in the state, to my knowledge. While that fact may speak to the rarity of those sites in Kentucky, I think it also underscores the paucity of work in the western fringe of the state, especially beyond the survey level. There certainly is no shortage of great sites out here, and surely some more of them contain baked clay objects.

ACKNOWLEDGEMENTS

Warm thanks to Jennifer Barnett, Janice Campbell, Chris Gunn, Nicole Konkol, Cheryl Munson, Nancy O'Malley, Dave Pollack, Christina Sabol, Karen Stevens, and foremost to Nick Laracuente for their help and encouragement.

REFERENCES CITED

Connolly, Robert P.
2006 An Assessment of Radiocarbon Age Results from the Poverty Point Site. *Louisiana Archaeology* 25:1-92.

Ford, James A., Phil Phillips, and William Haag
1955 The Jaketown Site in West-Central Mississippi. *American Museum of Natural History Anthropological Papers* 45(1), New York.

Ford, James A., and Clarence H. Webb
1956 Poverty Point, a Late Archaic Site in Louisiana. *American Museum of Natural History Anthropological Papers* 46(1), New York.

Gibson, Jon L.
2000 *The Ancient Mounds of Poverty Point: Place of Rings*. University Press of Florida, Gainesville.

Griffin, James
1952 *Archaeology of Eastern United States*. University of Chicago Press, Chicago.

Hays, Christopher T., and Cheryl A. Munson
2016 Poverty Point Culture in the Lower Ohio Valley: The Clarksville and Murphy Sites. Paper presented at the 60th Annual Meeting of the Midcontinental Archaeological Conference, Iowa City.

Hays, Christopher T., Richard A. Weinstein, and James B. Stoltman
2016 Poverty Point Objects Reconsidered. *Southeastern Archaeology* 35(3):213-236.

Mainfort, Jr., Robert C.
1994 Archaeological Investigations in the Obion River Drainage: The West Tennessee Tributaries Project. Tennessee Department of Environment and Conservation Division of Archaeology, Research Series No. 10.

McGraw, Betty
1981 Archaeological Reconaissance Survey of the Great River Road Project, Ballard Carlisle, Hickman, and Fulton Counties, Kentucky. Kentucky Department of Transportation, Frankfort.

Prentice, Jr. Thomas M., and L. Janice Campbell
2005 Investigations in the New Madrid Floodway: Data Recovery at 23MI20, The Burkett Site, Mississippi County, Missouri, Volume I: Final Report. Prentice Thomas and Associates, Inc.

2006 Investigations in the New Madrid Floodway: Data Recovery at 23MI25, the Weems Site, Mississippi County, Missouri. Volume I: Draft Report. Prentice Thomas and Associates, Inc.

Saunders, Joe W., Rolfe D. Mandel, C. Garth Sampson, Charles M. Allen, E. Thurman Allen, Daniel A. Bush, James K. Feathers, Kristen J. Gremillion, C. T. Hallmark, H. Edwin Jackson, Jay K. Johnson, Reca Jones, Roger T. Saucier, Gary L. Stringer, and Malcolm F. Vidrine

2005 Watson Brake, a Middle Archaic Mound Complex in Northeast Louisiana. *American Antiquity* 70(4):631-668

Smith, Brent W.
1985 A Preliminary Identification of Faunal Remains from the Claiborne Site. In *Anthology of Mississippi Archaeology 1966-1979*, edited by Patricia Galloway, pp. 143-150, Mississippi Archaeological Association and Mississippi Department of Archives and History.

Smith, Gerald P.
1998 Notes on Terminal Archaic/Poverty Point Culture and Its Transition into Woodland in Western Tennessee. *Tennessee Anthropologist* 23(1–2):29–35.

South, Stanley
1969 Summary of Archeological Work at Charles Towne. *Notebook* 1(6-9):7-8.

Webb, Clarence H.
1982 *The Poverty Point Culture*, 2nd Ed., Rev. ed. Geoscience and Man: Volume 17. Louisiana State University School of Geoscience, Baton Rouge.

THE PREHISTORIC CONTEXT OF FORT CAMPBELL, KENTUCKY-TENNESSEE

By

Richard D. Davis (Colorado State University, Fort Collins, Colorado)
Richard V. Williamson (Colorado State University, Fort Collins, Colorado)
Christopher G. Leary (URS Corporation, Cincinnati, Ohio)
Donald A. Miller (Gray & Pape, Cincinnati, Ohio)
Philip C. LaPorta (LaPorta & Associates, Warwick, New York)
and
Christopher A. Bergman (URS Corporation, Cincinnati, Ohio)

ABSTRACT

Throughout the past 25 years, archaeological site detection surveys have been conducted across approximately 53,000 acres of the Fort Campbell Military Installation, Kentucky-Tennessee. The results of these surveys have shown, in general, a prehistoric record consisting primarily of lithic scatters in upland settings. Over the last half-decade, 39 National Register eligibility evaluations have also been undertaken on prehistoric resources on the installation. These more detailed evaluations revealed that, due to the low contrast nature of local archaeological resources, more exacting field and laboratory methods are required to properly understand the prehistory of Fort Campbell. Among the research methods and techniques applied to prehistoric sites at Fort Campbell are a consistent use of GPS and GIS technology; geomorphological, soil core, and palynological analyses; studies of raw material extraction and lithic reduction trajectories; and functional investigations of lithic artifacts employing microwear and serological analyses. In this paper, we will present recent research, as well as the updated prehistoric context of the Fort Campbell area.

INTRODUCTION

The National Park Service (NPS) has published standards and guidelines that require the establishment of historic contexts as a means to guide a full range of management decisions regarding federally owned historic properties (Birnbaum 1994). In 2001, the Cultural Resource Program at the Fort Campbell Military Installation, Kentucky-Tennessee, contracted with BHE Environmental, Inc., to develop a Historic Context Statement for the Prehistory of Fort Campbell. A previous context statement for the prehistory of Fort Campbell had already been produced and provided a good overview of the installation's documented prehistoric record (Moffat and Ahler 2001). Their document, however, did not accomplish all of the objectives that the National Park Service guidelines set forth for a context statement, a limit many historic context projects tend to follow. Fort Campbell, however, desired a context statement that more closely followed the intent

of the NPS guidance. An integral component of this new effort required seeking patterns within the existing inventory of prehistoric resources documented at Fort Campbell, while re-examining *why* and *how* specific types of prehistoric sites might be important in the study of the prehistoric occupation across the region. This approach has been an unqualified success, and has resulted in the generation of new insights and research strategies into the prehistoric record at Fort Campbell.

The development of the second *Historic Context Statement for Prehistory at Fort Campbell, Kentucky-Tennessee* necessitated a change in archaeological methods and analysis (Bergman and Comiskey 2006). Once the prehistoric context for the area had been developed, maintaining established investigative practices into the prehistoric record at Fort Campbell without active reference to patterns discerned by that study would have been irresponsible. It was therefore logical to utilize methods and techniques not usually employed during site detection and eligibility evaluation investigations, such as pollen analysis from soil core samples, geomorphology, and serological studies on prehistoric artifacts. Through a detailed analysis of the existing prehistoric site inventory for the installation, synthesized with data recovered from newly-recorded resources, it became apparent that a systematic re-definition of the prehistoric Property Type schema used at Fort Campbell would be an invaluable tool for future research. Finally, redefinition assisted our research by allowing us to identify patterns of prehistoric occupation and activity at Fort Campbell. This process subsequently led to our development of an entirely new series of mid-level research questions that could be asked and, for the first time, addressed.

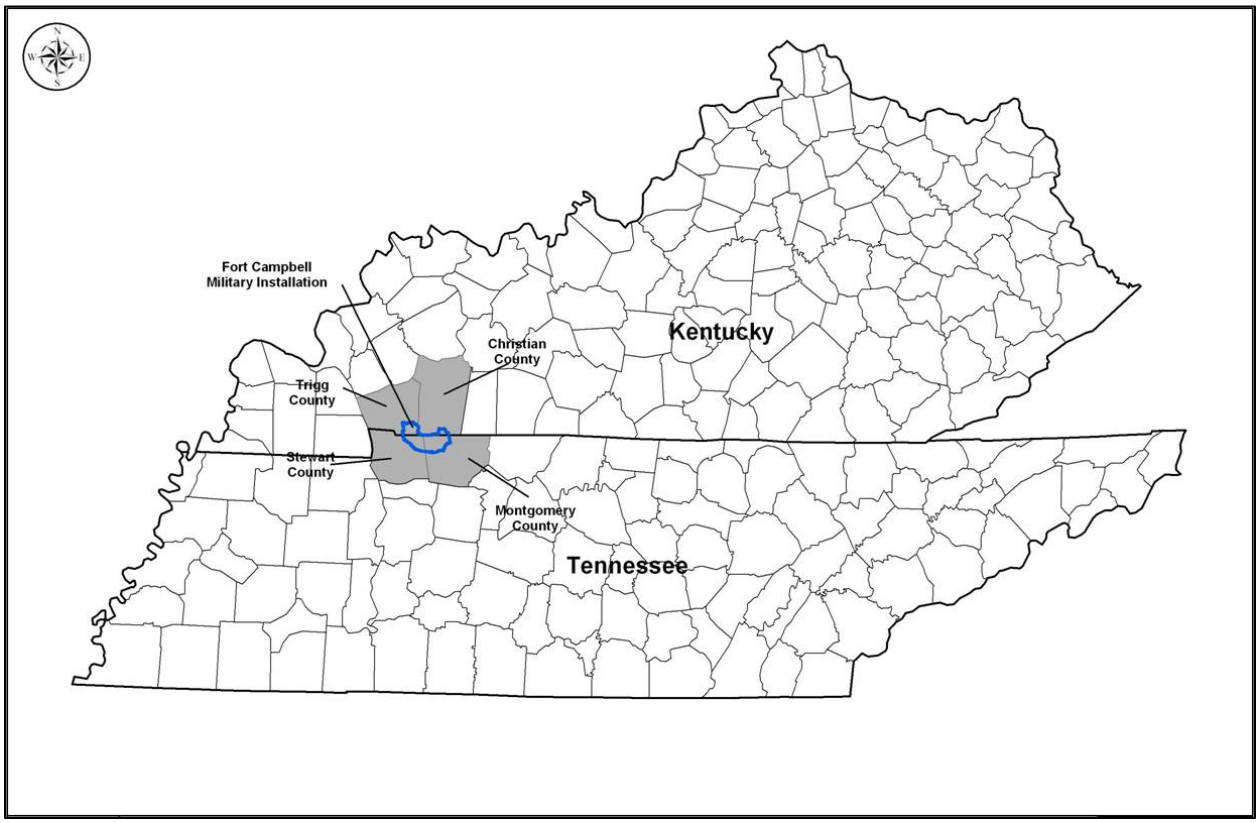

Figure 1. Location of Fort Campbell.

PROJECT BACKGROUND

The Fort Campbell Military Installation (Figure 1) encompasses over 105,000 acres (42,492 ha) within portions of four adjoining counties: Stewart and Montgomery in Tennessee, and Trigg and Christian in Kentucky. Perched atop the southwestern margin of the Highland Rim and Lexington Plain plateau, Fort Campbell is located along the divide between the undulating plateau to the east and the steeply dissected uplands to the west. These uplands, which account for over 90 percent of the entire installation, are underlain by a karstic landscape of sinkholes, caves, and drains (Figure 2). As such, Fort Campbell contains a variety of landforms, including ravines, perennial stream valleys, intermittent streams, and wet weather conveyances. The geological structure of Fort Campbell supports five distinct bedrock formations: Cretaceous Tuscaloosa Gravel, Mississippian Ste. Genevieve, St. Louis limestones, and Warsaw and Fort Payne formations, all of which outcrop on the installation as resource materials suitable for prehistoric economic purposes (especially the manufacture of stone tools).

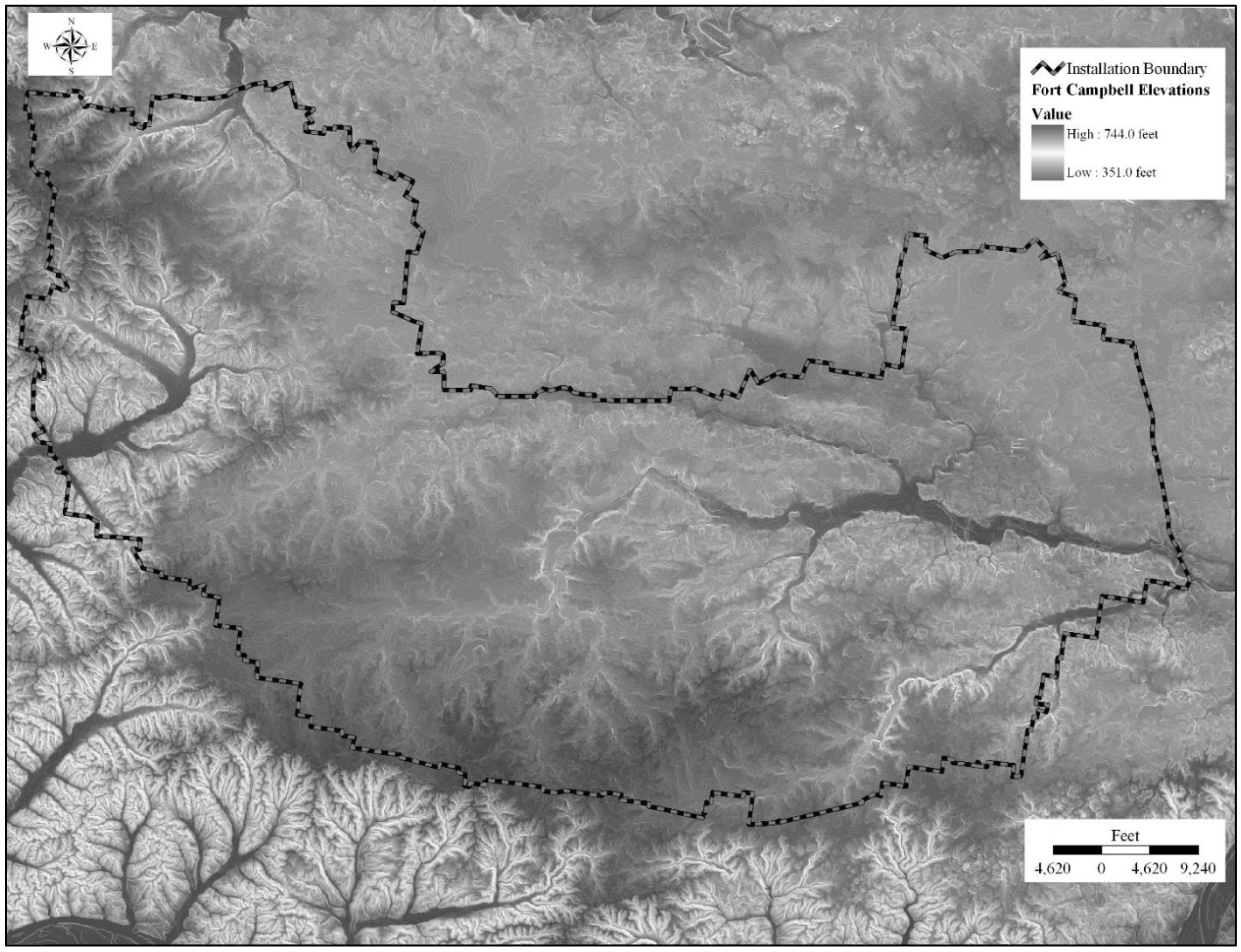

Figure 2. Elevation map of Fort Campbell (from Bergman and Comiskey 2006).

Of the total 105,000 acres (42,492 ha) encompassed within the installation, approximately 60,000 acres (24,281 ha) have been accessible for archaeological survey in the modern era, with

the remaining acreage rendered inaccessible due to a variety of military-related activities, such as munitions impact zones, administrative offices, and housing. Across the portions of the installation open for survey, a cumulative total of 53,000 acres (21, 488 ha, or approximately 88 percent of the available survey area; see Figure 3) has been subject to some form of systematic archaeological survey, ranging from pedestrian walkovers to set-interval shovel testing. The earliest of these systematic surveys began in the 1980's and have continued to the present (O'Malley et al. 1983). In total almost a dozen different archaeological consulting firms have conducted over three dozen different site detection surveys (e.g. Albertson and Buchner 1999, 2001, 2003; Barrett and Karpynec 2003; Buchner and Albertson 2003; Bradbury 1998; Brown and Lewthwaite 1996; Ezell 2002; Gray and Buchner 2003; Leary et al. 2005a; Pritchard 2005; Wilson et al. 2005) and eligibility evaluations (e.g. Ahler et al. 1998; Kreisa et al. 2002; Leary et al. 2005b; McNutt 2004; McNutt et al. 2002). Those surveys have identified over 1,300 archaeological sites, of which almost 300 were recommended as either eligible or potentially eligible for inclusion on the National Register of Historic Places (NRHP).

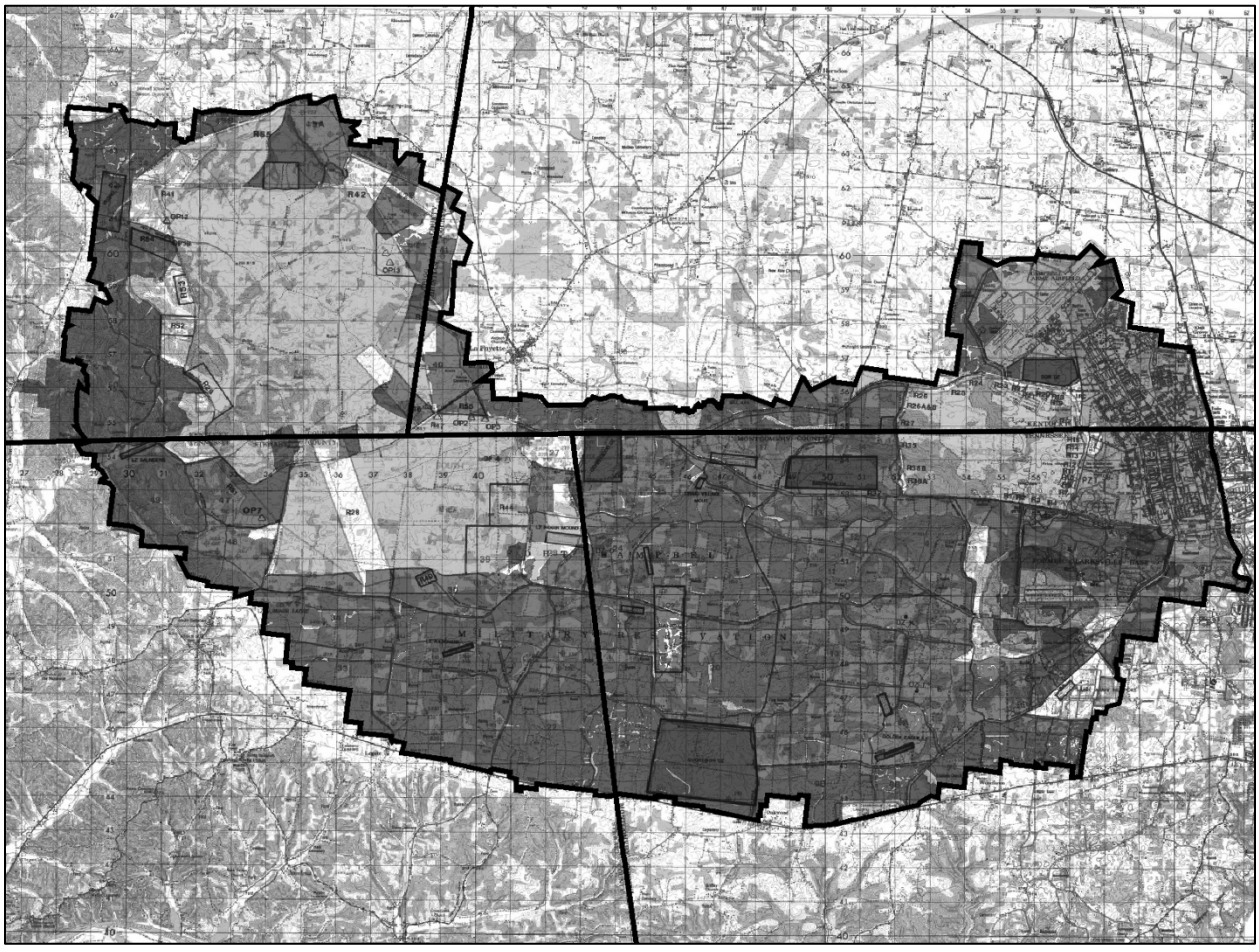

Figure 3. Surveyed lands (darker areas) at Fort Campbell.

Fort Campbell possesses a rich and varied record of prehistoric occupation that spans from Paleoindian through the Late Prehistoric cultural traditions (Table 1). While evidence for earliest

occupations is sparse, and predominantly confined to isolated finds of Clovis fluted projectile point or knife (PPK), the region experienced a much more intensive, and archaeologically visible, record of prehistoric occupation starting in the Early Archaic temporal period. This increase waned a bit in the Middle Archaic, but once again waxed in the Late Archaic.

The material components of these prehistoric occupations at Fort Campbell are manifest primarily as stone tools from all temporal periods, a small assemblage of Late Woodland and Late Prehistoric ceramics, and limited subsurface features. This record is undoubtedly biased, due to the poor organic preservation from the high permeability and general shallowness of the soils atop the karstic bedrock, as well as erosion during the 19th and 20th centuries resulting from logging and agricultural practices. Furthermore, only five percent of the recorded sites have been subjected to Eligibility Evaluation testing, effectively limiting the identification of cultural features.

PREHISTORIC SETTLEMENT PATTERNS

PREVIOUSLY RECORDED SITES

One of the first steps for the development of the *Historic Context for Prehistory* was the compilation of data that characterizes the location of previously recorded sites. This incorporated the documentary records extant for prehistoric occupations identified on the installation, amounting to 1,214 previously recorded sites. These 1,214 sites comprise 1,326 prehistoric components, 333 of which could be assigned a temporal affiliation of only "Archaic" or "Woodland." The vast majority of Fort Campbell's prehistoric components (n=993, or 74.9 percent of 1,326) are described as "unspecified prehistoric." Unspecified prehistoric sites present some of the most difficult interpretive challenges, as these have traditionally been lumped together as, simply, "lithic scatters." Recent investigations at the installation have attempted to characterize these sites better, to include a description of each resource's raw materials, technological organization, and function. Preliminary results, described at the 2004 Kentucky Heritage Council Annual Archaeological Conference, indicate that important differences can be detected among the sites, if fine-grained analytical techniques, such as microwear or serological analyses, are applied to the site's chipped stone lithic analysis (Bergman et al. 2007).

Following the compilation of the entire data set for Fort Campbell, information concerning the prehistoric components was tabulated, including temporal association, landform, distance-to-water, elevation, and soil types for each site. Analyses of these data revealed general trends for prehistoric settlement practices for each of the known components (and are summarized below in Table 2 through Table 7). Table 2 considers site types present on the installation. Data in the table clearly illustrate the overwhelming preponderance of the "Open Habitation" site type, which accounts for 92.7 percent of the 314 occupations that contained temporally-diagnostic material on the installation.

Table 1. Temporal components and assemblage characteristics at Fort Campbell, Kentucky-Tennessee.

Temporal Period	Number of Components	Material Assemblage Characteristics
Paleoindian	19	Paleoindian: Clovis PPKs Late Paleoindian: Dalton, Beaver Lake, Greenbrier PPKs
Early Archaic	74	Calf Creek, Cobbs Knife, Kessell side-notched, Kirk corner-notched, Kirk serrated, LeCroy bifurcated stem, Lost Lake, MacCorkle stemmed, Palmer corner-notched, Pine Tree corner-notched, St. Charles, Stillwell PPKs
Middle Archaic	30	Benton stemmed, Big Sandy II, Elk River stemmed, Eva II, Matanzas, Raddatz side-notched, Stanly stemmed PPKs
Late Archaic	78	Brewerton side-notched, Buck Creek Barbed, Delhi, Etley, Hebron Turkey-tail, Karnak stemmed, Kays, Lamoka, Ledbetter stemmed, Merom expanding stem, Motley, Pickwick, Saratoga broad-bladed, Saratoga expanding stem, Saratoga parallel stemmed, Table Rock stemmed, Turkey-tail, Wade PPKs
Early Woodland	32	Adena stemmed, Cypress stemmed, Dickson contracting stem, Gary contracting stem, Little Bear Creek PPKs; No reported ceramics
Middle Woodland	37	Affinis Snyders, Bakers Creek, Chesser notched, Copena, Lowe flared base, Nolichucky, Snyders, Steuben stemmed PPKs; Limestone-tempered, plain ceramics
Late Woodland	17	Jack's Reef corner-notched, Jack's Reef Pentagonal, Hamilton, Madison, Unnotched Pentagonal PPKs; No reported ceramics
Late Prehistoric/ Mississippian	27	Madison PPKs, Dover chert hoes and polished hoe flakes; Kimmswick Fabric Impressed, Bell Plain, Mississippi Plain, Baldwin Plain
TOTAL	**314**	

Table 2. Site types by cultural component at Fort Campbell, Kentucky-Tennessee.

Site Type	Paleoindian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississippian	n	%
Open Habitation/ Cemetery	0	0	0	0	0	0	0	6	**6**	**1.9**
Open Habitation	18	70	28	74	29	36	16	20	**291**	**92.7**
Isolated Temporally Sensitive Artifact	1	4	2	4	3	1	1	0	**16**	**5.1**
Stone Mound	0	0	0	0	0	0	0	0	**0**	**0.0**
Cave	0	0	0	0	0	0	0	1	**1**	**0.3**
Workshop	0	0	0	0	0	0	0	0	**0**	**0.0**
Unrecorded	0	0	0	0	0	0	0	0	**0**	**0.0**
TOTAL	**19**	**74**	**30**	**78**	**32**	**37**	**17**	**27**	**314**	**100**

Table 3 compares the landform designations recorded for each of the temporal periods. This illustrates the dominance of "Upland Ridge" sites within the entire sample (n=138, or 44.0 percent), followed by "Terrace" sites (n=57, 18.2 percent). In a few instances, there are variances in landform type, such as "Undissected Uplands" for the Early Archaic temporal period. This association is expected for the Early Archaic given the strong emphasis on upland site location during the early prehistory of Fort Campbell. A significant departure from the pattern towards upland utilization seen in the record of Archaic occupation on the installation is illustrated by Mississippian components, which required greater floodplain and terrace settings for settlement.

There is a clear trend in prehistoric settlement towards water sources forward through time (Table 4). This coincides with increased use of terrace and floodplain settings. As illustrated in Table 4, these changes in site location preferences toward riverine settings coincide with increased utilization of lower elevations during later prehistory.

The Soils data in Table 5 relate to site location preferences towards specific soil types across the installation. In particular, Dickson, Hammack and Sengtown soils are among the most commonly recorded soil types for prehistoric settlement. Dickson silt loam comprises over 28 percent of Fort Campbell's recorded soils, which is double the percentage reported for the next most common type, Hammack (Bewleyville) silt loam (13.6 percent). Sengtown gravelly silt loam is the third most prevalent soil type on the base at 10 percent; together, these three soils alone make up over 50 percent of the mapped soils. In only two instances, the Late Woodland and the Mississippian, are Dickson soils outnumbered by other soil types. In the case of the Mississippian

Table 3. Cultural component and landform by time period.

Landform Type	Paleoindian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississippian	n	%
Dissected Uplands	0	9	1	4	0	4	1	0	**19**	**6.1**
Undissected Uplands	0	11	4	1	0	2	1	0	**19**	**6.1**
Upland Bluff	0	0	0	0	0	0	0	0	**0**	**0.0**
Upland Escarpment	0	0	0	0	0	0	0	0	**0**	**0.0**
Upland Finger Ridge	0	0	0	0	0	0	0	0	**0**	**0.0**
Upland Hillslope	0	0	0	1	0	0	2	1	**4**	**1.3**
Upland Knoll	1	2	1	1	1	0	1	0	**7**	**2.2**
Upland Marsh	0	0	0	0	0	0	0	0	**0**	**0.0**
Upland Plain	1	6	2	6	5	1	0	0	**21**	**6.7**
Upland Ridge	11	25	15	36	16	19	7	9	**138**	**44.0**
Upland Terrace	0	2	1	5	3	0	0	0	**11**	**3.5**
Floodplain	0	2	1	2	0	3	1	7	**16**	**5.1**
Slope	1	2	0	1	0	0	1	0	**5**	**1.6**
Terrace	3	12	4	15	6	5	3	9	**57**	**18.2**
Unrecorded	2	3	1	6	1	3	0	1	**17**	**5.4**
TOTAL	**19**	**74**	**30**	**78**	**32**	**37**	**17**	**27**	**314**	**100**

Table 4. Cultural component and distance to water data.

Cultural Component	Mean Distance to Water
Paleoindian	101.1 meters
Early Archaic	123.3 meters
Middle Archaic	114.8 meters
Late Archaic	99.5 meters
Early Woodland	128.3 meters
Middle Woodland	108.8 meters
Late Woodland	92.1 meters
Late Prehistoric: Mississippian	82.3 meters

Table 5. Cultural component and soil type data.

Soil Type	Paleoindian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississippian	n	%
Baxter	0	2	0	0	0	1	0	1	**4**	**1.3**
Bedford	0	0	0	1	0	0	0	1	**2**	**0.6**
Bewleyville	0	0	0	0	0	0	0	0	**0**	**0.0**
Brandon	0	2	1	0	0	0	0	0	**3**	**1.0**
Crider	0	5	1	4	2	3	2	1	**18**	**5.7**
Dickson	8	16	10	23	11	10	2	4	**84**	**26.8**
Guthrie	0	0	0	0	0	1	0	0	**1**	**0.3**
Hammack	1	6	4	5	2	3	0	2	**23**	**7.3**
Humphreys	0	0	0	0	0	0	0	0	**0**	**0.0**
Landisburg	0	0	0	1	0	0	0	0	**1**	**0.3**
Lawrence	0	1	0	0	0	0	0	0	**1**	**0.3**
Lax	1	4	0	4	0	2	1	0	**12**	**3.8**
Linside	1	2	3	1	0	0	0	0	**7**	**2.2**
Mountview	1	1	0	1	0	0	0	0	**3**	**1.0**
Newark	0	1	0	1	0	0	0	0	**2**	**0.6**

Soil Type	Paleoindian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississippian	n	%
Nicholson	0	9	2	3	0	2	0	0	**16**	**5.1**
Nolin	1	5	1	3	2	4	2	7	**25**	**8.0**
Ocana	0	0	0	2	2	1	1	1	**7**	**2.2**
Paden	0	0	0	0	0	0	1	0	**1**	**0.3**
Pembroke	0	2	1	6	2	2	3	1	**17**	**5.4**
Pickwick	0	0	0	0	0	0	0	0	**0**	**0.0**
Saffell	0	0	0	1	0	0	0	0	**1**	**0.3**
Sengtown	2	3	0	5	3	1	2	0	**16**	**5.1**
Taft	1	4	1	4	6	2	0	4	**22**	**7.0**
Trace	2	5	3	4	2	1	1	2	**20**	**6.4**
Udorthents	0	0	0	0	0	0	0	0	**0**	**0.0**
Unrecorded	1	6	3	10	0	4	2	3	**29**	**9.2**
TOTAL	**19**	**74**	**30**	**78**	**32**	**37**	**17**	**27**	**314**	**100**

Period, Nolin soils, which are among the most fertile and suitable for crops, appear to have been positively selected for. Indeed, Nolin soils are among the three most commonly recorded soil types beginning with the Middle Woodland period, a significant observation given the increasing role of horticulture in the later Woodland period subsistence base.

Along with an increase in proximity to water, there is a marked trend toward utilization of lower elevations during the prehistory of the base (Table 6). The average elevation for Fort Campbell is 570 feet AMSL and the highest mean elevations appear in the Early and Middle Archaic and the Early Woodland temporal periods. Following the Early Woodland, there is a dramatic drop in elevation associated with a presumed increase in use of floodplain and other near-water settings. In the case of the Mississippian, it is suggested that level floodplains with fertile alluvial soils, such as Nolin, were ideally suited for horticultural purposes.

Overall, the general pattern of prehistoric land-use focuses initially upon the exploitation of upland settings. Occupation during the Late Paleoindian was directed towards upland environments across the installation, and this general pattern continues during the Early and Middle Archaic. The Late Archaic marked the beginning of a shift toward creek valleys and lower elevations, a development that increases markedly after the Early Woodland. In fact, later prehistoric sites tend to cluster within permanent and intermittent creek valleys, especially Saline Creek, Noah Spring Branch, Piney Fork Creek, and Fletchers Fork Creek.

Table 6. Cultural component and elevation data.

Temporal Period	Mean Elevation: AMSL
Paleoindian	571.0 feet
Early Archaic	576.5 feet
Middle Archaic	582.1 feet
Late Archaic	558 feet
Early Woodland	579 feet
Middle Woodland	545.8 feet
Late Woodland	528.5 feet
Late Prehistoric: Mississippian	510.2 feet

DEVELOPING A HISTORIC CONTEXT FOR PREHISTORY

While the trends identified from the dataset collected in the site location model represent a significant step forward for understanding of the prehistoric settlement patterns at Fort Campbell, the ultimate goal of the context statement is to provide a more meaningful and consistent basis for making management decisions about the installation's prehistoric sites. The next step of our research focused on the basic questions of site composition, location, distribution, and relationship to independent variables. This led us to a re-examination of the basic prehistoric property types known for the installation, an exercise that would have far-reaching implications on how the prehistory of the region in general, and Fort Campbell in particular, is viewed and assessed.

According to the National Park Service's "Secretary of the Interior's Standards for Preservation Planning", a property type, in a historic context, is defined as "a grouping of individual properties based on shared physical or associative characteristics" (NPS 2001). To avoid subjective ambiguities of property types, the property type definitions applied at Fort Campbell are focused upon the characteristics of the artifacts recovered at a given location. While definitions are necessarily broad, they are designed for the addition of more specific sub-categories, with temporal components or physiographic settings, for example.

Property types reflect an empirically oriented approach to site characterization. They are descriptive and formal, with no imbedded inferences to prehistoric activity. For example, the recovery of multiple artifacts of a single class–say debitage or ceramics–would be Property Type C – Activity Locus involving Discard of a Single Artifact Class. An exception to this empirically oriented approach is the Raw Material Extraction Property Type. While this property type admittedly contains inferences about prehistoric human activity, the characteristics of materials recovered, technologies, and associated behaviors are specific and unique, warranting subdivisions.

A) Raw Material Extraction Locus: characterized by outcropping of a raw material resource (or resources) and evidence for its extraction by prehistoric peoples.

B) Isolated Find Locus: characterized by the presence of culturally non-diagnostic or diagnostic materials as single finds in isolation from other cultural materials. There are two subclasses recognized for this property type.
   i. Non-diagnostic Isolated Find
   ii. Diagnostic Isolated Find

C) Activity Locus Involving Discard of a Single Artifact Class: characterized by the presence of multiple artifacts of a single class (e.g., prehistoric lithic debitage, tools or ceramics).

D) Activity Locus Involving Discard of a Single Artifact Class with Features: characterized by the presence of multiple artifacts of a single class (e.g., prehistoric lithic debitage, tools or ceramics) in association with features.

E) Activity Locus Involving Discard of Multiple Artifact Classes: characterized by the presence of multiple artifacts belonging to a variety of different classes (e.g., lithic debitage, fire-cracked rock (FCR), tools or ceramics).

F) Activity Locus Involving Discard of Multiple Artifact Classes Associated with Features: characterized by the deposition of multiple artifacts belonging to a variety of different classes (e.g., lithic debitage, FCR, tools or ceramics) in association with features.

G) Artifact Cache Locus: characterized by the presence of artifacts or other resources intentionally left at a location for either ceremonial or utilitarian purposes. Artifact caches may be isolated occurrences or associated with other property types.

H) Special Activity Locus: characterized by special activities involving cemeteries, rock art, mounds, or earthworks. This property type also includes caves and rockshelters with evidence of prehistoric activity. The subclasses of the Special Activity Locus Property Type:

   i. Stone box grave locus
   ii. Petroglyph or pictograph rock art locus
   iii. Mound or earthwork locus
   iv. Cave or rockshelter with evidence of prehistoric activity locus

I) Other Prehistoric Loci: this category is for property types that do not fall within any of the categories described above, but nonetheless represents elements of the prehistoric landscape at Fort Campbell. Table 7 illustrates the number of sites comprising each of the above-documented prehistoric property types found thus far on Fort Campbell for those areas of the base that have been systematically surveyed.

Table 7. Property type frequencies at Fort Campbell.

Property Type	n	%
A: Raw Material Extraction Locus	**0**	**0.0**
B1 and B2: Isolated Find Locus/Non-Diagnostic Artifact and Isolated Find Locus/Diagnostic Artifact	**266**	**21.9**
C: Activity Locus Involving Discard of a Single Artifact Class	**256**	**21.1**
D: Activity Locus Involving Discard of a Single Artifact Class with Features	**0**	**0.0**
E: Activity Locus Involving Discard of Multiple Artifact Classes	**681**	**56.1**
F: Activity Locus Involving Discard of Multiple Artifact Classes Associated with Features	**6**	**0.5**
G: Artifact Cache Locus	**0**	**0.0**
H1: Special Activity Locus/ Stone Box Graves	**1**	**0.08**
H2: Special Activity Locus/Petroglyph or Pictograph Rock Art	**0**	**0.0**
H3: Special Activity Locus/Mound or Earthwork	**1**	**0.08**
H4: Special Activity Locus/Cave or Rockshelter	**2**	**0.2**
I: Other Prehistoric Locus	**0**	**0.0**
Unrecorded	**1**	**0.08**
TOTAL	**1214**	**100**

GAPS IN THE DATA

Evidence of some expected prehistoric activity is absent for those areas of the installation that have been systematically surveyed (Table 7). Some of the gaps in the data set are puzzling, such as the absence of raw material extraction sites and associated workshop sites, specifically (but not uniquely) chert quarries. Chert is ubiquitous at Fort Campbell and yet, after some 20 years of survey and evaluation, no examples of this property type had been identified. Our development of a context statement led us to ask questions aimed at addressing a full range of questions about prehistoric settlement and subsistence activities at the installation. The following examples specifically reference problems associated with raw material extraction loci missing from Fort Campbell's prehistoric inventory.

1) Raw Material Extraction Loci have not been identified previously at Fort Campbell in spite of the fact that significant chert resources, both in primary bedrock and secondary contexts such as *Felsenmeer* (a concentrated chert deposit), exist on the installation. What investigative strategies can be applied to identify Raw Material Extraction Loci on the installation? Can geological predictive modeling aid the locating of chert sources and associated extraction and raw material processing areas?

2) What raw chert material types exist at Fort Campbell? How are they characterized in terms of physical composition, e.g., trace fossils, fabric and texture, geochemistry trace elements? Are cherts distinctive enough to be unequivocally identified in hand samples?

3) If Raw Material Extraction Loci do exist on the installation, what means of acquisition were employed prehistorically? Are outcrops exploited opportunistically along drainage or erosional cuts, or were there more intensive quarrying efforts, such as those seen at Dover, Tennessee? What styles of mining and extraction techniques were employed? Did cultures from different time periods extract materials differently?

4) Are identifiable bedrock, or near surface chert quarries, located at Fort Campbell?

5) Do Raw Material Extraction Loci, involving secondary source materials, which may be exploited opportunistically along drainages, have signatures that can be recognized archaeologically?

SOLVING THE PROBLEM

To answer these questions, our approach to archaeological investigations at Fort Campbell must be innovative and holistic. Methods applied to answer these questions must include geoarchaeological studies, predictive modeling, and additional field observations across the installation. For example, for chert extraction and initial chert reduction site areas, the most obvious question to be answered is *where would these site types be located*? The obvious answer is, where the chert is located! The most prevalent, visible, and accessible location of naturally-occurring cherts on the installation occur within the creeks themselves, as outwash from the decaying bedrock formations underneath the expansive upland environments and as outcrops exposed due to erosive downcutting of stream systems. Then, *where would chert initial reduction take place?* Probably, in proximity to the raw source materials, such as along the banks of creeks, and especially slopes near banks as well as directly in streambeds. Streams migrate over time, and their locations during prehistoric times may differ from where they are today. As a result, the prehistoric record was suffused with upland sites that exhibited later stage lithic reduction and finishing flakes, while remaining largely devoid of lithic procurement and initial reduction sites. Entire classes of artifacts, and, by extension, critical site types, were invisible due to a blind spot in previous archaeological field survey methods. A full and systematic investigation of the distribution of chert resources, extraction sites, and subsequent discard will require further archaeological and geological work that systematically uses information emerging from regional and larger comparative studies of chert formation and use (e.g., LaPorta 1994, 1996, 2000, 2004). Limitations written into previous survey projects, based on untested assumptions about the prehistoric record, have led to a systematic failure to look for, recognize, or record, an entire series of prehistoric site types at Fort Campbell.

The previous example is not exclusive. We acknowledge that there are, potentially, countless raw material extraction loci and chert quarries across the installation that may include sinkholes, caves, and upland areas. Furthermore, it is possible that quarries and extraction locations may, or may not, be temporally sensitive and, as such, will need to be addressed to understand fully the range of activities at these locations.

The context through which prehistoric sites at Fort Campbell were previously described and evaluated regarded most sites at Fort Campbell as uninformative "lithic scatters." In only a handful of instances, were sites noted as possessing intact features, and therefore, by default, holding interesting information about the past. The new *Historic Context for Prehistory at Fort Campbell*

has provided an opportunity to ask basic questions about *why* we find concentrations of lithic artifacts at the places we do across the Fort Campbell landscape (Bergman and Comiskey 2006). This, we are confident, will lead to a better understanding of the cultural characteristics of the different site types at the Fort Campbell installation as suggested by our earlier study (Leary et al. 2005b).

Re-doing the historic context for prehistoric sites in better accord with the Secretary of the Interior's guidelines led us to a fresh reconsideration of what kinds of sites ought to be found across the Fort Campbell landscape. Recognition of implausible gaps in the accumulated inventory then led to some directed search for chert quarries and workshops that had been entirely missed by over two decades of extensive and intensive archaeological surveys at Fort Campbell. A full account of how and why those many survey projects overlooked these sites is beyond the scope of this paper. Our primary point is that re-examination and re-compilation of existing data while trying to minimize reliance on unsupported inferences can yield very fruitful new insights about both the inventory in hand, and the inventory efforts still needed. We have already found knapped stone assemblages in streambeds in association with lithic manufacturing debris on slope locations between the streambed resources and sites on ridgelines near those streams (Figure 4). Some of these previously undocumented resources are in areas considered intensively surveyed by earlier survey efforts.

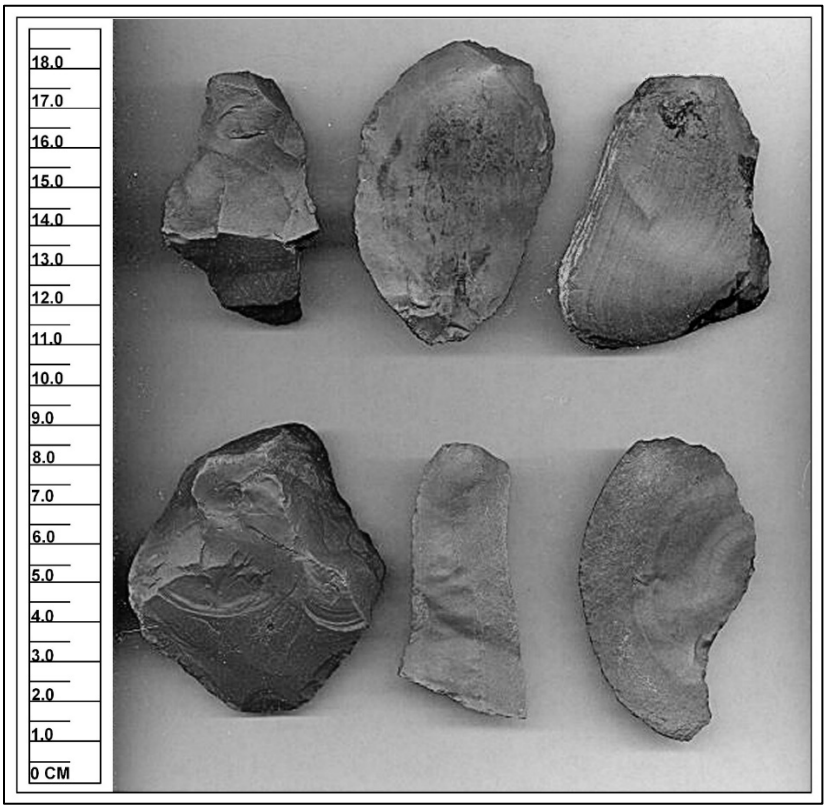

Figure 4. Lithic flakes recovered from Skinners Creek.

CONCLUSION

Even though our new historic context study is not yet finished, the process of seriously re-examining archaeological data already compiled and actively thinking through what it tells us, has led to several important conclusions:

1) recognition of site variation, both internally and externally, that was not noticed before;
2) the discovery of traces of prehistoric activity where none had been expected before;
3) and, the recognition of depositional contexts with associated artifacts that had escaped discovery in previous surveys.

All in all, our study represents an important advance for understanding how the landscape was used throughout prehistory. The normal "science" of recording locational data for sites sometimes overlooks the obvious, and archaeologist can become complacent with their data. If we force ourselves to examine site information anew based on the patient accumulation of basic data, then we can begin to formulate new questions that will guide our research. The compilation of a historic context is much more than simply summarizing what is already on record and tabulating basic characteristics. It is an invaluable tool for fostering a better understanding about the prehistoric landscape, which in the end, provides an intellectual framework for learning new information, instead of simply learning more about the same.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Fort Campbell for funding the Historic Context Statement for Prehistory as part of its Programmatic Agreement with the Kentucky Heritage Council and the Tennessee Historical Commission. Shelly Davis coordinated the contract through the USACOE-Louisville office. Michael Bruening of BHE assisted with graphics production. Charles Hockensmith, Kenneth Carstens, and Margaret Brewer offered valuable editorial comments.

REFERENCES CITED

Ahler, Steven R., Marjorie B. Schroeder, Karli White, Don Johnson, and Clark A. Dobbs
1998 *National Register Eligibility Assessment and Geophysical Investigation of Site 40MT28, Fort Campbell, Tennessee-Kentucky*. Illinois State Museum Research and Collections Center. Submitted to U.S. Army Corps of Engineers, Construction Engineering Research Laboratories, Champaign, Illinois.

Albertson, Eric S. and C. Andrew Buchner
1999 *Intensive Cultural Resources Survey of 5,180 Acres within Selected Portions of Training Areas 4, 11, 13, 17 and 19, Fort Campbell Military Installation, Montgomery County, Tennessee and Christian County, Kentucky*. PanAmerican Consultants, Inc. Submitted to National Park Service, Southeast Regional Office.

2001 *An Intensive Cultural Resources Survey of 1,307 Acres in Training Area 23, Fort Campbell Military Installation, Montgomery and Stewart Counties, Tennessee*. PanAmerican Consultants, Inc. Submitted to National Park Service, Southeast Regional Office.

2003 *Fort Campbell 8: A Report Documenting PCI's Eighth Intensive Cultural Resources Survey, Covering 4,128 acres, at Ft. Campbell, KY-TN*. PanAmerican Consultants, Inc. Submitted to National Park Service, Southeast Regional Office.

Barrett, Jared and Ted Karpynec

2003 *Phase I Cultural Resources Survey of the Proposed 7.3 Mile Transmission Line Tap to the Screaming Eagles Substation on Fort Campbell, Montgomery County, TN*. TRC Garrow and Associates, Inc. Submitted to Tennessee Valley Authority, Norris, Tennessee.

Bergman, Christopher A. and Charley Comiskey

2006 *The Historic Context for Prehistory at Fort Campbell,* Kentucky. BHE Environmental, Inc. Submitted to the U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky.

Bergman, Christopher A., Richard D. Davis, Christopher G. Leary, Donald A. Miller, and Richard V. Williamson

2007 Changing Methods, Changing Results: Recent Research at and a Review of the Fort Campbell, Kentucky Archaeology Program. In *Current Archaeological Research in Kentucky: Volume Nine*, edited by E. Nicole Mills, Richard V. Williamson, and Richard D. Davis, pp. 177-188. Kentucky Heritage Council, Frankfort, Kentucky.

Birnbaum, Charles A.

1994 *Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes*. Technical Preservation Service Preservation Brief 36. USDA National Park Service. Electronic document, https://www.nps.gov/tps/how-to-preserve/preservedocs/preservation-briefs/36Preserve-Brief-Landscapes.pdf, accessed on October 16, 2019.

Bradbury, Andrew

1998 *An Archaeological Survey of Portions of Training Areas 31, 32, 33, 34, and 40 within the Fort Campbell Military Installation, Christian County, Kentucky and Stewart County, Tennessee*. Cultural Resource Analysts, Inc. Submitted to the U.S. Army Corps of Engineers, Nashville District, Nashville, Tennessee.

Brown, Roderick S. and Simon Lewthwaite

1996 *Literature Review and Pedestrian Phase I Cultural Resources Reconnaissance, Portions of Training Areas 23 and 25, Fort Campbell Military Reservation, Montgomery County, Tennessee*. Greenhorne & O'Mara, Inc. Submitted to the U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky.

Buchner, C. Andrew and Eric S. Albertson
2003 *Fort Campbell 7: A Report Documenting PCI's Seventh Intensive Cultural Resources Survey, Covering 4,952 Acres at Ft. Campbell, KY-TN*. PanAmerican Consultants, Inc. Submitted to National Park Service, Southeast Region.

Ezell, Raymond
2002 *Phase II NRHP Eligibility Testing at 40Mt776 in Training Area 21, and Phase I Archaeological Survey of a Portion of the Proposed SR 76 Alignment in Training Areas 9B and 7 on Fort Campbell Military Reservation in Montgomery County, Tennessee*. TRC Garrow Associates, Inc. Submitted to Gresham, Smith and Partners Transportation Group, Nashville, Tennessee.

Gray, J.W., and C.A. Buchner
2003 *Fort Campbell 9: A Report Documenting PCI's Ninth Intensive Cultural Resources Survey, Covering 3,715 Acres at Fort Campbell, KY-TN*. PanAmerican Consultants, Inc. Submitted to the National Park Service, Southeast Region.

Kreisa, Paul P., Jacqueline M. McDowell, and Gregory R. Walz
2002 *National Register of Historic Places Evaluation of Six Prehistoric Archaeological Sites at Fort Campbell, Kentucky and Tennessee*. Public Service Archaeology Program, University of Illinois. Submitted to U.S. Army Corps of Engineers, Construction Engineering Research Laboratories, Champaign, Illinois.

La Porta, Philip C.
1994 Lithostratigraphic Models and the Geographic Distribution of Prehistoric Chert Quarries within the Cambro-Ordovician Lithologies of the Great Valley Sequence, Sussex County, New Jersey. *Journal of Middle Atlantic Archaeology* 10: 47-66.

1996 Lithostratigraphy as a Predictive Tool for Prehistoric Quarry Investigations: Examples from the Dutchess Quarry Site, Orange County, New York. In *A Golden Chronograph for Robert E. Funk: Occasional Papers in Northeastern Anthropology No. 15*, edited by C. Lindner, pp. 73-84. Archaeological Services, Bethlehem, Connecticut.

2000 Geologic Constraints on Prehistoric Quarry Development. In *Applied Mineralogy in Research, Economy, Technology, Ecology and Culture, vol. 2*, edited by D. Rammlmair, J. Mederer, T. Oberthur, R.B. Himann, and Pentinghaus, pp.1013-1015. A.A. Balkema, Rotterdam.

2004 A Geological Model for the Development of Bedrock Quarries, with an Ethnoarchaeological Application. In *Cultural Landscape of Prehistoric Mines*, edited by P. Topping and M. Lynott, pp. 123-139. Oxbow Books, Oxford.

Leary, Christopher G., Samiran Chanchani, and Christopher A. Bergman
2005a *Archaeological Site Detection Survey of Ca. 396-Acres on the Old Clarksville Base at Fort Campbell, Montgomery County, Tennessee*. BHE Environmental, Inc.

Submitted to the U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky.

Leary, Christopher G., Jorge Garcia-Herreros, Donald A. Miller, and Christopher A. Bergman
2005b *Eligibility Evaluation Investigations of 14 Sites: 15Ch398, 15Ch399, 15Ch400, 15Ch403, 15Tr94, 40Mt185, 40Mt216, 40Mt232, 40Mt233, 40Mt242, 40Mt599, 40Mt781, 40Sw287, and 40Sw 299 on Fort Campbell, Christian and Trigg Counties, Kentucky and Montgomery and Stewart Counties, Tennessee*. BHE Environmental, Inc. Submitted to the U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky.

McNutt, Charles. H., Jr., C. Andrew Buchner; Emanuel Breitburg; Neal Lopinot and Gina Powell
2002 *Phase II Investigations at Sites 40Mt22, 40Mt167, 40Mt227, 40Mt586, 15Tr257, 15Tr260, 15Tr261, and 15Ch575, Fort Campbell Military Installation, MontgomeryCounty, Tennessee and Christian and Trigg Counties, Kentucky*. PanAmerican Consultants, Inc. Submitted to National Park Service, Southeast Regional Office.

McNutt, Charles H., Jr.
2004 *Phase II Investigations of 21 Sites, Fort Campbell Military Reservation, Montgomery and Stewart Counties, Tennessee, and Christian County, Kentucky*. PanAmerican Consultants, Inc. Submitted to National Park Service, Southeast Regional Office

Moffat, Charles and Steven R. Ahler
2001 *Prehistoric Context Statement for Fort Campbell, Kentucky/Tennessee*. Illinois State Museum Society. Submitted to U.S. Army Corps of Engineers Construction Engineering Research Laboratory, Champaign, Illinois.

National Park Service (NPS)
2001 Secretary of the Interior's Standards for Preservation Planning. In *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines*. Electronic document, https://www.nps.gov/history/local-law/arch_stnds_1.htm, accessed on October 16, 2019.

O'Malley, Nancy, Jared Funk, Cynthia Jobe, Thomas Gatus, and Julie Riesenweber
1983 *Cultural Resources Reconnaissance of Fort Campbell, Kentucky-Tennessee*. Program for Cultural Resource Assessment, University of Kentucky. Submitted to the United States Army Corps of Engineers, Nashville District.

Pritchard, James C.
2005 *Final Report of Findings: Phase I Archaeological Survey of 670 Acres in Support of a Proposed Lands Exchange between Bi-County Solid Waste Management Systems and the U.S. Army Garrison Fort Campbell, Trigg County, Kentucky, and Stewart*

County, Tennessee. Brockington & Associates, Inc. Submitted to Fort Campbell Directorate of Public Works, Environmental Division, Fort Campbell, Kentucky.

Wilson, James F., Donald A. Miller, Christopher G. Leary, and Christopher Bergman
2005 *Site Detection Survey of 661 Acres at Fort Campbell, KY-TN*. BHE Environmental, Inc. Submitted to the U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky.

GLADIE CREEK:
A MULTICOMPONENT DEPOSIT LOCATED WITHIN THE RED RIVER GORGE, EASTERN KENTUCKY

By

Andrew M. Mickelson
Department of Earth Sciences
University of Memphis
Memphis, Tennessee

and

Katherine R. Mickelson
Department of Earth Sciences
University of Memphis
Memphis, Tennessee

ABSTRACT

Investigations at the Gladie Creek Site (15Mf410) in Eastern Kentucky produced a rich collection of temporally diagnostic lithic materials, which provide a diachronic perspective of prehistoric occupation of a steeply sloped landform in the Appalachian Mountains. These time-sensitive artifacts indicate near continuous human use of an upland colluvial slope, beginning during the Paleoindian period and continuing to the Late Prehistoric period. In addition to lithic artifacts, paleoethnobotanical remains from feature contexts provide a look at prehistoric plant exploitation in an open-air mountainous context. The results of this research indicate that Gladie Creek was optimally located along an ecotone consisting of wetland resources abutting the upland mesophytic forest. Undoubtedly, this ecotone provided habitat for a diversity of flora and fauna that attracted prehistoric foragers for millennia. Further, archaeobotanical and lithic data suggest the possibility that Gladie Creek was an open/disturbed habitat during the Late Archaic and Woodland periods, possibly providing an area ideal for the cultivation of domesticated plants which ample evidence exists from nearby rockshelter deposits.

INTRODUCTION

The Red River Gorge area of Eastern Kentucky is predominately known by archaeologists for rich rockshelter deposits. These sites have yielded desiccated plant remains which have provided

some of the best evidence for the presence of an indigenous agricultural complex in Eastern North America. Beyond the rockshelter niche, however, little is known of prehistoric landuse patterns and subsistence practices. The site provides a diachronic glimpse into prehistoric landuse outside of rockshelter or alluvial contexts. Although no domesticated plant remains were recovered from Gladie Creek, the paleoethnobotanical data indicate that a diversity of aquatic and upland species were exploited in prehistoric times.

Gladie Creek (15Mf410) is located on an 8-10 degree sloping colluvial landform near the North Fork of Red River. The site is located within an ecotone of high diversity containing riparian, wetland, and hill slope biomes. Over 60 temporally diagnostic projectile points indicate continuous occupation throughout prehistory. Notwithstanding the degradation of archaeological deposits due to plowing which caused deflation of the landform, Gladie Creek is an important site in the Red River Gorge. The site provides important evidence of prehistoric occupation outside of the rockshelter niche. Specifically, the site indicates concerted prehistoric use of colluvial landforms. Additionally, flotation samples and accelerator mass spectrometry dates from features allow for limited inferences regarding prehistoric subsistence practices. These data complement our knowledge about the Gorge area obtained from unique dry desiccated rockshelter paleobotanical assemblages (e.g., Delcourt et al. 1998; Gremillion 1995; K. Mickelson 2002).

SETTING

Gladie Creek lies in the Cumberland Plateau region of eastern Kentucky (Fenneman 1938). This area has a deeply entrenched V-shaped drainage system. The level plateau has eroded away into narrow ridgetops. The remaining land surface contains steep slopes, a few benches, and small alluvial landforms along stream courses. Variability in bedrock geology controls the region's hydrology, geomorphology, edaphic (soil) conditions, and vegetation. Because the Pennsylvanian and Mississippian bedrock were deposited nearly flat, bedrock strata also closely correlate to different zones in elevation. For example, the numerous rock overhangs or rockshelters found in the study area are almost exclusively restricted to the Corbin Sandstone Member of the Lee Formation. The Corbin sandstone member is restricted to between 305 m and 381 m above mean sea level. The Gladie Creek Site is situated on a gentle colluvial slope that faces southwest towards Red River. Colluvial slopes are found along the edges of valley floors where the underlying parent material consists of shales of the Borden Formation.

Gladie Creek is situated on a sloping colluvial landform with an eight to ten degree gradient. Colluvium is perched upon bedrock of the Cowbell Member of the Borden Formation (Weir and Richards 1974). The Cowbell Member consists of shale and siltstone of Mississippian age. Test trenches excavated to a depth of 2.4 m revealed silty-sandy clay to clayey sand soils the entire profile of the trench below the plowzone. In regional geomorphological terms, the landform is somewhat of an anomaly as it lacks blocks or slabs of bedrock bound within the matrix. Such material may exist at a greater depth than was probed, as colluvium can reach a depth of 12 m. The high sand content indicates that the primary source of the colluvium is the Corbin sandstone cliff face up slope of the site. An adjacent colluvial slope to the south contains blocks of limestone

and sandstone. Colluvium probably formed during the Pleistocene and stabilized by the early Holocene. This observation is based upon a Paleoindian fluted point recovered on the surface at adjacent site 15Mf28 and Early Archaic projectiles from the Gladie Creek Site. Since this locality has been plowed since the 1870's, no intact stratigraphy within the A Horizon exists.

The region falls within the Cliff Section variant of the Mixed Mesophytic forest, which is associated with the unglaciated Appalachian Plateau south of Pennsylvania (Braun 1950:39, 97). Vegetation composition for the immediate environs of the Gladie Creek Site has recently been completed by Thompson et al. (2000). The southwest facing aspect of the landform provides habitat predominately for oak, beech, and hemlock. Within a few hundred meters of the site, a rich diversity of flora and hence fauna may be found. Of notable significance are wetland areas along a small unnamed drainage north of the site, along Gladie Creek, and along the Red River. Other colluvial sites in the region like 15Po46 and 15Po111 also indicate that wetland environments were heavily exploited throughout prehistory.

PREVIOUS INVESTIGATIONS

Over the last 35 years several surveys and excavations have occurred in the vicinity of 15Mf410 (refer back to Figure 1). Site 15Mf28, was investigated by several researchers (Cowan 1976:124-125; Fryman 1967; Pool 1991; Stallings and Stallings 1993:24, 26, 31). Lithic artifacts, including stone tools- three Early to Middle Archaic, one Adena-like, and several Fort Ancient projectile points were recovered from this locus. Limited test excavations failed to find any prehistoric features below the plowzone (Cowan 1976:124-125). Pool et al. (1991) shovel tests isolated three concentrations of prehistoric materials at 15Mf28, while Phase II testing uncovered Feature 2 (interpreted as a tree remnant) dating to AD 1330 +/- 60 (Stallings and Stallings 1993).

Pool et al. (1991) surveyed 91 ha along lower Gladie Creek, including the Gladie Creek Historic District. Their work also located an additional two Archaic components, three Woodland deposits, and seven unassigned prehistoric components including two prehistoric sites on mid-slope benches. Significantly, their study observed that archaeological deposits located in slope contexts often go undocumented. This is because of perceived lack of prehistoric use of slope landforms of gradients beyond those stipulated in management guidelines.

Pool et al. (1992:78) on an area to the west of the area of the portion of the site reported here and also delineated the present site boundaries. The upper portion of 15Mf410 was identified through surface surveys made when the hillside was plowed by the U. S. Forest Service for planting sorghum for interpretive purposes. The Webb Archaeological Society in conjunction with the University of Kentucky's Program for Cultural resource Assessment worked on the lower reaches of the site. Their investigations consisted of controlled surface collection in 5 x 5 m blocks, uncontrolled or general surface collections, and shovel probes and test units tied to the 5 x 5 m block grid used for the controlled surface collection (Pool et al. 1992). The Webb Archaeological Society recovered 2,274 prehistoric artifacts and 17 pieces of raw material (Pool et al. 1992:34). Thirty hafted bifaces were recovered from the lower portion of the site. The majority of the

projectiles date to the Early Archaic period. However, projectiles from the Middle Archaic to Late Woodland periods were collected.

Seventy percent of the hafted bifaces were made from locally available chert, primarily Haney chert. Other artifacts included two drills and four unifacial tools produced from chert, two hammer stones, and one pitted stone (nutting stone?) (Pool et al. 1992:44-52).

Two 1 x 2 m test units excavated at the Gladie Creek Site (Pool et al. 1992:29-31) documented a few features as well. Feature 1 was determined to be a natural disturbance that contained two Archaic period drills. Feature 3, was a post mold 10 cm in diameter that extended 6 cm below the plowzone. A portion of a large earth oven contained 23.45 kg of FCR was exposed in Unit 2. Charcoal from Feature 2 produced a date of 920 ∀ 80 BP, calibrated to A.D. 1003-1212 (Beta-51356) (Pool et al. 1992:31). Botanical materials from features consisted of serviceberry (*Amnelanchier* sp.) (n=20) and raspberry/blackberry *(Rubus* sp.) (n=6). Hawthorne, hickory, wild grape, and elderberry were also reported. The presence of berries indicates that during the Fort Ancient period, 15Mf410 was probably an open rather than forested habitat. Perhaps this is an indication that the locality was farmed during the 10th century A. D.

RECENT INVESTIGATIONS AT THE GLADIE CREEK SITE

Archaeological investigations conducted in advance of a proposed visitor's center at 15Mf410 took place in five stages. Stage one consisted of grab bag sampling by Forest Service personnel from 1996 through 2000. Stages two through five took place over a month of work in 2001. That fieldwork consisted of a controlled surface collection, systematic random sampling of the plowzone, excavation of 1 x 1 m test units, and mechanical removal of the plowzone to locate and excavate features (A. Mickelson 2001). The materials collected include prehistoric debitage, bifaces, projectile points, and Historic period artifacts. Data recovery demonstrated that 15Mf410 is a significant multicomponent prehistoric site. Controlled surface collection consisted of walking transects of about one meter wide along the North-South axis of the site. Artifacts were placed in pre-numbered bags and each collection location was marked with a pin flag. Following the completion of several transects, artifact locations were mapped with a total station theodolite. Because of the high density of artifacts fire-cracked rock (FCR) was only collected along the western and eastern ends of the study area. All subsequent FCR observed during surface collection was mapped and left in the field. In all, 1,164 data points corresponding to a total of 1,655 artifacts were collected, resulting in the acquisition of about 0.20 m level spatial control on artifacts mapped in the field. Artifact bags were numbered prior to their use in the field. Field Sample cards were produced especially for this project, and each artifact bag was assigned an unique sample number. The unique sample number corresponds to a survey data point number. Each survey data point number contained Northing, Easting, and Elevation data. This technique allowed for rapid surveying of several hundred points, with minimal manual record keeping. The following artifact classes were used during mapping: historic artifacts, chert debitage, bifaces, and FCR. This procedure allowed for the generation of artifact distribution maps as the artifacts were being collected. The data from the theodolite were managed using ArcView GIS 3.2 on a laptop.

Stage three consisted of plowzone sampling. Placement of test units across the site was accomplished in two phases. The first phase of testing consisted of a systematic random sample layout of 27 50 x 50 cm test units. The goal was to obtain estimates of plowzone artifact density across the site. Following the completion of the systematic random sample, five 1 x 1 m test units were excavated (Figure 1). Three of the 50 x 50 cm units (units 4, 20, and 26) were expanded to 1 x 1 m units because probable features were noted during their excavation. Test units 28 and 29 were placed to examine high artifact densities noted during surface collection. An additional 353 artifacts were obtained from these excavations.

Block Stripping of the plowzone in three areas followed the surface collection and excavation of test units (Figure 1). Areas were selected either because features were detected by test excavations, or because of higher surface artifact densities in particular localities. Unit 30 (3 x 3 m) was stripped by hand. Units 31 and 32 were stripped by a backhoe. The interface between the A horizon and B horizon was shovel-scraped to produce a clean surface and to remove deep plow scars.

Two backhoe trenches were excavated to a depth of 3 m to examine the geomorphology of the landform. These trenches revealed that the colluvial matrix consists of silty-clayey sand to sand that extends at least 4 m deep. No buried cultural horizons below the plowzone were observed during the inspection of the geomorphology trenches. Soil samples were taken from the upper, middle, and lower portions of the exposed profiles for phytolith and geochemical analysis. Because the upper 30-40 cm of the site has been plowed, no information on the development of the A-Horizon was obtained. The geomorphological trenches indicate that the colluvium formed prior to the early Holocene as all artifacts were recovered in the plowzone or features extending into the sub-plowzone.

The controlled surface collection of lithic artifacts, FCR, and Historic artifacts supplements the materials recovered from test units provided information on the spatial extent of the site. Controlled surface collections also provided insight into taphonomic processes at work. Examination of the spatial extent of the lithic materials revealed two concentrations of prehistoric artifacts (Figure 1). The primary surface distribution of lithic artifacts occurred in the northeastern section of the site (centered near Test Unit 31). The secondary concentration of lithics occurred in the southwestern corner of the site (centered near block 32). The test units and surface collections revealed slightly different distributional pictures of the site but are generally in agreement. However, the volumetric density of artifacts from units points to a third concentration of artifacts in between the two concentrations discussed above. This tertiary concentration (centered near Test Units 10, 13, and 14) likely represents downslope artifact displacement and site deflation. The tertiary concentration correlates with a depression or trough of six to seven degrees in slope. Further, Test Units 5 and 9 placed in this area revealed multiple plowzones of probably recent formation (ca. 100 years or less). Within Test Unit 5, the presence of three plowzones extending to a depth of 70 cm deep indicate that plowing combined with sheet wash had transported artifacts downslope.

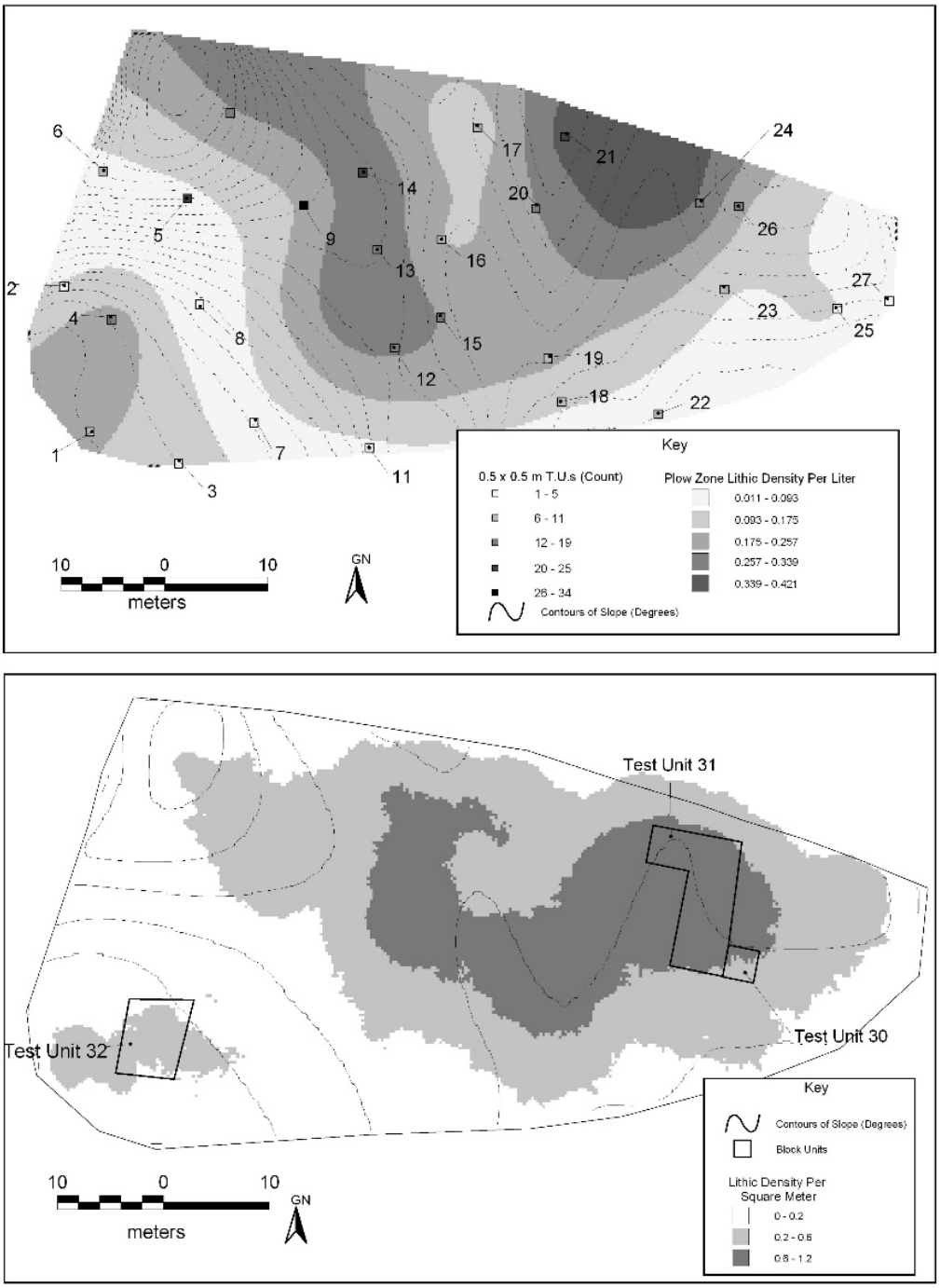

Figure 1. Examination of the spatial extent of the lithic materials revealed two concentrations of prehistoric artifacts.

Site degradation probably occurred in two stages. The first stage consisted of artifact movement along the surface and in the plowzone during plowing. The second stage of artifact

movement occurred as the plowed surface was subjected to sheet wash. These two processes stretched the spatial distribution of artifacts in a downslope (east-to-west) direction. Controlled surface collection data appear to reflect this process. Test pit data seem to indicate that multiple plowzones were created in wave- like pattern, in areas of slope of over six degrees.

Test pit excavations and block stripping, indicate that slopes of five to six degrees are constantly being degraded by the plow and soils and artifacts are being moved down steeper slopes. As soil and artifacts move downslope after each episode of plowing and sheet wash, the plowzone at the upslope portion of the site is thinned. Subsequent plowing creates a new plowzone by cutting deeper into the subsoil. The result is that features are constantly being down-cut. Ultimately only the deepest features remain. The distributional data indicate that initially the prehistoric concentration of artifacts probably resembled the discrete and compact distribution exhibited by the concentration of Historic period artifacts.

Boismier (1997) has synthesized previous research on the effects of tillage on archaeological deposits and has modeled the processes at work. On slopes of 9 degrees, like those at 15Mf410, the net downslope movement of artifacts due to plowing and excluding sheet wash was 4.22 cm per year (Boismier 1997:56). Over a period of 100 years of plowing, the net downslope movement of artifacts at 15Mf410 is on the order of 4.2 meters. Boismier (1997:236) observes that as the number of tillage events increases, the arrangement of surface artifact distributions undergoes an increasing loss of resolution.

FEATURES

The excavation of test units and the stripping of 133 m^2 exposed 14 probable prehistoric features (Figures 2-4). Seven of the 14 features were determined to be of human agency. Features 1, 2, 3, 5, 8, and 14 were determined to be post molds. Feature density at 15Mf410 was approximately one per 25 m^2. Features 7 and 13 were basin-shaped, while Feature 5 was a medium sized deep post with an abundance of carbonized plant material. Feature 7 was a well- defined pit feature with an adjacent small post (Figure 3). Feature 13 was an enormous, irregular crescent shaped feature measuring approximately 2.5 m in length by 50 cm in width and 1 m in depth. All archaeobotanical samples from feature 13 were excavated from the southwest quadrant. Fill from all features was floated in the field using a Flot Tech flotation machine.

Five radiocarbon dates were obtained from carbonized seeds or wood charcoal. The materials were sent to the National Oceanic and Atmospheric Administration's National Oceans Sciences Accelerator Mass Spectrometry Laboratory (NOSAMS) at Woods Hole, Massachusetts. Refer to Table 1 for uncorrected dates and laboratory numbers. Dates reported below are calibrated calendar dates generated by the OxCal software package (Bronk 1995). Feature 5, located proximate to the historic period debris scatter produced an assay of A.D. 1720-1890. Carbonized hickory from Feature 7 yielded an assay of A.D. 460. A carbonized dogwood seed from Feature 13 yielded a date from of A.D. 1450; wood charcoal corroborated this date with an assay of A.D. 1450 as well. Wood charcoal from Feature 8 produced a date of A. D. 1500.

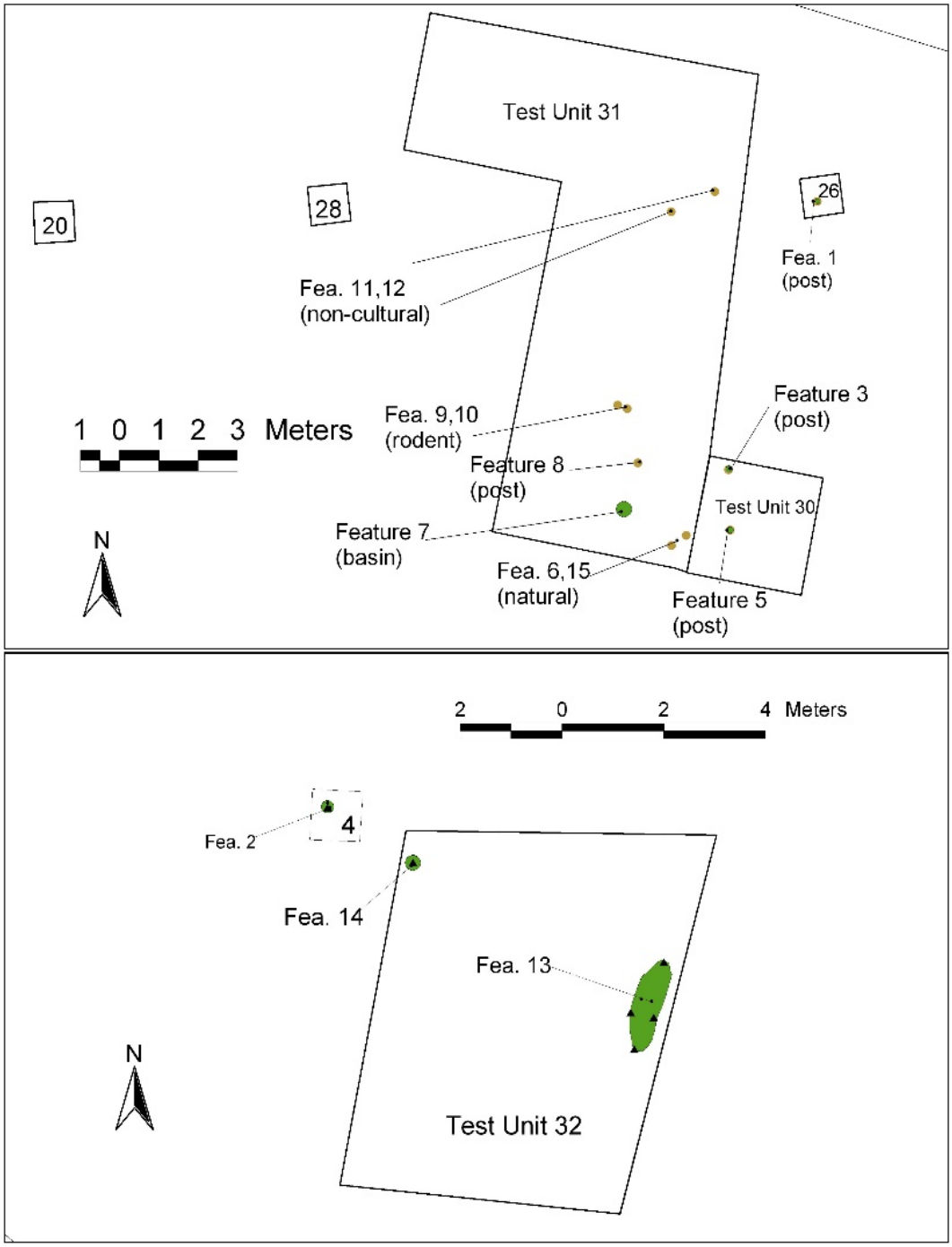

Figure 2. The excavation of test units and the stripping of 133 m^2 exposed 14 probable prehistoric features.

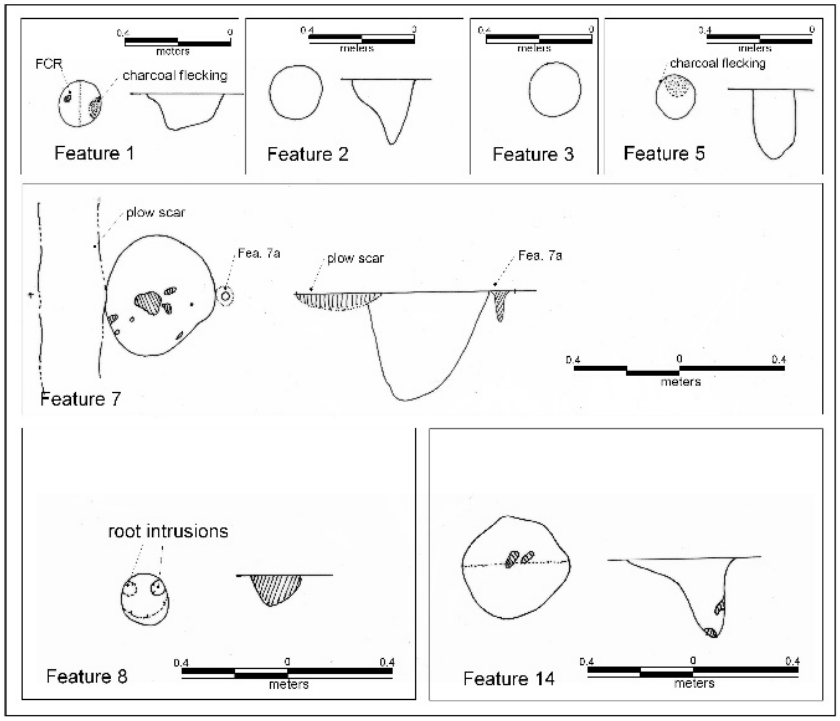

Figure 3. Feature profiles.

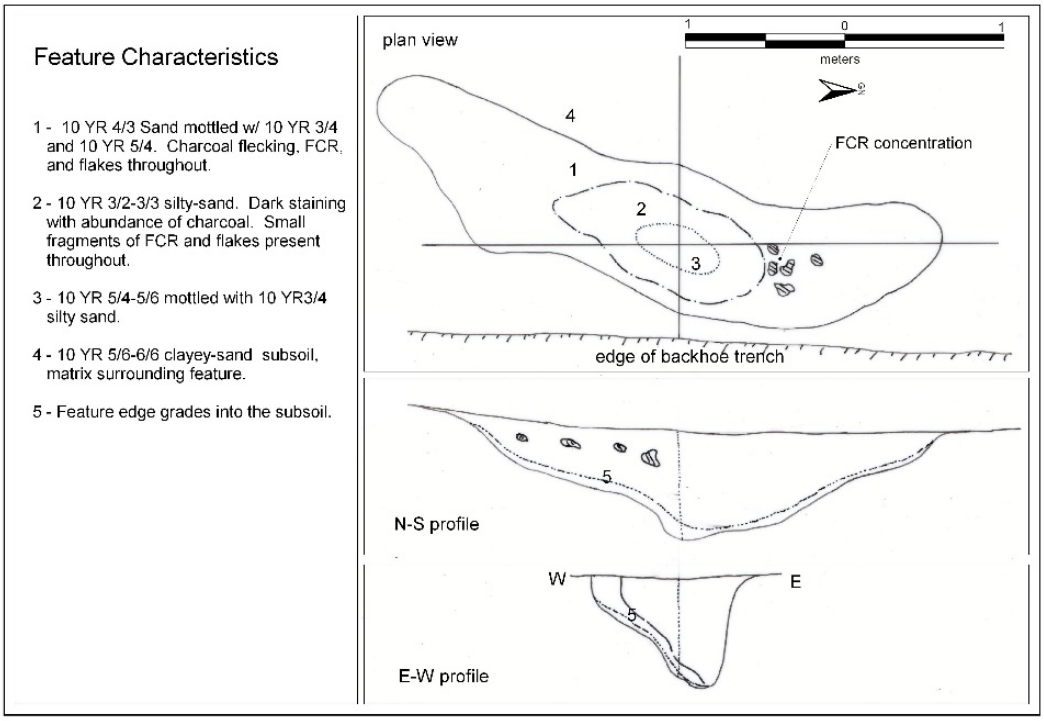

Figure 4. Feature characteristics.

Table 1. Features excavated at 15Mf410.

Feature	Type	Contents	AMS Assays (Uncorrected) and Laboratory Numbers1
1	Post	Charcoal	N/A
2	Post	Charcoal	N/A
3	Post	Charcoal	N/A
5	Post	Charcoal, botanical material	160 " 30 B. P. (carbonized wood); NOSAMS OS-34659
7	Basin	Charcoal, flakes, FCR, botanical material	1620 " 30 B. P. (carbonized hickory shell); NOSAMS OS-34660
8	Post	Charcoal	490 " 30 B. P. (carbonized wood); NOSAMS OS-34706
13	Basin	Charcoal, flakes, FCR, botanical material	480 " 30 B. P. (carbonized dogwood seed); NOSAMS OS-34704
			445 " 30 B. P. (carbonized wood); NOSAMS OS-34705
14	Post	Charcoal	N/A

[1] National Oceans Sciences Accelerator Mass Spectrometry Laboratory, Woods Hole, Massachusetts.

LITHIC ARTIFACT RECOVERY AND ANALYSIS

The most ubiquitous class of artifacts recovered from the Gladie Creek Site consisted of chipped stone tools and debris associated with stone tool maintenance and production. The lithic assemblage was acquired via grab bag samples, controlled surface collection, and the excavation of test units. Grab samples collected by Forest Service personnel during the period of 1995-2000 recovered 975 pieces (2573.76 g.) of debitage and debris. The mean weight of debris in this sample was 2.64 g. The Forest Service sample also contained 22 blocks or chunks of raw stone tool material, two cores, one biface base, nine biface tips, 20 thick bifaces, one utilized flake, 16 thin bifaces, one drill, three scrapers, and 48 hafted/stemmed bifaces (projectile points). No groundstone artifacts were recovered, though a single piece of limestone was collected. The stone tool assemblage collected by Forest Service personnel was combined with the materials collected during the 2001 field season for analysis.

Lithic artifacts were collected from controlled surface collection, test pitting, and from feature excavations. A total of 2,008 lithic artifacts weighing 47,848.84 g was recovered during the summer 2001 work. Flakes (n=1,932) constituted 96% by count and 61.1% by weight (2,904.37 g) of all lithic artifacts collected. The mean flake weight was 1.76 g, with a maximum of 77.64 g and a minimum of 0.01 g. Of the total flakes, only 48 contained cortex. The mean weight of flakes with cortex was 8.91 g with a range of 0.91 g to 69.16 g. A total of 1,884 flakes without cortex was recovered. The mean flake weight for flakes without cortex is 1.54 g. The small size (weight) of flakes at 15Mf410 indicates that tool refurbishing was occurring at the site rather than an emphasis on tool manufacturing.

Evidence for raw material acquisition and limited tool manufacturing at the site is represented by blocks of raw material, chert cobbles, cobble fragments, and shatter. A single unmodified chert cobble weighing 63.90 g along with four fragmentary cobbles averaging 41.73 g were collected. Blocks or chunks of chert, totaling twenty-four specimens and weighing 1197.63 g were also collected. The mean block weight was 66.53 g. Shatter is represented by sixteen pieces weighing a total of 100.11 g. Cobbles, cobble fragments, blocks, and shatter comprised only 2.2% of the lithic assemblage by count and 31.2% of the assemblage by weight.

An indicator of early stage stone tool production is the presence of larger flakes and the presence of cortex on flakes. Evidence for limited manufacture of stone tools is present in the form of shatter, a few cores, cobbles, and blocks of chert. A total of forty-eight flakes (2.5% of flakes collected in 2001) retain cortex on their dorsal sides. The mean weight of flakes with cortex is 8.91 g, nearly four times greater than the mean flake weight. Flakes with cortex ranged from 0.91 g to 69.16 g. The larger mean size for flakes with cortex as compared to the size of the overall flake assemblage indicates that limited tool production was occurring at upper 15Mf410. However, the predominance of smaller flakes indicates that tools were either nearly complete, or were being refurbished onsite.

The ratio of tools to debitage also indicates that little stone tool production occurred at upper 15Mf410. A total of 2,960 pieces of debitage was recovered from upper 15Mf410, while 122 stone tools were collected. The stone tool to debitage ratio is one stone tool to 24.3 pieces of debitage (1:24.3). The Webb Archaeological Society investigations at lower 15Mf410 recovered 2,355 pieces and 60 chipped stone tools. The stone tool to debitage ratio for lower 15Mf410 is 1:39.5, or about 38 percent higher than at upper 15Mf410. Tool manufacturing may have occurred more often along the lower portions of the site.

Stone tools in the lithic assemblage consist of hafted bifaces (projectile points), bifaces, unifaces, scrapers, drills, and utilized flakes. Bifaces that exhibit hafting elements like notches or stems are classified as hafted bifaces. However, hafted/stemmed bifaces did not necessarily function as projectile points. A total of 67 projectile points/hafted bifaces was collected from upper 15Mf410.

Bifaces are defined as having thinning flakes removed from both the ventral and dorsal faces while also lacking a hafting element. Bifaces were divided into two mutually exclusive classes: thick and thin. A total of 45 bifaces were collected from 15Mf410. Thick bifaces are defined as being greater than 10 mm in maximum thickness; thin bifaces are less than 10 mm in thickness. Thick bifaces tend to have fewer small flake scars than thin bifaces. Thin bifaces lacking hafting elements might represent incomplete stone tools, the final desired goal being a hafted biface. Other tool classes represented in the lithic assemblage include drills (n=1), biface tips (n=12), and scrapers (n=5).

Raw material selection for stone tools exhibits a preference toward Boyle, Haney, and Paoli cherts. The proportions of debitage, bifaces, and hafted bifaces made-up of Boyle, Haney, and Paoli cherts are nearly identical. For instance Boyle chert comprises 53.1% of all debitage by

count, 41.2% of all stone tools, and 51.5% of all hafted/stemmed bifaces. Boyle, Haney, and Paoli cherts account for 97.2% by count of all debitage (74.4% by weight), 77.0% by count of all stone tools, 77.8% by count of all thick and thin bifaces, and 78.8 by count of all hafted/stemmed bifaces. Local cherts dominate the artifact assemblage: only 5.4% of all stone tools are exotic. Both Applegate (1997) and Meadows (1977) note that Boyle chert was preferred by prehistoric stone tool manufacturers in the Powell County area. Evidence collected at 15Mf410 confirms this observation.

Pool et al. (1991) observed that 64% of debitage collected at lower 15Mf410 was of Haney chert, while 41.7% of hafted bifaces were manufactured from Haney chert. Haney chert, as a raw material is second to Boyle in all chipped stone tool classes at upper 15Mf410 except thick bifaces. Haney chert consists of 59.3% of the raw material for thick bifaces. Functional differences in activities at lower and upper 15Mf410 likely occurred. Specifically, biface production may have occurred on the lower portions of the site while modification of bifaces into hafted tools may have occurred at the upper reaches of the site.

LITHIC ARTIFACT CHRONOLOGY

When compared with other sites in the study area, 15Mf410 contains an unusually high number of time-sensitive bifaces. A total of 67 bifaces with hafting/stem attributes were collected from 15Mf410. Of these, 61 were assigned to a specific prehistoric period. Identifications were based upon stylistic and metric attributes. Identification aids (e.g., Justice 1987) as well as regional archaeological reports (e.g., Broyles 1966, 1971; Collins 1979; Lewis 1996), were used to assign bifaces to a specific time frame. Archaic bifaces dominate and comprise 72% of the assemblage. Late Archaic bifaces comprise the largest proportion of the assemblage (37.7%).

A total of 12 bifaces dating to the Early Archaic period was collected from 15Mf410. A single Dalton-like type point was found. The Dalton type dates to ca. 8,500-7,900 B.C., representing a shift from the Paleoindian period to the Early Archaic period (Justice 1987:40). The basal concavity of the specimen from 15Mf410 also resembles later Hardaway points. Two side-notched bifaces, one of which closely resembles Kessell Side Notched points which have been dated to ca 7,900 B.C. ∀ 500 at the St. Albans Site in West Virginia (Broyles 1966; Justice 1987:67) were recovered from the site. Kessell Side Notched points are distributed throughout Kentucky, West Virginia, and in limited numbers, into Pennsylvania and New York. Kessell side notched points were recovered from the Longworth-Gick Site in Kentucky (Collins 1979:560). Two Kirk Corner Notched serrated projectile points were also collected. The other side notched specimen may represent a local variant of the Kessell Side Notched type. The Kirk Corner Notched bifaces are also diagnostic of the Early Archaic period and fall within the range of 7,500 to 6,900 B. C. (Justice 1987:71).

Nearly three-quarters of the Early Archaic bifaces consist of bifurcate types (n=8). The bifurcates consist of MacCorkle Stemmed (n=1), LeCroy (n=1), Kanawha Stemmed (n=3), and three untyped varieties. The MacCorkle Stemmed variety was first recovered from the St. Albans

Site by Broyles (1971). MacCorkle Stemmed bifaces date from ca. 7,000 to 6,500 B.C. and are distributed throughout the Mideast (Justice 1987:89). LeCroy projectiles were recovered from the St. Albans site in association with a hearth that dated to 6,300 B.C. ± 100 (Broyles 1966). A LeCroy bifurcate was also recovered from Zone Three of the Longworth-Gick Site which was dated to 6,470 B.C. ± 110 (Collins 1979:579). The LeCroy type is also found throughout the Mideast and Northeast. Kanawha Stemmed bifaces were first identified at the St. Albans Site by Broyles (1966). Kanawha stemmed points were found in association with a hearth at St. Albans that dated to 6,210 ± 100 B.C. (Broyles 1971). Kanawha Stemmed projectiles are distributed throughout the East (Justice 1987:96). Three of the specimens have been re-worked into scrapers and two specimens also exhibit evidence of resharpening.

The Middle Archaic period at 15Mf410 is represented by nine diagnostic bifaces. The majority of the Middle Archaic bifaces from the Gladie Creek Site belong to the cluster of points designated by Justice (1987:60) as the Large Side Notched Cluster. These bifaces consist of Big Sandy (n=2), Raddatz (n=5), and one un-typed specimen. A single Eva type projectile was also found. Big Sandy types are found in dated contexts from 8,000 to 6,000 B.C. Raddatz Side Notched points date from 6,000 to 3,000 B. C., but are primarily found from 6,000 to 4,000 B.C. (Justice 1987:68). Eva projectile points were found at the Eva Site in Stratum IV which was dated to 5,200 B.C. ∀ 500 (Justice 1987:100). Big Sandy and Eva type bifaces are confined to the Kentucky-Tennessee vicinity while Raddatz bifaces are found throughout the upper Midcontinent. Some specimens from 15Mf410 exhibit substantial resharpening along their blades.

A total of 24 bifaces diagnostic of the Late Archaic period were obtained from 15Mf410. Late Archaic specimens consist of Brewerton Corner Notched (n=4), Brewerton Ear Notched (n=1), Matanzas Side Notched (n=1), Lamoka (n=2), Merom-Trimble (n=4), McWhinney (n=3), Perkiomen (n=1), Karnak Unstemmed (n=1), and Turkey-tail (n=1).

Additionally, bifaces resembling an unstemmed variety and a corner notched variety were recovered. Similar points were found at Late Archaic Riverton sites by Winters (1969: Plate 13) and at Newt Kash by Webb and Funkhouser (1936: Figure 16). Brewerton Corner Notched and Ear Notched points are found throughout the Ohio Valley. Brewerton-like points at 15Mf410 fall at the extreme southern limits of its recognized distribution (Justice 1987:115). Brewerton Corner Notched and Side Notched bifaces date from 3,000 to 1,700 B.C. Matanzas points are closely related to Brewerton Eared Notch (e.g., Justice 1987:119-120). Matanzas points date from 3,700 to 3,000 B.C. at the Koster Site and persist until 2000 B.C. (Justice 1987:119). The Lamoka type projectile point is found throughout the Northeast. Site 15Mf410 falls at the southern limit of its distribution. The two examples from 15Mf410 resemble those depicted in Justice (1987: Figure 26-g). A Late Archaic association of the Lamoka type has been posited with its temporal range falling between 2570-1800 B.C. (Justice 1987:129). Merom-Trimble like points date to between 2,000 and 1,000 B.C., bracketing the last part of the Late Archaic period. The examples from 15Mf410 are like those reported by Winters (1969: Plate 13). Similar points were found by Webb and Funkhouser (1936) at Newt Kash. Gremillion (1996) obtained an uncalibrated date of 3025 BP +/- 55 on paleofecal contents from Newt Kash which included *Chenopodium*. Two additional dates of 3,400 +/- 150 BP and 4,700 +/- 250 BP from Newt Kash domesticates also point to a

Late Archaic occupation (Gremillion 1993). Karnak Unstemmed points, diagnostic of the Late Archaic period fall between 3,700 to 3,000 B.C. (Justice 1987:133). Karnak Unstemmed points are distributed throughout the middle Midcontinent. Site 15Mf410 falls at the eastern limits of their distribution. A few similar points have also been found at Newt Kash. McWhinney Stemmed projectiles date from 4,000 to 1,000 B.C. These points are found within the Middle Ohio Valley. One point was made from Kanawha Black chert, the source of which is found in central West Virginia.

Two terminal Archaic/Early Woodland period projectile points found at 15Mf410 resembled Perkiomen-like and Turkey-tail like diagnostic bifaces. These points are found throughout the Northeast extending into the Ohio Valley. Site 15Mf410 falls outside of the southern limits published by Justice (1987:170). Perkiomen points have been associated with radiocarbon dates of 1,720 B.C. +/- 120 and 1,500 B.C. +/- 120 (Justice 1987:170). Dates from 1,220 to 535 B.C. have been obtained for the Turkey-tail like point (Justice 1987:170).

Early Woodland bifaces from 15Mf410 consist of seven examples. Three types were identified in the collection. Two specimens resemble Adena Stemmed varieties. Two straight stemmed specimens resemble Little Bear Creek points. The third type of Early Woodland biface consists of a slightly expanding stem variety. Adena Stemmed bifaces date from 800 to 500 B.C., while Little Bear Creek points have been dated from 1500 to 500 B.C. (Justice 1987:191-196).

The Middle Woodland period is represented by four diagnostic bifaces. Two specimens are of the expanding stem type. The expanding stem type is similar to the Bakers Creek type. Bakers Creek points date from A.D. 150 to A.D. 400 to 600 (Justice 1987:208-211). The other two projectiles are side notched varieties commonly classified as Lowe Flared Base points. The Lowe Flared Base point is of the terminal Middle Woodland period, and date from A.D. 200 to 500. These points are found throughout the Ohio Valley.

Two Late Woodland and two Late Prehistoric bifaces were recovered from 15Mf410. Two Jacks Reef Pentagonal type points which date from A.D. 500 to A.D. 1000 are in the assemblage. The two Late Prehistoric projectiles are Levanna and Madison Triangular Type points respectively. Levanna points are diagnostic of the Fort Ancient period that dates from A.D. 1000 to the beginning of the Historic period. According to Justice (1987: 221) Levanna points appear as early as A.D. 800 and are eventually replaced by Madison type points by ca. A.D. 1200.

Gladie Creek's importance lies in its nearly continuous record of prehistoric landuse spanning 10 millennia. The multicomponent nature of 15Mf410 provides a chance to examine changing intensity of use of colluvial landforms through time. Prehistoric occupation began by the Early Archaic and peaked during the Late Archaic. A decline in use may have occurred during the Middle Archaic period. A common trait among the Early, Middle, and Late Archaic periods is that stone tools at the site exhibit a high degree of reworking in many cases (e.g., bifurcates reworked into scrapers, Middle Archaic and Late Archaic blade resharpening). Tools were being exhausted at the site throughout the Archaic. Following the Archaic period, an apparent decline in occupational intensity begins during the Early Woodland period. By the Middle Woodland period,

use of the site appears to have changed radically. By the Late Woodland a new trend in intensity of use at 15Mf410 appears to have become established.

An accumulation index (Jefferies 1996) was constructed to evaluate potential difference in occupational intensity through time. Occupational intensity is measured in terms of the accumulation rate of diagnostic bifaces per thousand years. It is greatest during the Late Archaic and Early Woodland periods. Occupational intensity is lowest during the Middle Archaic period. The trend toward increased numbers of occupations during the Late Archaic observed by Jefferies (1996: Table 3.1), is also reflected in the assemblage from 15Mf410 (Tables 2-3).

Table 2. Diagnostic bifaces per prehistoric period adjusted to accumulation rate per 1000 years.

Period	Length of Period (Years)	No. of Bifaces[1]	Bifaces per 1000 years[2]	Relative Accumulation Index[2]
Early Archaic	2,000	13	6.5	0.145
Middle Archaic	3,000	9	3	0.067
Late Archaic	3,000	23	11.5	0.257
Early Woodland	800	8	10	0.223
Middle Woodland	700	4	5.7	0.127
Late Woodland	500	2	4	0.089
Late Prehistoric	500	2	4	0.089
TOTALS	**10,500**	**61**	**44.7**	**0.997**

[1] Five bifaces were not assigned to a prehistoric period.

[2] Relative accumulation index is calculated by computing the frequency of bifaces per 1000 years for each period by dividing the number of bifaces for a given period by the total number of bifaces that have accumulated at the site (44.7). Total accumulation of bifaces is less than that observed because all periods after the Late Archaic are less than 1,000 years in length.

Table 3. Comparison of relative accumulation index rates between known components (Jefferies 1996) and numbers of diagnostic bifaces at 15Mf410 during the Archaic Period.

Period	Relative Accumulation Index by Archaic Component (Data from Jefferies 1996)	Relative Accumulation Index for based upon Diagnostic Bifaces from 15Mf410
Early Archaic	0.37	0.31
Middle Archaic	0.15	0.14
Late Archaic	0.48	0.54

Jefferies posits that the decline in the number of Middle Archaic components corresponds to a shift in landuse rather than population decline. Early Archaic populations were more mobile and subsequently left many more sites across the landscape. During the Middle Archaic, human groups became more sedentary and created fewer sites over the landscape. If this were truly the case, then one would expect that some multicomponent sites should have more Middle Archaic materials

than Early Archaic materials. The data from 15Mf410 indicate that fewer artifacts were being deposited across the landscape during the Middle Archaic. It appears there was decrease in total population during the Middle Archaic, or that at present insufficient data exists to address the Middle Archaic problem properly. However, a third explanation may lie in increased diversification of the Middle Archaic toolkit: more resources were being exploited using a wider variety of stone tools, some of which are not temporally diagnostic.

During the Late Archaic period, the intensity of use at 15Mf410 appears to have doubled over that of the Early Archaic and quadrupled over the intensity of use during the Middle Archaic. The trend of higher intensity use continues into the Early Woodland. Following the Early Woodland period, a new landuse pattern appears to have become established. The decrease in accumulation of diagnostic bifaces during the Middle Woodland to Late Prehistoric periods might indicate that a shift away from use of upland wetland resources occurred.

ARCHAEOBOTANY

Archaeobotanical samples were collected from six features at the Gladie Creek Site. The samples contain over 100 grams of carbonized plant material, including 29.59 grams of plant food remains. A large array of seeds dominates the assemblage and includes edible fleshy fruits, weeds and aquatic plants. Nutshell, especially hickory, is well represented, while walnut, chestnut and acorn are represented by a few fragments. No cultigens were identified. The botanical remains were processed at the Ohio State University Paleobotanical laboratory following standardized procedures (Pearsall 1989) by K. Mickelson (2001).

Three major botanical classes of carbonized plant material were recovered from the Gladie Creek Site. These are wood or bark, nutshell, and seeds. In addition, a single sample from Feature 13 contained one fragment of hickory husk. Nutshell comprises 84% of the plant food remains by weight but only 12% by count. The primary reason for this difference is that seeds, which weigh much less than nutshell, dominated the Gladie Creek botanical assemblage. The samples from the Gladie Creek Site yielded four distinct types of nutshell fragments: hickory (*Cayra* sp.), acorn (*Quercus* sp.), walnut (*Juglans nigra*), and chestnut (*Castanea americana*). In addition, a single sample contained one fragment of hickory husk. Hickory is clearly the dominant nut species accounting for 85% of all identified nut remains. This taxon is distantly followed by walnut, acorn, and chestnut, each of which was represented by a few fragments.

Optimal availability of hickory nuts would have been from late October through early November. Walnuts are common on hill slopes, and well-drained, rich bottomlands. Walnuts are available from late October though early December (Talalay et al. 1984). Hazelnuts are brushy shrubs that occur in dense clumps or thickets in open areas or forest edges. Hazelnuts are available from July through September (Peterson 1977). Acorns, which are abundant in the early fall, are found throughout the environment. Cowan (1984:148) used descriptive accounts of the number of chestnut trees per hectare and the proportional area of land for ridgetops, slopes and floodplain in the Red River area to estimate the annual productivity of chestnut. From these figures, ridgetops

(7776 kg/year) are the most prolific physiographic zone of chestnut production. Slopes (7260 kg/year) rank second, while floodplains (528 kg/year) ranked third in chestnut production. Chestnuts are available August through September.

An impressive array of seeds was recovered from features at Gladie Creek. The seed assemblage is dominated by Unknown Type I which will be discussed in detail below. Fleshy fruits were quite abundant while seeds of grains or greens were less common. Wetland species, while not proportionally abundant, were identified in two features (Features 7 and 13) and represent some of the few aquatic species identified from open-air sites in the Red River Gorge region. Non-domesticated Goosefoot (C*henopodium* sp.) was represented by nine seeds recovered from six samples. Of these, four were fragmented. The remaining six seeds are small (1-1.3 mm) and have rounded margins. These seeds do not exhibit morphological characteristics associated with domestication, but rather indicate a wild or weedy population (Smith 1989). Poke (*Phytolacca americana*) is an aggressive colonizer of open habitats, both natural and anthropogenic. A total of nine pokeweed seeds was identified from Feature 13. Purslane (*Portulaca oleracea*) is persistent in rich cultivated soils and disturbed places. Purslane commonly invades gardens, has fleshy, succulent leaves and produces seeds in a capsule in late summer and early fall (Strausbaugh and Core 1978). Because it readily invades cultivated areas, its presence in archaeological deposits may be incidental. A single purslane seed was identified in Feature 7. Bearsfoot (*Polymnia uvedalia*), a perennial herb that favors open meadow areas and woodlands, produces globular nutlets from July through October (Radford et al. 1968:1101). A single nutlet fragment was identified from Feature 13. Sumac (*Rhus* sp.) produces fruit from June to September and is a shrub or small tree that grows in fields and disturbed areas (Yanovsky 1935). This habitat preference, combined with its tolerance of variable environmental conditions has led Rossen (1992:196) to suggest that sumac was possibly a protected, encouraged or even cultivated plant.

Huckleberry (*Gaylussacia* sp.) and blueberry (*Vaccinium* sp.) are shrubs that produce fruit from the mid to late summer (Peterson 1977). Both genera are predominantly restricted to xeric ridgetops and dry, south and west facing upper slopes as they require acidic, well-drained soils (Cowan 1984:164). A single huckleberry seed was identified from Feature 7 and a single blueberry seed was identified from Feature 13. Greenbrier, most commonly found in woods or thickets, and a single seed was identified in Feature 7. Hawthorn (*Crataegus* sp.) is a small tree that produces sweet fruits rich in pectin in late fall in wet or dry woods. A total of two hawthorn seeds was identified in Feature 13. Elderberry (*Sambucus canadensis*) shrubs often form thickets along streambanks or other wet or moist areas and produce berries in large cluster inflorescence. Elderberries, become available in August and September. A total of three elderberry seeds were identified from Feature 13 at the Gladie Creek Site. Grape (*Vitis* sp) produce edible fruits from August to October and occur in thickets and at the edge of woods (Strausbaugh and Core 1978). Two grape seeds were identified in Feature 13 at the Gladie Creek Site. Blackberry/Raspberry (*Rubus* sp.) is a successional genus and would vary in its density depending on the amount of disturbed land in a given area. Fruits begin to ripen in June and continue through September. Blackberry/Raspberry seeds were the second most common positively identified seed (n=35) at the Gladie Creek Site and were identified in Feature 13 samples. Persimmon (*Diospyros virginiana*) was represented by three fragments in Feature 13. Persimmon grows in varied sites,

especially in moist bottomlands mixed with hardwoods and open, edge habitats associated with successional forest growth (Harlow and Harrar 1969). Strawberry (*Fragaria* sp.) grow in fields and open areas and produce a fleshy fruit in late spring. Strawberries are good indicators of seasonality due to their limited time range of fruiting since spring is a period when other plant resources are not commonly available. However, only a single strawberry seed was identified from Gladie Creek.

Several tree seeds were also recovered from flotation samples. Black Gum (*Nyssa sylvatica*) was well represented in samples from Feature 7 (n=3) and Feature 13 (n=8). Blackgum is a tree which favors dry to moist soils and produces an acidic fruit in fall (Braun 1989; Fernald and Kinsey 1996). Flowering Dogwood (*Cornus florida*) seeds were common in Feature 13 (n=23) and present in Feature 7 (n=3). Dogwood is a small tree or shrub common in dry woods and produces thin-skinned fruits with large pits from April through June (Strausbaugh and Core 1978). In addition a total of eight seeds that could not definitively be assigned to either black gum or dogwood taxa were identified from Feature 7 (n=2) and Feature 13 (n=6).

Many wetland species also appear in flotation samples from 15Mf410. Bulrush (*Scirpus* sp.) are perennial or annual herbs with edible seeds, roots and stems (Peterson 1977). This genus inhabits the shores of lakes, ponds or wetlands and are known to be an important food source for waterfowl (Strausbaugh and Core 1978). Bulrush seeds have been identified at the Cold Oak shelter (15Le50), Newt Kash Shelter (15Mf1) and Pine Crest Shelter (15Le70) (Gremillion 1994, 1995; O'Steen et al. 1991). A single bulrush seed was identified from Feature 13. Sedge Family (Cyperaceae) species are grass-like or rush-like herb with fibrous roots that are predominantly wetland edge plants. Although their exact habitat preference depends on positive identification at the genus level. A total of two Cyperaceae seeds was identified from the Gladie Creek archaeobotanical assemblage, one each from Feature 7 and Feature 13. Sedges (*Cyperus* sp.) are most commonly found in wet soils along streams, riverbanks or wetlands, although some species prefer drier habitats. A total of three sedge seeds was identified from Feature 13. All three of these seeds appear to be very similar to flat sedge (*Cyperus strigosus*) however positive identification was not possible.

Several miscellaneous seeds-bearing species were also identified. Bedstraw (*Galium* sp.) or cleavers produce a bristly fruit in April that can adhere to the plant until fall (Peterson 1977). Bedstraw thrives in a variety of habitats, including woods, thickets, and riverbanks (Peterson 1977; Strausbaugh and Core 1978). A single seed from Feature 13 was identified to the family Compositaeae, which is a large family of herbaceous plants. In addition, eight grass seeds, which were only identified to the family level (Poaceae) were identified from Feature 13.

The seeds that could not be identified at the present time were segregated into unidentifiable and unknown groups. Unidentifiable seeds are badly eroded or otherwise damaged in such a way that identification is probably not possible. Seeds categorized as unknown bear distinctive morphological features that may be sufficient to permit taxonomic assignment in the future. Two unknown seed types were distinctive enough and/or frequent enough to merit separate tabulation. Unknown Type I was the most abundant seed type in the Gladie Creek archaeobotanical

assemblage. These seeds are globulose with a smooth to lightly reticulate surface. Several specimens exhibited a distinct hilum. While tenuous at the present time, unknown type I greatly resembles vetch (*Vicia* sp.) or peavine (*Lathyrus* sp.). Unknown Type IV remains were small to medium sized fragments with a rough, bumpy surface and generally spherical in shape. These remains have been identified by the author at numerous other sites, but positive taxonomic identification has yet to be completed (K. Mickelson 1997a, 1997b, 2000, 2002). The surface of unknown type IV closely resembles bayberry (*Myrica* sp.), however, until further comparative analyses are conducted the taxonomic status of Unknown Type IV will remain unknown.

HUMAN ECOLOGY OF 15Mf410

Archaeological studies have addressed human ecology issues in two distinct ways. Catchment studies have been employed to address the location of a particular site within a given environment. The goal of catchment studies is to examine what types of resource might have been accessible to the occupants of a given site. A second approach to human use of the landscape has been to examine what types of materials extracted from the environment are present at a given site (e.g., raw material sourcing, and paleoethnobotanical studies). This section integrates both approaches to examine human use of the landscape.

Gladie Creek is located on a colluvial landform that faces southwest and is divided into three lobes by two small, ephemeral streams. The two streams contain large pockets of wetland species that intermingle with mixed mesophytic forest species further upslope. This locality is an ecotone; a zone of high diversity between contrasting floodplain/wetland and slope forest biomes. The locale is enhanced by the fact that it receives considerable solar radiation (insolation), making it a landform of high biomass potential. That the floodplain, wetland, and slope forest biomes were exploited in prehistory is supported by the paleobotanical record recovered from features at the site (Table 4).

Table 4. Correspondence of plants recovered in archaeological contexts at 15Mf410 to natural areas.

Biome	Representative Species Recovered from Paleobotanical Samples
Riparian/Floodplain	bedstraw, elderberry, persimmon
Wetland	sedges, bulrush
Anthropogenic?/ Open?	Elderberry, blackberry, raspberry, grasses, *Compositaeae*, *Chenpodium*
Slope Forest	hickory, acorn, walnut, chestnut, greenbrier, black gum

Unfortunately, the highly acidic nature of the soils of the region prevents preservation of the archaeofauna record. Undoubtedly, fauna from each of the biomes were extracted in prehistory.

The paleobotanical data indicate that open areas and edge areas with brambles, weeds, and grasses were also present in prehistory. Based upon the predominance of Late Archaic and Early Woodland period bifaces, anthropogenic modification of the landscape may have occurred at this time.

From a seasonality perspective, the site was probably occupied most intensely during the late summer and fall when mast resources were available. The recovery of elderberry and raspberry also suggests a late summer occupation. Storage at the site, as indicated by at least two features may document longer-term occupations, perhaps year round occupation by the Late Archaic period. The presence of large post molds also indicates that at some point in prehistory, residential structures may have been present on the site.

A GIS model was developed to model the environs of 15Mf410 to examine ecological composition of the surrounding terrain (A. Mickelson 2002a). Environmental variables consisting of elevation, slope, facing aspect, and bedrock geology were used to create a model that predicts the type of environment a given landform may possess (A. Mickelson 2002a). Second, a caloric cost model traversing the landscape was employed to examine what types of resources were available to occupants of 15Mf410. The spatial caloric cost model (SCM) is based upon human energetic studies. The model uses data to calculate the cost of walking over terrain with a known slope (Machovina 1996; A. Mickelson 2002b; Pandolf et al. 1977). Instead of using time or distance as a cost as is the case for other catchment models, the SCM estimates the cost in calories for a human walking at 3 km per hour to traverse a given landscape. Human landuse is modeled as a round trip from a site to a resource and back with a 10 kg load. A load may consist of nuts, chert, or animal prey. The results are presented in terms of 100, 250, 500, 1000, and 2000 calorie (kcal) round trips (Table 5). When applied to 15Mf410, the SCM indicates that at the 100 and 250 kcal levels, riverine and slope forest environments, primarily with a southwesterly facing aspect are accessible and south and west facing slopes are dominated by oaks. Also, south and west slopes are the only habitats in which black gum and black walnut trees are found in the study area (Braun 1950). Black gum, hickory, walnut, and oaks are all represented in this study's paleobotanical record.

The catchment data and the botanical data appear to be complimentary, indicating that 15Mf410 was occupied primarily to take advantage of local resources like black gum and hickory. Further, catchment data indicate that prehistoric foragers were probably not traveling too far from the site for subsistence trips. The tentative identification of chert from the Mariba Fork/Laurel Fork confluence (part of the upper Gladie Creek watershed) in the lithic assemblage, also suggests that 15Mf410 was occupied to take advantage of local resources. For example, the SCM predicts that a trip to the Mariba Fork chert source and back with a 10 kg load to 15Mf410 would consume only 1200 calories; a day trip.

Table 5. Resource availability within five caloric cost distances from 15Mf410.

Topographic Setting	Ecological Zone/Forest Composition	100 Calorie Catchment		*250 Calorie Catchment*		500 Calorie Catchment		1000 Calorie Catchment		2000 Calorie Catchment	
		Ha	**Percent**	***Ha***	***Percent***	**Ha**	**Percent**	**Ha**	**Percent**	**Ha**	**Percent**
Low Level Land	River Birch/ Sycamore/Wetlands/Riparian	14.1	18.8	*41.3*	*8.4*	88.4	4	253.9	2.1	852.1	2.1
Slope-N Facing[1]	Beech/Tulip/Maple/Chestnut (MMF)1	14.3	19	*70.7*	*14.4*	210.7	9.7	898.8	7.6	3690.9	9.2
Slope-E Facing[1]	Beech/ Tulip/Maple/ Chestnut (MMF)	13.4	17.8	*84.2*	*17.1*	317.7	14.6	1082.1	9.2	4165.1	10.4
Slope- S Facing[1]	Beech/Tulip/Maple/Oak/ Black Gum/Walnut/ Pine (MMF)	15.7	20.9	*81.3*	*16.5*	257.3	11.9	895.5	7.6	3591.1	8.9
Slope-W Facing	Oak/Beech/Tulip/ Black Gum/Walnut/ Pine (MMF)	17.7	23.5	*75.2*	*15.3*	329.1	15.2	2763	23.4	4143.6	10.3
Cliffline Zone[1]	Beech/Tulip/Maple/Black Gum/Chestnut	0	0	*96.8*	*19.7*	461.5	21.3	2260.4	19.1	8354.9	20.7
Upland Level Land	Oak-Pine Forest/Heath	0	0	*42.6*	*8.6*	502.6	23.2	3662.8	31	15441	38.4
	TOTALS	**75**	**100**	***492.1***	***100***	**2167**	**99.9**	**11817**	**100**	**40239**	**100**

[1] Mixed Mesophytic Forest (MMF). Forest associations are based upon Braun (1950) and Thompson et al. (2000).

DISCUSSION AND CONCLUSION

The Gladie Creek Site represents an important contribution to the understanding of Red River Gorge prehistory despite severe deflation due to plowing and sheet wash. The lithic assemblage indicates concerted use of the location for over 10 millennia, while the archaeobotanical assemblage indicates the use of wild plant resources in upland contexts. While rockshelter deposits dating to the Early Woodland through Late Prehistoric period contain domesticated plant remains, none were recovered from Middle Woodland and Late Prehistoric features at Gladie Creek. Lastly, Gladie Creek demonstrates the high archaeological potential for steeply sloped landforms. Such a finding is significant, in that steep-sloped areas have often been overlooked by archaeologists.

Data from Gladie Creek indicate that while rockshelters containing evidence of domesticated plants were being utilized during the Late Archaic and Woodland periods at high frequency, other landforms were also occupied. Temporally diagnostic bifaces indicate the highest rate of occupation at Gladie Creek from the Late Archaic through Middle Woodland periods, at the same time that Eastern Agricultural Complex plants are found within rockshelter deposits. Specifically, Feature 7, a Middle Woodland basin dating to A.D. 460, contained carbonized hickory and greenbrier which indicates that mast resources were being acquired and processed downslope of rockshelters in an open/disturbed habitat at this time. That open/disturbed habitats existed on hillslopes proximate to rockshelters might not be insignificant. The possibility of hillslope garden plots is intriguing (e.g., Ison 1991). However, because no domesticates were found at Gladie Creek, the probability that such plots existed remains uncertain.

ACKNOWLEDGMENTS

The authors wish to thank Cecil Ison for generously providing knowledge of the area, background information and for providing documentation for the project. Cecil Ison and Johnny Faulkner helped with portions of the fieldwork and they also provided samples of chert for comparative purposes. Don Fig willingly provided access to his collection of historical documentation and photographs of the Gladie Creek area.

REFERENCES CITED

Applegate, Darlene
1997 Lithic Evidence of Prehistoric Rockshelter Use in Eastern Kentucky. PhD dissertation, Department of Anthropology, The Ohio State University, Columbus.

Braun, E. Lucy
1950 *Deciduous Forests of Eastern North America*. The Blakiston Company, Philadelphia.

1989 *The Woody Plants of Ohio*. Ohio State University Press, Columbus.

Boismier, William A.
1997 *Modelling the Effects of Tillage Processes on Artefact Distributions in the Ploughzone A Simulation Study of Tillage-induced Pattern Formation*. British Archaeological Reports International Series No. 259, Oxford.

Bronk, Ramsey C.
1995 Radiocarbon Calibration and Analysis of Stratigraphy: The OxCal Program. *Radiocarbon* 37:425-430.

Broyles, Betty J.
1966 Preliminary Report: The St. Albans Site (46 Ka 27), Kanawha County, West Virginia. *The West Virginia Archaeologist* 19:1-43.

1971 Second Preliminary Report: The St. Albans Site (46Ka27) Kanawha County, West Virginia. *West Virginia Geologic and Economic Survey Report Archaeological Investigations 3*, Charleston.

Collins, Michael. B. (editor)
1979 Excavations at Four Archaic Sites in the Lower Ohio Valley Jefferson County, Kentucky. *Occasional Papers in Anthropology No. 1*. Department of Anthropology, University of Kentucky. Lexington.

Cowan, C. Wesley
1976 *Test Excavations in the Proposed Red River Lake, Kentucky: 1974 Season*. Submitted to the National Park Service, Atlanta. Copies available from University of Kentucky, Museum of Anthropology, Lexington.

1979 Excavations at the Haystack Rockshelter, Powell County, Kentucky. *Midcontinental Journal of Archaeology* 4:1-33.

1984 From Foraging to Independent Food Production: Subsistence Change and Continuity on the Cumberland Plateau of Eastern Kentucky. PhD dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

Delcourt, Paul. A., Hazel. R. Delcourt, Cecil. R. Ison, William. E. Sharp, and Kristen. J. Gremillion.
1998 Prehistoric Human Use of Fire, The Eastern Agricultural Complex, and Appalachian Oak-Chestnut Forests: Paleoecology of Cliff Palace Pond, Kentucky. *American Antiquity* 63:263-278.

Fenneman, Nevin. M.
1938 *Physiography of Eastern United States*. McGraw-Hill Book Company, New York.

Fernald, Merritt L. and Alfred C. Kinsey
1996 *Edible Wild Plants of Eastern North America*. Idlewild Press, Cornwall-on-Hudson, New York.

Fryman, Frank. B., Jr.
1967 *An Archaeological Survey of the Red River Reservoir in Wolfe, Powell, and Menifee Counties, Kentucky*. Inter-Agency Archaeological and Paleontological Salvage Program, Contract No. 910-728. Department of the Interior, Southeastern Region, Richmond, Virginia.

Gremillion, Kristen. J.
1993 Plant Husbandry at the Archaic/Woodland Transition: Evidence from the Cold Oak Shelter, Kentucky. *Midcontinental Journal of Archaeology* 18(2):161-189.

1994 Evidence of Plant Domestication from Kentucky Caves and Rockshelters. In *Archaeological Origins and Development in the Midcontinent*, Report 19, edited by William Green, pp. 87-104. Office of the State Archaeologist, University of Iowa.

1995 *Archaeological and Paleoethnobotanical Investigations at the Cold Oak Shelter, Kentucky*. Submitted to the National Geographic Society, Grant No. 5226-94.

1996 Early Agricultural Diet in Eastern North America: Evidence from Two Kentucky Rockshelters. *American Antiquity* 61(3):520-536.

Harlow, William and Edward S. Harrar
1969 *Textbook of Dendrology*. McGraw Hill, Chicago.

Ison, Cecil R.
1991 Prehistoric Upland Farming along the Cumberland Plateau. In *Studies in Kentucky Archaeology*, edited by C. D. Hockensmith, pp. 1-10. Kentucky Heritage Council, Frankfort.

Jefferies, Richard. W.
1996 Hunters and Gatherers after the Ice Age. In *Kentucky Archaeology*, edited by R. B. Lewis, pp. 39-77.University of Kentucky Press of Kentucky, Lexington.

Justice, Noel. D.
1987 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States*. Indiana University Press, Bloomington.

Lewis, R. B.
1996 *Kentucky Archaeology*. University of Kentucky Press, Lexington,

Machovina, Brian. J.
1996 *Modelling of Pedestrian Mobility Across a Natural Landscape Using a Geographic Information System*. Department of Geography, The Ohio State University. Submitted under National Park Service Contract No. 6115-4-8031.

Meadows, Larry. G.
1977 Chert Resources in Powell County in Concurrence with Aboriginal Use. In *A Reconnaissance and Evaluation of Archaeological Sites in Powell County, Kentucky*, edited by M. K. Weinland and T. N. Sanders, pp.98-122. Kentucky Heritage Commission, Frankfort.

Mickelson, Andrew. M.
2001 *Mitigation of the Upper Portions of the Gladie Creek Site (15Mf410) Red River Gorge Geological Area, Daniel Boone National Forest, Stanton Ranger District, Menifee County, Kentucky*. Submitted to United States Department of Agriculture, Forest Service, Daniel Boone National Forest, Contract No. 01-CS-11080212004.

2002a Evidence from Eastern Kentucky Documenting Changes in Prehistoric Settlement Patterns as a Result of Shifts in Subsistence Practices. PhD dissertation, Department of Anthropology, The Ohio State University, Columbus.

2002b A GIS-Based Energetics Cost Analysis of Eastern Kentucky Rockshelter Occupations with Cultigens. Paper presented at the 59th Annual Meeting of the Southeastern Archaeology Conference, Biloxi, Mississippi.

Mickelson, Katherine. R.
1997a *Archaeobotany of the Fox Site (44SM4), Smyth County, Virginia*. Submitted to Roanoke Regional Preservation Office, Virginia Department of Historic Resources, Richmond.

1997b *Archaeobotany of the Stewart Site (44PK62), Patrick County, Virginia*. Submitted to Roanoke Regional Preservation Office, Virginia Department of Historic Resources, Richmond.

2000 *Archaeobotany of the Thomas-Sawyer Site (44RN39B), Roanoke County, Virginia*. Submitted to Roanoke Regional Preservation Office, Virginia Department of Historic Resources, Richmond.

2001 Archaeobotanical Analysis. In *Mitigation of the Upper Portions of the Gladie Creek Site (15Mf410) Red River Gorge Geological Area, Daniel Boone National Forest, Stanton Ranger District, Menifee County, Kentucky*. Submitted to United States Department of Agriculture, Forest Service, Daniel Boone National Forest. Contract No. 01-CS-11080212004.

2002 Formation Processes, Macrobotanical Preservation and Middle Archaic Subsistence: A Geochemical Approach to the Understanding of Plant Preservation from Dry Deposits at the Mounded Talus Rockshelter, Lee County, Kentucky. PhD dissertation, Department of Anthropology, The Ohio State University, Columbus.

O'Steen, Lisa. D., Kristen. J. Gremillion, and R. Jerald Ledbetter
1991 *Archaeological Testing of Five Sites in the Big Sinking Creek Oil Field, Lee County, Kentucky*. Submitted to the United States Department of Agriculture, Forest Service, Daniel Boone National Forest.

Pandolf, Karl. B., Brian Giovoni, and Richard. F. Goldman
1977 Predicting Energy Expenditure with Loads while Standing or Walking Very Slowly. *Ergonomics* 22:897-907.

Pearsall, Deborah M.
1989 *Paleoethnobotany: A Handbook of Procedures.* Academic Press, New York.

Peterson, Lewis.
1979 *A Field Guide to Edible Wild Plants*. Houghton Mifflin, Boston.

Pool, Chris. A., A. Gwynn Henderson, and Kim A. McBride
1991 *Cultural Resource Assessment of a Portion of the Lower Gladie Creek Watershed in Menifee County, Kentucky, Stanton Ranger District, Daniel Boone National Forest*. Archaeological Report No. 269. Program for Cultural Resource Assessment, University of Kentucky.

Pool, Christopher, Kim Combs, Leif D. Meadows, Amy Mudd, C. Margret. Scarry, and William. Updike.
1992 *Archaeological Testing at the Gladie Creek Site (15Mf410), Menifee County, Kentucky*. Archaeological Report 283. Program for Cultural Resource Assessment, University of Kentucky.

Radford, Albert E., Harry E. Ahles, and C. Ritchie Bell
1968 *A Manual of the Vascular Flora of the Carolinas*. University of North Carolina Press, Chapel Hill.

Rossen, Jack
1992 Botanical Remains. In *Fort Ancient Cultural Dynamics in the Middle Ohio Valley*, edited by A. Gwynn Henderson, pp. 189-208. Monographs in World Archaeology, No. 8. Prehistory Press, Madison, Wisconsin.

Smith, Bruce. D.
1989 Origins of Agriculture in Eastern North America. *Science* 246:1566-1571.

Stallings, Ross and Nancy Stallings
1993 *Phase II Archaeological Testing at 15Mf28, USDA Forest Service, Statnon Ranger District, Menifee County, Kentucky*. Cultural Horizons, Berea, Kentucky. Submitted to United States Department of Agriculture, Forest Service, Statnon Ranger District. Contract No. 43-531A-2-2543.

Strausbaugh, Paul .D. and Earl Core
1978 *Flora of West Virginia.* Seneco Books, Grantsville, West Virginia.

Talalay, Laurie, Robert K. Donald, and Patrick Munson
1984 Hickory Nuts, Walnuts, Butternuts, and Hazelnuts: Observations and Experiments Relevant to their Aboriginal Exploitation in Eastern North America. In *Experiments and Observations on Aboriginal Wild Plant Food Utilization in Eastern North America*, edited by Patrick Munson, pp. 338-358. Prehistory Research Series VI (2), Indiana Historical Society, Indianapolis.

Thompson, Ralph. L., Ronald L. Jones, J. Richard Abbott, W. Neal Denton
2000 *Botanical Survey of Rock Creek Research Natural Area, Kentucky*. Northeastern Research Center. Technical Report NE-272. Submitted to United States Department of Agriculture, Forest Service.

Webb, William. S. and William D. Funkhouser
1936 *Rockshelters of Menifee County, Kentucky*. Reports in Anthropology and Archaeology No. 3. University of Kentucky, Lexington.

Weir, Gordon. W. and Paul W. Richards
1974 *Geologic Map of the Pomeroyton Quadrangle, East-central Kentucky*. Map GQ-1184. United States Geological Survey, Reston, Virginia.

Winters, Howard. D.
1969 *The Riverton Culture*. Reports of Investigations, No. 13. The Illinois State Museum and the Illinois Archaeological Survey, Springfield.

Yanovsky, Erica
1935 Food Plants of the North American Indians. United States Department of Agriculture, Miscellaneous Publication 237, pp. 1-83, Washington, D. C.

THE ADENA MOUND AS *AXIS MUNDI* AND IMPLICATIONS FOR SETTLEMENT PATTERNS AND SOCIAL ORGANIZATION

By

Michael Striker
Gray & Pape, Inc
Rabbit Hash, Kentucky

ABSTRACT

North American archaeologists have been slow to use the field of comparative religion as a point of reference for the interpretation of ritual or religious contexts. This is unfortunate as there is a very well developed literature about comparative religion that is applicable to the problem. The application of the concept, axis mundi, to Adena mound and sub-mound structures provides important insight into the social organization and settlement patterns of the Adena people.

INTRODUCTION

The mid-1980's witnessed a transformation in the way the archaeological community viewed Adena mounds. Clay (1983, 1986) and Seeman (1986) published papers positing what has now become obvious to us all, that structures underlying Adena mounds were not domestic, but rather ritual. While Seeman (1986) limited his interpretations concerning the actual rituals that occurred within these structures to stating simply that they were mortuary-related, Clay (1986) hypothesized more elaborate and difficult to document activities, such as "sun monitoring." What these interpretation had in common, however, was an emphasis on cultural-ecological causes for the development of the rituals, an emphasis which was in keeping with the prevailing theoretical climate at the time. It was not until much more recently that North American archaeologists have been willing to apply an emic perspective to the interpretation of ritual (see, for example Brown 2006; Carr and Case 2006; Lankford 2004; Townsend 2004).

A rich source of interpretive information is the existing literature from the field of comparative religion, which identifies broad, cross-cultural and trans-temporal patterns in religious experience. As it is among the most conservative of human endeavors, religion is exceptionally suited for interpretation within archaeological contexts. This paper is intended as an initial attempt at incorporating some of the well-developed literature on comparative religion into Adena studies, and a preliminary exploration of the implications for Adena social structure and settlement patterning.

ADENA MOUNDS AND SETTLEMENT PATTERNS

In his initial argument for Adena sub-mound structures as ritual sites rather than domestic sites, Seeman (1986:575-576) favored the view that Adena sub-mound structures were "mortuary camps." Clay (1986:589-590), however, recognized that the mound itself is an end-product of a process that included ritual activity that may or may not have been mortuary in nature. While each of these interpretations mark an important step forward to understand Adena mortuary behavior, neither Seeman nor Clay were able to take the analysis further. It is my contention that without reference to comparative religion, subsequent research concerning Adena settlement patterns will suffer from a lack of reference to current knowledge concerning the nature of ritual and religion.

Ritual activities are ephemeral, and the limited material remains produced force archaeologists to interpret behavior with little physical evidence. Broken ceramic vessels can become, in the archaeological interpretation, evidence of ritual feasting (Clay 1983; Seeman 1979). Whether ritual feasting occurred at these locations or not cannot actually be demonstrated in the archaeological record. It is just as likely that the ceramic fragments that have been interpreted as evidence for ritual feasting may in fact be evidence of burial offerings, and that the vessels were broken because the offering must be "killed" before it is of use to the deceased for whom it is intended. The fact that such an important interpretation is debatable is evidence of the limited material available about interpretation of ideological beliefs. Material for interpretation is limited only when we ignore the largest artifact of human behavior, the landscape.

While most Precolumbian populations of North America certainly did not alter their landscape on the scale of modern people, unmistakable alterations were made. Adena mounds are an obvious manifestation of landscape alteration. However, they are but one component in a larger system of landscape use. In terms of this discussion, the most important interpretation of Adena landscape use comes from Railey (1991), who recognized that the Adena settlement pattern in the Bluegrass region, if not elsewhere, was composed of dispersed hamlets with spatially-segregated ritual facilities.

Railey's (1991:62) model consists of dispersed habitations, each of which is surrounded by an "intensive foraging zone" that includes gardens and fallow plots. Extending beyond this zone is a "hunting and extended foraging zone" which includes forested areas, abandoned habitations, and fallow areas. In the center of the territory is a ritual facility, although it is not clear whether this central location is physical or symbolic.

Several investigators have attempted to determine the spatial relationships between settlements, between mounds, and between mounds and settlements (Abrams 1992; Clay 1991, Mink et al. 2005; Waldron and Abrams 1999). Clay (1991) argued that ritual facilities served "multiple groups and not an isolated polity" (Clay 1991:32). Clay (1991:32) stated that: "the Adena mound occupied an 'edge' location with respect to the groups that used it and, because of this placement it is difficult to interpret from the mound and its burial populations what groups used it." This view places the ritual facility in an area in which the territory of two allied polities overlap.

Abrams (1992) has suggested that in the Hocking Valley of southern Ohio, early mounds were located adjacent to habitations rather than remote from them. Analysis of mound locations using geographic information system (GIS) software indicates that each mound, and therefore each village, was visible from at least one other mound throughout the area (Waldron and Abrams 1999). The locations of these mounds "contributed to a growing sense of territoriality" (Waldron and Abrams 1999:106), and provided a potential avenue for long-distance communication. Recent GIS analysis of Adena mounds in Kentucky (Mink et al. 2005) indicates a similar inter-mound visibility.

Analyses of mound location, however, ignores an important aspect of the whole equation. That is the view that these populations had of their own world and the place that their settlements and their ceremonial sites occupied within in that view. As will be illustrated below, the Adena mound served as a territorial marker for those within the territory rather than outside of it.

COSMOGONY, COSMOLOGY, AND *AXIS MUNDI*

As is made clear by the segregation of ceremonial sites from habitation sites among the Adena, people do not perceive space as homogenous. According to Eliade (1957:20), people view the world as a vast region of profane space broken by areas of sacred space. Profane space is analogous to the chaos from which the world was created. Sacred space is the space occupied by the group in question, while the space "outside" remains, at least to some degree, chaos.

This worldview is common to all human groups and can be summarized in four parts:

1) A sacred place constitutes a break in the homogeneity of space;
2) this break is symbolized by an opening by which passage from one cosmic region to another is possible;
3) communication with heaven is expressed through images that refer to the *axis mundi* or cosmic axis; and
4) around this axis lies the world.

The cosmic regions referred to here are the upper world, the middle world, and the lower world (Eliade 1954:34). There are many variations on this theme. The Puebloans conceptualize a series of four underworlds. The Ojibwe conceptualize two underworlds (Grim 1983:77). The basic divisions, however, remain. Human beings dwell between the world situated above and the world situated below.

That ancient people who participated in the Adena ritual complex shared this cosmology is made explicit with an examination of any of a number of Adena "tablets," believed to have been used as stamps. The finest example of these, and the most useful for the purposes of illustrating this concept, is the Wilmington Tablet (Figure 1). At the base of the bas-relief carving is a water motif symbolizing the waters of chaos from which the world was created. In Algonquin mythology the waters of the underworld were the domain of the horned serpent or the underwater panther (Grim 1983:77-78; Howard 1981:178), a monster that itself symbolizes chaos. The tablet is bisected by a columnar feature representative of the *axis mundi*, which rises from the water and

morphs into raptor or thunderbird forms at the top of the tablet. These forms represent the sky. The interceding space is divided into two distinct layers, one for the underworld, and one for the earth on which man lives.

Figure 1. The Wilmington Tablet.

The *axis mundi* represents the center of the cosmos. It is the center around which the world is spread, and is the point at which the three levels of reality meet. The *axis mundi* is, therefore, the most sacred place in the middle world. Its effect on the surrounding territorial can be conceptualized as a center point from which sacredness radiates. Like a radio wave, the effect is diminished as the distance from the center increases. The closer the land is to the *axis mundi*, the greater its sacredness. Areas outside of the range of influence of the *axis mundi* remain in chaos.

In his book *The Myth of the Eternal Return*, Eliade (1954:48) wrote: "every territory occupied for the purpose of being inhabited…is first of all transformed from chaos to cosmos." This transformation is a repetition of the cosmogonic act, or act of creation of the world, in which the creator transforms primeval chaos into sacred order. This is a common mythological motif. In Babylonia mythology Marduk, god of the sky, slew the dragon Tiamat, who is the manifestation of chaos. In doing so, Marduk brings order and made the world safe for human occupation (Campbell 1964:83; Eliade 1957:48).

A similar cosmogonic myth is told by the Nez Perce of north Idaho. The following is a series of excerpts from the Nez Perce creation myth as told by Alan Slickpoo (Slickpoo et al. 1972:201-206):

> "Once upon a time, Coyote was…building a fish ladder…when someone shouted to him, 'Why are you doing that? All the people [actually the animals] are gone now because the Monster has eaten them.'…Suddenly, he saw a great head...The head was huge, and sweating off somewhere in the distance was its big body…Then Coyote said,… 'You have already swallowed all the people, so you should swallow me too, so I won't be lonely.'…Now the Monster inhaled like a mighty wind. He carried Coyote right towards him…he dashed right into the monster's mouth…
>
> Coyote had arrived at the heart of the Monster…Coyote began cutting away on the heart [with flint knives that he had strapped to his back]…Coyote then said to the people, 'Now gather up all the bones [of other victims] around here and carry them to the eyes, ears, month, and anus of the Monster. Pile them up, and when he falls dead, kick them out the openings…Coyote then threw himself on the heart, just barely tearing it loose with his hands. Then the Monster died and opened up all the openings of his body. The people kicked the bones out and then went out themselves. Coyote went out, too…
>
> Coyote smeared blood on his hands and sprinkled this blood on the bones. Suddenly there came to life again all those [animals] who had died while inside the Monster. Everyone carved up the great Monster and Coyote began dealing out parts of the body to different areas of the country…Where each part landed, he named a tribe and described what their appearance would be. The Cayuse were formed and became small and hot tempered…The Coeur d'Alene and their neighbors to the north became skillful gamblers. The Yakima became short and stocky and were good fishermen.
>
> He used up the entire body of the Monster in this way. Then Fox came up to Coyote and said, 'What is the meaning of this, Coyote? You have used up the body of the Monster and given it to far away lands, but have given yourself nothing for this area.'
>
> …Then he [Coyote] turned to the people and said, 'Bring me some water with which to wash my hands.' He washed his hands and made the water bloody. Then with this bloody water, he threw drops over the land around him and said, 'You may be little people, but you will be powerful. You will be little because I did not give you enough of the Monster's body, but you will be very brave and intelligent and will work hard…And you will be known as the Nu-me-poo (later referred to as Nez Perce)…Today, the heart and liver of the Monster are to be found in the beautiful Kamiah Valley in Idaho, the home of the Nez Perce tribe."

In the above myth, the monster, variously referred to as the Kamiah monster or the Swallowing Monster, represents primeval chaos. Coyote, the Nez Perce culture hero, liberates the other animal forms from chaos, and creates the various races of people out of chaos. It is important to note that it is not until the Nez Perce are created that Human Beings came into existence. The other tribes are created from parts of the monster rather than the bones of his victims and are therefore something more than simply animals. They are not, however, true Human Beings. This term is reserved exclusively for the Nez Perce. The Heart of the Monster to which Slickpoo refers in the last paragraph is a large rock which outcrops in the territory of the Nez Perce. It is considered to be the center of the world, the *axis mundi*. As it also marks the origin of the people, it is also the World Navel, the point at which the sacred enters the human world.

Neighboring groups, of course, do not share this view precisely. The Chelan have a very similar cosmogony, but in their version the Nez Perce are created from the liver of the monster (Smith 1988). The Chinook say that the Nez Perce were created from the head of the monster (Ruby and Brown 1976). These differences are important because in each version of the cosmogony the part from which the tribe was created is related to some defining characteristic of the tribe. It is not surprising, therefore, that the Nez Perce themselves say that they are born of the heart, the most important part.

The cosmogonic myth of the Nez Perce and the identification of a prominent natural feature as the Heart of the Monster (i.e., the *axis mundi* and the world navel) is an example of one of the two ways in which a "territory occupied for the purpose of being inhabited…is first of all transformed from chaos to cosmos" (Eliade 1954:11). The similarities between the Nez Perce creation myth and countless other creation myths from around the world (see Campbell 1949, 1959, 1962, 1964, 1968, 1990; Eliade 1954, 1957, 1963) indicates that the ancestors of the Nez Perce (and the Chelan, the Chinook, and the Babylonians) brought this cosmogony with them when they moved into the territory. In the case of the Nez Perce, a natural feature was adopted as the *axis mundi*, transforming the surrounding territory the from profane chaos to sacred order.

The use of a natural feature for this purpose is a common feature of culture in which seasonal movement or seasonal fission and fusion of component groups is a characteristic. The group is moving throughout a territory, all of which is part of the World as a result of the cosmogony. The World is surrounded by chaos, inhabited by Others. These Others, whether they be Chelan, Chinook, or Minoans, bear no connection to the World Navel and therefore are not truly human, but are inferior. Furthermore, their territories, being distant from the *axis mundi*, are profane places inhabited by profane beings.

The other manner in which a territory may be transformed "from chaos to cosmos" is through the use of ritual. A place is not simply built and designated as the center. The place becomes the center through a ritual reenactment of the creation of the world. The place that will serve as *axis mundi* is built as an imago mundi, or image of the world. More precisely, it is conceived and constructed as a microcosm of the macrocosm. If the place is a building, for example, its very architecture is a reflection of the cosmology and its construction is a recapitulation of the cosmogony. Those building it are reenacting the original act of creation.

The Navajo house, or *hogan*, serves as a useful example. The architecture of a *hogan* is symbolic. The first *hogan*, which was built by First Man, was conical, having a framework made up of four posts, one each of white shell, one of abalone, one of turquoise, and one of jet (Biehl 1992; Wyman 1970). As he built his *hogan*, First Man gave instructions for the building of all later *hogans*. This original blessing was described by Wyman (1970:112-113) as follows:

> These [main poles] of the *hogan* along the east, the south, west, north, four in number, will be the important ones", was said. "And the one in the east is going to be picked up first, the south one next, the west one is between the others, the north one being last in line. And on the east side two stones are placed for its pole, by which that side may be recognized," was said. And this person who directs it will speak of it as it goes along. So it was decided. Right along these points the line of songs runs. "And when set there will be a prayer said with it", was announced. "There will be a prayer with the one at the east, at the south, the west, and the north", was said. "There will be prayer with the fillers put on them and a prayer with [soil] put on its surface", was said.

The construction of a *hogan*, and the blessing that accompanies it, is conducted in *imitatio dei*, it is a reenactment of an original act of a deity, in this case First Man. Each of the four posts represents one of the cardinal directions (each associated with a particular color), the *hogan* itself, however, is round like the world. The floor represents the underworld, and the flat roof of the *hogan* (the origin of which is explained by saying that First Man found the *hogan* to be too small and enlarged by blowing on the poles until the space was sufficiently enlarged [Wyman 1970]), represents the sky or the heavens. The effort made to mark the east side is also significant, as will be seen below.

The *hogan* is clearly an imago mundi, and the symbols used in the construction of the house: the round shape, the four directions, the entrance facing the east; are repeated in Navajo sand paintings, which are, in essence, cosmograms. The *hogan* as imago mundi is so sacred, that without the blessing it would be unsafe for human occupation (Biehl 1992). In repeating the acts of First Man, the people make the people are returning to the beginning, their *hogan* is the first *hogan*.

The following song indicates the association of the individual *hogan* with the first *hogan*, as well as making explicit the association with the *axis mundi* or World Navel:

> *haiye ne yana*
> It is placed, it is placed, it is placed,
> It is placed, it is placed, it is placed,
> Now at the Rim of the Emergence Place, it is placed, it is placed.
> At the *hogan*, blessedness is placed, it is placed,
> At the rear, Turquoise Boy, it is placed, it is placed,
> At the rear, White Shell Girl, it is placed, it is placed,
> At the center of the *hogan* of soft goods, it is placed, it is placed,
> At the *hogan* of all kinds of jewels, it is placed, it is placed,
> Now *sa'ah naaghei*, now *bik'eh hozhoo* below the *hogan*,
> it is placed, it is placed, It is placed, it is placed,
> It is placed, It is placed, *neyowo*. [Frisbie 1968:191]

In this song the *hogan* is associated with the “Rim of Emergence,” or World Navel, as well as with Turquoise Boy and White Shell Girl, the originators of the sexual division of labor in the domestic sphere. The *hogan* is situated at the center of the world, and reference is made to the origins of domestic life. Today many Navajo live in Western-style houses, however, in areas where

this is the common practice, the *hogan* is still used as a ceremonial structure, highlighting the sacred nature of the construction.

Countless other examples could be given for the construction of a house to be constructed as an imago mundi and therefore serve as the *axis mundi* for an individual domestic unit. However, it has already been demonstrated that the sub-mound "house" of the Adena is not a domestic structure (Clay 1986; Seeman 1986). The analogy, however, remains valid as there are other structures that serve as the *axis mundi* for larger groups beyond the domestic unit. Clay (1986:589) suggested similarities between the Adena ritual structure and the *kiva*. This is an apt comparison, however, another similar structure, the *midewigan* of the Ojibwe and neighboring groups, serves as a better example for this discussion.

The *midewigan* is also known as the *midewiwin* lodge. It is the ceremonial structure of the *Midewiwin* society, which is a shamanic society among the Ojibwe (Grim 1983). As was the case with the *hogan*, the construction of the *midewigan* is a repetition of an act of the gods, in this case the culture hero Nanabozho. Nanabozho is responsible both for the origin of the *Midewiwin* society, and the construction of the first *midewigan* (Grim 1983:79). The *midewigan* is built of a frame of bent saplings, looking somewhat like the frame of a Quonset hut. The four walls represent the four cardinal directions, the bare earthen floor represents the underworld. The bottom meter or so of the structure is covered with branches, while the top is left open to the heavens in imitation of the world. In the center is a cedar post representative of the *axis mundi*, which, in the Ojibwe cosmology, is a sacred cedar tree. The entrance faces east (Grim 1983:130).

The similarities between the *midewigan* and the Adena sub-mound structures are manifold, particularly when following the interpretation provided by Clay (1986). As Clay (1986:584) indicated, the outward-sloping posts of the sub-mound structure were either incapable of supporting a roof or, at a minimum, would possess significantly less structural integrity than other forms. Consequently, Clay (1986:589) favors the interpretation of an "open screen" formed by posts without "wicker work." As illustrated by the *midewigan*, the presence of walls is not necessary to delineate a sacred space. Similarly, the *hogan* (or for that matter, the *kiva*) indicated that four walls are not necessary to represent the directions. That the four directions are present in

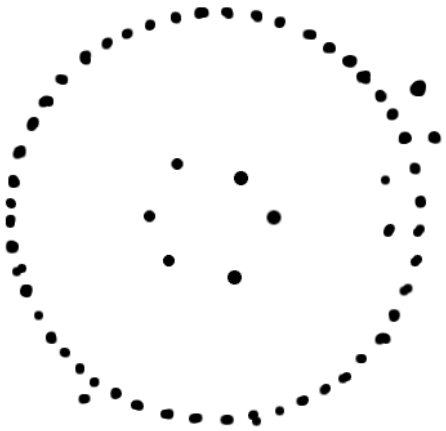

Figure 2. Post-mold pattern beneath the Robbins Mound.

the cosmology is clear in the post-mold pattern beneath the Robbins mound (Figure 2), where six central posts forms a hexagonal pattern at the center of the structure. The six posts in the center of the sub-mound structure at the Robbins mound may also form some representation of the *axis mundi*, however, it is more likely that this feature is represented by the central hearth that is present at Robbins and in many other sub-mound structures.

Fire, and the accompanying rising smoke, is often used to symbolize the *axis mundi*. The widespread use of the ceremonial pipe in Native American cultures is an expression of this very image.

> The pipe is always at the center of the cosmos. The smoke is offered in all directions radiating outward from the pipe. This centering of the cosmos about the primary ritual feature at the time of the ritual is typical of Native American religions; e.g., the center pole of the thirst (sun) dance, the fire of the ritual lodges, and the pit in the sweat lodge and the *kiva* [Paper 1988:39].

The use of the ritual fire as the *axis mundi* provides implications for the construction of subsequent fires on existing mounds as has been seen at Cresap mound (Dragoo 1963) and other sites.

Although the entrance is not clearly visible in the Robbins sub-mound structure, Clay (1986:589) indicated that the entrance of these structures commonly face the east and he makes an argument for the use of these structures as "sun monitors." A different interpretation would relate to the symbolic importance of the sunrise rather than the sunrise itself. The sunrise is a manifestation of the eternal rebirth, a rebirth that may be spiritual or temporal. The entrance of the Adena sub-mound structure, the *midewigan*, or European megalithic tombs is oriented towards the east for the same reason that Navajo sandpaintings are open to the east (the top).

Clay (1986) has suggested that the use of mound locations as mortuary sites may have been simply their final use. This is likely, but in the end, not all that important. The important point is that they are an *axis mundi* for some group and, as was illustrated in the discussion of the Nez Perce cosmogony, the fact that a place is sanctified through a recapitulation of the cosmogony has important implications for the type of group that can share an *axis mundi*. Specifically, the group must share a cosmogony. The composition of the group in question will be explored below.

SETTLEMENT PATTERNING AND SOCIAL ORGANIZATION

In his assessment of Adena settlement patterning, Seeman (1986:576) noted that "[f]or reasons as yet unknown, it would seem that the seasonal fusing of the far-flung macroband itself could no longer serve as the major context for social integration." In making this assessment, Seeman follows, as most archaeologists have Service's (1966) assessment that foraging societies generally live at a band level of organization. Much of the literature concerning the Archaic period, particularly the Late Archaic period, deals with such concepts as bands, macro-bands, and the fission-fusion paradigm (cf. Boisvert 1986; Janzen 1978; Jobe 1983; Winters 1969). It is further assumed that with the gradual introduction of horticulture, social organization became increasingly complex, leading to the development of some form of tribal organization, chiefdom, or big man collectivity (cf. Clay 1992).

As has been thoroughly discussed by Johnson and Earle (2000), the basic unit that forms all social groups, whether it is a "band" or a "chiefdom," is the family group. Functionally, a society is not composed of individuals, but of these family groups. The groups may be nuclear families or extended families, but the "Hearth Group" is the fundamental building block of the society. In fact, in this paper, the term "Hearth Group" will be used for this basic domestic unit to avoid the confusion inherent in the use of "family group" to indicate both the basic domestic unit and the socio-organizational structure as a whole.

Emphasis here on the Hearth Group is not intended to suggest that the fission-fusion paradigm is not a legitimate model. In fact, Johnson and Earle (2000:32-33) recognize the importance of camp groups of 25 to 50 persons that assemble to exploit high-density resources. These groups break down, however, into the smaller Hearth Groups when less dense resources are the targets of exploitation. Their model follows the fission-fusion pattern hypothesized for the Late Archaic period, although the groups involved are somewhat smaller than those discussed for that time period.

The transition to an economy based, at least in part, on horticulture would not change the fact that the Hearth Group was the central economic and organizational unit in the society. Indeed, the settlement model proposed by Railey (1991) places an even greater emphasis on this basic unit. Under this model, individual Hearth Groups reside in isolated households or in hamlets consisting of a small number of such individual households. The Hearth Group is semi-sedentary, spending at least a portion of the year in this isolated homestead. A major feature of such a settlement system is the isolation imposed upon those living within it. In previous times, Hearth Groups were mobile across the landscape as well as having the freedom to move into or out of larger bands as was appropriate to their economic and social needs. In the isolated homestead arrangement the Hearth Group is now isolated from the larger social network.

Of course, this isolation is not permanent. Individual Hearth Groups may come together for seasonal tasks that require large numbers of people. The Shawnee, for example, organized hunts made up of men and women of multiple households that would last for two or three months (Voegelin 1941:514-515). While the Shawnee were village dwellers, one can see a similar need for dispersed groups to assemble. The focus here is on determining what type of social group is tied together by the ritual precinct represented by the mound locality.

Clearly, the transition from the Archaic period to the Woodland involved increasing territorial restriction as part of a gradual move towards sedentism and population nucleation. The most important aspect of this transition does not appear to be population increase (Seeman 1986:576), but rather the adoption of horticulture. Although food production may eventually lead to population increase, the impetus for adopting a horticultural lifestyle is not an increase in the amount of food produced, but in the security of that production. Horticulturalists have a reliable, predictable subsistence base, the size of which they can control, at least minimally, by altering the amount of land that is cleared and planted. The trade-off for this predictability is that the gardens must be maintained. Some degree of sedentism is, therefore, imposed upon the population as they are tied to their garden plots.

The dispersed horticultural hamlet settlement pattern is not unique to the Adena for which it has also been hypothesized (Railey 1991). In their discussion of Family-level (Hearth Group) organization, Johnson and Earle (2000:93-112) illustrate some of their points using the example of the Machiguenga. The Machiguenga are horticulturalists living in the western fringe of the Amazon rain forest in southeastern Peru. The Machiguenga settlement pattern includes "settlements [that] fluctuate between individual households, isolated from others by expanses of virgin forests and hamlets of three to five cooperating and related households" (Johnson and Earle 2000:95). Households are semi-sedentary, residing in houses built to last from three to five years. At certain times of year, Hearth Groups leave their individual hamlets for temporary dwellings along the rivers, where they harvest wild foods. Unlike the Adena or Hopewell cultures, Machiguenga "hamlet groups do not own corporate property, nor are they validated by…ceremonial occasions" (Johnson and Earle 2000:110).

Another example is the Jívaro who, like the Machiguenga, live in the western portion of the Amazon rain forest in the foothills of the Andes Mountains (Harner 1984:14). The Jívaro live in isolated households limited to a single Hearth Group, which may include a polygamous nuclear family, or an extended family (Harner 1984:41-47). Related family groups live nearby, but usually no closer than a day's walk. The Jívaro Hearth Group maintains contact with their neighboring groups through shamanic partnerships and trading partnerships (Harner 1984). Each of these partnerships is formalized, and in the case of the shamanic partnerships, certain types of information and power are transmitted only in a particular direction. This arrangement effectively forces an individual shaman (a large percentage of the population is shamans) to have multiple partnerships, providing him with a large social circle upon which he can draw when organizing group-oriented tasks.

Despite the lack of corporate property and ceremonialism among these Family-level horticulturalists, the settlement system described above is very similar to that proposed by Railey (1991). Although Railey (1990) does not discuss the possibility of temporary seasonal movement away from the hamlet base, there is certainly room for such movement in the model. There is also evidence for seasonal occupations during the Middle Woodland period in Ohio (Abrams 1989; Church and Ericksen 1997), and small, seasonal sites are documented in Kentucky during both the Early and Middle Woodland periods (Railey 1990:250, 252).

Seeman's (1986:576) observation that "the seasonal fusing of the far-flung macroband itself could no longer serve as the major context for social integration" would appear to hold. The reason, however, is not some limitation of the fusing process, but rather an abandonment of it. As Hearth Groups became increasingly tied to their gardens, the fusing of large components of the macroband becomes unnecessary. While there is still a need to coalesce into larger groups, these groups are considerably smaller and less visible archaeologically, than the macroband. The Family-level organization, however, provides no political mechanism for integration and one must be developed.

In summary, near the end of the Late Archaic period, horticulture began to develop as an important component of the economy. Individual Hearth Groups which, during the Archaic period, would have moved freely in and out of bands of various sizes as their social and economic needs dictated, became less mobile as they became tied to their gardens. The semi-sedentary lifestyle

forced upon the Hearth Group by its new horticultural lifestyle deprived it of its primary means for integrating itself into the larger society. At the same time, the extent of the landscape available to the individual Hearth Group was reduced to a region within easy travel of its gardens. While this certainly has economic consequences, it would also have spiritual consequences as portions of the population became isolated from the sacred spaces of the group territory.

Eliade's (1954:11) statement that "every territory occupied for the purpose of being inhabited…is first of all transformed from chaos to cosmos" is true not only of a territory newly inhabited by an existing group, but of a territory inhabited by a newly created group. Because a sacred space *becomes* the *axis mundi* through the ritual recapitulation of the cosmogony, the *axis mundi* need not be permanent. If some segment of the population becomes isolated from the *axis mundi*, a new one can be ritually created. In this way, a new group is created as well.

This is what appears to have occurred during the early part of the Woodland period. As the individual Hearth Group became geographically isolated from segments of the society and, perhaps, from the sacred center of the group territory, new groups formed to fill the social vacuum. The existence of these groups, like the existence of the world itself, must be validated by linking the groups to the cosmogony. Just as a location becomes sanctified through a recapitulation of the cosmogony, so does the existence of a social or ritual organization. It is for this reason that rites of passage universally include some recitation or ritual reenactment of a portion of the cosmogonic myth (Eliade 1963:21-38).

The ritual center represents an imago mundi and a recapitulation of the cosmogony, and any groups sharing the center must share the same cosmogony. As was further demonstrated in the discussion about the Heart of the Monster, distinct groups, even closely related ones, do not share a cosmogony. This belief may even include clans within a larger group; distinct clans may have distinct cosmogonies that enhance their own connection to a deity and minimize the connection of others. In terms of the Adena people then, the ritual precinct must, be shared by local groups (individual settlements) that are related by descent, or represent sodalities or secret societies such as the *midewiwin*. The fact that the mound locale represents as *axis mundi* precludes the interpretation that allied neighboring polities that are not related by blood or other cosmogonic relationship share such a religious site. The larger group (i.e., the language group, tribe, society, etc.) may even continue to have a natural center, such as the Heart of the Monster, while smaller groups, descent groups, sodalities, have their own ritually-created centers. There can, in fact, be an unlimited number of such centers as the composition of these groups changes over time.

The fact that the groups that come together to create the sub-mound structure (which is a recapitulation of the cosmogony), coupled with the end-use of the locality as a mortuary location, strongly indicates that the group associated with the ritual precinct is a descent group. This organization would provide a convenient, workable model, or series of models, from which to organize a society. A particular ritual precinct might belong to a particular lineage, lineage segment, or a clan. A particular descent group might also be broken down into a number of segments that is limited only by the potential number of generations that could be alive at any particular time, each with its own ritual precinct.

This interpretation might lead the reader to conclude that the truly monumental mounds, such as Robbins, etc. represent the ritual precinct of a larger lineage segment, perhaps a clan. While such a conclusion is one possibility, the size of a mound might equally be related to the fecundity of a certain population segment, or the period of time during which the particular mound locale was functioning.

IMPLICATIONS

Certain authors (cf. Abrams 1989; Clay 1991; Waldron and Abrams 1999) have attempted to place mounds within the settlement systems by determining the relationships between a mound and dispersed settlements in the general area. Some authors have suggested that the mounds are remote from habitations because they mark territorial boundaries (Clay 1991; Clay and Niquette 1992), or are adjacent to a habitation to promote visibility between habitations (Waldron and Abrams 1999). Perhaps the view that habitations are "tied" to a mound locale is an inevitable result of the development of the field of study. However, for the reasons discussed above it is more likely that the population was tied to its gardens. The mound locales are the physical remains of the rituals employed to form new social groups that replace the band as the entity through with individual Hearth Groups are linked. The mound locale further serves as the spiritual center of the territory of this new group, the *axis mundi* around which the group orients itself.

In terms of settlement patterns, it really makes no difference whether a mound is situated in the geographic center of a territory, if it is located remote from a habitation, or, as appears to be the case in the Hocking valley, immediately adjacent to it. These are simply regional variations. Locations are likely to prove useful in distinguishing between ethnic groups, but as a whole, the location of the ritual center does not dictate the location of the settlements. This analysis suggests that the mound indeed marks a territory, but it marks it for the people who live within it. Outsiders are irrelevant. The mound marks the spiritual and cosmological center of the territory of a group. If, as is likely, these groups are descent-based groups, there is the potential for members of a particular neighborhood of Hearth Group-based hamlets to have ties to multiple ritual precincts. In fact, if a ritual precinct belonged to a lineage segment, a particular individual could have ties to multiple precincts. Such possibilities make attempts to link habitations and mounds by purely geographic relationships questionable.

Based on the information presented above, the presence of Adena mounds, and the rituals that they represent, are the earliest archaeological indicators of a developing social structure beyond the informal organization of the band. Although the Hearth Group remains as the basic social unit, the dispersal of these groups, and the shift to a semi-sedentary lifestyle, that results from the introduction of horticulture necessitated the development of some mechanism to maintain social ties across the larger society.

The groups that developed, whether they be descent based or otherwise, are organized around a ritually created *axis mundi*, which would, as has been suggested by Waldron and Abrams (1999), contribute to a developing sense of territoriality. The feeling of territoriality would, however, be oriented internally. That is to say that the group associated with the mound locality would develop a feeling of territoriality around the newly consecrated *axis mundi*. For this reason it is important

to adopt the view that Adena mounds were intended as internal symbols rather than external markers. This subtle, but important, distinction may prove to be important to our future understanding of the Adena landscape.

REFERENCES CITED

Abrams, Elliot M.
1989 The Boudinot #4 Site (33AT521): An Early Woodland Habitation Site in Athens County, Ohio. *West Virginian Archaeologist* 41:16-26.

1992 Woodland Settlement Patterns in the Southern Hocking River Valley, Southeastern Ohio. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*, edited by Mark Seeman, pp. 19-23. MCJA Special Paper No. 7. Kent State University Press, Kent.

Biehl, Michelle L.
1992 The Navajo House Blessing Ceremony. Electronic document, http://jammed.com/~mlb/*hogan*.html, accessed March 25, 2005.

Boisvert, Richard A.
1986 Late Archaic Settlement Models in the Middle Ohio Valley: A Perspective from Big Bone Lick, Kentucky. PhD dissertation, Department of Anthropology, University of Kentucky, Lexington.

Brown, James A.
2006 The Shamanic Element in Hopewellian Period Ritual. In *Recreating Hopewell,* edited by Douglas K. Charles and Jane E. Buikstra, pp. 475-488. University Press of Florida, Gainesville.

Campbell, Joseph
1949 *The Hero with a Thousand Faces*. Princeton University Press, Princeton, New Jersey.

1959 *The Masks of God, Volume I, Primitive Mythology*. Penguin Books, New York.

1962 *The Masks of God, Volume III, Oriental Mythology*. Penguin Books, New York.

1964 *The Masks of God, Volume III, Occidental Mythology*. Penguin Books, New York.

1968 *The Masks of God, Volume IV, Creative Mythology*. Penguin Books, New York.

1990 *Transformations of Myth through Time*. Harper Row, New York.

Carr, Christopher and D. Troy Case (editors)
2006 *Gathering Hopewell: Society, Ritual, and Ritual Interaction*. Springer, New York.

Church, Flora, and Annette G. Ericksen
1997 Beyond the Scioto Valley: Middle Woodland Occupation in the Salt Creek Drainage. In *Ohio Hopewell Community Organization*, edited by W. S. Dancey and P. J. Pacheco, pp. 331-360. Kent State University Press, Kent, Ohio.

Clay, R. Berle
1983 Pottery and Graveside Ritual Among the Adena. *Midcontinental Journal of Archaeology* 8:109-126.

1986 Adena Ritual Spaces. In *Early Woodland Archeology*, edited by Kenneth B. Farnsworth and Thomas E. Emerson, pp. 581-589. Center for American Archeology, Kampsville, Illinois.

1991 Adena Ritual Development: An Organizational Type in Temporal Perspective. In *The Human Landscape in Kentucky's Past*, edited by Charles Stout and Christine Hensley, pp. 30-39. Kentucky Heritage Council, Frankfort.

1992 Chiefs, Big Men, or What? Economy, Settlement Pattern, and Their Bearing on Adena Political Models. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*, edited by Mark Seeman, pp. 77-80. MCJA Special Paper No. 7. Kent State University Press, Kent.

Clay, R. Berle and Charles M. Niquette
1992 Middle Woodland Mortuary Ritual in the Gallipolis Locks and Dam Vicinity, Mason County, Virginia. *West Virginia Archaeologist* 44:1-2:1-25.

Dragoo, Don W.
1963 *Mounds for the Dead*. Annals of the Carnegie Museum 37, Pittsburgh, Ohio.

Eliade, Mircea
1954 *The Myth of the Eternal Return or, Cosmos and History*. Translated by Willard R. Trask. Princeton University Press, New Jersey.

1957 *The Sacred and the Profane: The Nature of Religion*. Translated by Willard R. Trask. Harcourt, New York.

1963 *Myth and Reality*. Translated by Willard R. Trask. Harper & Row, New York.

Frisbee, Charlotte J.
1968 The Navajo House Blessing Ceremonial. *El Palacio* 75:26-35.

Grim, John A.
1983 *The Shaman: Patterns of Religious Healing Among the Ojibway Indians*. University of Oklahoma Press, Norman.

Harner, Michael J.
1984 *The Jívaro: People of the Sacred Waterfalls*. University of California Press, Berkley. Originally published 1972, Natural History Press, New York.

Howard, James H.
1981 *Shawnee! The Ceremonialism of a Native American Tribe and Its Cultural Background*. Ohio University Press, Athens.

Janzen, Donald E.
1978 An Examination of Late Archaic Development in the Falls of the Ohio River Area. In *For the Director*, edited by Charles E. Cleland, pp. 123-143. Anthropological Paper No 61. University of Michigan Museum of Anthropology, Ann Arbor.

Jobe, Cynthia
1983 *Late Archaic for the Upper Ohio, Miami-Whitewater, and Kentucky-Licking River Drainages*. Manuscript on file, Ohio Historic Preservation Office, Ohio Historical Society, Columbus.

Johnson, Allen W. and Timothy Earle
2000 *The Evolution of Human Societies: From Foraging Group to Agrarian State*. Stanford University Press, Stanford, California.

Lankford, George E.
2004 World on a String: Some Cosmological Components of the Southeastern Ceremonial Complex. In *Hero, Hawk, and Open Hand: American Indian Art of the Ancient Midwest and South*, edited by Richard F. Townsend, pp. 207-218. The Art Institute of Chicago.

Mink, Philip B., A Gwynn Henderson, and David Pollack
2005 Quantifying The Adena Landscape: A Case Study in Utilizing Kentucky's Statewide Archaeological Database. Paper presented at the 22nd Annual Kentucky Heritage Council Archaeological Conference, Lexington.

Paper, Jordan
1988 *Offering Smoke: The Sacred Pipe and Native American Religion*. University of Idaho Press, Moscow.

Railey, Jimmy A.
1990 Woodland Period. In *The Archaeology of Kentucky: Past Accomplishments and Future Directions*, Volume 1, edited by David Pollack, pp. 247-374. Kentucky Heritage Council, Frankfort.

1991 Woodland Settlement Trends and Symbolic Architecture in the Kentucky Bluegrass. In *The Human Landscape in Kentucky's Past*, edited by Charles Stout and Christine Hensley, pp. 30-39. Kentucky Heritage Council, Frankfort.

Ruby, Robert and John A. Brown
1976 *The Chinook Indians: Traders of the Lower Columbia River*. University of Oklahoma Press, Norman.

Seeman, Mark
1979 Feasting with the Dead: Ohio Hopewell Charnel House Ritual as a Context for Redistribution. In *Hopewell Archaeology: The Cillicothe Conference*, edited by David S. Brose and N'omi Greber, pp. 39-46. Kent State University Press, Kent, Ohio.

1986 Adena "Houses" and Their Implications for Early Woodland Settlement Models in the Ohio Valley. In *Early Woodland Archeology*, edited by Kenneth B. Farnsworth and Thomas E. Emerson, pp. 564-580. Center for American Archeology, Kampsville, Illinois.

Service, Elman R.
1966 *The Hunters*. Prentice Hall, Englewood Cliffs, New Jersey.

Slickpoo, Allen, Leroy Seth, and Deward E. Walker, Jr.
1972 *Nu-Mee-Poom Tit-Wah-Tit: Nez Perce Legends*. Nez Perce Tribe, Lapwai, Idaho.

Smith, Allan H.
1988 *Ethnography of the North Cascades*. Center for Northwest Anthropology Project Report No. 7. Washington State University, Pullman.

Townsend, Richard F.
2004 American Landscapes, Seen and Unseen. In *Hero, Hawk, and Open Hand: American Indian Art of the Ancient Midwest and South*, edited by Richard F. Townsend, pp. 15-36. The Art Institute of Chicago.

Voegelin, Erminie Wheeler
1941 The Place of Agriculture in the Subsistence Economy of the Shawnee. *Papers of the Michigan Academy of Science, Arts and Letters* 24:513-520. Ann Arbor.

Waldron, John and Elliot M. Abrams
1999 Adena Burial Mounds and Inter-Hamlet Visibility: A GIS Approach. *Midcontinental Journal of Archaeology* 24:97-111.

Winters, Howard D.
1969 *The Riverton Culture: A Second Millennium Occupation in the Central Wabash Valley*. Illinois State Museum, Reports of Investigations 10. Springfield.

Wyman, Leland C.
1970 *Blessingway*. The University of Arizona Press, Tucson.

THE OMER ADAMS SITE (15HY25): EARLY HISTORIC SALT MAKING AT DRENNON SPRINGS, HENRY COUNTY, KENTUCKY

By

Kurt Fiegel
MACTEC Engineering and Consulting
Louisville, Kentucky

and

William A. Huser
Environment and Public Protection Cabinet
Frankfort, Kentucky

ABSTRACT

An adequate supply of salt was critical to the settlement of the Ohio River valley. Local salt was obtained by precipitating it from the waters of mineral springs. Salt making developed into an early commercial industry that historians recognize as a distinct influence on early Ohio Valley settlement. Archaeological investigations of saltworks, however, have been rare. Fieldwork at Drennon Springs in 1995 provided a first detailed look at the remains of some Kentucky saltworks and are herein described. To put them into context, springs and the technology of precipitating salt from their waters is described and the history of salt making at Drennon Springs and elsewhere is briefly recounted.

INTRODUCTION

Currently, few archaeological excavations of historic-period salt making facilities in the eastern United States have been conducted. Well-known saltworks, such as the mid-18th to early 19th century one at St. Genevieve, Missouri (Trimble et al. 1991) and the early 19th century "United States Salines" in Gallatin County, Illinois (Herdrich 1985) have been investigated. A smaller operation at Boone's Lick, Missouri, in operation from 1805 to 1833, has also been sampled (Bray 1986, 1987; Yelton and Bray 1992). Additionally, several descriptions of saltworks have been produced from initial and evaluation-level archaeological studies. Boisvert (1984) produced a general overview of Kentucky salines but he did not describe any saltworks examined during the investigations. Dickinson and Edwardson (1984) described Civil War Confederate coastal saltworks in northwest Florida. Prentice (1994) described one of the several Beatty Saltworks in Tennessee, which operated from ca. 1820 to ca. 1877. Anslinger et al. (1996)

described the evidence for ca. 1850's saltworks in the Kanawha River valley of West Virginia, while Updike (2001) reported the data recovery of the coal-fired furnace at Marmet, West Virginia.

In late 1995, archaeologists from the Kentucky Transportation Cabinet, Division of Environmental Analysis, Frankfort, and Wilbur Smith Associates, Lexington, conducted extensive National Register eligibility testing of the Omer Adams Site (15Hy25) at Drennon Springs in north-central Kentucky. Mechanical excavation of the site within a proposed right-of-way for the KY 1360 bridge over Drennon Creek revealed a concentration of features associated with Euro-American salt making ca. 1785-1815. In this paper, the Omer Adams Site and its archaeology are described, and salt making in this frontier setting is interpreted within the context of the larger role salt played in early Ohio Valley settlement.

SALT AND COLONIAL NORTH AMERICA

Salt was indispensable in the life ways of the European colonists of North America as it was used in abundance for the preservation of meat, fish, hides, and furs. It also was used in leather tanning, fabric dyeing, ceramic glazing, and in lesser quantities for medicinal purposes, and for cooking and dining. An ample supply of salt was therefore essential for domestic life and commercial endeavors. Salt was understandably an important article of commerce and one of the earliest products manufactured by the English in colonial North America (Weiss and Weiss 1959:12)

In 17th century Europe, two techniques of evaporation of saline waters, solar and direct heat application, were widely used to obtain salt. In coastal areas, where fuel was scarce, solar evaporation of seawater was typically practiced, sometimes augmented by the direct application of heat through the burning of peat. Inland, where sufficient wood fuel existed, the waters of mineral springs were boiled to obtain salt and direct heat evaporation was the norm. These basic techniques of solar and applied heat evaporation of saline waters diffused to North America with European colonists.

In the English colonies, the first attempt at salt making occurred at Jamestown before 1620, using seawater (Bishop 1868:274). The encouragement and regulation of domestic salt making enterprises by governmental authorities date to 1662 Virginia (Bishop 1868:286). Before the Revolutionary War however, local production of salt in the colonies could not meet demand and salt was primarily imported. Coarse salt, employed in the fisheries industry and the fur trade, was supplied by ships that arrived from Europe, the Azores, and the Caribbean. Culinary salt was supplied from England and commanded a higher sale price (Bishop 1868:288; Weiss and Weiss 1959:12).

As Europeans penetrated the interior of eastern North America, they were on the fringes of the international salt trade. The high demand for salt, concomitant with the costs of production and transportation, made salt a precious and expensive commodity on the frontier. To obtain an adequate supply of salt, the colonists exploited the waters of local mineral springs. As salt making developed into an industry in the Ohio Valley, it provided employment, furnished a medium of

exchange, effected land value, influenced settlement patterning, spurred road development, encouraged other industries, and inspired legislation (Jakle 1969).

SALT AND OHIO VALLEY SETTLEMENT

Mineral springs occur in abundance throughout the Ohio Valley. An inland sea-covered portion of the Ohio Valley as late as the Tertiary period deposited sands and mud up to several thousand feet thick trapping seawater between the mineral grains as these deposits solidified into rock. This water and lesser quantities of meteoric solutions are the sources of the region's spring brines. The brine varies in strength due to physical and chemical changes that have occurred through time but are on average stronger than seawater. The springs of highest salinity in the Ohio Valley occur in the strata of the Pennsylvanian-age Pottsville series (Jakle 1969:689).

From the start, mineral springs played a central role in Euro-American settlement of the Ohio Valley. The earliest explorers of the region were hunters, trappers, and traders who quickly learned that animals were attracted to the springs or "licks" by the presence of the salt that impregnated the earth there. These animals included the buffalo, from the western plains, which were present in the eastern woodlands in small herds. The seasonal migrations of the buffalo between prairie grasslands and salt licks throughout the Ohio Valley had, through years of repetitious movement along specific routes, created a system of well-defined paths that connected larger springs. In some locales these buffalo "traces" were the only clear overland routes. Often buffalo traces evolved into roads that exist to the present, and initial settlement in Kentucky was largely concentrated at the locations of springs and along traces (Clark 1938:42; Jakle 1969:689-691).

By 1737, the French had found springs of high salinity in the Middle Mississippi River valley near Ste. Genevieve, Missouri. There, they 1750, they established the first viable commercial saltworks in the interior of eastern North America (Bishop 1868:294; Bray 1986:9; Trimble et al. 1991:171). Ste. Genevieve salt sustained both the French in the Illinois Country and the small population of English inhabitants in the Ohio Valley until 1763, the end of the French and Indian War (Jakle 1969:692).

When France relinquished to England all of her lands east of the Mississippi, and Spain took control of the Upper Louisiana salt springs, the English in the Ohio Valley essentially lost their access to salt. The Proclamation of 1763 forbade English settlement west of the Appalachian Mountains, and Native American hostility made settlement a perilous act. Even so, small parties of English hunters, the "Long Hunters" roamed the Ohio Valley on extended, wide-ranging trips during the years leading up to the American Revolution. The hunters boiled the waters of mineral springs to obtain salt for expedient use and by that gained knowledge about the relative salinity of the various springs of the region (Clark 1938). Yet, there was no steady local supply of salt, in quantity, available. Thus, in 1766, English traders began to import West Indies' salt into the Illinois Country by transporting it overland from Philadelphia and Baltimore to Fort Pitt and then shipping it down the Ohio River (Jakle 1969:692).

SALT AND EARLY KENTUCKY SETTLEMENT

Early Anglo-American explorers and settlers got to Kentucky by traveling down the Ohio River or by land over the Appalachian Mountains. The river route brought them to locations where buffalo traces intersected the river, locations, which grew into early urban centers of travel and commerce, such as Maysville, Covington, and Louisville. Meanwhile, many of those who came through the Appalachians passed through Cumberland Gap, a buffalo trace well known to Native Americans and a few European explorers by 1750. These travelers were familiar with the valleys of eastern Kentucky, which contained salt springs and abundant game. However, it was the level lands and mineral springs of the Bluegrass Region of north-central Kentucky that first attracted permanent settlement starting in 1774-1775 with fortified stations at Harrodstown (Harrodsburg) and Boonesborough (Clark 1938:43). Settlement in the Bluegrass was preceded by land surveys, including a 1773 survey expedition led by Virginian Thomas Bullitt, during which land close to Drennon Springs was first surveyed (Woods 1905:434).

The outbreak of the American Revolution in 1775 delayed permanent settlement in Kentucky but encouraged the manufacture of salt there. The British naval blockade and military occupation of the Middle Atlantic colonies eliminated the supply of imported salt and drove up the price. In 1775, the price of salt on the coast increased from 15 shillings to between 5 and 19 pounds sterling per bushel (Jakle 1969:697). In reaction, the Continental Congress attempted to stimulate domestic salt production. Congress reprinted and distributed in 1776, an extract from William Brownrigg's, an M.D. 1748 article entitled "The Art of Making Common Salt as now practiced in most parts of the World" (Multhaulf 1978:36; Weiss and Weiss 1959:13) This pamphlet described salt making by solar evaporation. Additionally, the Continental Congress passed resolutions to alleviate the salt shortage. In May of 1776, Virginia, and later Kentucky, addressed the scarcity of salt in an ordinance that encouraged the construction and operation of saltworks in the colony (Henning 1821:122-126). During May 1777, Virginia offered bounties for the private manufacture of salt (Henning 1969 [1821]:311-312).

Virginia's 1776 Ordinance, with its subsequent revision in 1777, and a Congressional committee's report of 1777, stimulated speculative developments of the saline springs in western Virginia and Kentucky, although Native American hostility made salt manufacture a risky undertaking. For example, in February 1778, Native Americans briefly captured Daniel Boone and a small party while making salt at Blue Licks, Kentucky.

Nevertheless, the tide of settlers was unstoppable and after the Revolutionary War ended, Americans surged into Kentucky. Kentucky's population in 1790 was recorded as 73,677 people, including 12,430 slaves and 114 free African-Americans (Heinemann 1992:1-2). Statehood followed in 1792. As the population-increased, salt making quickly grew from a low-level activity intended to supply local needs to an intensive, capitalistic industrial venture designed to supply domestic and commercial regional needs,. Jakle (1969:696) points out that the commercial raising of livestock was equal in importance to agriculture on the Ohio Valley frontier, and livestock could neither be raised nor slaughtered without an adequate supply of salt. The early Kentucky iron industry was also stimulated by the growth of salt making, as kettles used to boil brine, was one of the main products of the early iron furnaces. The Bourbon Furnace, in present-day Bath County,

Kentucky, dates to 1791 and is believed to have been the first iron works west of the Appalachian Mountains (Jakle 1969:701-702).

Kentucky was a major producer of Ohio Valley salt between 1780 and 1800, commercial manufacture having begun at all of the larger springs by 1790. These springs, found primarily in the Bluegrass region (Figure 1), were the Big Bone, Bullitt's, Drennon's, Goose Creek, Little Sandy, Lower Blue, Mann's, May's, and Ohio licks. The Bullitt saltworks, in operation by 1779, were the earliest and became the largest and most advanced operation (Jakle 1969:699; McDowell 1956:241). Entrepreneurs sought to control the salt supply for personal gain. In 1783, General James Wilkinson moved to Kentucky from Pennsylvania to engage in business, and by 1785 had achieved a monopoly on salt in the Lexington area, and on salt produced by the Mann and Bullitt saltworks (Clark 1938:44; Jakle 1969:701). In 1787, Wilkinson negotiated a trade agreement with the Spanish Governor of Louisiana under which Kentucky goods could be sold in New Orleans. Commodities shipped south-included tons of pork, bacon, dried beef, butter, and biscuits, which all required quantities of salt in preparation for market. Attainment of a southern market also stimulated Bluegrass tobacco production (Clark 1938:45; Jakle 1969:701).

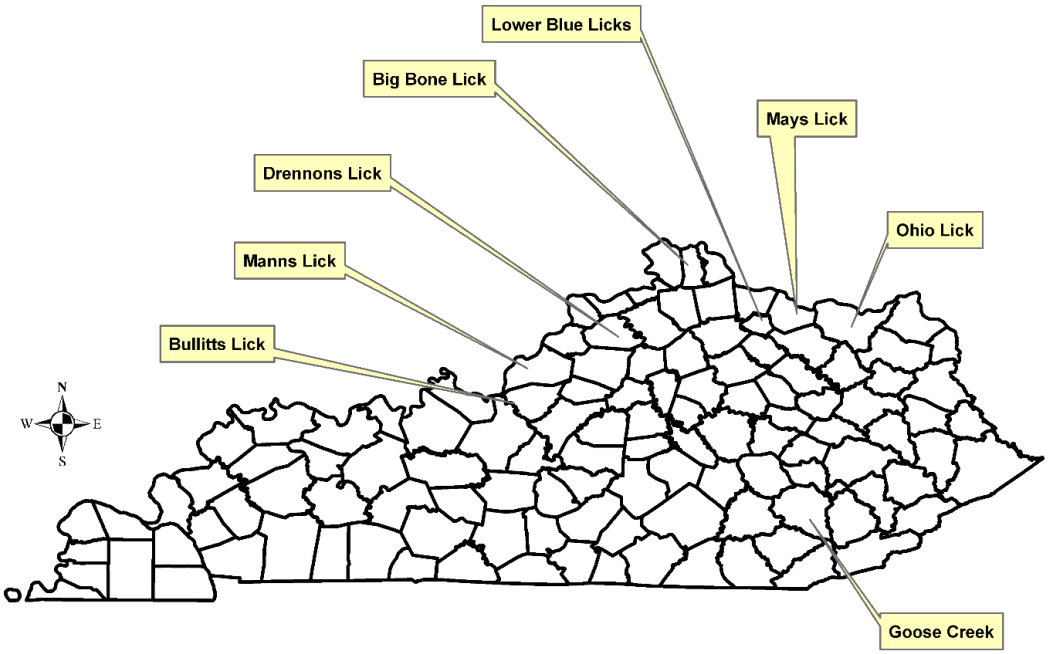

Figure 1. Lick locations within the Commonwealth of Kentucky.

DRENNON SPRINGS SALT MAKING

Drennon Springs is a cluster of mineral springs in the Drennon Creek Valley, in Henry County, in north central Kentucky (Figure 1). This area is part of the Hills of the Bluegrass Physiographic Region, an area of steep, rough, and hilly topography that has been highly dissected by streams (Whitaker and Eigel 1992:4). The area is underlain by Late Ordovician limestone. Drennon Creek is an entrenched minor tributary of the lower Kentucky River, with a watershed of 60,000 acres,

most of which is upstream from the Omer Adams Site. The creek's flood plain is about 2,000 feet wide close to the site. A vein containing galena and barite, minerals important in lead production, outcrop in the Drennon Creek bedrock (Fohs 1913:507). The mapped soils overlying the bedrock are deep silt loam of moderate permeability. Jillson (1967: 123) observed four mineral springs on Drennon Creek in 1923.

Among Thomas Bullitt's 1773 party of surveyors was Jacob Drennon, who visited the Drennon Creek valley and subsequently tried without success, to patent 400 acres surrounding the saline springs found there (Hammon 1978:149; LaRoche 1980a:4; Woods 1905:433). Although Drennon's name became permanently associated with the locale, extensive documentary research has identified the Hite family of Virginia as the group most closely associated with salt making at Drennon Springs.

Isaac Hite, of Dutch descent, was another member of Bullitt's party (Hammon 1978:149; Rice 1993:49-51). Isaac's grandfather, Joist Hite, was a land speculator said to have aided in settling 100 members of the Dutch Reform Church in the Shenandoah Valley (Brookes-Smith 1976:iv). Isaac's father, Abraham Hite, Sr. was a land speculator and member of the Virginia Legislature, who immigrated to Jefferson County, Kentucky, ca. 1787. Revolutionary War hero George Rogers Clark also claimed Drennon Springs. Research, however, has failed to produce evidence that Clark was significantly involved in salt making at Drennon Springs, or the outcome of the 1784 pending a lawsuit.

In 1774, Isaac Hite returned to Kentucky and made a private survey of 16,000 acres in the Little Kentucky River and Drennon Creek drainages for Hite, Bowman and Company. This was a co-partnership consisting of Isaac Hite (son of Joist Hite) and Abraham, John, and Joseph Bowman, all Hite's relatives by marriage. Hence, a pattern of acquisition and ownership began in the Drennon Creek drainage by the Kentucky Hite family. By 1797, this co-partnership of individuals had accumulated some 11,000 acres there (Kentucky Secretary of State, Land Office).

In the summer of 1775, Isaac Hite, Abraham Hite, Jr. and others made a survey and an entry of 1,000 acres in Kentucky, including Drennon Springs, under a military warrant assigned to Colonel William Preston. Nicholas Cresswell, an English traveler who visited Drennon Springs in June 1775 may have observed Isaac and Abraham, Jr. there as he wrote that:

> This is the largest lick I ever saw. I suppose here is 50 acres of land trodden by buffaloes, but there is not a blade of grass upon it... Here is a number of salt and Brackish springs in a small compass, some of them so strong of the brine that the sun forms the salt round the edge of the Springs. Here were two Dutchmen, sent by the proprietors to make an experiment on the water of the strongest spring. They had made about a pint of salt from sixteen Gallons of water (Cresswell 1968:85-86).

In April, 1776, Abraham Hite, Sr. agreed to be partners with Peter Hogg in a saltworks at Drennon Springs (Hite et al. 1820:424-425). Hogg, a Scottish immigrant, settled in Virginia ca. 1745. He was a noted lawyer in the Shenandoah Valley and a member of the Virginia Legislature (Waddell 1886:63). Salt making at Drennon Springs was not feasible in 1776. That year, James McDaniel (or McDonald) was killed by Native Americans (Mason 1951:144) while attempting to manufacture salt.

The 1,000 acre tract surveyed in 1775 was a military grant, assigned by Colonel Preston to Abraham Hite, Sr. and Peter Hogg in 1780. The same year the survey was entered by the Virginia Land Office (Fincastle County 1775; Brookes-Smith 1976:177). In 1780 Hogg received a 400-acre settlement grant and a 1000-acre preemption next to the Drennon Springs military survey, also called the Lick Survey (Kentucky Historical Society 1992: 204). That same year a party supervised by Joseph Hite, a son of Abraham Hite, Sr., attempted to build a saltworks at Drennon Springs but was driven off by Native Americans. Moreover, in 1781 a group from the Falls of the Ohio attempted to go to Drennon Springs to make salt. Several male and one female member of the group were killed, while three African-American slaves owned by Squire Boone were captured (O'Malley 1996:5).

Documentary evidence places the first operational saltworks at Drennon Springs during the winter of 1785. Shane (1841a:108, 1841b:247-251) states that Archie Dickinson was employed to hunt game for the workers, and it apparently was Dickinson who discovered galena on Isaac Hite's property. In 1787, a small fort or "station" was built to protect the Drennon Springs workers. On December 9, 1787, the station was overrun by Native Americans resulting in the death of two of the four occupants and the capture of a third, with the fourth escaping because he was out hunting (Bradford 1787:1-3).

A 1795 a Native American attack on a fortified station at the mouth of the Kentucky River prompted Richard Turner to write to Governor Shelby requesting the militia to be stationed at Drennon Springs to protect settlers and salt workers (Jillson 1950:9). In 1799 and 1800, the Henry County Judge Executive ordered several studies of existing and proposed roads connecting Drennon Springs with various other locations. The firm of Hogg and Hite received permission to construct and operate an inspection station for tobacco, hemp and flour at the confluence of Drennon Creek and the Kentucky River in 1800 (Littell 1810:384). We have been unable to find any record of the station's existence before 1817 (Hite et al. 1820:466-467). Between 1808 and 1811, Abraham Hite, Jr. initiated several lawsuits to evict tenants and squatters on Hite land at Drennon Springs. Although these lawsuits illustrated land improvements, as well as the residents near the springs, there was no description of the saltworks or lead mine.

In 1810, single operation at Drennon Springs produced 800 bushels of salt per year (Coxe 1814:121-128). No saltworks in Henry County were recorded in the Third Federal Census of 1820. By 1840, Bluegrass salt making had ended, probably falling victim to competition from more productive saltworks elsewhere, monopolistic practices, and improvements in the brine reduction process.

DESCRIPTION OF A HYPOTHETICAL KENTUCKY SALTWORKS

A commercial-scale saltworks would first require a well to serve as the brine supply. Well depths were recorded as being 12 (3.66 m) to 15 ft (4.57 m) at the Ohio Saltworks, 22 ft (6.71 m) at Knob Lick (Shaw 1939 [1807]: 190, 195), 35 ft (10.68 m) at Mann's Lick (Toulmin 1948: 104-106), and 70 ft (21.34 m) at Mann's Lick (NAUS 1965: 117). Wells were initially hand excavated and early ones were lined with a large, hollow tree trunk, probably a sycamore (Buford 1837:116;

Hildreth 1833:54-56). Later wells became larger in circumference and may have required a log crib frame with the interior sheathed in tongue and groove planks.

The most common method for removing and elevating brine water from a well was the sweep (Toulmin 1948:104). This mechanism consisted of a bucket that probably held 5 gallons (0.019 m^3) or more, a pole, pivot and a person to operate it. The bucket was suspended from one end of a pole, 25 (7.62 m) to 30 ft (9.14 m) long and with a counter balance weight on the opposite end. The pole was mounted on a pivot or swivel post. Brine could be hand-carried in buckets to the furnaces, but was also conducted from an elevated wooden cistern to the furnaces by a gravity-fed network of wooden aqueducts or pipes made of bored logs (Smith 1927:138). It was considered more economical to place a furnace near a fuel source (wood or coal), and pipe water to it, than to haul wood to the furnace (Toulmin 1948:106). Pipelines sometimes extended for several miles to connect wells to distant furnaces (Bartlett 1911:77-78; Collot 1909:290).

Alternatives to the sweep device include a reel, or windlass, in which a bucket of brine was hand-cranked up to the surface (Cummings 1904:164). The use of draft animals to operate a windless consisted of the power being transferred to the windless by a system of gears and drive shafts with ratchets running overhead. Inclined horse and human tread mills were sometimes used (Bray 1987; Hildreth 1833:54-56; Yelton and Bray 1992), as was a force pump, a hollow wooden tube with two or more sets of valves that was similar in design to a present day bicycle pump or bilge pump (Smith 1927:138).

Boiling it in kettles that sat atop wood-fired, semi-subterranean furnaces reduced brine. A furnace trench was excavated on top of a stream terrace, or into the side of an embankment, with the deepest end at the lowest elevation (McDowell 1956:256). The trench had a thermometer-shaped plan view and cross-section. A firebox was located at the deep end of the trench, with a chimney at the opposite end. The trench walls were lined with stone blocks to form an arch on which brine kettles sat (DeWitt 1801:280-282). The rock walls were then plastered with clay. At this juncture, the floor of the trench, which sloped upward to the chimney (Hildreth 1833:54-56), was coated with a layer of lime plaster. Kettles were laid on the arch formed by the walls and gaps between the kettles were filled with rocks or cast iron kettle fragments and mortared with clay to seal the flue (Michaux 1904: 196). The firebox could be covered with metal plates and fed wood through a door (Crammer 1979 [1811]: 119). The chimney was probably of mortared stone; unfortunately, historic descriptions do not describe chimney height. One would expect that a chimney stood well above the kettles to prevent ashes from collecting in the brine solution. At some operations, sheds were built over the furnaces, presumably to prevent dilution of brine by rainwater (Hildreth 1833:54-56).

The brine was placed in kettles and was permitted to boil for approximately 24 hours. During this process, animal blood or lime was added to the solution to precipitate and enable the extraction of impurities such as sulfur and calcium carbonate. The solution was then transferred to a cooling trough. This also potentially served as a settling tank, which produced clear saturated brine. This brine was then drawn off by hand into other "graining" kettles to be boiled again. Once calcium chloride crystals formed and began to settle to the bottom of the kettles the heat was reduced so that the pot would remain at an even simmer. The crystals were removed by dippers and placed in baskets to drain (Fleming 1916:620; Hildreth 1833:54-56; McDowell 1956:256). The excess water

removed during this process was retrieved in additional pans and returned to the main kettles, which were never allowed to boil dry. Impurities such as calcium carbonate and sulfur would accumulate in the main boilers during continuous use and required removal. Thus, the kettles and the furnace required frequent cleaning to remove accumulated ash and slag (Smith 1927:138-139).

Kettles were globular or bell-shaped. Kettle capacity stated in documents ranges from 20 [0.076 m^3] (Daniel 1783a) to 90 gallons [0.34 m^3] (Hildreth 1833:54-56), with intermediate capacities of 24 gallons [0.091 m^3] (Toulmin 1948:104-106), 30 [0.11 m^3] (National Archives 1965:117), 35 [0.13 m^3] (Bradford 1794), 40 [0.15 m^3] (Daniel 1873b), and 60 gallons [0.22 m^3] (Hildreth 1833:54-56).

By at least 1796 salt furnace design had evolved from single-trench furnaces with one row of kettles to furnaces with two parallel trenches and rows of kettles (Crammer 1979 [1811]:119; McDermott 1963:23-24). However, a much more efficient method for reducing the brine to salt was available by 1785 which made use of large, shallow metal pans instead of kettles, as was typical in Europe (DeWitt 1801:280-282; Merriwether 1785). Dearinger (1977:19) states that pans were used at the U.S. Salines, but there is no evidence that this system was ever employed in Kentucky, although the primary renters were Lexington, Kentucky residents. By 1810 however, groups of kettles graduated in size were set on the furnace starting at the firebox end with the largest one. The fresh brine was poured into the kettles closest to the heat and evaporated. It was then removed from the heat and permitted to settle and clarify. After the liquid became clear it was placed in smaller kettles toward the chimney end furnace as the liquid evaporated and sodium chloride crystals were removed. The last unit was a large, flat stirring-off pan. The salt then was shoveled on to a large draining board to dry (Dearinger 1977:17). A horse drawn cart or wagon would have been utilized to transport the salt to a storage building to be packed in barrels, then, shipped to market.

OMER ADAMS SITE ARCHAEOLOGY

The Omer Adams Site is located on the Drennon Creek flood plain about 2 km (1.25 mi) northwest of the confluence of Drennon Creek and the Kentucky River. The site is situated on and around a low rise on the northern side of Drennon Creek. Beginning in the early 1980's, the Kentucky Transportation Cabinet proposed to build causeway approaches across the flood plain for a new KY 1360 highway bridge over Drennon Creek. The Cabinet's Division of Environmental Analysis discovered the Omer Adams Site in 1984 during an archaeological survey of the project area. Named for a local property owner, the site was known in 1985 to have Late Woodland and early historic period components and was included in the Kentucky Heritage Council's nomination of the Drennon Springs Archaeological District to the National Register (Fiegel and Fiegel 1990).

The route of the KY 1386 bridge approach on the north side of Drennon Creek crossed the western end of the Omer Adams Site, and the Division of Environmental Analysis acted to assess the site's significance. In 1991, the Division excavated three 2 m^2 (21.53 ft^2) units. The material recovered by these excavations was meager. It was concluded that the examination of the highway right of way utilizing this method was not cost effective. In 1994, the exposure of two 10 m (32.8 ft) long by 3 m (9.84 m) wide areas along the eastern edge of the right of way at the top of the rise

exposed a pit feature (Feature 1), and a burned trench feature (Feature 2). In early 1995 hand excavation revealed that Feature 1 (Figure 2) was a shallow pit with horizontal dimensions of 1.9 m (6.23 ft) N-S by 1.7 m (5.58 ft) E-W and a maximum depth of 26 cm (10.27 in). It had well-preserved floral and faunal remains and yielded an undecorated pearlware sherd that indicated a date after 1790 (Noel Hume 1972:232).

Figure 2. 15Hy25 Feature 1 cross-section.

More-extensive testing of the site was conducted after the property was acquired between late July and early November 1995. During this period of fieldwork, over 3,000 square meters (32,291.73 square feet) of surface area on the top and western slope of the rise and the flood plain to the south of the rise were stripped mechanically (Figure 3). Stripping revealed that the flood plain and slope were covered by as much as 1.5 m (4.91 ft) of alluvium deposited by flood water after the site had been abandoned, as determined by soil scientists Greta Steverson and Steve Jacobs through an examination of profile walls (Ms. on file, Kentucky Transportation Cabinet, Frankfort). The damming of the Kentucky River downstream from Drennon Creek in the 1830's dramatically increased the amount of backwater standing in the Drennon Creek valley. Flooding is likely to have greatly accelerated the rate of sedimentation, resulting in a blanket of soil being deposited over the lower portion of the valley. Logging and agricultural activities within the valley during the historic period also likely contributed to increased sedimentation.

Beneath the alluvium, sheet midden composed mainly of compact wood ash and silt, was found to extend over at least 228 m^2 square meters (2,454.17 ft^2) of surface area on the western slope of the rise and the flood plain to the west and south of it. The large quantities of ash created as a waste product during salt making were periodically removed from furnaces and apparently were dumped on the ground in the immediate vicinity. The midden on the slope and western flood plain was sampled by unit excavation. A third midden, located on the flood plain south of Features 24-27 at 2 m (6.56 ft) below surface, was exposed in a backhoe trench but was not sampled further as it was completely saturated with groundwater. Its extent appears to encompass the entire lower terrace.

The midden on the rise covered at least 18 m^2 (59.06 ft^2) of surface area and was 30 cm (.98 ft) thick. Investigated by block excavation, it yielded 38 historic artifacts, the most temporally diagnostic ones being three pearlware sherds. The midden also yielded four creamware, two

redware sherds and 18 kettle fragments. Additionally, one stoneware, and one porcelain sherd, a redware tobacco pipe fragment, a cut nail, a blond gunflint, were recovered.

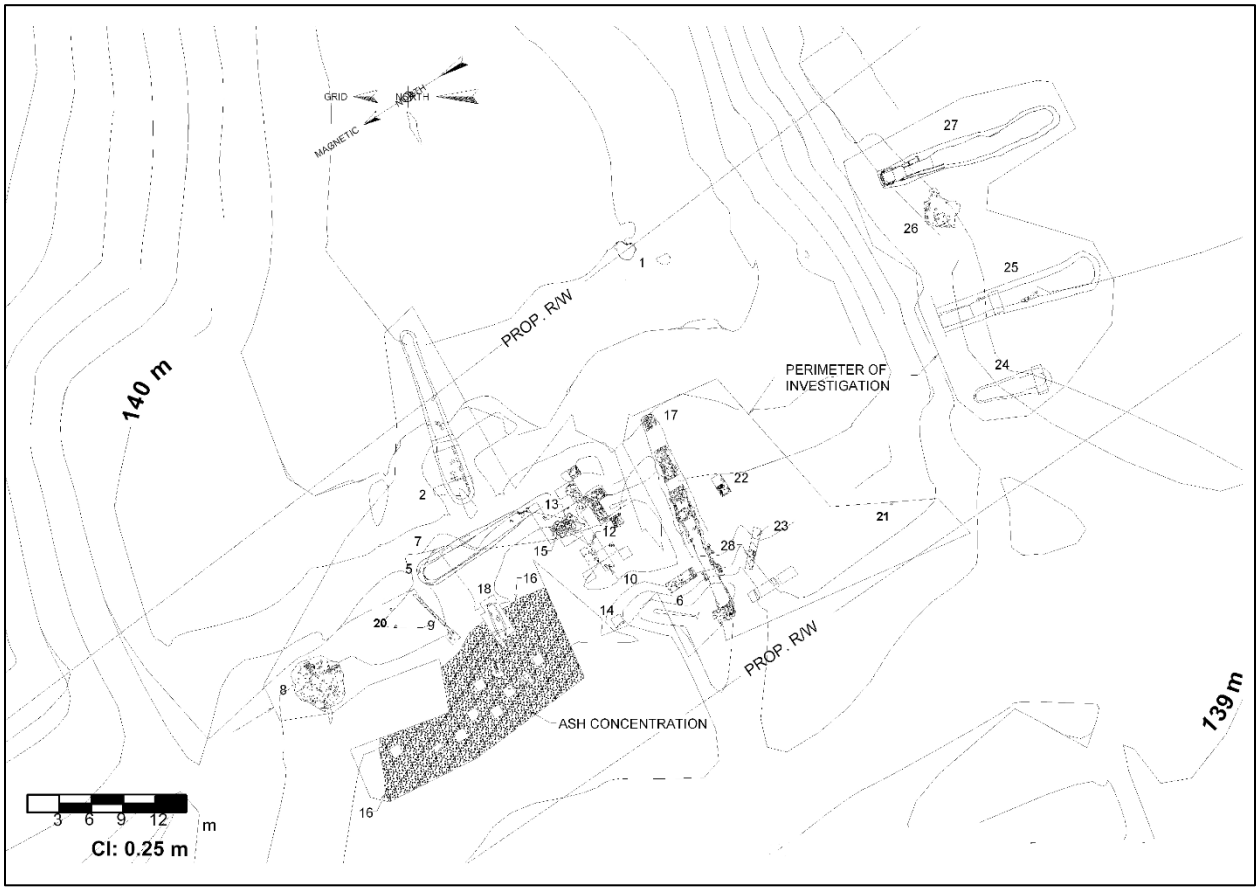

Figure 3. Planview of the Omer Adams Site excavation.

The top of the yellowish-brown soil layer (Zone II) beneath the ash was the ground surface during the salt making period. It was littered with chunks of limestone and numerous animal bones. The artifacts dispersed throughout the zone included two pearlware sherds. However, Feature 13, an erosional gully intrusive into Zone II, yielded three undecorated whiteware sherds that date to 1800 or later, and as the ash midden overlay Feature 13 the midden can be assigned a more accurate date of the early 19th century date.

The ash midden in a low area west of the rise was designated Feature 16. It covered at least 210 square meters (688.97 square feet) of surface area and was overlain by up to 1.2 m (3.94 ft) of alluvium. The excavation of 11 1X1 m^2 (3.28 ft^2) units, several of which ended in standing groundwater, sampled it. The midden contained 33 historic artifacts including one sherd each of creamware and redware, two container glass fragments, three cut nail fragments, two copper or brass buttons, and twelve kettle fragments, plus numerous animal bones. Intermixed were 110 prehistoric artifacts including cord-marked, limestone tempered ceramic sherds. This midden was assigned a date of 1790-1800 based on the artifacts it contained. Beneath the ash, Zone II contained

only six historic artifacts whereas it yielded 161 prehistoric artifacts including ceramic sherds with limestone and shell tempering. No prehistoric or historic features were found, and given the flood plain context, it is possible that all of the archaeological materials at this locale were redeposited by water and were in secondary context.

No well was identified on the site although Feature 8 was extremely circular in plan, had a maximum diameter of 5 m, and may have been a well or cistern (Figure 4). It was excavated by hand to 1.35 m (4.43 ft) below its surface. Zone I, the uppermost 44 cm (1.44 ft) of the feature, was completely excavated. It consisted of very compact wood ash and charcoal furnace debris that had been dumped into a basin-shaped pit intrusive into Zone II. Artifacts were scattered randomly throughout Zone I; the most diagnostic of which was an overglaze painted pearlware sherd (post-1795) and a one piece round metal button, similar to South (1964) Type 8 button. Also present were one sherd each of redware and stoneware, an olive-green container glass fragment of undetermined manufacture, an ash-encrusted stub-stem pipe, three corroded cut nails, an animal shoe fragment, and 14 kettle fragments, as well as numerous animal bones, chunks of fired clay, and blocks of limestone. Beneath Zone I the feature boundaries were vague. The excavation of six square meters (18.68 square feet) sampled Zones II and III. Zone II consisted of 20 cm (7.87 in) of yellowish brown alluvium that yielded 5 kettle fragments, animal bone, prehistoric artifacts, and limestone. Zone III consisted of laminated silt 75 cm (2.46 ft) thick, from which a chert flake and small amounts of bone and fired soil were recovered. Below Zone III, mechanical excavation to 3 m (9.82 ft) below present ground surface failed to detect the feature.

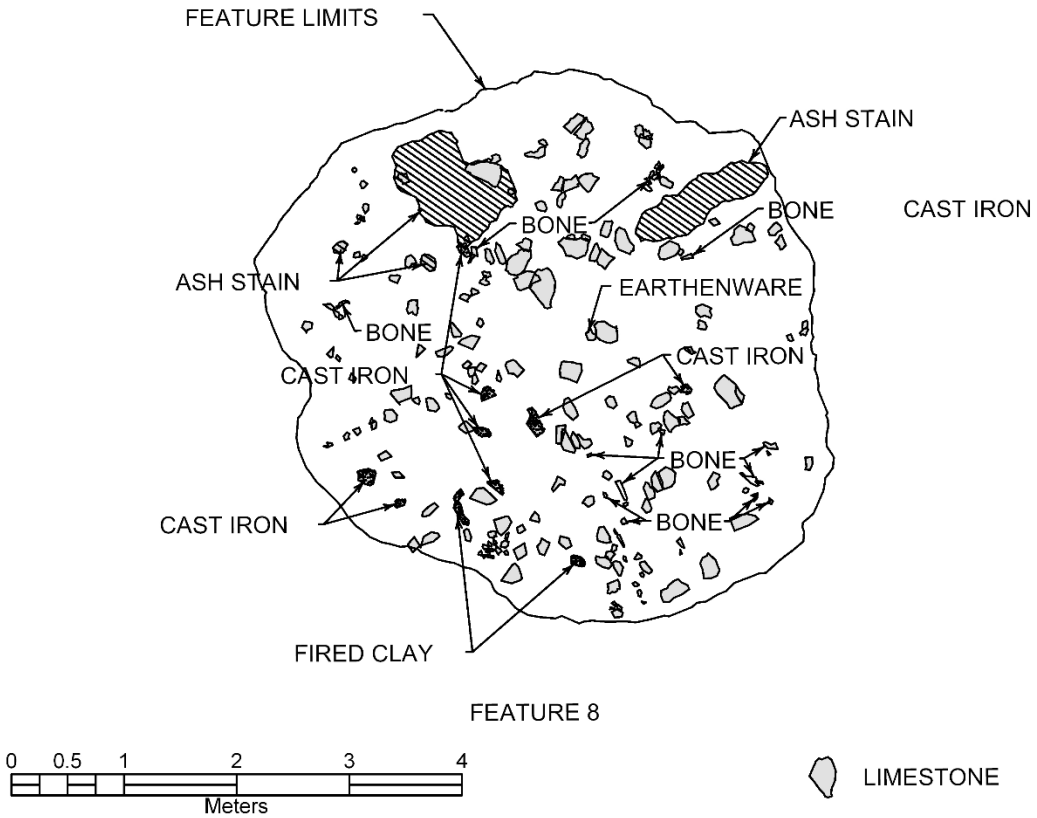

Figure 4. 15Hy25 Feature 8 planview.

Ten furnaces were excavated wholly or in part (Features 2, 5, 6, 17, 18, 23, 24, 25, 27, 28). Some furnaces were oriented north-south, south-north or west-east to take advantage of the prevailing winds. They were present on top of the rise, on its western slope, and on the flood plain to the south. Feature 5, the only furnace completely excavated, was located just west of the top of the rise. Its firing chamber was 14.5-m long, averaged 1.5 m (4.29 ft) in width, and had a maximum depth of 2.25 m [7.38 ft] (Figure 5). The southern, chimney end was in the plowzone and had been destroyed. Profiles of the firing chamber fill showed that the uppermost fill was laminated gray silt that contained abundant limestone blocks, a few animal bones, and the majority of a large kettle. Beneath this was a layer of blended ash, silt, and fired soil, interpreted to be evidence of gradual filling by flooding and wall erosion after furnace abandonment. The basal deposit consisted of dark ash and limestone blocks. The sloping floor of the firing chamber was coated with lime that may have made a smooth surface to facilitate ash removal. Feature 5 was one of three furnaces in which no intact stone lining was present. The linings of these furnaces may have been robbed for use elsewhere after their abandonment. The only diagnostic artifact in Feature 5 was one undecorated creamware sherd.

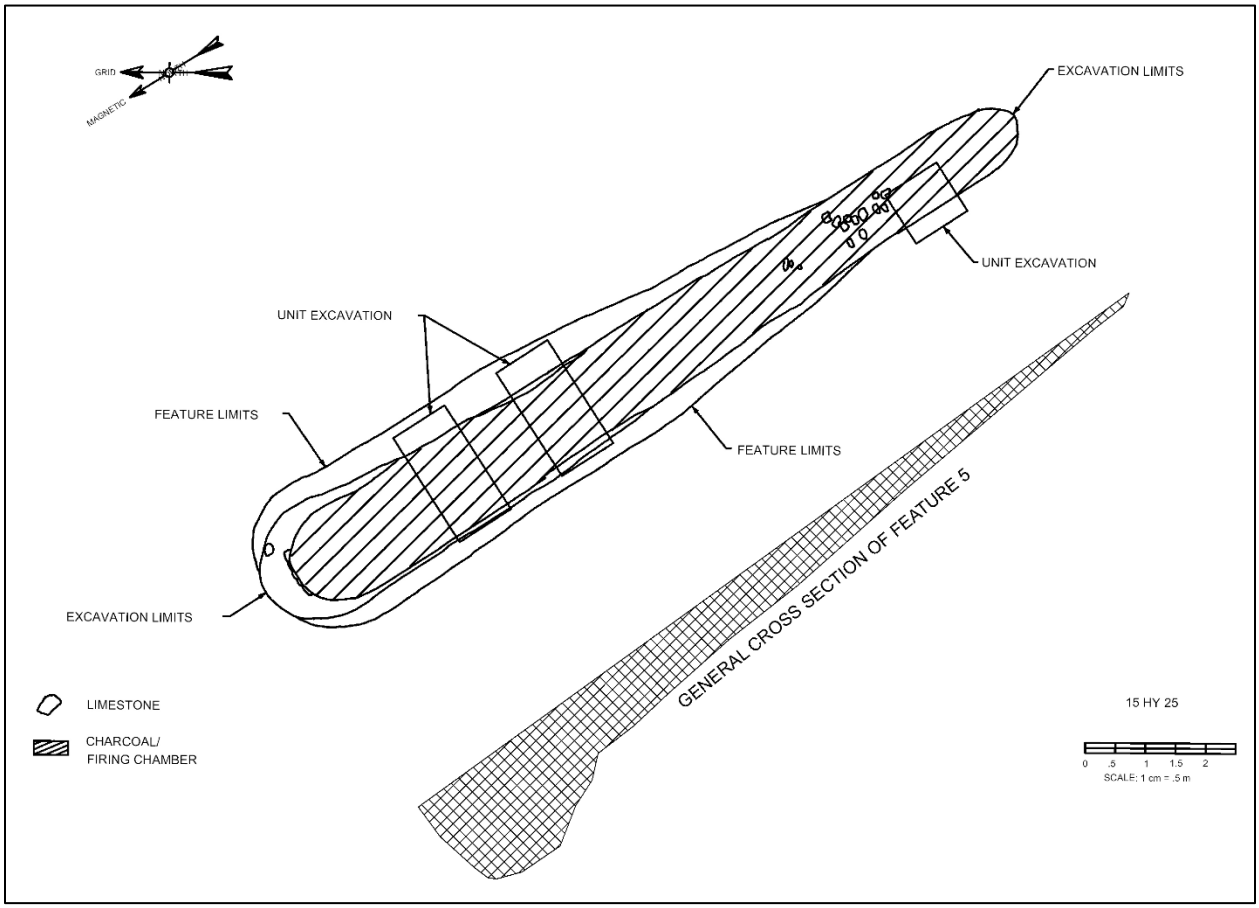

Figure 5. General cross-section and planview of Feature 5.

Feature 17, set into the western slope of the rise, was the largest furnace found, being 20.5 m (67.26 ft) in length with a firing chamber 1.5 m (4.82 ft) in width on average (Figure 6). In total,

17.5 linear meters (57.41 ft) of the firing chamber were excavated. The eastern, chimney end of the furnace was in the plowzone and was a jumble of rocks. However, the furnace's stone lining was intact for the majority of the length of the chamber. At the western, firebox end of the furnace the lining was two courses thick. A broken kettle had been incorporated into the wall of the stone lining on the northern edge of the firebox and a second broken kettle was recovered from the firing chamber. The deepest part of the firing chamber was not completely excavated due to persistent groundwater flooding. Two stoneware sherds with an Albany slipped interior recovered from Feature 17 indicate that the feature was filled ca. 1800 or later.

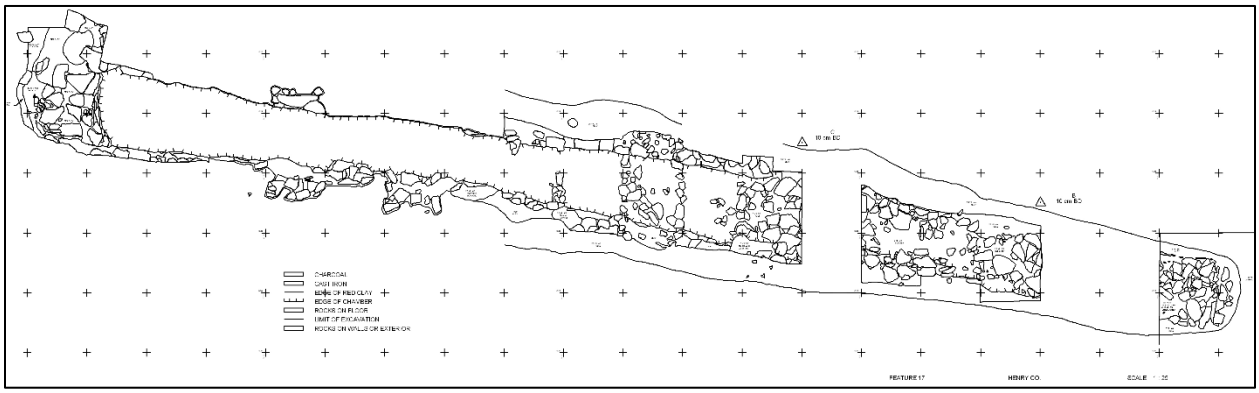

Figure 6. Planview of Feature 17.

The smallest furnace found (Feature 18) was sealed beneath the Feature 16, an ash midden. Feature 18 had a length of 4 m (13.12 ft), a width of 1 m (3.28 ft), and ranged in depth from 10 (3.94 in) to 20 cm (9.45 in). It was unlined and was filled with alluvium and a few blocks of limestone. This may have been a smaller, graining furnace used in the final boiling of brine as the salt precipitated out, or perhaps was one of the earlier furnaces on the site. The only diagnostic artifact present was one undecorated creamware sherd.

Feature 27, on the flood plain south of the rise, contained an excellently preserved chimney end (Figure 7). Feature 2; on top of the rise, contained large quantities of lime that was used to coat furnace floors and was added to brine to precipitate impurities such as sulfur.

In addition to the ash midden described above, other deposits of furnace debris were identified: Feature 26 was a discreet deposit of fired soil, ash, charcoal, and limestone blocks located between two furnaces on the flood plain south of the rise. Feature 26 had dimensions of 3.5 m (11.48 ft) by 4 m (13.12 ft) and had a maximum thickness of 24 cm (9.45 in). The single diagnostic artifact present was a sherd of under glaze blue painted pearlware dating to after 1780 (Miller 1980, 1991). Feature 15, located on the rise, was a debris pile that consisted mainly of limestone blocks. It had horizontal dimensions of 1.5 m (4.91 ft) by 2 m (6.56 ft) and was 33 cm (12.99 in) thick. The Feature 15 debris was deposited in a shallow basin-shaped hole, which was perhaps a puddle. Part of Feature 15 overlay Feature 11, a shallow basin 22 cm (8.66 in) deep, that contained some limestone chunks, a few animal bones, and a sherd of annular banded pearlware that indicated a date of 1790 or later for the two features.

Two features interpreted to be water-related (Features 13 and 9) were found. Feature 13, mentioned above; apparently was an erosional gully that trended east west for at least six m down the western slope of the rise. Feature 13 ranged from one to two and one-half m (3.28-8.2 ft) in width and had an average depth of 15 cm (5.9 in). The feature was filled with a dense cluster of limestone chunks, numerous animal bones, and occasional artifacts including a few small whiteware, creamware stoneware and redware sherds, a harness buckle, kettle fragments, and a small piece of barite.

Figure 7. Feature 27 chimney base.

Feature 9 was a curious, hand-dug channel oriented east west on the western slope of the rise. The feature, perhaps a drain, was 5.5 m long, 25 cm wide, and 19 cm deep. The flat floor declined 2.5 m in elevation over its length and terminated to the west in a fan-shaped deposit of ash and silt. The feature fill consisted of black ash in which were chunks of charcoal, lime, and fired soil, with lenses of white ash. This fill had settled or been dumped into the channel as the feature matrix was not fire-reddened. The fill contained a few kettle fragments and animal bones, including a mussel shell with a button blank cut out of it. Toward the eastern end of the feature, a circular posthole (Feature 9a) was centered in the channel. Feature 9a had a diameter of 31 cm and extended down 38 cm below the base of Feature 9. The fill of Feature 9a was the same dark ash of Feature 9. No post mold was discerned. The only diagnostic artifact present was a small sherd of plain pearlware.

Five other postholes (Features 7, 12, 19, 20, 21) were found. Feature 12 contained a distinct post mold. Features 19 and 21 were interpreted to be the filled voids of pulled posts due to the

homogeneity of their fill. Feature 20 contained an un-decayed cedar post and was of recent age. None of these five features contained diagnostic artifacts. Another probable recent posthole (Feature 4) was destroyed during site stripping in 1995.

Between 1991 and 1995, 657 historic artifacts were recovered from contexts sealed beneath 19th century flood-deposited alluvium (i.e. Zones I and II and Features 1-28). These artifacts were in the least-disturbed contexts investigated during testing and are the only ones discussed here. Zone I (including Feature 16 ash midden) yielded 73 specimens (11.1% of total), Zone II yielded 123 specimens (18.7% of total), and the features yielded 461 specimens (70.2% of total). After South (1977), the artifacts pertain to the functional groups of Kitchen (N = 116), Architecture (N = 18), Arms (N = 2), Clothing (N = 9), and Activities (N = 512). No artifacts pertaining to South's Furniture Group or Personal Group were found.

The Kitchen Group (17.7% of assemblage) is made up of 96 ceramic sherds and 21 fragments of glass. Of the ceramic sherds, 68 (70.8%) are of refined and 28 (29.2%) are of unrefined wares. The refined specimens consist of 45 creamware, 15 pearlware, three whiteware, three indeterminate refined, and two porcelain sherds. The creamware sherds are the lighter yellow variety first produced in 1775 (Miller 1991:5). All are undecorated. The pearlware sherds include examples with annular banded, shell edge, and monochrome and polychrome under glaze painted decoration. The whiteware sherds, found in Feature 13, are undecorated. The porcelain sherds are of the hard paste, Chinese Export variety imported into the United States mainly from ca. 1784-1830 (Palmer 1983:16). One porcelain sherd, from Zone I, lacks decoration; one from Feature 28 has red overglaze painted decoration in geometric motif.

The unrefined ceramic specimens consist of 21 redware (75%) and seven stoneware (25%) sherds. The redware sherds include unglazed, clear- and brown-tinted lead glazed, and white slipped examples. Lead-glazed vessels include ones glazed only on the interior as well as ones glazed interior and exterior. One clear lead glazed sherd from Zone II has incised geometric decoration, the remaining are undecorated. All of the stoneware sherds are salt glazed. There are four decorated and three undecorated specimens. Incising, in geometric motif, is the only decoration type represented. Feature 17 yielded a conjoining rim and body sherd of a pitcher that has a salt glazed exterior and an Albany slipped interior, indicative of a date of ca. 1800 or later (Phillippe 1990:80). Feature 8, Zone I, contained two conjoining sherds of a large vessel, probably a bulbous jug, with salt glaze exterior and a green slip interior. Both the pitcher and the jug have incised exterior decoration, as does a sherd from Zone I that has an unglazed exterior and an Albany slipped interior.

The ceramic sherds clearly indicate a late 18th to early 19th century date for the saltworks. Creamware, the most popular ware type on the American market at the end of the 18th century (Miller 1991:5), is the most common ware type in the assemblage. Creamware is three times as abundant as pearlware, the second most common type. Pearlware replaced creamware as the most common tableware in the United States ca. 1810 (Majewski and O'Brien 1987:118-119). Whiteware, first produced ca. 1800 and popular by 1820, is poorly represented (Hume 1978:130-131; Miller 1980:16-17). No mean ceramic date was calculated for the assemblage, however. Small sample size and the inability to precisely determine the number, form, and size of vessels due to small sherd size (less than one square cm, on average) make date calculation an exercise of

questionable accuracy. Inexpensive, undecorated and minimally decorated vessels, as might be expected on an industrial site (Miller 1991) dominate the assemblage.

The 21 glass fragments in the assemblage consist of 13 bottle fragments and seven fragments of undetermined function. The glass fragments, like the ceramic sherds, were quite small on average. Their age is consistent with but does little to refine the date of site occupation indicated by the ceramics. Of the 13 bottle fragments, eight were found in features, five in Zone II. There are seven olive green, two clear, two light green, one light aqua, and one green fragment present, in the form of eleven body two basal fragments. These represent a minimum of five bottles, based on form, method of manufacture, and/or color. Two conjoining basal fragments from Zone II are from a clear, leaded, square bottle made in a dip mold and finished using an unimproved pontil. A second vessel, from Feature 9, is a light aqua bottle, possibly a flask, which was mold blown. Liquor flasks were introduced ca. 1810 and had become very popular by 1830 (Deiss 1981:62). Fragments of a third vessel type, an olive green square bottle, possibly a case bottle, were found in Feature 8 and in Zone II of the site.

Of the seven glass fragments not attributable to a container or other object type, five were found in features, two in Zone I. They consisted of three clear leaded, three clear unleaded, and one light green specimen, all of which are small body fragments. The presence of unleaded clear specimens raises to six the minimum number of glass vessels present in the assemblage.

Architecture Group building materials (2.7% of assemblage) were rare. Eight cut nail fragments, seven unidentified nail fragments, two probable fence staples, one complete handmade 5:1 brick and a fragment of mortar were recovered. Seven of these artifacts were found in Zone I, three in Zone II, and nine in features. The nail fragments were too corroded to identify more precisely. The scarcity of building materials other than limestone blocks on this industrial site is in sharp contrast to their abundance on domestic sites.

The Arms Group (0.3% of assemblage) is limited to two artifacts, a fragment of a "blond" or "honey-colored" gun flint of a size appropriate for a pistol, from Zone I, and a piece of lead sprue, debris from lead ball molding, from Zone II. In total only five arms-related artifacts were found in 1994-1995, and the rarity of objects of this category at this early frontier site is striking.

The Clothing Group (1.4% of assemblage) consists of eight buttons and one small eyelet/grommet, the latter probably from a shoe. Three clothing items each were found in Zone I, Zone II, and in features. They are all made of metal. One button or sleeve link is octagonal in shape and is stamped with a design. The other seven buttons are circular and lack decoration. Two are copper/brass, one-piece buttons similar to South's Type 8 (South 1964). Two, copper/brass, two-piece buttons are similar to South's Types 9 and 18. One two-piece steel button is similar to South's Type 10. One copper/brass specimen is probably a button back.

Two hundred-ninety-three kettle fragments, 207 small metal unidentified objects, dominate the Activities Group (77.6% of assemblage). The other objects in the category includes one buckle, one animal shoe, four small specimens of barite, (locally-occurring lead-bearing rock), two stub-stem pipes and four small pieces of coal, the last two of which are included in this group as they are at least manuports. Forty-six Activities items were found in Zone I, 85 in Zone II, and 379 in

features. One stub-stem pipe specimen is a brown-glazed redware bowl fragment from Zone I at terminus of Feature 5. The other, from Feature 8, is apparently a complete pipe although little more can be said about it as it is completely encrusted with wood ash, perhaps the result of super-heating in a salt furnace.

Sixty-two archaeobotanical samples totaling 776 liters of feature soil were processed by water flotation and analyzed. The recovered specimens are overwhelmingly of wood charcoal (2,347 g) with minute amounts of two cultigens (corn and gourd), five species of nutshell, and seeds of berries, fruits, and weeds. Rossen (1998) notes that some of the wood charcoal is salt encrusted and may have been construction material. The most common charcoal is from the white oak group, followed by black locust, ash, hickory, red oak group, and black walnut, all highly desirable woods for fuel. Less-desirable fuel woods present in minor amounts include eastern red cedar, soft maple, sycamore, yellow poplar, honey locust, American chestnut, and hackberry. Fifty-two recovered nutshell specimens include acorn, black walnut, hickory, and single specimens of hazelnut and butternut. Squash rind was present in Feature 1. Gourd rind was present in two locations, corn in three. Of the edible fruit or berries represented, blackberry/raspberry is the most common, followed by trace amounts of grape, peach, persimmon, ground cherry, small-seeded nightshade, and sumac, the last three being common field weeds, edible but likely to have been naturally deposited. Other weeds present were large-seeded nightshade or buffalo burr, common on historic sites but rare on prehistoric ones, and trace amounts of chenopod, black nightshade, knotweed, and grass. In sum, the archaeobotanical remains reflect the heavy consumption of wood for fuel that occurred on the site. Various species of trees present in proximity to the saltworks are identified. Selection for slow-burning hardwoods was evident. Food plant remains were rare on the site and were distinguished by the scarcity of cultigens (Rossen 1998).

Animal bones were abundant and ubiquitous on the site. Testing resulted in the recovery of 4,314 bones and shell. Species identified are bison, cow, white-tailed deer, dog, pig, sheep/goat, fox species, chicken, turkey, mallard duck, goose species, pigeon, catfish species, gar species, soft-shell turtle, turtle species, buckhorn, mucket, and brown wood snail. Mammal bones make up 90 percent of the collection. As ranked by minimum number of individuals pig (11) is the primary species, followed by deer (6), cow (5), sheep/goat (2), bison (2), dog (1), and fox (1). Warner notes that while a large number of deer elements are present, there is also a distinct lack of diversity of wild species in the collection. He suggests that the pattern of exploitation may indicate that the feeding of salt workers was a well-organized affair in which procurement was concentrated on large species that would feed a group of people, meals were prepared by someone specifically assigned the task, and were eaten communally. Warner discerned that cows and pigs were slaughtered at optimum ages for meat yield and were processed at the Omer Adams Site. (Curiously, no evidence of rats or mice was recovered despite the quantities of offal, which must have been present.) The small quantities of bird, fish, turtle, and mussel remains present offered only scant evidence of dietary diversity. The mussels may have been gathered for button making rather than for food. Wood snails recovered almost certainly occurred naturally (Warner 1998).

CONCLUSION

While the Drennon Springs saltworks was one of the less-productive operations in Kentucky, considerable effort and energy was expended in that remote location to produce that valuable product. The documentary evidence of the involvement of the Hite and Hogg families of Virginia in salt making underscores the idea, that while participating in an agrarian economy, some of the earliest American settlers of the Ohio Valley came not to farm but to practice industry. The archaeological evidence of salt making at the Omer Adams Site agreed well with historic descriptions of the components of saltworks. Excavation revealed that massive, well-preserved features lay sealed beneath deposits of alluvium, and that the topography of the Drennon Creek valley was altered by human activity after the salt-making period, principally by the damming of the Kentucky River. Analysis of archaeobotanical samples identified some of the species of trees making up the forest in proximity to the site, and has demonstrated a predictable pattern of exploitation of hardwoods for their superior heat yield. Other plants present, including cultigens, were also identified. Analysis of faunal remains indicated a concentration on large, domesticated species as well as animal processing on-site. The associated artifacts, the small amounts of kitchen refuse, clothing and personal items present, comprise scant evidence of the lives of the anonymous laborers who occupied the site, but support the documentary evidence of an occupation date of ca. 1785-1815.

REFERENCES CITED

Anslinger, C. Michael, Henry S. McKelway and Jeffery G. Mauck
1996 *Phase I and II Archeological Investigations for the Marmet Lock Replacement Project, Kanawha County, West Virginia*. Contract Publications Series 96-08. Cultural Resource Analysts, Lexington, Kentucky.

Bartlett, Henry
1911 Diary of a Journey to Ohio and Kentucky, 1805. *Virginia Magazine of History and Biography* 19:68-86. Richmond.

Bishop, J. Leander
1868 *A History of American Manufactures from 1608 to 1860*. 3rd ed. Edward Young & Co., Philadelphia.

Boisvert, Richard A.
1984 *Kentucky Salt Licks: A Preservation Planning Perspective*. Edited and assembled by R. Berle Clay. Office of State Archaeology, University of Kentucky, Lexington.

Bradford, John (editor)
1787 The Kentucky Gazette, December 22, 1787, No. XVIII 1:3. Lexington, Kentucky. Microfilm, Kentucky Historical Society, Frankfort, Kentucky.

1794 The Kentucky Gazette, May 17, 1794, Volume VII, No. XXXV 4. Lexington, Kentucky. Microfilm, Kentucky Historical Society, Frankfort, Kentucky.

Bray, Robert T.
1986 *Boone's Lick Salt Works, 1805-1833: Investigations in Historical Archaeology*. Submitted to Missouri Department of Natural Resources, Division of Parks, Recreation and Historic Preservation, Jefferson City.

1987 Boone's Lick salt Works: 1805-1833. *Missouri Archaeologist* 48(1):1-65.

Brookes-Smith, Joan E. Compiler
1976 *Master Index: Virginia Surveys and Grants 1774-1791*. Kentucky Historical Society, Frankfort, Kentucky.

Buford, N. B.
1837 Report on the Survey of the Little Sandy River. In *The Journal of the Senate of the Commonwealth of Kentucky*, edited by A. G. Hodges, pp. 113-117. Frankfort, Kentucky.

Clark, Thomas D.
1938 Salt, A Factor in the Settlement of Kentucky. *Filson Club Quarterly* 12:42-52.

Collot, Victor
1909 *A Journey in North America, Transactions of the Illinois State Historical Society 13*. Reprinted. Illinois State Historical Society, Springfield. Originally published 1826, Arthus Bertrand Paris, France.

Coxe, Tench, Esquire
1814 *A Statement of the Arts and Manufacturers of the United States of America for the Year 1810*. A. Cornman, Junior, Philadelphia.

Crammer, Zadock
1979 [1811] *The Navigator: Containing Directions for Navigating the Monongahela, Allegheny, Ohio and Mississippi Rivers*. 7th ed., Young & Klein, Inc., Cincinnati, Ohio.

Cresswell, Nicholas
1968 *The Journal of Nicholas Cresswell 1774-1777*. Originally published 1924, Kennikat Press, Port Washington, New York.

Cumming, Fortesque
1904 Cumming's Tour to the Western Country (1807-1809). In *Early Western Travels 1748-1846 Volume IV*, edited by Reuben Gold Thwaites. Originally published 1810, Arthur H. Clark Company, Cleveland.

Daniel, Mary
1783a Original unpublished written correspondence by Mary Daniel to her brother, William Christian, dated November 21, 1783. On file, Filson Club Manuscript Collection, William Marshall Bullitt MSS. Col. William Christian, 1767-1785, Drawer 28, Folder 1, Louisville.

1783b Original unpublished written correspondence by Mary Daniel to her brother, William Christian, dated December 25, 1783. On file, Filson Club Manuscript Collection. William Marshall Bullitt MSS. Col. William Christian, 1767-1785, Drawer 28, Folder 1, Louisville.

Deiss, Ronald W.
1981 The Development and Application of a Chronology for American Glass. Master's Thesis, History Department, Illinois State University, Normal.

Dearinger, Lowell A.
1977 Some Legends of the Times: When Salt was an Industry. *Outdoor Illinois* 16(1):10-20.

DeWitt, Benjamin
1801 A Memoir on the Onondaga Salt Springs and alt Manufactories in the State of New York. In *Society for Promotion of Agriculture and Manufactures Transactions*, pp. 268-286. Charles R. & George Webster, Albany, New York.

Dickinson, M. F. and G. W. Edwardson
1984 The salt works of Salt Island Florida (8Lv133): A site survey and historical perspective. *The Florida Anthropologist* 37(2):63-74.

Fiegel, Jayne H. and Kurt H. Fiegel
1990 *An Archaeological and Cultural Historic Analysis of the KY 1360 Bridge over Drennon Creek, Henry County, Kentucky*. Division of Environmental Analysis, Kentucky Transportation Cabinet, Frankfort.

Fincastle County
1775 Original unpublished Virginia Survey and Grant Books 5:15, Grant No. 3952. Manuscript on file, Kentucky Secretary of State, New State Capitol, Frankfort.

Fleming, W.
1916. Colonel William Fleming's Journal of Travels in Kentucky, 1779–1780. In *Travels in the American Colonies*, edited by N. D. Mereness, pp. 617–55. Macmillan, New York.

Fohs, F. Julius
1913 *Barytes Deposits of Kentucky*. Kentucky Geological Survey, Series IV(I), pp. 441-588. Roberts Printing Company, Frankfort.

Hammon, Neal O.
1978 Early Louisville and the Beargrass Stations. *Filson Club Quarterly* 52(2): 147-165.

Heinemann, Charles B.
1992 *First Census of Kentucky*. Originally published 1938, Charles Brunk Heinemann and Gaius Marcus Brumbaugh, Southern Historic Press, Greenville, South Carolina.

Henning, William Walker
1969 [1821] *Statutes At Large of All The Law of Virginia*. Volume 9:1775-1778. 1969 facsimile ed. University Press of Virginia, Charlottesville.

Herdrich, David J.
1985 Ecology and Conceptual Systems at the Gallatin County Saltworks. Master's thesis, Illinois University, Champaign-Urbana.

Hildreth, S. P.
1833 Observation on the Saliferous Rock formation in the Valley of Ohio. *American Journal of Science* 24(1):46-68.

Hite, Abraham, Joseph Hite, Jacob Hite, Isaac Hite Fishback, Harriet Smith Fishback, Henry Fishback, William Harrison Fishback, Elizabeth Rigley Fishback and Charles Fishback versus James Hogg heir at law of Peter Hogg, deceased
1820 Records of District Courts of the United States, National Archives Southeast Region, East Point, Georgia. Record Group 21, District of Kentucky, Frankfort Chancery and Equity Judgments and Decrees Complete Record D2: 422 - 480; filed in 1820 and completed ca. 1829. B/44/18/D.

Hume, Ivor Noël
1972 Creamware to Pearlware: A Williamsburg Perspective. In *Ceramics in America*, edited by Ian G. Quimby, pp. 217-254. Winterthur Conference Report 1972, University Press of Virginia, Charlottesville.

1978 *A Guide to Artifacts of Colonial America*. Knopf, New York.

Jakle, John Allias
1969 Salt on the Ohio Valley Frontier, 1770-1820. *Annals of the Association of American Geographers* 59(4):687-709.

Jillson, Willard R.
1950 *A Bibliography of Drennon's Lick (1773-1948)*. Roberts Printing Company, Frankfort, Kentucky.

1967 *The Geology of Henry County, Kentucky*. Roberts Printing Company, Frankfort, Kentucky.

Kentucky Historical Society
1992 *Certificate Book of the Virginia Land Commission*. Originally published 1923, The Register of the Kentucky State Historical Society, Volume 21, Southern Historical Press, Greenville, South Carolina.

LaRoche, Sara
1980a Drennon's Lick: A Place of Great Consequence. *Henry County Historical Society Quarterly Review* 1(4):1-13.

Littell, William
1810 *The Statute Law of Kentucky; with Notes, Praelections, and Observations on the Public Acts, Volume II*. Johnson & Pleasants, Frankfort, Kentucky.

McDowell, Robert E.
1956 Bullitt's Lick: The Related Saltworks and Settlements. *Filson Club Quarterly* 30:240-269.

Majewski, Teresita, and M. J. O'Brien
1987 The Use and Misuse of Nineteenth Century English and American Ceramics in Archaeological Analysis. In *Advances in Archaeological Method and Theory*, edited by M. B. Schiffer, pp. 97-209. Academic Press, New York.

Mason, Kathryn Harrod
1951 *James Harrod of Kentucky*. Southern Biography Series, edited by T. Harry Williams, Louisiana State University, Baton Rouge.

Merriwether, Nicholas
1785 Original unpublished proposal Nicholas Merriwether to William Christian. On file, Filson Club Manuscript Collection, William Marshall Bullitt MSS Christian - Bullitt, Undated, Drawer 28, Folder 6, Paper 1, Louisville.

Michaux, Francois Andre
1904 *Travels to the West of the Allegheny Mountains in the States of Ohio, Kentucky and Tennessee, and back to Charleston, by the upper Carolinas*. Originally published 1805. In *Early Western Travels 1748-1846, Volume III*, edited by Reuben Gold Thwaites. Arthur H. Clark Company, Cleveland.

Miller, George L.
1980 Classification and Economic scaling of Nineteenth Century Ceramics. *Historical Archaeology* 14:1-40.

1991 A Revised Set of CC Index Values for Classification and Economic Scaling of English Ceramics from 1787 to 1880. *Historical Archaeology* 25(1):1-25.

Multhauf, Robert F.
1978 *Neptune's Gift: A History of Common Salt*. John Hopkins University Press, Baltimore.

National Archives of the United States (NAUS)
1965 Original unpublished 1820 Records of the 1820 Census of Manufactures: Kentucky and Indiana. Microfilm on file, M279 Roll 20, National Archives and Records Administration, General Services Administration, Washington, D.C.

O'Malley, Nancy
1996 *Squire Boone's Panted Stone Station: A Locational Survey*. University of Kentucky Archaeological Report 368. University of Kentucky Research Foundation. Submitted to Shelby County Development Corporation, Kentucky.

Palmer, A. M.
1983 *A Winterthur Guide to Chinese Export Porcelain*. Crown Publishers, New York.

Phillippe, John S.
1990 *The Drake site: Subsistence and Status at a Rural Illinois Farmstead*. Midwestern Archaeological Research Center, Illinois State University, Normal.

Prentice, Guy
1994 *Big South Fork National River and Recreation Area Archeological Resource Survey: 1993 Field Season*. Manuscript on file, Southeast Archeological Center, National Park Service, Tallahassee, Florida.

Rice, Otis K.
1993 *Frontier Kentucky*. The University Press of Kentucky, Lexington.

Rossen, Jack
1998 Archaeobotanical Remains from Phase II Excavations at Site 15Hy25. In *A report of Archaeological Investigations at the Drennon Creek Salt works, Omer Adams Site (1525), Henry County, Kentucky*, edited by Kurt Fiegel. Division of Environmental Analysis, Kentucky Transportation Cabinet, Frankfort.

Shane, John D.
1841a Original unpublished interview with Josiah Collins, Bath County, Virginia, Draper Manuscripts 12CC108. Microfilm on file, Kentucky Department for Libraries and Archives, Frankfort.

1841b Original unpublished interview with James Stevenson, Woodford County, Kentucky, Draper Manuscripts 11CC247-251. Microfilm on file, Kentucky Department for Libraries and Archives, Frankfort.

Shaw, John Robert
1939 [1807] *A Narrative of the Life and Travels of John Robert Shaw, the Well Digger, Now Resident in Lexington, Kentucky*. Originally published 1807, George Fowler, Louisville.

Smith, John F.
1927 The Salt-Making Industry of Clay County, Kentucky. *Filson Club Quarterly* 1(3):134-141.

South, Stanley
1964 Analysis of the Buttons from Brunswick Town and Fort Fisher. *Florida Anthropologist* 17(2):113-133.

Toulmin, Harry
1948 *The Western Country in 1793: Reports on Kentucky and Virginia*, edited by Marion R. Tinling and Godfrey Davies. The Castle Press, Pasadena, California.

Trimble, Michael K., Terrista Majewski, Michael J. O'Brien, and Anna L. Price
1991 Frontier Colonization of the Saline Creek Valley. In *French Colonial Archaeology: The Illinois Country and the Western Great Lakes*, pp. 164-188. University of Illinois Press, Chicago.

Updike, William D.
2001 *Archaeological Data Recovery for the Red Sand (46KA354) and Terrace Green (46KA356) Sites, Marmet Lock Replacement Project, Kanawha County, West Virginia*, Contract Publications Series 96-08. Cultural Resource Analysts. Submitted to U.S. Army Corps of Engineers, Huntington District, Huntington, West Virginia, Contract Publications Series WV00-43.

Waddell, Joseph A.
1886 *Annals of Augusta County, Virginia*. William Ellis Jones, Book and Job Printers, Richmond.

Warner, Mark S.
1998 Analysis of the Faunal Remains. In *A Report of Archaeological Investigations at the Drennon Creek Saltworks, Omer Adams Site (15Hy25), Henry County, Kentucky*, edited by Kurt Fiegel. Division of Environmental Analysis, Kentucky Transportation Cabinet, Frankfort.

Weiss, Harry B. And Grace M. Weiss
1959 *The Revolutionary Saltworks of the New Jersey Coast*. The Pat Times Press, Trenton, New Jersey.

Whitaker, O.J. and R.A. Eigel
1992 *Soil Survey of Henry and Trimble Counties, Kentucky*. United States Department of Agriculture, Soil Conservation Service. Washington, D.C.

Woods, Neander A.
1905 Appendix A: The McAffee Journals of 1773. In *The Woods-McAfee Memorial containing an account of John Woods and James McAfee of Ireland and their Descendents in America*, pp, 425-453. Courier Journal Job Printing, Louisville.

Yelton, Jeffrey K. And Robert T. Bray
1992 *Archaeological Investigations at Boone's Lick State Historic Site: Final Report on MDNR Contract B001952*. Submitted to Missouri Department of Natural Resources, Division of Parks, Recreation and Historic Preservation, Jefferson City.

CONSTANT'S STATION?
DATA RECOVERY AT SITE 15Ck461, CLARK COUNTY, KENTUCKY

By

Jeannine Kreinbrink,
K&V Cultural Resources Management
Union, Kentucky

Jason Hutchinson
Northern Kentucky University
Highland Heights, Kentucky

ABSTRACT

Site 15Ck461 is a multi-component archaeological site located in Winchester, Clark County, Kentucky. The Kentucky Heritage Council determined that the historic component of site 15Ck461 should be investigated through data recovery excavations prior to any development of the property. Natural & Ethical Environmental Solutions (N&E) conducted data recovery (mitigation) at the site during late July and August 2004. Research had associated the site with Captain John Constant who moved his family to the Winchester, Kentucky area by 1780 and to his own station in 1783. Constant died in 1788, but his widow Abigail and their children apparently continued to live on the property until most of the family moved to Illinois in the late 1820s to early 1830s.

Located on one of Constant's land grant properties, the site produced artifacts that date to the relevant time period as well as subsurface archaeological features including three limestone chimney bases, one very large barn cistern or cellar, four pits/cellars, and numerous postmolds. Most of these appear to be associated with Constant and/or his family's occupation of the property. Site 15Ck461 appears to be the site of John Constant's Station, a mid-1780s pioneer station and farmstead in Clark County. The site's location and configuration match early nineteenth century oral histories, memoirs, or other early accounts of the settlement of Clark County.

INTRODUCTION

Site 15Ck461 is a multi-component archaeological site located just north of the city of Winchester in Clark County, Kentucky. Phase I and II archaeological investigations conducted by various companies revealed 21 cultural features. The Kentucky Heritage Council determined that

the historic component at the site should be investigated through data recovery excavations (Cooper and Kirkwood 2001; Schock 2004). Natural & Ethical Environmental Solutions (N&E) conducted data recovery at the site during late July and August 2004. The removal of over 4,300 m2 of plowzone revealed 45 additional cultural features, most of which were related to the early historic occupation of the site. Research indicated that this may be the site of John Constant's Station, first settled in 1783. Constant was a Revolutionary War veteran who had served with George Rogers Clark and at Boonesborough, Kentucky.

SITE SETTING

The site is located north of Winchester and I-64 in the east central part of Clark County (Figure 1). Most of the Inner Bluegrass region consists of gently rolling hills, although terrain near streams may be steep with narrow divides/ravines. The site is within the upper part of the Strodes Creek drainage (Figures 1 and 2). Site 15Ck461 lies just off the southwest crest of a ridge just above the headwaters of a small ravine that runs southwest into a branch of Strodes Creek (Figure 1). Forests of mixed hardwoods formed the primary native vegetation in Clark County, although some open grasslands were found by the early pioneers in the eighteenth century (Braun 1950; USDA 1989). Schock (2004) reported the recovery of *Sylvilagus floridanus* (eastern cottontail rabbit); *Scalopus aquaticus* (eastern/bare-tailed mole); *Anas* sp. (duck), unknown type; and *Meleagris gallopavo* (turkey), from the Phase II investigations at 15Ck461. This investigation at 15Ck461 added *Odocoileus virginianus* (white tailed deer) and turtle (unknown species).

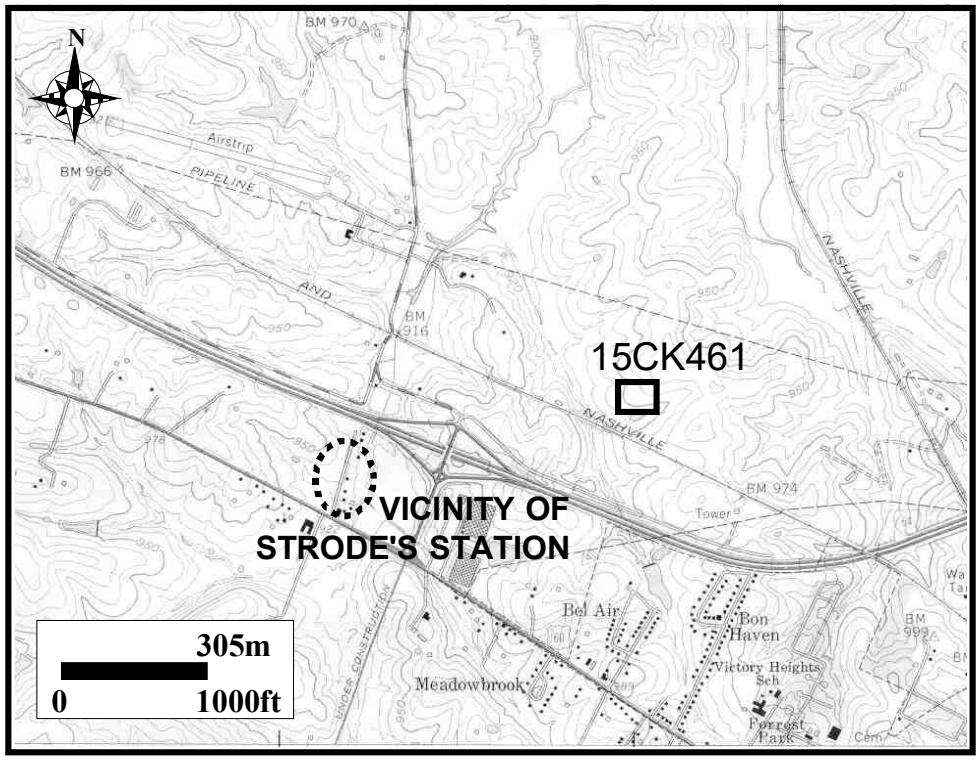

Figure 1. Portion of Austerlitz 7.5 minute topographic map showing the location of 15Ck461.

Figure 2. View northwest to project site.

Archaeological investigations at other central Kentucky settlement sites/stations have documented additional animals. These include black bear, eastern woodchuck, squirrels, skunks, foxes, wolves, elk, various birds including bobwhite and turkey, and perhaps bison although they are very rare archaeologically (cf. Andrews et al. 2004; McBride and McBride 2000; Schock 2004; Wyss and Wyss 1977).

Organic remains processed from other contemporary sites include floral species that indicate disturbed, agriculturally modified landscapes. Plants such as purslane, pokeweed, carpetweed, and clover, among others, are commonly found in cleared fields and disturbed habitat. These plants probably grew around the house yards and in the adjacent cleared fields. All of these and other varieties were recovered from 15Ck461 (Kreinbrink 2005; Schock 2004). The site also produced bedstraw, ragweed, and other similar weedy varieties that are also indicative of cleared land. The Phase III botanical analysis results also identified several species of trees and shrubs, either as wood charcoal or nutshell fragments. These included cherry, elderberry, ground cherry, hickory, walnut, and gooseberry. In addition, a domestic burned peach pit was recovered during feature excavation at 15Ck461 (Kreinbrink 2005).

DATA RECOVERY RESULTS

The Phase III mitigation at site 15Ck461 took place between late July and August 2004 with three main goals (Kreinbrink 2005).

1: Conduct mitigation level archaeological investigations at site 15Ck461.

2: Conduct intensive archival research to provide a detailed picture of site 15Ck461 within the historic contexts of historic settlement, early development of Clark County, and rural settlement patterns.

3: Conduct an archaeological literature review for comparative and analysis purposes.

During the Phase III of site 15Ck461, approximately 4,330 m^2 of subsoil was exposed and a perimeter was established around the site's features. The field crew used a self-loading pan scraper for general plowzone removal and a large backhoe with a smooth bucket for more fine-tuned soil removal. Features 1, 2, and 3 were found in the Phase II trenches and their locations were mapped in 2004 before any mechanical excavation began. None of the 2003 postmolds were re-located due to erosion and natural infilling of the trenches. After completion of the plowzone soil removal by mechanical methods, elimination of non-cultural features left 48 cultural features (including Features 1-3 from the Phase II) (Figure 3). Postmolds from the Phase II study are included in the following discussion section.

The excavations documented six morphological feature categories. Several of these categories are discussed individually below.

1: Chimney bases (n = 3),
2: Pit cellars or large pits (n = 5) of varying morphology,
3: Square postmold-like features (n = 25),
4: Round postmold-like features (n = 10),
5: Small pits or basins of varying sizes (n = 4),
6: One concentration of limestone fragments (n = 1).

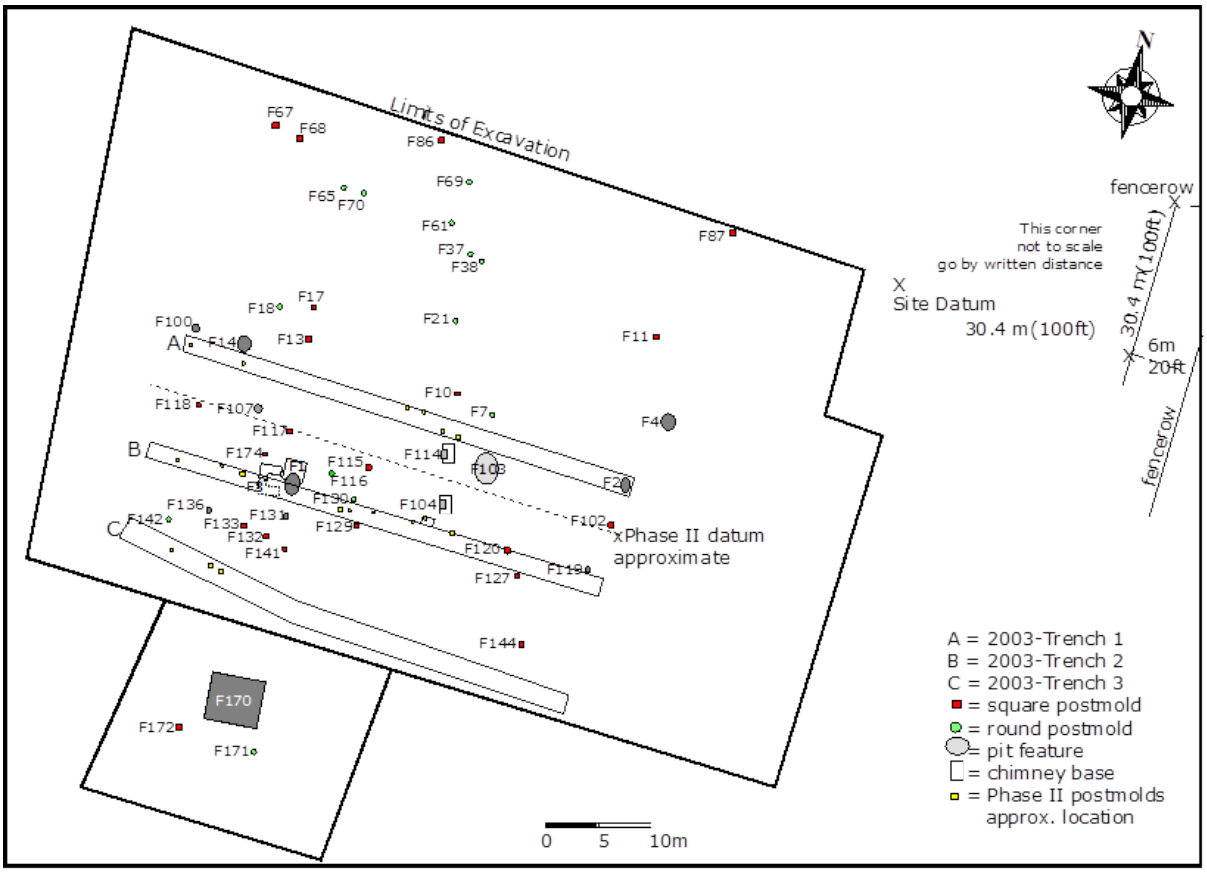

Figure 3. Project site map showing distribution of features.

CHIMNEY BASES

The investigations uncovered three chimney bases (Features 3, 104, and 114) (Figures 3 and 4). Feature 3 was first documented in 2003 by Schock (2004) as a cluster of limestone in the north wall of Trench 2, just west of Feature 1 (pit cellar). The 2004 data recovery uncovered the north half of the chimney base, but the south half had either been removed inadvertently during the Phase II in 2003 or by previous farming activities at the site. The Feature 3 chimney base was made of dry-laid limestone. Portions of two courses of rock were uncovered. It was a squared, U-shaped foundation with an open firebox opening that faced east.

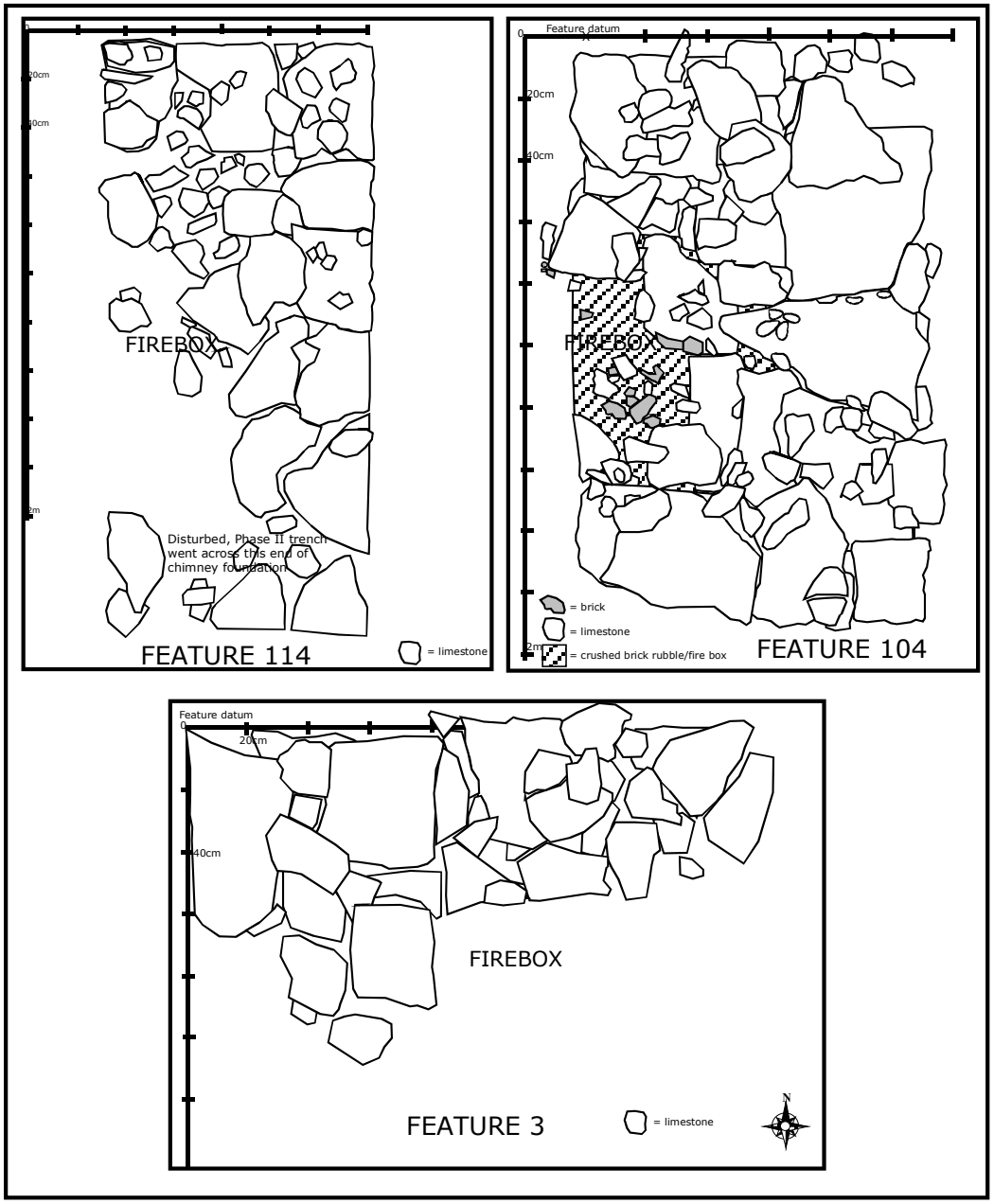

Figure 4. Illustrations of chimney bases at 15Ck461.

Features 104 and 114 were two slightly smaller chimney foundations uncovered approximately 15-16 meters east of Feature 3 (Figures 3 and 4). The location of Features 104 and 114 correspond to a large, surface limestone concentration illustrated in Schock's (2004) field sketch. The dimensions of Features 104 and 114 are similar to each other, but smaller than Feature 3. Both fireboxes face west (Figure 3). Feature 104 apparently had a common brick-lined firebox. Large common brick fragments were recovered from this feature within the firebox opening. Feature 114 may have had a brick lining, but had been greatly impacted by plowing.

PIT CELLARS OR LARGE PITS

The Phase II and III investigations uncovered a total of five large pit features (Table 1).

Table 1. Large Pit Features at 15Ck461.

FEATURE #	DIMENSIONS	CONTENTS
1	At least 1.4 x1.5 m in diameter (rest dug in 2003). >1.2 m deep	Ceramics, flat glass, animal bone. Includes Whiteware and Pearlware. Phase II will be reevaluated. Two brass thimbles and straight pin in Phase II. One straight pin from Phase III.
2	Oval pit; >/= 80cm x 1.2m x 50cm deep	Ceramics, flat glass, brick fragments. Excavated during Phase II, except for very base of feature.
4	Round pit; 1.4 x 1.5 m x 70cm deep	Ceramics, flat glass, brick fragments. Includes small brass padlock, other metal artifacts, buttons
14	Oval pit, 142 cm by 130 cm by 48 cm deep	Redware, deer and pig bones with cut marks. Includes a few prehistoric artifacts.
170	4.5 m by 5.1 m (15 ft by 17 ft) by 1.4 m (4.6 ft) deep.	Heavy clay fill, rocks, a few green, edge decorated plate fragments, cow bones.

Features 1 and 2 were partially excavated during the 2003 Phase II study and were completed in 2004. The Phase III excavations revealed three other large pits. Features 4 and 14 were oval pit features that may be small pit cellars. Feature 170 was a very large pit feature found south of the other features at the site (Table 1). Feature 1 was a deep pit feature found just in front of Feature 3, the chimney foundation (Figures 3 and 5). This was probably a deep storage cellar. The use of Feature 1 may have continued into the nineteenth century given the presence of Whiteware ceramics within the feature. Its greater depth compared to the other three features contributes to this interpretation. Features 2, 4, and 14 are similar sized pit features, in horizontal dimensions, to Feature 1 but are shallower in depth.

Feature 14 was distinguished by the scarcity of artifacts although with similar morphology to Features 2 and 4. It contained a few sherds of Redware, but no table ceramics such as Whiteware or Pearlware. This feature also produced virtually all of the deer and pig bones found at the site.

Feature 4 is another basin shaped, circular pit feature (Figures 3 and 5). It contained ceramics and some personal artifacts such as a small brass padlock, buttons, and what may be a small fragment of silver jewelry. Features 2, 4, and 14 did not contain any of the later period artifacts such as were recovered from Feature 1. They may be associated with the earlier occupation in the eighteenth century.

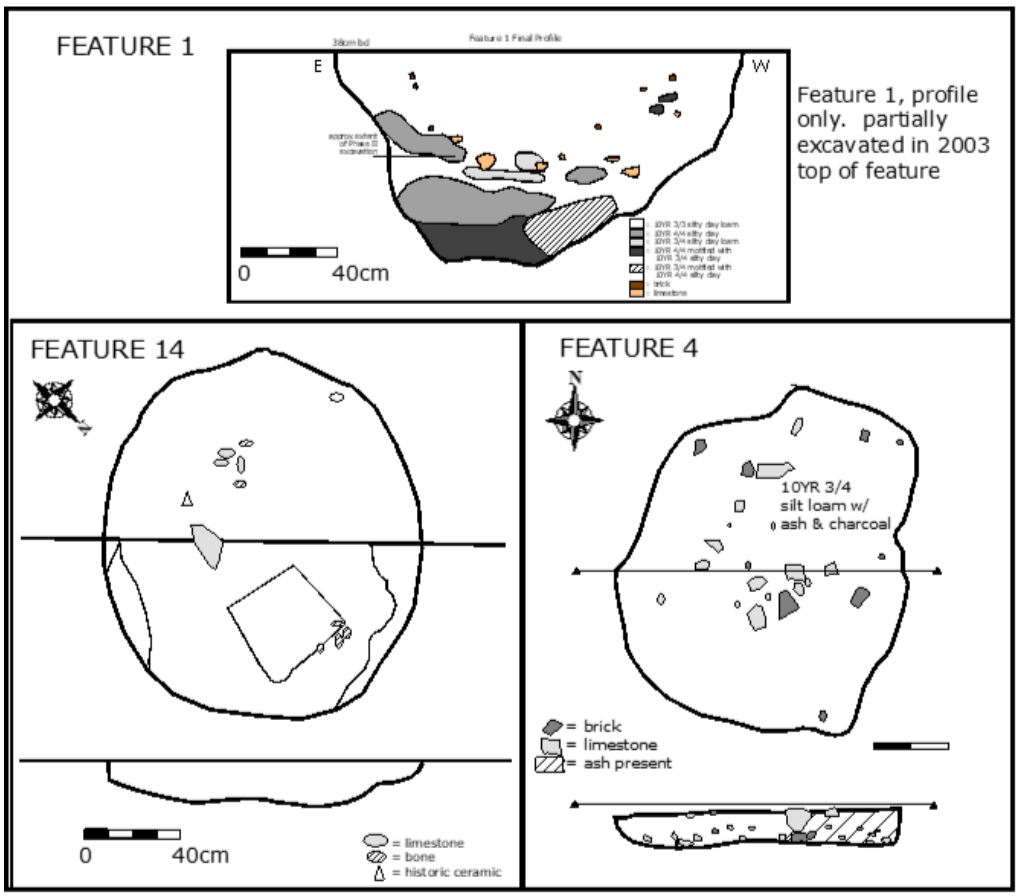

Figure 5. Features 1, 14, and 4 at 15Ck461.

Feature 170 was a very large pit feature measuring 4.5 m by 5.1 m (15 ft by 17 ft) in diameter and reached about 1.4 m (4.6 ft) deep, onto the top of bedrock. A 3 ft wide backhoe trench was excavated across the center of the feature because of its large size. This large pit was filled with heavy clay in mixed context. A few ceramic sherds and animal bones were recovered from the trench. The pit had been originally dug down to the top of the bedrock. It did not appear to have any sort of lining, but may have been a cistern or basement for a larger barn. No foundations or corner piers were found around the feature, although a large amount of limestone had apparently been dumped into the pit during its in-filling. These may have been surface piers for some type of barn.

SQUARE POSTMOLD-LIKE FEATURES

A total of 25 square postmold-like features were scattered around the site but clustered in the vicinity of the chimneys and pit features (Figure 3). One group averaged about 20 cm in diameter while the second group were larger, averaging about 35-40 cm in diameter. Patterning is discussed below.

ROUND POSTMOLD-LIKE FEATURES

Ten features may be round postmolds. Some of these features may date to the Native American occupation of the site. Features 37, 38, 61, 65, and 69 cluster in the northern part of the site, away from the clearly historical component (Figure 3), and may be Native American in origin. These features are very similar to each other morphologically and appear to be grouped into a semicircle. Other round postmold features were scattered across the site and their origin is uncertain. Feature 142 was a nicely tapered feature that looked like a prehistoric postmold; however, it contained a large brass button 15 cm below the trench floor. The button dates to the late eighteenth century and likely entered the postmold fill during infilling. If Feature 142 is of historic origin, then some of the other round postmolds may date to the historical occupation of the site as well.

FEATURE DISCUSSION

Overall, excavations at site 15Ck461 uncovered an array of cultural features associated with domestic habitation of the historical period. The site includes at least three structures with chimneys (including one with an associated pit cellar) and three additional pit cellar locations that may mark outbuilding locations. The site produced no actual building foundations such as limestone corner piers or perimeter foundations. Several large square postmold-like features were found that may have served as support piers, although none mark a complete square or rectangle. It appears that most of the structural foundations were surface constructed piers.

The three chimney foundations may represent three separate structures. Features 104 and 114 are separated by only eight feet (2.43 m) from edge to edge. They might represent two structures with short dimensions of about 10-12 ft wide situated adjacent to each other (Figures 3 and 6). The chimneys would have been on the east end of each structure. Alternatively, they could be end chimneys for one structure with two side-by-side rooms.

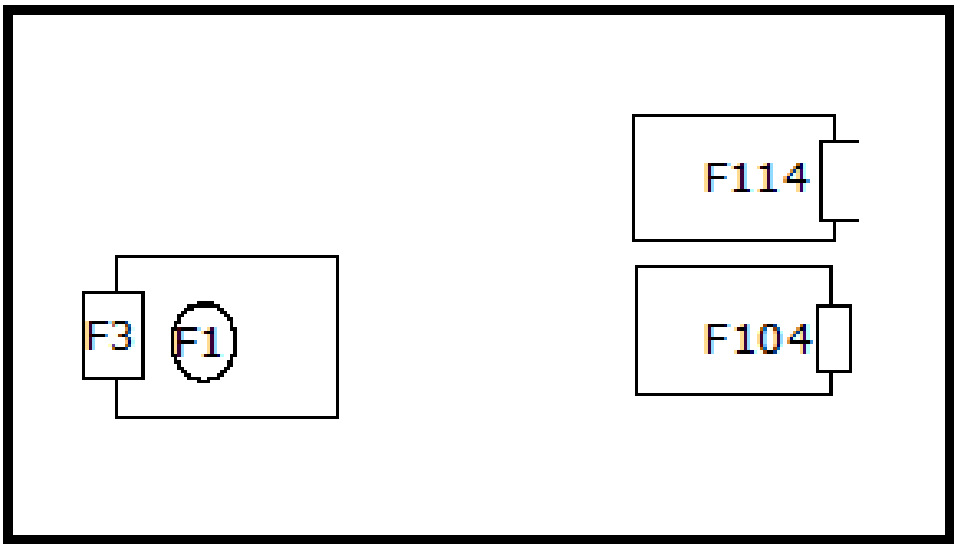

Figure 6. Possible layout of three structures at the site.

Feature 3 was likely a different structure, oriented the same direction (that is, gable oriented east-west), but with the chimney on the west end of the structure instead of the east (Figure 6).

The three chimney bases uncovered at the site are each of slightly different size and appear to represent three separate structures as noted above (Figures 3 and 6). Rectangular areas in front of the two side-by-side chimney bases (Features 114 and 104) measure about 10 ft (3 m) wide by 20 ft +/- (6 m) in length and are devoid of features. Postmolds surround these rectangles, but none were found within these areas. These areas appear to represent the interior of these two structures. Some of the surrounding postmolds may represent porch supports, building corners, or outbuilding supports. None appear to make complete squares or rectangles.

Feature 3 is the third and slightly larger chimney foundation (Figure 6). This chimney faces east with the firebox on that side. Feature 3 has a pit cellar (Feature 1) in front of the firebox. With the exception of two small features that may be prehistoric in origin (Features 116 and 130) this area is also otherwise devoid of postmolds. This area measures approximately 7 to 7.5 meters in length (23-24 ft).

The three chimneys are surrounded by square postmolds that can make any number of arrangements and associations. Some of them may represent posts to a yard/perimeter fence, outbuilding supports or other farm related structures such as wood drying supports, sorghum processing stations, or other activity areas that may require a lean-to or framed covering. As will be discussed below, Constant's Station reportedly had a yard fence, although the nature and type of fence were not noted in the interviews (various Draper Manuscript sections, see below). Some of the seemingly linear arrangements of posts may represent successive yard fences, or fences for kitchen gardens throughout several generations of use by the Constant family.

Two square postmolds located just west of Feature 3, the larger chimney, may represent posts for chimney props. Neither Feature 104 or 114 had associated postmolds. If they had props, they were surface ones and not dug into the ground.

The site appears to represent a farmstead that included three chimneys of varying sizes along with evidence for support structures and fences. As will be seen below, the archaeological evidence can be correlated with historical evidence to associate it with Constant's Station.

ARTIFACT ANALYSIS

The Phase III data recovery at 15Ck461 recovered 766 artifacts. The artifacts are summarized in Table 2. The Phase III excavations recovered 715 artifacts that are associated with the historical occupation of the site. Several artifact categories are discussed individually below.

Table 2. Data Recovery Artifact Summary.

ARTIFACT CATEGORY-HISTORIC PERIOD	QUANTITY
Ceramics (excluding brick)	229
Glass	84
Metal	100
Faunal or wood: used such as buttons	5
Faunal: animal bone, etc.	219
Organic, wood, plant remains (not including float results)	34
Construction materials: brick, mortar	43
Stone: gunflint	1
TOTAL HISTORIC	**715**
ARTIFACT CATEGORY-PREHISTORIC	
Chert projectile point, Late Archaic	1
Chert core	1
Chert flakes	38
Prehistoric pottery sherds, leached limestone temper	4
TOTAL PREHISTORIC PERIOD ARTIFACTS	**45**
OTHER: 7 geode or quartz fragments	7
TOTAL ALL ARTIFACTS	**766**

CERAMICS

The Phase III mitigation at 15Ck461 recovered 229 ceramics from various contexts. Each ceramic category is described by type with diagnostic date ranges. Discussion of the Phase II ceramics is also included.

Porcelain

Six small thin porcelain sherds were recovered during the Phase III excavation. The Phase II investigation collected 14 porcelain sherds from both test unit and feature context. Of the 20 total porcelain sherds, only two exhibit any type of decoration. Both had been recovered during the Phase II. One sherd had faded red handpainting and a second sherd had once had overglaze handpainting that had been worn off. These sherds are all too small to assign any type of stylistic or formal types. Their context places them in the late eighteenth to early nineteenth century and they are stylistically consistent with that period.

Creamware

The Phase III study recovered 16 Creamware sherds, and the Phase II study found 42 sherds. The Phase III assemblage included two handpainted sherds, one each from the 2x2 meter unit adjacent to Feature 1 and one sherd from Feature 4. The Phase II study recovered three handpainted Creamware sherds, one from Unit 10, and two from Feature 1. All exhibited a similar hand painted style, with maize, or golden-yellow color, and either cobalt blue or brown. The remaining sherds were plain (n=53). Miller et al. (2000) assign a manufacturing date range of 1762-1820 for Creamware. Most of the sherds from this site fall into Miller's earlier category of darker to moderate intensity Creamware, putting it in the earlier part of that time range. The Constant family

may have brought a few Creamware dishes with them from Virginia. Alternatively, these could date from the middle portion of their occupation at the site, from the 1790s, perhaps once imported goods became available in central Kentucky during this period.

Earthenware

One sherd of tin glazed, Delft-like earthenware was recovered during the Phase III from Feature 115, a square postmold that contained a variety of other artifacts (Figure 7). The earthenware sherd (cat# 41.05) has a cream-colored body with spalled tin glazing with cobalt blue handpainting. This sherd may have been a saucer or plate brought from Virginia. Given the time frame for occupation of the site, it is likely that this sherd dates to the 1780s occupation. Delft was produced from the seventeenth through late eighteenth centuries with a variety of color palettes and decorative styles. Based on cross-dating, this fragment probably dates from the second half of the eighteenth century (c.f. Historic Deerfield Museum 2001; Miller et al. 2000).

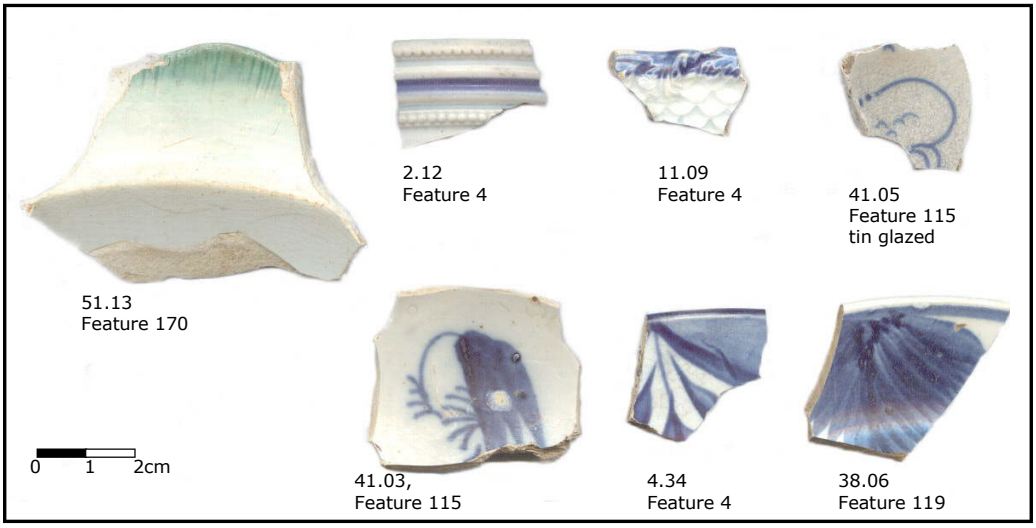

Figure 7. Examples of Pearlware and Tin Glazed Earthenware at 15Ck461.

Pearlware

Pearlware constitutes the most numerous ceramic category at the site. The Phase III recovered 138 Pearlware sherds, while the Phase II produced 117 with the majority collected from Feature 1. The Pearlware from the site was recovered from a variety of features and excavation contexts as noted above in Table 2 and illustrated in Figure 7. Pearlware recovered from the site comes in a variety of decorative styles, including transfer print, handpainted, and edge decorated (Figure 7). The Pearlware sherds recovered from the site probably date to the later occupation of the site by the Constant family in the early nineteenth century. Several of the decorative styles were not available until the early nineteenth century.

Whiteware

The site produced only 58 sherds of Whiteware from Phase II and III contexts (Figure 8). The Whiteware found at the site, with the exception of those artifacts collected from Feature 1, were recovered essentially from plowzone context. Black, mulberry, cobalt, and red Transfer print sherds were recovered from Feature 1 (Figure 8). No other deep, sub-plowzone features contained whiteware sherds. Feature 3 is one of the chimney bases, situated just west of Feature 1. One sherd of mulberry transfer print (cat# 7.16) was found along the north side of the chimney base. It may have been plowed up from the top of Feature 1 as it is situated so close to it.

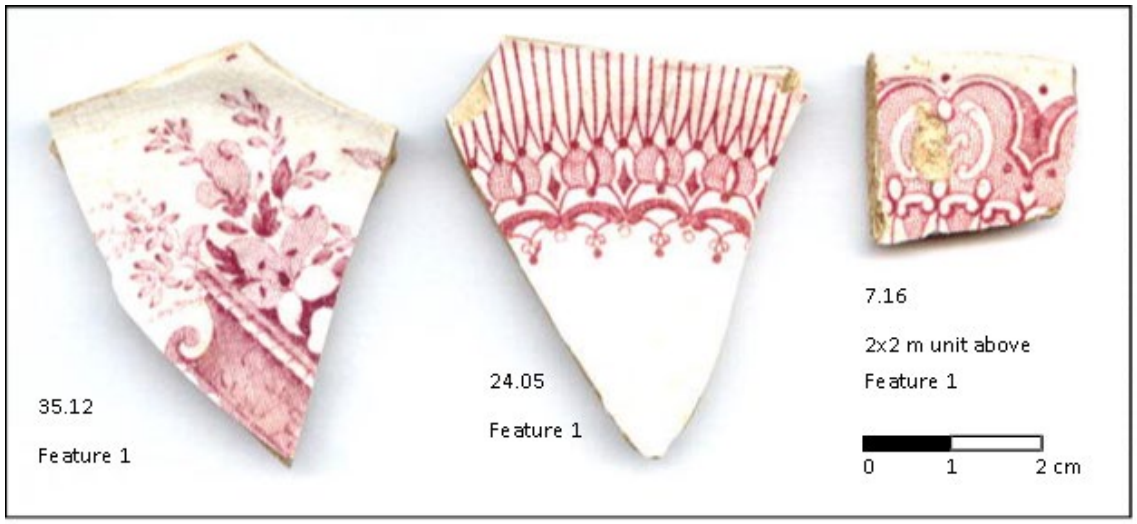

Figure 8. Examples of Whiteware at 15Ck461.

The Whiteware sherds are clustered in two areas at the site. The Phase II test units that produced Whiteware sherds include Units 1, 5, 7, 8, and 10. Unit 5 was located along the south edge of the Phase II test area, near Feature 170. Units 3 and 7 were west of Features 104 and 113, between them and Feature 1. Units 8 and 10 were located just south and then west of Feature 1. Unit 1 was the only unit that is located away from the central or southern part of the site; it was located to the east, near Feature 2.

It may be that Feature 1 was in-filled at the end of the site's occupation in the early 1830s when the last of the Constant family left for Illinois. The other shallower pit features may have been filled in at an earlier date. The Constant family would only have needed one house after the dissolution of the original, multi-family station. It is likely that they lived in the structure associated with Feature 3, the largest chimney, and Feature 1, the nearby pit cellar. They probably would not have filled Feature 1 until they abandoned the house. Clinkenbeard, the next owner after 1826, was married to a Constant. They may have lived on the property for a short while but then apparently moved to another portion of their property, closer to established roads during the 1830s.

Redware

The Phase II investigation produced 73 Redware sherds, and the Phase III work recovered 53 sherds for a total of 126 sherds. The quantity of Redware sherds at the site attests supports its early occupation date. As will be seen below, only a few Stoneware sherds were recovered and most of those are eighteenth century table ware varieties rather than storage containers. In addition, no Yellowware sherds were seen at the site to indicate use of the site later than the 1830s.

Several of the Redware sherds are interesting when compared to other eighteenth century Kentucky occupation/ station/fort sites. Two sherds exhibit a puddled green glaze on their exterior. O'Malley (1989) noted at least one similar sherd at Boonesborough during her testing at that location. She has also noted the presence of Redware sherds with glazed interiors but unglazed exteriors on many eighteenth century sites in central Kentucky (O'Malley, personal communication 2005). The Jackfield sherd and the black glazed Redware sherds are also early. Jackfield carries a manufacturing date range of 1740-1800 (Miller et al. 2000).

Stoneware

Site 15Ck461 yielded only a very small number of Stoneware sherds (11 total). The Phase II work only found five Stoneware sherds and the Phase III only recovered six. Most of these are eighteenth century table wares. Only two sherds are from gray saltglazed Stoneware crockery. Feature 170 contained a thick walled, saltglazed crock fragment, and Unit 1 from the Phase II contained a small basal section of a saltglazed crock or bowl. The remaining eight sherds include a variety of table ware vessels. The 2x2 meter unit adjacent to Feature 1 produced a white salt glazed cup fragment with a cobalt blue chinoserie design (cat# 7.17, Figure 9). The brown glazed sherds are from small, thin walled vessels such as straight walled cups or mugs. O'Malley believes they are European in origin (personal communication 2005).

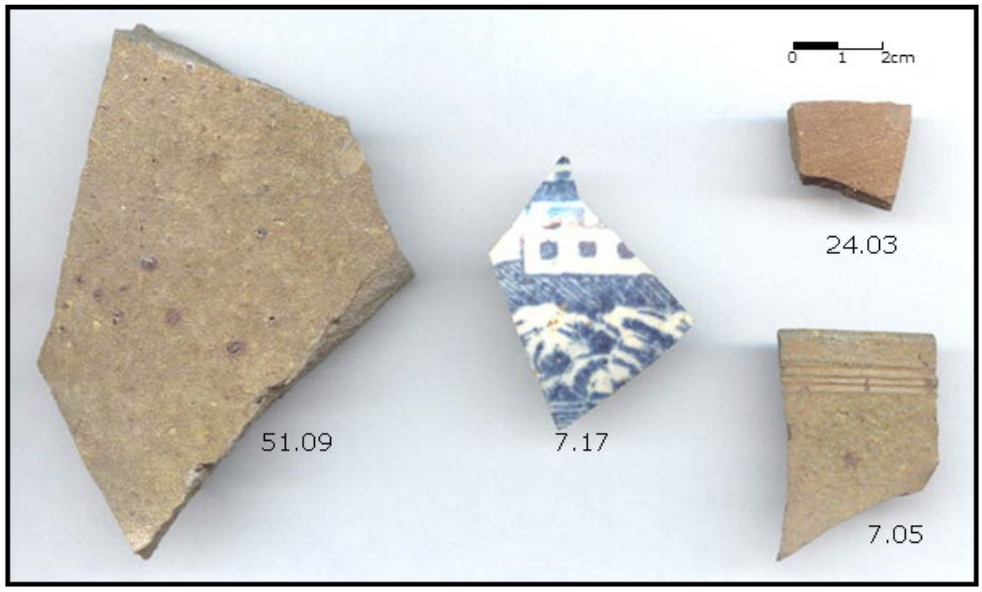

Figure 9. Stoneware sherd examples.

Overall, the ceramics from site 15Ck461 include a range of late eighteenth to early nineteenth century vessels. No ceramics manufactured after the mid nineteenth century were recovered. None that began production in the 1840s, or were introduced into the U.S., such as molded white Ironstone, flow blue Whiteware, sponge decorated Whiteware, and so forth were recovered from the site. The Whiteware that was recovered is of the thin-walled, 'China glaze' variety. Although the red and mulberry transfer print designs could not have been made before 1828, they are probably from the early range of production for those colors.

GLASS

The glass assemblage for the site is small and includes only a few categories of artifacts. Of the 84 Phase III glass artifacts, 73 are aqua flat glass. The remaining 11 fragments are from various containers. Except for several amethyst and modern clear glass container sherds, the other glass container fragments may date to the early occupation of the site, or to the early nineteenth century. The Phase II investigation recovered several black glass and/or olive green glass sherds as well as two small sherds of cut table glass.

Flat glass sherds recovered from the Phase III were recovered from a variety of feature contexts, including most of the pit features, except Feature 14. The 73 flat glass sherds range in thickness from .54 mm in thickness through 2.11 mm. Except for three sherds, the other 73 range from .54 to 1.55 mm. The Schoen (1990) and Ball (1983) formulae place this cluster in the 1807 to either 1817 or 1827 range. The three Moir (1987) formulae cluster later, in the 1820 (1828) to 1843 (1854). Given that most of the Constant family left for Illinois in the late 1820s or early 1830s, and the ceramic and other artifact types support an 1830s abandonment date range, the earlier date range for the flat glass is more likely.

METAL

The Phase III artifact assemblage includes a variety of metal artifacts. One hundred metal artifacts were recovered from a variety of feature contexts during the Phase III and include a variety of categories such as Personal, Kitchen/Domestic, Architectural, and Farm related items (Figure 10).

A small brass padlock recovered in Feature 4 is very similar to others seen on station sites in Kentucky such as McGary' Station that date within the 1750-1780 period (Figure 8) (O'Malley, personal communication 2005; McBride and McBride 2000). Andrews et al. (2004) illustrated an almost identical lock that they recovered from the John Arnold Farmstead (15Lo168) in Logan County, Kentucky. The Arnold Farmstead was settled by 1790 and perhaps a bit earlier. Arnold was a Revolutionary War veteran who moved his family to Kentucky from North Carolina. Neumann and Kravic (1989:180, Item 9) illustrate an almost identical padlock and note that this small type of padlock was commonly used for "small chests and personal containers". The fragment of small hinge and the silver scrollwork fragment found in Feature 4 may also represent parts of a small document box or chest.

The data recovery also found a broken mouth harp. Neumann and Kravic (1989:169) report that these are common items on sites from this time period. The one found at 15Ck461 has lost its

vibrator, and is a bit corroded, but closely resembles the #2 mouth harp illustrated in Neumann and Kravic (1989:169, Item 2).

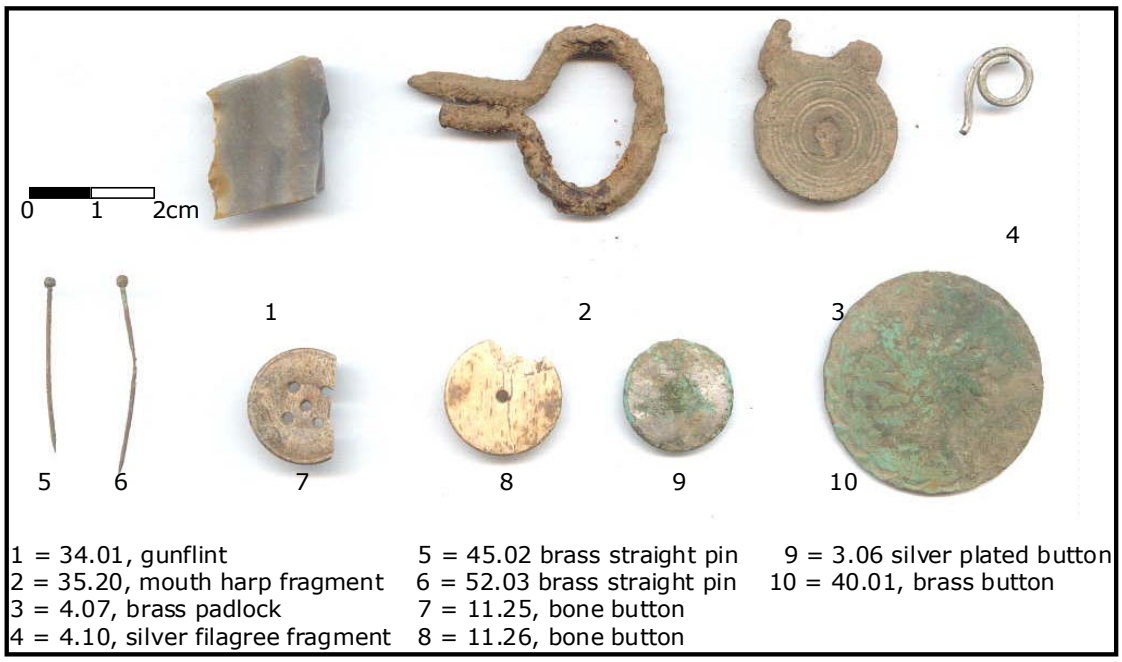

Figure 10. Early metal and other personal items from 15Ck461.

Domestic sewing items recovered from 15Ck461 include items from both the Phase II and Phase III investigations. The data recovery found two brass straight pins with round, applied heads (Figure 10). The pins are similar to modern dressmakers' pins. The Phase II also recovered one brass straight pin (identical to those from the Phase III), two brass thimbles, and a broken scissors. All would have been used for clothing manufacture. Women would have spun thread and yard to create clothing, quilts, blankets, and other cloth items. A large, 6 inch long iron needle or awl with an eye was also recovered and may have been used for a variety of tasks such as working leather or stitching rag rugs.

A total of 11 buttons were recovered during the Phase III excavations, including one wood, four bone and six metal buttons. The six metal buttons include one pewter button and five brass ones. One of the brass buttons is a very large (1.5 inch diameter), decorated button with a single brass backloop (Figure 10). This button is very similar in design and size to an illustrated button in Neumann and Kravic (1989:56, Row 4, 1st button on left). These are large coat buttons found on military coats, generally postdating the French and Indian War. Nancy O'Malley (personal correspondence January 2005) reports similar buttons on other Kentucky station sites including Site 15Me48 McGary's Station in Mercer County.

A total of 56 nails or nail fragments were recovered during the Phase III. The nails include hand wrought nails (n=18), cut nails (n=270), and corroded fragments that could not be defined as to category. The 18 hand wrought nails are characterized by pointed, hand formed tips, squared,

tapered shafts, hand formed heads, and some irregularity in form. These include one with a brad head, and one broad-headed tack. The inhabitants of the site must have had access to a blacksmith, at either nearby Strode's Station or south in Boonesborough. Other hand forged items at the site include the nails, chain links, the awl/large needle, a hinge, and hooks/latches. The cut nails are all corroded and some could not be identified as to exact shape/type. The nails at the site provide evidence of framing and wood work at the site. The Draper Manuscript interviews about Constant's Station state that Constant's house had a wood floor. The brad-head wrought nail might have been used as a flooring/finishing nail. The cut nails may have been used in later additions/repairs during the early nineteenth century.

ORGANIC

The flotation analysis included at least 224 liters of soil from 16 features; however, only four features produced what appeared to be quantifiable remains. Bonzani (2004) found identifiable organic remains in only 3 features. Carbonized remains from the Phase III study consist of carpetweed, mustard, squash, beans, purslane, bedstraw, and hull fragments from hickory and walnut. Most of these remains were recovered from Feature 14, a shallow pit that also contained butchered deer and pig bones (see below).

Bedstraw is an interesting addition to the floral component of the site. Bonzani (2004) indicates that it served a variety of purposes during historic times including as incense for fragrance. It also had medicinal uses as a cough remedy, diuretic, and tuberculosis remedy (Moerman 1998:241-242). In addition, bedstraw had additional historical uses. It could be used to curdle milk. The plant fibers could be woven to make milk strainers, and it was often called goose grass and used as poultry food (Haragan 1991). Interestingly, Feature 4 did not contain a lot of carbonized small plant seeds, but it did contain all the nut shell fragments, half of the squash, and 2 peach pit fragments recovered.

Bonzani also analyzed the flotation samples from the Phase II work at site 15Ck461 (Bonzani 2003). Schock had floated 77 liters of soil from Feature 1, the large pit cellar. The analysis identified four crop plants among the remains; corn, pepper, squash, and either wheat or barley grain. Combining the Phase II and Phase III results increases the variety of crop plants from the site. Garden crops such as squash, pepper, and beans were grown at the site, probably within the house yard. Corn and the wheat/barley would have been sown out in the surrounding fields. The historical documentation for Constant's Station mentions hemp in addition to corn. No evidence of hemp seeds was recovered archaeologically during this study.

FAUNAL

The Phase III excavations recovered 219 fragments of animal bone. Most were recovered during excavation. Several of the small mammal bones were recovered during flotation. The Phase III faunal assemblage did not include any exotic or surprise elements. The Phase II investigations recovered animal bones from Features 1 and 2. Those are reported in Peres (2003). The Phase II and Phase III results are compared in Table 3.

Table 3. Comparison of Phase II and III Animal Remains.

TAXON/COMMON NAME	DOMEST/WILD	PHASE II	PHASE III	COUNT
Bos taurus (cow)	Domesticated	2	1	3
Sus scrofa (pig)	Domesticated	2	2	4
Gallus gallus (chicken)	Domesticated	2	0	2
Anas (species-duck)	Wild	1	0	1
Meleagris gallopavo (turkey)	Wild	1	0	1
Odocoileus virginianus (white-tailed deer)	Wild	0	2	2
Sylvilagus floridanus	Wild	1	1	2
Osteichthyes (bony fishes)	Wild	1	0	1
Turtle (unk), flat shelled	Wild	0	1	1
TOTAL MNI, IDENTIFIABLE ANIMALS				**17**

As Peres (2003) notes in her summary for the Phase II report, the animal remains found at site 15Ck461 are characteristic of those from a central Kentucky historic period site. The domestic animals consist of cow, pig, and chicken. References to these animals are found in contemporary memoirs, oral histories, and other regional documents. Brought with them on their immigration into Kentucky, the pioneers would have kept these animals for dairy, eggs, meat, and other uses such as soap, lard, and other useful necessities from remains after butchering for food.

The investigation of the Arnold Farmstead (15Lo168), an early farmstead in Logan County, Kentucky, identified a similar type of assemblage of faunal material (Andrews et al. 2004). They recovered a similar assortment of domestic and wild species, although that assemblage also included a bobcat, or lynx, and elk.

Archaeological investigations at Logan's Fort (15Li95), Lincoln, County, Kentucky, also produced a similar assortment of wild versus domestic species of animals (McBride and McBride 2000). That study recovered elements from cow, pig, chicken, and horse representing the domestic animals. Wild taxa included rabbit, deer, opossum, squirrel, and black bear. They also recovered turtle and bony fish elements, similar to site 15Ck461.

Investigations at Boonesborough by O'Malley (1989) recovered faunal remains from limited testing that included black bear, turkey, channel catfish, and probably bison, as well as domestic species such as cow and pig.

DISCUSSION AND COMPARATIVE REVIEW

The historic period artifacts recovered from site 15Ck461 during the Phase II and III investigations provide chronological and functional information about the site. Some artifacts such as Redware were produced on local levels for a long period of time in the eighteenth through nineteenth century. Miller et al. (2000) does not include a date range for general Redware. The presence of utilitarian Redware at the site, and the virtual absence of other utilitarian varieties such as Stoneware or Yellowware, does however, indicate an occupation date range for the site that falls generally before the 1840s.

The ceramics from site 15Ck461 range from clearly eighteenth century types such as tin glazed, white salt glazed stoneware, early Creamware, and several of the other Stoneware types (brown glazed for example), to Whiteware which is a nineteenth century ceramic type. Calculation of the mean ceramic manufacturing date for the site yields an average date of 1810 (Figure 11).

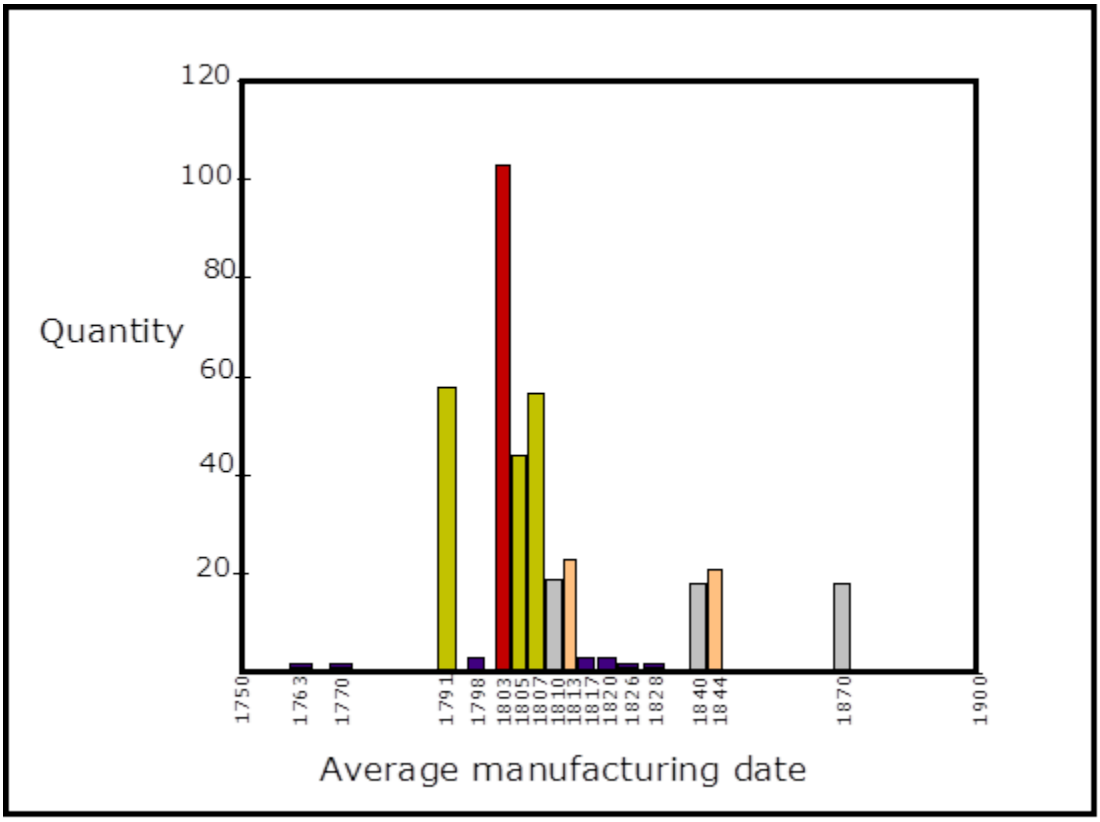

Figure 11. Chart of average ceramic average manufacturing dates.

Figure 11 illustrates the average manufacturing dates for the ceramics at the site (based on Miller et al. 2000). Note the tight clustering in the 1791-1817 range. This date ranges represents the average dates for the Pearlware recovered from the site. The late 1870 date, off to the right by itself is for plain Whiteware sherds. However, these, similarly to the few sherds of decorated Whiteware, appear to be of the thin walled variety common in the late 1820s. Indicators of eighteenth century usage of the site include the following items that are rarely found on nineteenth century sites and certainly not in this combination. They are commonly found at station sites and other late eighteenth century sites in Kentucky or other contemporary sites (c.f. Andrews et al. 2004; Neumann and Kravic 1989; O'Malley, personal communication 2005).

- Brass padlock typical of 18th century document or small boxes.
- Mouth harp, similar to others from Revolutionary War period sites.
- 1.5 inch brass button from overcoat/great coat
- Tin Glazed earthenware, probably Delftware with cobalt handpainting
- White salt glazed Stoneware with cobalt handpainting.

- Other early Stoneware tableware, thin walled, brown bodied with brown (clear) glaze
- Jackfield style black glazed Redware
- Hand wrought nails and other hand forged objects
- Creamware ceramics, including hand painted

Pearlware and Whiteware ceramics indicate that the site continued to be occupied after its initial settlement in the eighteenth century. As will be seen below in the Historical Research Section, the Constant family owned the land until 1826, at some point after which they moved to Illinois. Several Whiteware sherds such as the red and mulberry Transfer Printed pieces probably were not manufactured until at least 1828 (Miller et al. 2000). This indicates someone occupied the site perhaps into the early 1830s. By that time, the occupants would probably have had access to a regional if not local stoneware potter; however, only two Salt glazed Stoneware sherds have been recovered from the site. The lack of mid-nineteenth century ceramics such as white Ironstone, later transfer decorated Whiteware, sponge decorated Whiteware, Yellowware, or additional Stoneware crockery indicate that no one was disposing of broken artifacts at the site after the early 1830s.

Archaeological investigations into Revolutionary War era and late eighteenth century sites in Kentucky have been limited. Most of those investigated, at least on a survey level, include Fort Boonesborough in Madison County, John Grants Station in Bourbon County, Hugh McGary's Station in Mercer County, the John Arnold Farmstead (15Lo168) in Logan County, Kentucky, and Logan's Fort (15Li95), Lincoln, County, Kentucky (Andrews et al. 2004; McBride and McBride 2000; O'Malley 1987, 1999). Regional studies have included investigations of late eighteenth century forts in West Virginia (McBride and McBride 1993, 1991).

O'Malley (1987, 1999) reports that at McGary's Station contained some evidence of subsurface pits, including one feature that may be a hearth. That site also produced a very similar assemblage of artifacts to the early items found at Constant's Station. McGary's Station includes at least one large brass button, lock and box fragments, straight pins, and other eighteenth century artifacts. At O'Malley's (1987, 1999) investigations at John Grant's Station, they found limestone rocks that may have formed a crude foundation pier. O'Malley also notes that some pioneer log cabins had full stone chimneys, others were built with 4-5 ft of stone, then built with sticks and mortar, others were built of all mud and sticks (personal communication 2005). Many early sites then would only manifest themselves archaeologically as surface sites if the chimneys were only of sticks and mud (cat and clay). The three Constant site chimney bases consist of substantial limestone foundations. The lack of abundant limestone in the plowzone may indicate that the upper portions were of stick/mud, or that the limestone was taken away for use elsewhere after abandonment of the active use period of the site.

O'Malley also found evidence that storage pits were built not just under houses. At Fishers Garrison in Boyle County, John Hinton was killed in 1781 while retrieving food from a storage pit outside the stockade. This probably had some type of small covering structure such as a shed. The presence of several shallow pit features at this site may indicate a similar setup where small pit cellars were covered with small outbuildings. One of the oral history accounts (discussed below) about Constant's Station notes that the Constant cabin, at least, lacked underpinning, that is, the underside of the cabin was not closed off, but accessible. A pit cellar beneath a cabin of this type

would be useless as animals could easily access it. It makes sense that in the early days, they had several pit cellars enclosed by sheds for protection of the pit contents. Later, they apparently excavated the deep cellar (Feature 1) associated with Feature 3, one of the chimney bases.

Scarcity of artifacts on historic sites that date to the reported occupation periods of the relevant fortifications is characteristic of frontier forts and station sites (McBride and McBride 1991, 1993). Artifactual evidence was primarily limited to wrought nails, Creamware and Redware ceramic sherds, and a few personal items such as pipes, buttons, and armaments such as gunflints and musket balls. The early historical material recovered from Constant's Station compares favorably with the material recovered from other excavated Kentucky and West Virginia eighteenth century sites.

HISTORIC BACKGROUND

The historic research correlates this site with the station founded by John Constant, Jr. But who was John Constant? Where did he come from and why did he settle here? The following information is summarized from Tuttle (1931) and the Constant Family Folder on file at the Clark County Public Library. John Constant was the son of John Constant, Sr. who moved his family from Yvelines, France to Maryland around 1730. From this oldest known beginning, the Constant family migrated to Hampshire County, Virginia, where John Constant, Jr. (hereafter referred to as Captain John Constant) was probably born. The Constant family migrated to Kentucky sometime during the 1770s. The first records of Captain John Constant in Kentucky appear in 1779. He was listed as a member of Captain John Holder's Company on June 10, 1789, which was stationed at or near Boonesborough (Constant Family Folder). He also appears as a lot holder at Boonesborough before 1780 (O'Malley 1989:25). After serving at Fort Boonesborough, he and his family apparently moved out to Strodes Station in Clark County about 1780. While living at Strodes Station between about 1780-1783, Constant served as the ranking militia officer (Bedford 1958:106).

Isaac Clinkenbeard's Revolutionary War pension application taken in 1833 describes several activities that included John Constant and associated him with George Rogers Clark. Constant apparently commanded a company of Fayette County militia in 1782 as shown by the following quotes taken from the Constant Family Folder (and ultimately from the George Rogers Clark papers 1781-1783):

- "Captn Constants pay roll from the 14th October until the 23rd November 1782".
- "A list of appraisements of horses etc lost at Capt Constant's defeat on the 14th at the Upper Blue Licks."

Bedford (1958:106) refers to the above mentioned "Constant's defeat" as "Boyle's Defeat." According to Bedford, Constant was blamed for this defeat and soon after left Strodes Station to start his own settlement.

Constant had applied for one 400-acre presumption grant in the late 1770s, but whether he built a house on it is not recorded. Between 1783 and 1786 he received seven land grants, in what would become Clark County, totaling 3,738 acres (Brookes-Smith 1976; Hammon 1992). For this project,

the relevant land grant is an 800-acre grant on Strodes Creek, surveyed on January 30, 1783 (Brookes-Smith 1976). The grant date is listed as June 1784, however, Constant, his wife Abigail, and their children reportedly moved from Strodes Station in 1783. They probably moved soon after the land was surveyed, perhaps during early spring so they could clear land and plant crops. Up to four families reportedly accompanied John Constant to his new station (Clinkenbeard 11CC54-66; Parvin 11CC172-175; John Hedge 11CC19-23). The various informants agree that the Andrew Hood family and the Parvins went with them. Others add either the Stampers (or Stubens), and/or the Morgan family. Andrew Hood was married to John Constant's sister during the 1770s-1780s (Bedford 1958:107).

Oral history accounts about Constant's Station appear in the Draper Manuscripts. Three accounts agree on some details, but differ in several regards (Clinkenbeard 11CC54-66; Parvin 11CC172-175; John Hedge 11CC19-23). The descriptions of the station layout vary slightly. William Clinkenbeard and Henry Parvin each drew a sketch for the interviewer (Figure 12). William Clinkenbeard was an adult during the 1780s and apparently lived with Constant for a short time in the later 1780s (after the 1785 Indian attack). Henry Parvin was a child who was actually involved in the attack. Clinkenbeard stated that:

> "Stamper's house was north of Constant's, right between it and the lane, a double house and Parvin had a part in it. It was partitioned in the middle, inside. Then there was another house, John Morgan's that married Constant's sister. That was east of Stamper's and Parvin's house. Then old Major Hood came and built out east of Constant's door". Wm Clinkenbeard (Draper 11CC54-66). [Draper Manuscripts n.d.]

Clinkenbeard also provided a description of the Native American attack in 1785. A few important points from that interview are summarized here:

- Constant's house was on corner piers that allowed him to crawl under the house and up through the floor boards during the attack.
- The house was built on uneven ground.
- The interview mentions the yard fence and a gate.
- They had at least hemp and corn fields.

Henry Parvin was a boy in the 1780s and lived at Constant's Station in 1785 and witnessed the attack. He was outside at the time of the attack and described the events in a very similar manner to Clinkenbeard. He also drew a plan of the station layout (Figure 12). The drawing is included both as found in the Draper Manuscripts (n.d.) and flipped so that north is to the top. If we compare this to the feature layout at 15Ck461, the arrangement of chimneys closely matches the sketch of Parvin's.

Many references speculate about the location of Constant's Station in relation to Strode's Station and other local Winchester landmarks. O'Malley (1987) reviewed many of these references. Unfortunately, O'Malley could not pinpoint a location, due to discrepancies in the various descriptions. Several descriptions are listed here to illustrate this variation.

- "Constant's Creek, or Constant's Fork of Strode's Creek, on which they lived, was named for them and this is the little stream that drains the present city of Winchester" (Constant Family Folder n.d.).
- "He left Strode's Station and established his own station a half mile downstream on Strode's Creek…The Constant descendants lived and owned land in the area and William

Landrum, who taught school in the area in the 1810s, referred to the community as the Constant Community rather than the Strode Community" (Bedford 1958).

- "Constant built where Moore now lives" (Wm Clinkenbeard's interview, 11CC54-66)
- "A blockhouse of logs known as Constant's Station stood in the valley of Strode's Creek about a mile below Strode's Station" (Jillson 1966 references Clinkenbeard's interview in Draper, but Clinkenbeard did not say this about Constant's Station).
- "This early fortified habitation was located within three-quarters of a mile of Strode's Station in Clark County (Jillson 1934).
- John Hedge said that Constant's Station was on a road that was opened up to Maysville from Boonesborough, through Strode's Station, and then on past Constant's Station.

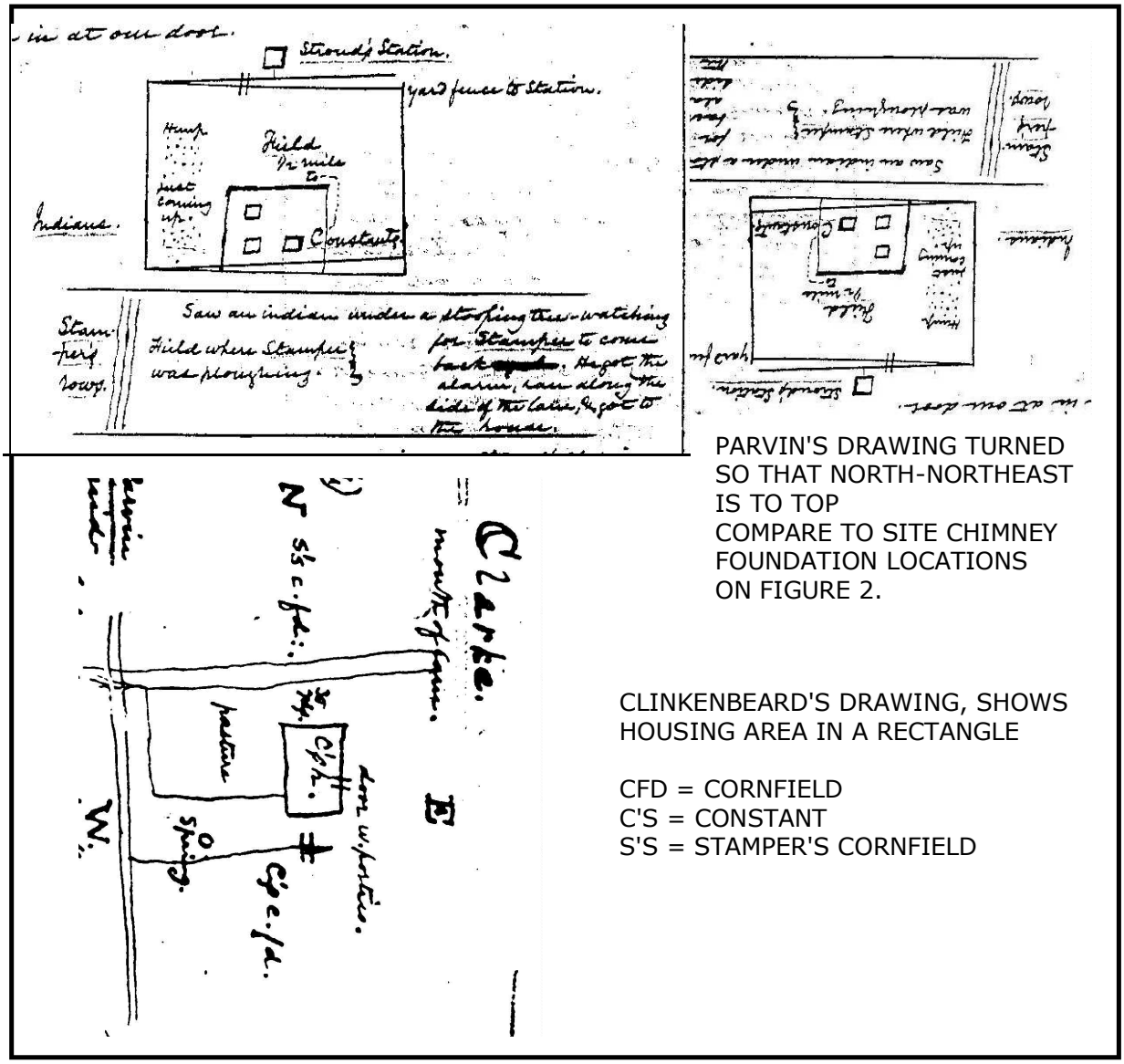

Figure 12. Clinkenbeard's and Parvin's sketch drawings of Constant's Station.

A review of the property deeds from 1811 and 1826 for the property on which the site is located finds that two early deeds reference an old road as a boundary of the property. The deeds call it the "old Hood Road." Hood's Station was supposed to be somewhere east of Constant's and Strode's Stations by several miles (Jillson 1934). Bedford (1958:106-107) claims that Hood's Station was about five miles north of Strode's Station and the Andrew Hood and John Constant were brothers-in-law. The mention of Hood's Road in deeds associated with this project property strengthens the argument that site 15Ck461 is the site of Constant's Station. It makes sense that the road to Hood's Station would run past Constant's property.

Jillson (1934) noted that the Wilderness Trail left Boonesborough after crossing the Kentucky River. This trail then extended to Strode's Station in the vicinity of present-day Winchester. At this point the road turned northeast and proceeded over the head of "Gest's Creek," the left or main fork of Stoner's Creek, crossed over the head of Hingston Fork and joined the Warriors Path just above the upper Blue Lick (Jillson 1934). This is likely the same road that O'Malley (1987) calls the Salt Lick Trace. If either/both is true, the "old Hood's Road" probably formed the beginning of the longer trace as it led north-northeast from Strode's Station. The Filson map of 1784/1793 shows a trail that leads northeast from Strode's Station, across the headwaters of Strode's Creek and on to the Upper Blue Lick. This trail would have passed very near Constant's Station.

As for the other locational descriptions, they all place Constant's Station north to northeast of Strode's Station, either in relation to Strode's Creek itself or to a fork of that creek. Site 15Ck461 is located northeast of Strode's Station at just over a mile distance. It is situated above a small fork of Strode's Creek that is probably the "Constant's Fork" referred to above.

If we accept the 15Ck461 site as Constant's Station then we may move forward into an analysis of what happened to his family after his death in 1788. John and Abigail Constant came to Kentucky in the late 1770s. Their first child, Thomas Constant, was born while they were still in Virginia in 1776. John, their second child, was born in Kentucky in 1781. Their children are listed here (Tuttle 1931).

- Thomas Constant; born Hampshire County, Virginia, August 14, 1776, died December 14, 1840, Menard County, Illinois.
- John Constant; born Clark County, Kentucky, September 13, 1781. Died November 18, 1835, ____ County, Illinois.
- Jacob Constant, born Clark County, Kentucky, unknown date in 1787. Died 1814 in Clark County, Kentucky.
- Abigail Constant born in Clark County, Kentucky, unknown date. Married Jacob Dawson and died in Clark County, unknown date.
- Isaac Constant; born Clark County, April 3, 1789 (seven months after death of Captain John Constant). Died December 25, 1854, _____ County, Illinois.

After the Native American attack sometime in 1785, the Constant's apparently moved back to Strode's Station for a short period of time but soon went back to their own property at Constant's Station. Bedford (1958:106) states that the station broke up in 1787. Captain John Constant and family evidently stayed on their land because he died there on October 10, 1788. Bedford (1958:106-107) also places Andrew Hood and family at Constant's Station until 1789.

John Constant's will was probated in Bourbon County (Bourbon County Will Book 1, pages 11-12). Van Swearingen and Isaac Constant (Captain John's brother) witnessed the will as it was dictated (called a noncuperative will). Constant was ill with an acute sickness (exact illness unknown). The will was dictated on October 1 and he died on October 10, 1788, at his home. Swearingen and Isaac Constant swore that the will was valid even though Captain John was too ill to sign it. The will left everything to his children in care of his wife Abigail but does not individually name the children. This may be because she was pregnant with their last child, Isaac, who would not be born until the following April.

Abigail Constant apparently stayed on their land through her lifetime, raising her children and farming the land. John's probate inventory includes a few household items such as kettles and wash tubs, furniture, chests and plain bed, and feather beds. It conspicuously leaves out other household and food production items such as dishes, cutlery, and so forth. The men doing the inventory may have just included those as 'furniture' or not included them because they would definitely stay with Abigail.

The few personal items that are included are interesting as they mark him as being literate. The inventory includes a compass and instruments, presumably surveying instruments, possibly inherited from his father. They also had books and periodicals such as the Spectator to read. Constant, at least, apparently had some education. This may indicate that they had brought other items not listed with them such as porcelain, good tableware, and so forth.

Two spinning wheels are also listed in the inventory. The discovery of sewing notions in the archaeological record indicates that Abigail was processing wool and flax (the inventory also lists eight sheep and flax) to make cloth. She would then use that to produce clothing and blankets for her family. She may also have traded the cloth for other goods or services.

As a widow, she would have had a difficult time providing for her young children whose ages ranged from 12 down to newborn after the father's death. Thomas, as the oldest at 12, would have been old enough to plow, work on the farm, and hunt.

The archaeological evidence indicates that during the latter part of their occupation of the site, the family probably lived in the structure associated with Features 1 and 3, the larger pit cellar and chimney foundation respectively. The shallower pit features contain earlier period artifacts and do not include any Whiteware ceramics in them. The shallow pit features were likely associated with the earlier occupations during its use as a station. The Constant family probably then filled them in over the next several decades. They may have torn down the extra houses, converted one or more into outbuildings, or even rented them out to men such as William Clinkenbeard who indicated in his Draper Interview that he lived with the Constant's at least for a while after the 1785 attack.

Census and tax records indicate that Abigail Constant did not own any slaves, nor did any of her sons who by 1810 were heads of households in their own right. They would have worked the land themselves or possibly with tenants.

Abigail's death date is not recorded. The Constant Family Folder (n.d.) includes some anonymous biographical information that says she died in 1798. This is unconfirmed. Her children began to come of age and marry beginning in the late 1790s. Thomas married Margaret Edmundson on January 16, 1796, when he was 20 years old (Clark County Marriage Book 1W, p15). John Constant married Margaret's sister, Susanna Edmundson on March 11, 1802. Jacob and Isaac married a bit later. Jacob married Elizabeth Judah (surname now known as Judy locally) on March 31, 1808. Isaac married Amy Dean on July 4, 1811. No marriage record was found for the daughter Abigail, although the Constant Family Folder says she married a man named Dawson and lived in Clark County.

Thomas, John and Jacob appear in the 1810 Clark County census but none have an older female living with them. Six Dawson families lived in Clark County in 1810 and none have an older female without an accompanying male of similar age. It is probable that Abigail was deceased by or before 1810. In 1811, the Constant children divided up their family property. A set of deeds breaks up the large holdings and John Constant III ended up with the site on which 15Ck461 is located.

The archaeological data provides clues to their lifestyle and how they operated the farm. Both a mule and horse shoe were recovered from the site. The Phase II also collected a broken iron stirrup from the ground surface. Constant's probate inventory lists two mares and two work oxen. They would have used those animals and perhaps later a mule for plowing, dragging wood and other heavy items, and for pulling a wagon or cart.

Butchered pig and deer remains were recovered along with chicken, rabbit, duck, and other small animals that may have served as food. They kept pigs and chickens to provide food and sources for lard and soap in the case of the pigs. The inventory for John Constant lists ten hogs, eight sheep, several cows, calves, and a steer. The cows would have provided milk and meat from the steer. They may have added chickens at a later date.

The wild game suggests that they supplemented their basic food choices with additional choices. These include deer, rabbit, turtle, fish, wild fowl, and other small game such as squirrels. The ratio of domestic to wild seems typical for other sites found in the central Kentucky region as noted in the Faunal Analysis Section above. The deer and cattle may have also provided hides for leather working. Constant's inventory includes several entries of rawhide or leather.

Crops noted in the probate inventory include corn, wheat, rye, hemp and flax. The hemp and flax are cash and product crops that provided income. Abigail probably processed most of the flax herself into cloth using one of her two spinning wheels. They may have sold the hemp or processed it into rope, baskets, or other rough cloth. Neither are represented in the archaeological record by seeds or other floral material. The archaeological investigations recovered corn/maize, wheat/barley seeds, peppers, beans, and squash. It appears they were producing crops to be self-sufficient in terms of food. They probably traded or sold any excess.

Artifacts from the 1790s to 1820s time period include a variety of Creamware and Pearlware ceramics. A very few glass container sherds from handblown bottles were also recovered. The Constant family does not appear to have consumed alcohol in any quantity as few if any sherds of

that type of container were found. Two small sherds of cut glass were recovered, probably from a small, tableware dish such as a salt or condiment dish. The ceramics are moderate to somewhat upper class, and include some transfer print Pearlware in cobalt blue. By the early nineteenth century, the family would have access to imported goods in Lexington and probably in Winchester itself. Certainly, imported goods such as English ceramics, cloth, cutlery, glassware, and other fine goods were available in Maysville to the north by the early nineteenth century. Goods would have traveled south to Lexington, through Paris and other local towns (Kreinbrink 2004).

The Constant Family Folder (n.d.) indicates that the Constant family left Kentucky and moved to Illinois between 1826 and 1835. No Constant family members were found in the Clark County 1830 census. This fits neatly with the decline in artifacts found at the site. Archaeologically, it appears that Constant's Station was abandoned during or toward the end of the 1830s. The site became abandoned to agriculture and time.

CONCLUSIONS

Archaeological investigations at 15Ck461 included Phase I-III studies. The data recovery included excavation of over 4,330 m^2 and excavation of multiple historic period features. Spatial distribution of features suggests three separate small houses with limestone fireplace foundations. One fireplace (Feature 3) also has a deep pit cellar (Feature 1) located in front of it. The presence of other, shallow pit features such as Features 2, 4, and 14 indicates other possible structure locations. Feature 170 may be the in-filled base of a bank barn that probably dates to the early nineteenth century use of the farm.

The historical research and archaeological investigations have provided the following data:

- 15Ck461 produced a tight date range of artifacts that fits the Constant family's use of their homestead/station from 1783 to the early 1830s.
- The general layout of the primary structural features at the site appears to match the historical sketches of Constant's Station.
- The site lies within a mile of the historical location of Strode's Station, in the same general direction given in the nineteenth century interviews.

The evidence indicates that 15Ck461 is the original site of Constant's Station and later the homestead for his widow and children. Most of the remaining Constant children left for Illinois by the early 1830s and the site became abandoned to agriculture and time. The excavation and analysis contribute significant information about the settlement and early historical period occupation of the Clark County and central Kentucky area.

REFERENCES CITED

Andrews, Susan C., James P. Fenton, Tracey A. Sandefur, W. Stephen McBride
2004 *"The Necessary, Durable, Useful, and Ornamental…" Archaeology of a Transitional Pioneer Farmstead, the John Arnold Farmstead, Logan County, Kentucky, Item N0. 3-275.00*. Manuscript on file, Office of State Archaeology, Lexington, Kentucky.

Ball, Donald B.
1983 Approaches Toward the Dating of 19th Century Ohio Valley Flat Glass. In *Proceedings of the Symposium in Ohio Valley Urban and Historic Archaeology*. Volume I, pp. 129-137. Louisville.

Bedford, A. Goff
1958 *Land of Our Fathers: History of Clark County, Kentucky.* Series: History of Clark County Volume 1. Manuscript on file, Clark County Public Library, Winchester.

Bonzani, Renee
2003 Botanical Analysis. In *Investigations of Site 15Ck461, Clark County, Kentucky*, edited by Jack M. Schock. Manuscript on file, Office of State Archaeology, Lexington, Kentucky.

2004 Botanical Analysis for Site 15Ck461, Clark County, Kentucky. In *Constant's Station Mitigation of Site 15Ck461 Winchester, Clark County, Kentucky.* Manuscript on file, Office of State Archaeology, Lexington, Kentucky.

Braun, E. Lucy
1950 *Deciduous Forests of Eastern North America*. The Blakiston Company, Philadelphia.

Brookes-Smith, Joan E.
1976 *Master Index Virginia Surveys and Grants 1774-1791.* Kentucky Historical Society, Frankfort.

Constant Family Folder
n.d. Original unpublished documents. Folder on file, Clark County Public Library, Winchester, Kentucky.

Cooper, D. Randall, and James T. Kirkwood
2001 *An Archaeological Survey of the Proposed Winchester Industrial Park, Phase VI Expansion Area in Clark County, Kentucky.* Manuscript on file, Kentucky Heritage Council, Frankfort.

Draper Manuscripts
n.d Original unpublished Parvin Interview: 11CC172-175; John Hedge Interview: 11CC19-23; Clinkenbeard: 11CC54-66. Interview on file, Kentucky Department of Libraries and Archives, Frankfort.

Hammon, Neal O.
1992 Early Kentucky Land Records 1773-1780. Filson Club, Louisville. On file, Kentucky Department of Libraries and Archives, Frankfort.

Haragan, Patricia
1991 *Weeds of Kentucky and Adjacent States.* University Press of Kentucky, Lexington.

Historic Deerfield Museum
2001 Delftware at Historic Deerfield. Historic Deerfield Museum.

Jillson, Willard Rouse
1966 *Early Clark County Kentucky: A History (1674-1824)*. Roberts Printing Co., Frankfort, Kentucky.

1934 *Pioneer Kentucky an Outline of its Exploration and Settlement, its early cartography and primitive geography coupled with a brief presentation of the principal trails, springs, licks, fords and ferries used prior the year 1800.* The State Journal Company, Frankfort, Kentucky.

Kreinbrink, Jeannine
2004 *"Among your Friends and Acquaintances": The Anderson Slave Pen and the Business of Slavery; Cultural Resources Mitigation at 15Ms112/Ms549 Mason County, Kentucky.* Submitted to National Underground Railroad Freedom Center by Natural & Ethical Environmental Solutions. Office of State Archaeology, Lexington, Kentucky.

2005 *Constant's Station Mitigation of Site 15Ck461Winchester, Clark County, Kentucky.* Manuscript on file, Office of State Archaeology, Lexington, Kentucky.

McBride, W. Stephen and Kim A. McBride
1991 *An Archaeological Survey of Frontier Forts in the Greenbriar and Middle New River Valleys of West Virginia.* Archaeological Report No. 252. Program for Cultural Resource Assessment, University of Kentucky, Lexington.

1993 *Forting-up on the Greenbrier: Archaeological Investigations of Arbuckle's Fort, 46GB13, Greenbrier County, West Virginia*, edited by W. Stephen McBride and Kim A. McBride. Archaeological Report No. 312. Program for Cultural Resource Assessment, University of Kentucky, Lexington.

2000 *Archaeological Investigations at Logan's Fort, Lincoln County, Kentucky.* Kentucky Archaeological Survey Research Report No. 3. Office of State Archaeology, Lexington, Kentucky.

Miller, George, B, Patricia Samford, Ellen Shlasko, and Andrew Madson
2000 Telling Time for Archaeologists. *Northeast Historical Archaeology*:291-22.

Moerman, Daniel E.
1998 *Native American Ethnobotany.* Timber Press, Portland, Oregon.

Moir, Randall W.
1987 Socioeconomic and Chronometric Patterning of Window Glass. In *Historic Buildings, Material Culture, and People of the Prairie Margin: Architecture, Artifacts, and Synthesis of Historic Archaeology*, edited by Randall W. Moir and David H. Jurney. Richland Creek Technical Series (5), Archaeology Research Program, Southern Methodist University, Dallas.

Newman, George C. and Frank J. Kravic
1989 *Collector's Illustrated Encyclopedia of the American Revolution.* Rebel Publishing Company, Inc., Texarkana, Texas.

O'Malley, Nancy
1987 *Stockading Up, A Study of Pioneer Stations in the Inner Bluegrass Region of Kentucky*. Archaeological Report No. 127. Program for Cultural Resource Assessment, University of Kentucky, Lexington.

1989 *Searching for Boonesborough*. Archaeological Report No. 193. Program for Cultural Resource Management, University of Kentucky, Lexington.

1999 Frontier Defenses and Pioneer Strategies in the Historic Settlement Era. In *The Buzzel about Kentucky.* edited by Craig Thompson Friend. The University Press of Kentucky, Lexington.

Peres, Tanya M.
2003 *Zooarchaeological Remains from Site 15Ck461, Clark County, Kentucky.* Program for Archaeological Research, University of Kentucky, Lexington.

Schock, Jack M.
2004 *Archaeological Phase II Testing of site 15Ck461 in Clark County, Kentucky*. Manuscript on file, Office of State Archaeology, Lexington.

Schoen, Christopher
1990 Window Glass on the Plains: An Analysis of Flat Glass Samples from Ten Nineteenth Century Plains Historic Sites. *Central Plains Archaeology* 2(1):57-90.

Tuttle, Dr. H.H.
1931 Letter from Dr. Tuttle to Dr. George Doyle, dated March 5, 1931 regarding Constant family genealogy. On file, Clark County Public Library, Constant Family Folder, Winchester, Kentucky.

United States Department of Agriculture (USDA)
1989 *Soil Survey of Clark County, Kentucky.* U.S. Department of Agriculture, Washington, D.C.

Wyss, James D. and Sandra K. Wyss
1977 *An Archaeological Assessment of Portions of the Red River Gorge, Daniel Boone National Forest, Kentucky.* Archaeological Report No. 1, U.S. Department of Agriculture, Forest Service, Southern Region.

BOTANICAL EVIDENCE OF FUNCTION, STATUS, GENDER AND ETHNICITY IN HISTORIC PERIOD CONTEXTS: THE CASE OF THE ARMSTRONG FARMSTEAD SITE (15FA185) IN KENTUCKY AND THE ARGOSY SITES (12D502, 12D520, AND 12D508) IN INDIANA

By

Renée M. Bonzani
Department of Anthropology
University of Kentucky
Lexington, Kentucky

ABSTRACT

Current interests in anthropology are often focused on the issues of status, gender, and ethnicity. Approaching these issues from an archaeological point of view, four Historic period sites (mid-nineteenth through early twentieth centuries) were investigated to determine if status, gender, ethnicity relations, and function could be identified in the archaeological record using botanical remains recovered from these sites. The sites include the Armstrong Farmstead (15Fa185) located in Fayette County, Kentucky and three others (12D502, 12D520 and 12D508) that are part of the Argosy complex located in Lawrenceburg, Indiana. The botanical remains revealed that the function of the sites had the most influence in determining the different categories of ecofacts recovered. Status could be differentiated to a lesser degree based on the diversity of plants recovered, while gender relationships to plant use could not be directly determined by the botanical remains recovered. Ethnicity, however, was identifiable through ethnic food preferences, though the evidence of this comprised less than one percent of the total botanical remains recovered.

INTRODUCTION

Many issues are important to archaeologists and anthropologists studying human lifeways. Traditionally, various lines of evidence focused on information on the function of a site or particular context (Taylor 1983; Trigger 1989; Willey and Sabloff 1974). As issues concerning status and gender became important in anthropology, so to did the need for approaches to studying these issues in the archaeological record (D'Altroy and Hastorf 2001; Gero and Conkey 1991; Hodder 1982; Welch and Scarry 1995). Ethnicity, long known as the culture-historical approach in archaeological terms, is also a current issue of great concern to anthropologists as groups from different parts of the world have more and more contact (Anderson 1991; Trigger 1989). All of these topics can be studied archaeologically using various lines of evidence. In this paper the use

of the botanical remains from four Historic period sites in the Midwestern United States will be used to approach the topics of site function, status, gender and ethnicity (Bonzani 2002a, 2002b, 2003, 2006). Approaches for how these topics can be discerned using these types of archaeological remains will be discussed.

This study utilized the macro-botanical remains recovered from four Historic period archaeological sites. The sites include the Armstrong Farmstead (15Fa185) located in Fayette County, Kentucky and three sites (12D508, 12D502, and 12D520) that are part of the Argosy complex located in Lawrenceburg, Dearborn County, Indiana. These sites were investigated during archaeological projects conducted by Cultural Resource Analysts, Inc. (CRAI). Historic documents for these sites were reviewed and they give important information about the economic status and ethnicity of the owners and inhabitants of the sites, and the function of the sites was established.

In the case of the Armstrong Farmstead, historic documents reveal that the site was occupied from the early 19th to early 20th centuries. In 1846 John Armstrong, an immigrant from Ireland, bought the property. Based on the amount of land owned, the family was probably of middle class status. The family maintained a large farm on the property and sold wheat, oats, corn and potatoes (Moore and Rotman 2002). The household structures themselves may also have been used as an inn, way-station or boarding house for Irish immigrants who worked on the turnpike between Paris and Lexington along the Lexington-Maysville Pike in Kentucky (Allgood and Kirkwood 2002; O'Malley 1987; Deborah Rotman, personal communication 2003).

The historic documents for the Argosy sites reveal information about function, ethnicity, and potential status of the sites' occupants (Creasman and Rotman 2003). The Argosy sites are located in Lawrenceburg, Indiana. Lawrenceburg was intensively settled between 1815-1880 with industrialization occurring after 1880. In 1839, the Whitewater Canal was built which caused an economic boom for the town. As the population grew, many German immigrants arrived in the town. Due to this German influence, the town later became known as Germantown. Railroad lines constructed in the 1850's to 1860's also added to the town's growth and prosperity.

In terms of function, the historic documents indicate that Site 12D508 was used as an inn for travelers who arrived in Lawrenceburg on the canal system during the Canal period from 1839 to 1843. The site is located next to the old Canal route through the town. Occupants were probably of low status or transitory in nature. Sites 12D502 and 12D520 are both noted as being used for domestic residential households. Site 12D502 was a single domestic household occupied from 1839 to 1918. The site was initially owned by wealthy landowners from New England and then from North Carolina. In 1851 the property was sold to persons who were all natives of Germany. Later in 1864 the property was sold to another German family and it remained in this German family's hands from 1864 to 1918. Occupants of Site 12D502 were probably of middle to upper class status since they were listed as owning horses and carriages and buying the property for a large sum of money. Site 12D520, however, was divided into two residential or domestic structures and occupied from 1839 until 1883. Different families, mainly of German descent, occupied it through time. Status of the occupants of Site 12D520 was probably low to middle income as occupations include grocer, laborer and foreman in local factories, and railroad workers. The

historic documents provide a context within which the botanical remains can be interpreted. From this background the issues of function, status, gender, and ethnicity can be studied and elaborated.

METHODOLOGY

Flotation samples were processed at the offices of Cultural Resource Analysts, Inc., in Lexington using the R. J. Dausman Technical Services, Inc. Flote-Tech system. This system allows for both a "light" fraction and "heavy" fraction to be collected. The light fraction includes the carbonized material that floats in the water and is collected after the soils are poured into the system. The heavy fractions are those materials which do not float and are collected in a fine screen at the bottom of the container. Experiments on efficiency of recovery done with this brand machine yielded a 74 to 80 percent recovery rate, which is within acceptable limits (Pearsall 2000; Wagner 1982). No cross-contamination between samples occurred. This paper reports about botanical materials recovered from both light and heavy fractions.

Prior to sorting, all light and heavy fraction samples were weighed. The light fractions from each sample were gently sifted through a nested series of geological sieves (mesh sizes 2 mm, 1 mm, and 500 μm). This procedure facilitates sorting by producing three fragment size classes: > 2mm, 2 mm – 1 mm, and <1 mm. Heavy fractions are processed in the same manner.

For samples from prehistoric sites, except for those with extremely good preservation, only the carbonized botanical remains undergo full analysis (Lopinot and Brussell 1982). However, in the case of historic sites with a time depth of a few hundred years, botanical remains may be preserved in a desiccated form for many plant taxa (Miller 1989; Rossen 1992; Scarry 1993). However, as with carbonized remains, tubers and plants that have undergone extensive processing are unlikely to be preserved in either form. Both carbonized and desiccated botanical remains were analyzed as part of this study. In some instances seeds were recovered that revealed no signs of age or of being buried in an archaeological context and these were assigned to an uncarbonized seed category.

All carbonized and desiccated materials in the > 2mm size screen were sorted by count and weight into constituent material categories (e.g., nutshell, wood charcoal, and seeds). Nutshell and seeds were then further quantified by genus/species. Carbonized and desiccated plant materials retained in the 1 mm and 500 μm mesh screens and catch basin were scanned using an Olympus binocular microscope at a magnification of 10x. Any seeds, fleshy fruits (e.g., *Cucurbita* rind), etc. were removed, counted, and weighed by taxon and type of material.

Identification of plant remains was done by using an Olympus binocular microscope at magnifications of 7x for materials >2 mm and at 10 to 20 x for materials <2 mm. Identifications were substantiated with use of the reference collection in possession of the author. Secondary sources included various identification manuals (D'Arcy 1986; Martin and Barkley 2000; Montgomery 1977; Muenscher 1955; Panshin and de Zeeuw 1980; Steyermark 1963; Young and Young 1992).

A number of factors can affect the preservation of plant remains at an archaeological site. These include cultural factors such as food preparation techniques as well as nonhuman factors, including animal perturbations, soil type, post-depositional geological activities, plant preservation differences and others. To adjust for these factors a number of statistical measures are utilized when presenting the results of ecofactual analysis that help build interpretations presented in any report about plant remains. The most common statistical measures found in paleobotanical analyses include density, ubiquity, and in some cases, diversity indexes. All of these measures can be used to overcome problems in the quantification of ecofacts (Johannessen 1984; Jones et al. 1986; Lennstrom and Hastorf 1992, 1995; Lopinot et al. 1991; Pearsall 1983).

Density ratios represent the raw count of plant remains or their weight divided by the total liters of processed fill for a cultural context. They are used in an effort to standardize sample data. Density ratios give abundance values that allow for the comparison of count or weight of a plant taxon per volume of soil processed. These ratios are often used for comparisons between sites and through time to discern changing plant use strategies. Ubiquity is a measure of presence or absence of a given type or taxa in each sample (Hastorf and Popper 1988; Thompson 1994). Ubiquity scores account for differential preservation factors affecting archaeological plant remains. In general they are not used between site comparisons but they can be meaningful within a site or archaeological assemblage for determining the importance of a plant taxon or addressing the type of site under study (Asch and Asch 1981). The ubiquity scores at these sites are not addressed in this paper (see Bonzani 2002a, 2002b, 2003, 2006). The diversity index is a measure of two factors. The first factor is the quantity of the number of types of taxa at a site, referred to as richness. The second factor, referred to as evenness, indicates how many individuals of each type occur. A diversity index can be measured by the following equation (see Magurran 1988:39-40):

$$\text{Simpson's Index:} \quad L = \frac{\Sigma\, n1\,(n1-1)}{N\,(N-1)} \;;\; 1 - L$$

Where $n1$ = number of individuals in a particular taxa, N = total number of individuals in a sample, and 1 = most diverse.

The diversity index allows for the determination of the redundancy or similarity of remains (including ecofacts, features, etc.) within a site or of remains between sites (Binford 1980, 1983; Bonzani 1997; Kelly 1995; Oyuela-Caycedo 1998). Redundancy or similarity of ecofacts in an assemblage would be indicated by their low diversity index. Low diversity indicates either the use of a few species to the exclusion of others or by the greater use of few species with other species occurring in lesser quantities. High diversity indicates that many plants are being utilized or that many plants are available and are found within the plant management system of the group under study (i.e., ruderal or weedy taxa). The following results incorporate these statistical measures in the interpretations of the data obtained.

Table 1. Carbonized and desiccated botanical remains from the light and heavy fractions and diversity index for the Armstrong Farmstead Site (15Fa185).

Sample No.	3	4	10	11	6	7	8	9	42	43	46(47)	48(49)	13	32	33	18	19	34	35	36	37	59	69	70	71	72	
Unit Description	26	26	26	26	28	28	28	28	42	42	42	137	31	97	97	27	27	99	99	99	99	135	141	141	141	141	
Feature	-	-	-	-	-	-	-	-	-	-	-	-	16	3	3	14	14	14	14	14	14	34	37	37	37	37	
Level /*cmbd*	2	3	4	5	2	3	4	5	2	3	4	1	-	3	4	*55-72*	*72-86*	*25-35*	*35-45*	*45-55*	*55-56*	-	3	4	5	6	
																											TOTAL
Volume (L)*	10	10	8	10	20	20	20	20	10	10	15(3)	10(10)	12	16	6	10	10	16	17	8	4	18	10	10	10	10	**320**
Total Volume														32		20	20	34									**387**
Weight of light fraction (g)**	98.2	59	50	22	44.4	44.4	45	10	19	53	61.3	44.8	85	9.3	27	49.4	3.1	38.7	7.9	21.3	4.5	44	44	11.5	26	32	**956**
Total Weight	242				176	167					74.1	127.7		36		73.7	45.1	93.6				89					**1642.6**
Weight of heavy fraction (g)	34.2	82	11	3.8	282	300	29	2.8	13	0.2	0.9	146.6	100	4	10	77.7	28.5	139	11.7	6.4	11.7	73	2.9	0.7	0.1	0	**1370.9**
Wood number from both fractions	1	7	3	3	2	9	22	14	23	120	265	0	209	163	236	109	35	45	44	11	1	11	108	1	6	3	**1451**
Wood weight (g) from both fractions	<0.1	0.4	0.1	0.1	0.1	0.6	0.7	0.5	1	4.9	11.4	0	7.9	8.3	15	4	1.3	1.3	1.8	0.3	0.1	0.6	5.6	<0.1	0.2	0.1	**66.7**
Nutshell number from both fractions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0	0	0	0	0	**7**
Nutshell weight (g) from both fractions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	<0.1	0	0	0	0	0	0	**0.2**
Aizoaceae *Mollugo verticillata*	1	5	9	8		1	6			1	2	7	5	19	4	53	14	13	7	7	4	6	3	1	4	3	**183**
Aquifoliaceae *Ilex* cf. *montana*		9													1			1									**11**
Caprifoliaceae *Lonicera* sp.															1												**1**
Caryophyllaceae *Cerastium vulgatum*	20	7	2	2			2					1						3									**37**
Silene antirrhina		1			8	1	2		1			2	1	3		12	11	13	3	5	4						**67**
Stellaria media	3	1	1																	1	1		12	11	12	4	**46**
Chenopodiaceae *Chenopodium* sp.	6	2	1		2	1	4				1							2				4	7		2	3	**35**
Chenopodiaceae/Amaranthaceae		3	1	1			2						18	2		7	2	21	7								**64**
Compositae			1					1					4			1											**7**
Ambrosia artemisiifolia	13				4		3										1					5					**26**
Cucurbitaceae *Cucurbita* sp.					1	2			1	14	1		1			2	4			1	1						**28**
cf. Cyperaceae																2											**2**

Sample No.	3	4	10	11	6	7	8	9	42	43	46(47)	48(49)	13	32	33	18	19	34	35	36	37	59	69	70	71	72	
Unit Description	26	26	26	26	28	28	28	28	42	42	42	137	31	97	97	27	27	99	99	99	99	135	141	141	141	141	
Feature	-	-	-	-	-	-	-	-	-	-	-	-	16	3	3	14	14	14	14	14	14	34	37	37	37	37	
Level /*cmbd*	2	3	4	5	2	3	4	5	2	3	4	1	-	3	4	*55-72*	*72-86*	*25-35*	*35-45*	*45-55*	*55-56*	-	3	4	5	6	
																											TOTAL
cf. *Carex* sp.																						1					**1**
Cyperus sp.																	1										**1**
cf. *Scirpus* sp.							1																				**1**
Euphorbiaceae *Acalypha* sp.	2	3			3		2	1				1		1	1		1	1									**16**
Euphorbia sp.	3				4		2		3	3	2							4		2		1					**24**
cf. *Euphorbia* sp.																			1								**1**
Juglandaceae *Juglans* sp.***																		6		1							**7**
Labiatae								2	1																		**3**
Lamium sp.	10	2		1	40	12	3	5	2			23	2	5	3	2	2	4			1	7	12	7	12	6	**161**
Leguminosae													6				1										**7**
Robinia cf. *psuedoacacia*			1			1											1										**3**
Liliaceae cf. *Allium* sp.	2	1																									**3**
cf. *Allium schoenoprasum*								1																			**1**
Malvaceae													4									1					**5**
cf. *Malva* sp.		1				1	5						9			10	4	6	1				2				**39**
Sida sp.													16													1	**17**
Onagraceae *Epilobium* cf. *ciliatum*	7						1	1	1				1	1		3		1	2	1							**19**
Oxalidaceae *Oxalis stricta*	19	7	2	2	29	11	9	5	2			9	3	1	13	3		2	2	3	1	1	1		6	2	**133**
Phytolaccaceae *Phytolacca americana*		1		1								1						3					1				**7**
Pinaceae																		4									**4**
Plantaginaceae *Plantago* cf. *psyllium*	6	3	1																								**10**
Poaceae	32	11	12	7	9	1	6						18	10		1		4		1	1	1	1	1	1	2	**119**
Avena sativa													2	1													**3**
Digitaria spp.	7	1				1	1					1	5									1	2				**19**
Paspalum sp.	6		12	1	5		1					2	6			2		4	1			4	8				**52**

Sample No.	3	4	10	11	6	7	8	9	42	43	46(47)	48(49)	13	32	33	18	19	34	35	36	37	59	69	70	71	72	
Unit Description	26	26	26	26	28	28	28	28	42	42	42	137	31	97	97	27	27	99	99	99	99	135	141	141	141	141	
Feature	-	-	-	-	-	-	-	-	-	-	-	-	16	3	3	14	14	14	14	14	14	34	37	37	37	37	
Level /*cmbd*	2	3	4	5	2	3	4	5	2	3	4	1	-	3	4	*55-72*	*72-86*	*25-35*	*35-45*	*45-55*	*55-56*	-	3	4	5	6	
																											TOTAL
Setaria cf. *glauca*	102	33	39	6	8	2	3	6	9	3	5	10	6	14	91		1	2	2		2	37	2		2	1	**386**
Triticum aestivum										7				1													**8**
Zea mays			1							5							1	3	2		1						**13**
Polygonaceae *Polygonum* sp.										1			29				1										**31**
cf. *Polygonum erectum*					5	1							18	1	1	3	1	2									**32**
Portulacaceae *Portulaca oleracea*	3	5	6	13	3	2	12	2			8	8	8	7		559	146	223	107	36	8	6	3	2	5		**1172**
Rosaceae *Crataegus* sp.													2	1	6												**9**
Rubus sp.													1														**1**
Potentilla sp.													2														**2**
Rubiaceae *Galium* sp.		1													1												**2**
Solanaceae *Capsicum* sp.													2			1						1					**4**
cf. *Lycopersicum exculentum*	5				29	12	11	10																			**67**
Physalis sp.		1	3	1	4	4	3	2			1		62			25	1	58	32	5		3	6	1	1	5	**218**
cf. *Nicandra physaludes*						1												1									**2**
cf. *Nicotiana* sp.		1	1																								**2**
cf. *Solanum* sp.							1																				**1**
Solanum cf. *americanum*													64			3	1	27		2							**97**
cf. Violaceae	189	25	10	23	28	13	12	6									1	1		1		14	3	1	3	2	**332**
Vitaceae *Vitis* sp.																	1										**1**
Unknown type 1											3																**3**
Unknown type 2																	1										**1**
TOTAL	**436**	**124**	**103**	**66**	**182**	**67**	**92**	**42**	**20**	**34**	**23**	**65**	**295**	**67**	**122**	**689**	**197**	**409**	**167**	**66**	**25**	**94**	**61**	**24**	**48**	**29**	**3547**

Sample No.	3	4	10	11	6	7	8	9	42	43	46(47)	48(49)	13	32	33	18	19	34	35	36	37	59	69	70	71	72	
Unit Description	26	26	26	26	28	28	28	28	42	42	42	137	31	97	97	27	27	99	99	99	99	135	141	141	141	141	
Feature	-	-	-	-	-	-	-	-	-	-	-	-	16	3	3	14	14	14	14	14	14	34	37	37	37	37	
Level /*cmbd*	2	3	4	5	2	3	4	5	2	3	4	1	-	3	4	*55-72*	*72-86*	*25-35*	*35-45*	*45-55*	*55-56*	-	3	4	5	6	
																											TOTAL
Uncarbonized seeds	2	1			1				1			1	2	2	1	2	2		2	1	1		2				**13**
Unidentified carbonized fragments	4	4		19****			3	5			5		12	1	2	1		7	3								**58**
Insect remains	38	20	11		31	18	19	36		12		6	8		6	361	25	61	91	1	2	6	74	19	6		**640**
Mollusk remains	74	42	76		17	5	43	34	3	10	32	72	106	833	449	105	27	8	36	9	3	5	156	90	75	19	**1859**

Diversity Index for seeds/fruits/nutshell is 0.86.
*One sample analyzed of two flotation samples collected (32, 18, 19, 34). Total volume listed under volume analyzed.
**Total light fraction weight for sample listed under the amount analyzed.
***Recovered only from heavy fractions. Included in total.
****Carbonized fragments of a capsular fruit type as is found in some members of the Solanaceae.

RESULTS

For the Armstrong Farmstead, 28 flotation samples recovered from five features and four units were analyzed. Total flotation volume from the 28 samples was 387 liters with 320 liters undergoing analysis. Both light and heavy fractions from the samples were analyzed. The flotation of the 28 samples yielded 1,642.6 grams of light fraction with 956 grams undergoing analysis and 1,370.9 grams of heavy fraction with all of the heavy faction analyzed. Two of the floated samples (flotation numbers 47 and 49) were not analyzed as they represented the same provenience as flotation sample numbers 46 and 48, respectively. Likewise, only one of two samples collected from flotation numbers 18, 19, 32, and 34 was analyzed as they also represent the same provenience. For four samples (flotation numbers 3, 6, 7 and 59), the recovered light fraction was prohibitively large for complete analysis and random sub-samples of these fractions were analyzed. Proveniences analyzed include a privy (Feature 14), a dumping episode (Feature 16), a trash pit (Feature 3), an area located under a brick patio (Feature 34), an area below a stone path (Unit 42) and general midden (Units 26 and 28).

The Armstrong Farmstead collection included 3,540 carbonized and desiccated seeds/fruits (0.4 grams), as well as 21 uncarbonized modern seeds, 857 insect remains, 2,369 mollusk shells and 66 unidentified fragments of carbonized botanical material (Tables 1 and 2). In addition, 1,451 fragments of carbonized wood (66.7 grams) and seven fragments of carbonized nutshell (0.2 grams) were recovered. The majority of the samples analyzed contained desiccated seed remains and some carbonized seeds. The exception to this was Feature 16, a probable dumping episode, in which most of the seeds were carbonized. All of the wood and nutshell recovered was carbonized, as were the seed remains from the domesticated crop plants of corn (*Zea mays*), oats (*Avena sativa)*, and wheat (*Triticum aestivum*). It is noteworthy that none of the desiccated seed remains recovered had a dark brown cast noted in Rossen (1992) for seeds that most likely were baked into pies or cobblers. In total, 28 families, 43 genera, and 21 species of plants were identified. Four seeds from two unknown taxa were also encountered.

Table 2. Density measures for carbonized and desiccated botanical remains recovered from the Armstrong Farmstead Site (15Fa185).

	Raw Count		Density*	
	Count	Weight (g)	Count	Weight (g)
Site 15Fa185 (320L)				
Wood	1451	66.7	4.5	0.2
Nutshell	7	0.2	<0.1	<0.1
Seed/fruits	3540	0.4	11.1	<0.1

*Number or weight divided by total liters (320L) of processed fill for cultural context.

Five Historic period sites were initially analyzed from the Argosy sites (12D502, 12D508, 12D516, 12D517, and 12D520) located in Lawrenceburg, Dearborn County, Indiana. Analysis focused on 17 flotation samples (184 liters) recovered from ten features excavated at five sites. Only the light fractions from the samples were analyzed. The flotation of the 17 samples yielded 3,681.2 grams of light fraction with 406.1 grams undergoing analysis. For ten of the samples, the

recovered light fraction was prohibitively large for complete analysis and random sub-samples of these fractions were analyzed. Proveniences analyzed include a privy (Feature 14) for Site 12D508; a brick-lined privy (Feature 8), a wood-lined privy (Feature 6), and a trash pit (Feature 7) for Site 12D502; and a privy (Feature 24) for Site 12D520.

A total of 49,425 carbonized and desiccated seeds/fruits (53.1 grams) and five unidentified fragments of carbonized botanical material were recovered from the light fractions (Tables 3, 4, and 5). In addition, 408 fragments of carbonized and uncarbonized wood (21.8 grams) and five fragments of carbonized and uncarbonized nutshell (1.0 grams) were recovered. The majority of the samples analyzed contained desiccated seed remains and some carbonized seeds. In total 25 families, 42 genera, and 17 species of plant remains were identified. One seed from one unknown taxon was also encountered. Of the five sites initially analyzed, only three of these, 12D508, 12D502, and 12D520, are discussed for issues of function, status, gender and ethnicity.

The results of the botanical analysis of the Armstrong Farmstead (15Fa185) and Sites 12D508, 12D502, and 12D520 are discussed in terms of their relationship to the issues of site function and occupants' status, gender, and ethnicity. Each of these issues requires the botanical remains to be analyzed in different statistical ways. To help understand the relationship between plant use and site function, the botanical remains are categorized in relation to the type of plant recovered. The plant type or category is defined based on plant use, growth habitat (i.e., ecological zone), and habit (i.e., tree, shrub, vine, herb). The plant categories included herein are grains, garden crops, fruit trees and shrubs, and weeds or plants with known uses other than food (Table 6; Figures 1, 2, 3 and 4). Each of these categories is then presented in terms of density or numbers of seeds of that category divided by the volume of floated material for the site. Information for each site is then presented.

For the analysis of the relationship between plant use and occupants' status at each of the sites, the diversity index is calculated for all of the seeds/fruits/nutshell recovered from each site (Figure 5). The diversity index is also calculated for botanical remains recovered from Henry Clay's Ashland Estate (Scarry 1993), as a comparative case of an upper class domestic residence located in Fayette County, Kentucky. Interpretations are then based on this data.

For the issue of gender, no specific relationship between plant use and gender was discerned. This fact may be due to the lack of gender specific contexts that were analyzed at these sites (i.e., general use privies, trash pits, and walkways). Future excavation and analysis of material from gender specific sites such as monasteries, men's clubs, or factories that employed only men or women may help to illuminate patterns of plant use by specific genders.

Ethnicity and plant use were approached through food preferences. These are identifiable by the recovery of specific plants that can be tied to a particular location and therefore to a particular ethnic group. In the case of the sites under study herein, the recovery of plants originally from the Old World helped to identify European food preferences and most likely those of German ethnicity. Each of these approaches and results are discussed in further detail.

Table 3. Carbonized and desiccated botanical remains from the light fractions and diversity index for the Argosy sites in Lawrenceburg, Dearborn County, Indiana.

Site Number 12D	502	502	502	502	502	508	508	508	516	516	516	516	517	517	517	520	520	
Sample Number	1	2	5	3	4	1	2	3	1	2	3	4	3	6	4	2	3	
Feature	6	7	7	8	8	14	14	14	1	3	4	4	17	17	18	24	24	
Zone/*cmbd*	3	*99.07-98.97*	*98.67-98.5*	5	7	1	2	3	2	1	1 + 2	3	4	3	1	3	4	
																		TOTAL*
Volume (L)	20	10	10	5	5	20	20	20	6	5	5	10	5	3	10	10	20	**184**
Weight of light fraction analyzed (g)*	20.6	24.9	16.6	40.8	20.5	20.9	41	21.9	20.6	20.2	23.2	17.3	31.1	22.9	21.8	20.7	21.1	**406.1**
Weight of total light fraction (g)	734.6	24.9	16.6	98.1	143.2	1028	41	827.5	109	48.1	23.2	17.3	31.1	22.9	262.7	95.7	198	**3681.2**
Wood number	16	73	39	31	67	0	1	2	65	4	13	54	20	1	1	18	3	**408**
Wood weight (g)	3.4	2.5	1.3	1.3	2.3	0	<0.1	0.1	6.1	0.2	0.4	2.3	0.6	<0.1	<0.1	0.7	0.3	**21.8**
Nutshell number	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	**5**
Nutshell weight (g)	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	**1**
Aizoaceae *Mollugo verticillata*				1			10	1					10	3				**25**
Amaranthaceae *Amaranthus* sp.				44	3		5	1	1				26	3		88	5	**176**
Caprifoliaceae *Sambucus* sp.	24	28	1	3	1			8			1	1	5	341 (0.2)		54	47	**514 (0.2)**
Caryophyllaceae *Stellaria media*													1					**1**
Chenopodiaceae *Chenopodium* sp.		6	4	2	8	8	8	2	3		5	19		7	1	29	3	**105**
Compositae cf. *Anthemis cotula*																	1	**1**
Helianthus sp.										1								**1**
Taraxacum officinale							1											**1**
Cucurbitaceae *Citrullus vulgaris*			1													3	3 (0.1)	**7 (0.1)**
cf. *Cucumis melo*																	1	**1**
Cucurbita cf. *moschata*																1	2	**3**
Cyperaceae *Cyperus* sp.																	2	**2**

Site Number 12D	502	502	502	502	502	508	508	508	516	516	516	516	517	517	517	520	520	
Sample Number	1	2	5	3	4	1	2	3	1	2	3	4	3	6	4	2	3	
Feature	6	7	7	8	8	14	14	14	1	3	4	4	17	17	18	24	24	
Zone/*cmbd*	3	*99.07-98.97*	*98.67-98.5*	5	7	1	2	3	2	1	1 + 2	3	4	3	1	3	4	
																		TOTAL*
Scirpus sp.																	3	**3**
Euphorbiaceae *Acalypha* sp.				1									2	1				**4**
Euphorbia sp.																1		**1**
Fagaceae *Quercus* sp.																	2 (0.1)	**2 (0.1)**
Juglandaceae *Juglans* sp.	3 (0.9)																	**3 (0.9)**
cf. Labiatae				1														**1**
Leguminosae				1														**1**
cf. *Crotalaria* sp.											3	2						**5**
Melilotus sp.			3								1							**4**
Moraceae *Morus* cf. *rubra*	8	1		351 (0.1)	54								2	5	4	139	260 (0.1)	**824 (0.2)**
Oxalidaceae *Oxalis stricta*		3	7										1					**11**
Papaveraceae *Papaver somniferum*																2	5	**7**
Phytolaccaceae *Phytolacca americana*			2						1		3	1						**7**
cf. Pinaceae					1													**1**
Poaceae				1														**1**
cf. *Avena* sp.			1															**1**
Digitaria sp.		1	1							6								**8**
Eleusine indica													3			4		**7**
Zea mays										9								**9**
Polygonaceae *Polygonum* sp.					2											3		**5**
Rumex sp.												1	1			9	1	**12**
Portulacaceae *Portulaca oleracea*		8	23	2			11	1			18	18	54	46		8	1	**190**
Rosaceae																	31	**31**
cf. *Amelanchier* sp.																3	2	**5**
Fragaria sp.	8		27	546 (0.1)	438 (0.1)								21	2		38	45	**1125 (0.2)**

Site Number 12D	502	502	502	502	502	508	508	508	516	516	516	516	517	517	517	520	520	
Sample Number	1	2	5	3	4	1	2	3	1	2	3	4	3	6	4	2	3	
Feature	6	7	7	8	8	14	14	14	1	3	4	4	17	17	18	24	24	
Zone/*cmbd*	3	*99.07-98.97*	*98.67-98.5*	5	7	1	2	3	2	1	1 + 2	3	4	3	1	3	4	
																		TOTAL*
Malus sp.																	13	**13**
Prunus sp. (cherry)																11 (0.1)	5 (0.4)	**16 (0.5)**
Prunus sp. (plum)																6 (0.3)		**6 (0.3)**
Prunus persica	1			4														**5**
Pyrus sp.																4	6	**10**
Rubus sp.	1500 (1.5)	750 (0.5)	49	6300 (6.3)	1700 (1.7)	11	244 (0.2)	700 (0.7)	1		4	2	18400 (9.2)	7100 (7.1)	1000 (0.5)	2800 (2.8)	1267 (1.9)	**41828 (32.4)**
Solanaceae																1	8	**9**
Capsicum sp.	1	4	43 (0.1)	14	4		1		2	3	45 (0.1)	35 (0.1)			2	39 (0.1)	2	**195 (0.4)**
Lycopersicum esculentum	82			650 (0.4)	600 (0.3)			6					37	30	1	800 (0.4)	200 (0.2)	**2406 (1.3)**
Physalis sp.	9	20	144	10	1				2		2	9	1			166	552	**916**
cf. *Nicandra physaludes*																	1	**1**
Umbelliferae																1		**1**
Anethum graveolens																	3	**3**
Vitaceae *Vitis* sp.	633 (13.6)	4 (0.1)	4	38 (1.0)	11 (0.2)		2	28 (0.2)					84 (0.5)	27		58 (1.5)	26 (0.4)	**915 (17.5)**
Unknown type 1																	1	**1**
TOTAL**	**2269 (16.0)**	**825 (0.6)**	**310 (0.1)**	**7969 (6.8)**	**2823 (2.1)**	**19**	**282 (0.2)**	**747 (0.7)**	**10**	**19**	**82 (0.1)**	**88 (0.1)**	**18648 (9.7)**	**7565 (7.3)**	**1008 (0.5)**	**4268 (5.2)**	**2498 (3.2)**	**49430 (54.1)**
Insect remains		1			4											6	20	**31**
Mollusk remains		5	3												1	2		**11**

Diversity index for seeds is 0.46 for Site 12D502; 0.17 for Site 12D508; 0.76 for Site 12D516; 0.05 for Site 12D517; and 0.6 for Site 12D520.

* Weight of seed remains in grams listed after number count in parenthesis.

** Totals include nutshell fragments.

Table 4. Summary of carbonized and desiccated botanical remains from the Argosy sites in Lawrenceburg, Dearborn County, Indiana.

Site Number 12D	502	508	517	520	516		
Sample Number	-	-	-	-	-		
Features	6,7,8	14	17,18	24	1,3,4		
Zone/*cmbd*	-	-	-	-	-		
						TOTAL*	
Volume (L)	50	60	18	30	26	**184**	
Weight of light fraction analyzed (g)*	123.4	83.8	75.8	41.8	81.3	**406.1**	
Weight of total light fraction (g)	1017.4	1856.2	316.7	293.7	197.2	**3681.2**	
Wood number	226	3	22	21	136	**408**	
Wood weight (g)	10.8	0.2	0.8	1	9	**21.8**	
Nutshell number	3	0	0	2	0	**5**	
Nutshell weight (g)	0.9	0	0	0.1	0	**1**	
Aizoaceae *Mollugo verticillata*	1	11	13			**25**	*carpet weed*
Amaranthaceae *Amaranthus* sp.	47	6	29	93	1	**176**	*pigweed*
Caprifoliaceae *Sambucus* sp.	57	8	346 (0.2)	101	2	**514 (0.2)**	*elderberry*
Caryophyllaceae *Stellaria media*			1			**1**	*common chickweed*
Chenopodiaceae *Chenopodium* sp.	20	18	8	32	27	**105**	*goosefoot*
Compositae cf. *Anthemis cotula*				1		**1**	*dog fennel*
Helianthus sp.					1	**1**	*sunflower*
Taraxacum officinale		1				**1**	*common dandelion*
Cucurbitaceae *Citrullus vulgaris*	1			6 (0.1)		**7 (0.1)**	*watermelon*
cf. *Cucumis melo*				1		**1**	*melon*
Cucurbita cf. *moschata*				3		**3**	*field pumpkin*
Cyperaceae *Cyperus* sp.				2		**2**	*sedge*
Scirpus sp.				3		**3**	*bulrush*
Euphorbiaceae *Acalypha* sp.	1		3			**4**	*copperleaf*
Euphorbia sp.				1		**1**	*spurge*
Fagaceae *Quercus* sp.				2 (0.1)		**2 (0.1)**	*oak*
Juglandaceae *Juglans* sp.	3 (0.9)					**3 (0.9)**	*walnut*
cf. Labiatae	1					**1**	*mint family*
Leguminosae	1					**1**	*bean family*

Site Number 12D	502	508	517	520	516		
Sample Number	-	-	-	-	-		
Features	6,7,8	14	17,18	24	1,3,4		
Zone/*cmbd*	-	-	-	-	-		
						TOTAL*	
cf. *Crotalaria* sp.					5	**5**	*crotalaria*
Melilotus sp.	3				1	**4**	*sweet clover*
Moraceae *Morus* cf. *rubra*	414 (0.1)		11	399 (0.1)		**824 (0.2)**	*mulberry*
Oxalidaceae *Oxalis stricta*	10		1			**11**	*yellow wood sorrel*
Papaveraceae *Papaver somniferum*				7		**7**	*poppy seed*
Phytolaccaceae *Phytolacca americana*	2				5	**7**	*pokeweed*
cf. Pinaceae	1					**1**	*pine family*
Poaceae	1					**1**	*grass family*
cf. *Avena* sp.	1					**1**	*oats*
Digitaria sp.						**8**	*crabgrass*
Eleusine indica			3	4		**7**	*goose-grass*
Zea mays					9	**9**	*corn*
Polygonaceae *Polygonum* sp.	2			3		**5**	*knotweed*
Rumex sp.			1	10	1	**12**	*dock*
Portulacaceae *Portulaca oleracea*	33	12	100	9	36	**190**	*purslane*
Rosaceae				31		**31**	*rose family*
cf. *Amelanchier* sp.				5		**5**	*serviceberry*
Fragaria sp.	1019 (0.2)		23	83		**1125 (0.2)**	*strawberry*
Malus sp.				13		**13**	*apple*
Prunus sp. (cherry)				16 (0.5)		**16 (0.5)**	*cherry*
Prunus sp. (plum)				6 (0.3)		**6 (0.3)**	*plum*
Prunus persica	5					**5**	*peach*
Pyrus sp.				10		**10**	*pear*
Rubus sp.	10299 (10.0)**	955 (0.9)**	26500 (16.8)**	4067 (4.7)**	7	**41828 (32.4)**	*blackberry/raspberry*
Solanaceae				9		**9**	*nightshade family*
Capsicum sp.	66 (0.1)		2	41 (0.1)	85 (0.2)	**195 (0.4)**	*pepper*
Lycopersicum esculentum	1332 (0.7)**	6	68	1000 (0.6)**		**2406 (1.3)**	*tomato*
Physalis sp.	184		1	718	13	**916**	*ground cherry*

Site Number 12D	502	508	517	520	516		
Sample Number	-	-	-	-	-		
Features	6,7,8	14	17,18	24	1,3,4		
Zone/*cmbd*	-	-	-	-	-		
						TOTAL*	
cf. *Nicandra physaludes*				1		**1**	*Apple-of-Peru*
Umbelliferae				1		**1**	*parsley family*
Anethum graveolens				3		**3**	*dill*
Vitaceae *Vitis* sp.	690 (14.9)**	30 (0.2)	111 (0.5)	84 (1.9)		**915 (17.5)**	*grape*
Unknown type 1				1		**1**	
TOTAL*	**14196 (26.9)**	**1048 (1.1)**	**27221 (17.5)**	**6766 (8.4)**	**199 (0.2)**	**49430 (54.1)**	

* Totals include nutshell fragments. Weight in grams is listed in parenthesis.
** Total number calculated using the formula: number of seeds in sub-sample multiplied by total weight of seeds divided by weight of sub-sample of seeds.

Table 5. Density measures for carbonized and desiccated botanical remains recovered from the Argosy sites.

	Raw Count		Density *	
	Count	Weight (g)	Count	Weight (g)
Site 12D502 (50L)				
Wood	226	10.8	4.5	0.2
Nutshell	3	0.9	<0.1	<0.1
Seed/fruits	14193	26	283.9	0.5
Site 12D508 (60L)				
Wood	3	0.2	<0.1	<0.1
Nutshell	0	0	0	0
Seed/fruits	1048	1.1	17.5	<0.1
Site 12D516 (26L)				
Wood	136	9	<0.1	<0.1
Nutshell	0	0	0	0
Seed/fruits	199	0.2	7.7	<0.1
Site 12D517 (18L)				
Wood	22	0.8	1.2	<0.1
Nutshell	0	0	0	0
Seed/fruits	27221	17.5	1512.3	1
Site 12D520 (30L)				
Wood	21	1	0.7	<0.1
Nutshell	2	0.1	<0.1	<0.1
Seed/fruits	6764	8.3	225.5	0.3

*Number or weight divided by total liters of processed fill for cultural context.

Table 6. Scientific name, common name, use, and area of probable origins for botanical remains recovered from the Armstrong Farmstead and Argosy sites.

Domesticated Food Crop Plants

Cucurbitaceae *Citrullus vulgaris*	watermelon	food	OW*
cf. *Cucumis melo*	melon	food	OW
Cucurbita sp.	squash	food/container	NW
Cucurbita cf. *moschata*	field pumpkin	food	NW
Poaceae *Avena sativa*	oats	food	OW
Triticum aestivum	wheat	food	OW
Zea mays	corn	food	NW
Solanaceae *Capsicum* sp.	pepper	food	NW
Lycopersicum exculentum	tomato	food	NW
Vitaceae *Vitis* sp.	grape	food	NW/OW

Fruit -Bearing Trees and Shrubs

Caprifoliaceae *Sambucus* sp.	elderberry	food	NW/OW
Moraceae *Morus* cf. *rubra*	mulberry	food	NW/OW
Rosaceae *Crataegus* sp.	hawthorn	food	NW/OW
Fragaria sp. (herb)	strawberry	food	NW/OW?
Malus sp.	apple	food	NW/OW
Prunus sp.	plum	food	NW/OW
Prunus sp.	cherry	food	NW/OW
Prunus persica	peach	food	OW
Pyrus sp.	pear	food	OW
Rubus sp.	blackberry/raspberry	food	NW/OW
Solanaceae *Physalis* sp.	ground cherry	food	NW
Solanum cf. *americanum* (herb)	nightshade	food	NW/OW

Plants Used as Spices

Papaveraceae *Papaver somniferum*	poppy seed	spice	OW
Umbelliferae *Anethum graveolens*	dill	spice	OW

Other Food Plants with Minimal Presence

Liliaceae cf. *Allium* sp.	onion	food	NW/ OW
cf. *Allium schoenoprasum*	wild chives	food	NW/OW

Weedy or Ruderal Plants Frequently Associated with Agriculture

Aizoaceae *Mollugo verticillata*	carpet weed	weed	NW/OW
Amaranthaceae *Amaranthus* sp.	pigweed	weed/food	NW
Caryophyllaceae *Cerastium vulgatum*	mouse-ear chickweed	weed	NW/OW
Silene Antirrhina	night-flowering catchfly	weed	NW/OW
Stellaria media	chickweed	weed	NW/OW
Chenopodiaceae *Chenopodium* sp.	goosefoot	weed/food	NW
Chenopodiaceae/Amaranthaceae	goosefoot/pigweed	weed/food	NW
Compositae cf. *Anthemis cotula*	dog fennel, dill-weed	weed	OW
Helianthus sp.	sunflower	weed/food	NW
Taraxacum officinale	common dandelion	weed/food	OW
Euphorbiaceae *Acalypha* sp.	copperleaf	weed	NW
Euphorbia sp.	spurge	weed	NW/OW
Labiatae *Lamium* sp.	henbit	weed	OW
Leguminosae cf. *Crotalaria*	crotalaria	weed	NW
Melilotus sp.	sweet clover	weed	OW
Malvaceae cf. *Malva* sp.	mallow	weed	OW
Onagraceae *Epilobium* cf. *ciliatum*	fireweed	weed	NW/OW
Oxalidaceae *Oxalis stricta*	yellow wood sorrel	weed/food	NW
Poaceae	grass	weed/food	NW/OW
Digitaria spp.	crabgrass	weed	NW/OW
Eleusine indica	goosegrass	weed	OW
Paspalum sp.	paspalum	weed	NW
Setaria cf. *glauca*	yellow foxtail	weed/food	NW/OW
Polygonaceae cf. *Polygonum erectum*	erect knotweed	weed/food	NW/OW
Polygonum sp.	knotweed	weed	NW/OW
Rumex sp.	dock	weed	NW/OW
Portulacaceae *Portulaca oleracea*	purslane	weed/food	NW/OW
cf. Violaceae	violet	weed/ornamental	NW/OW

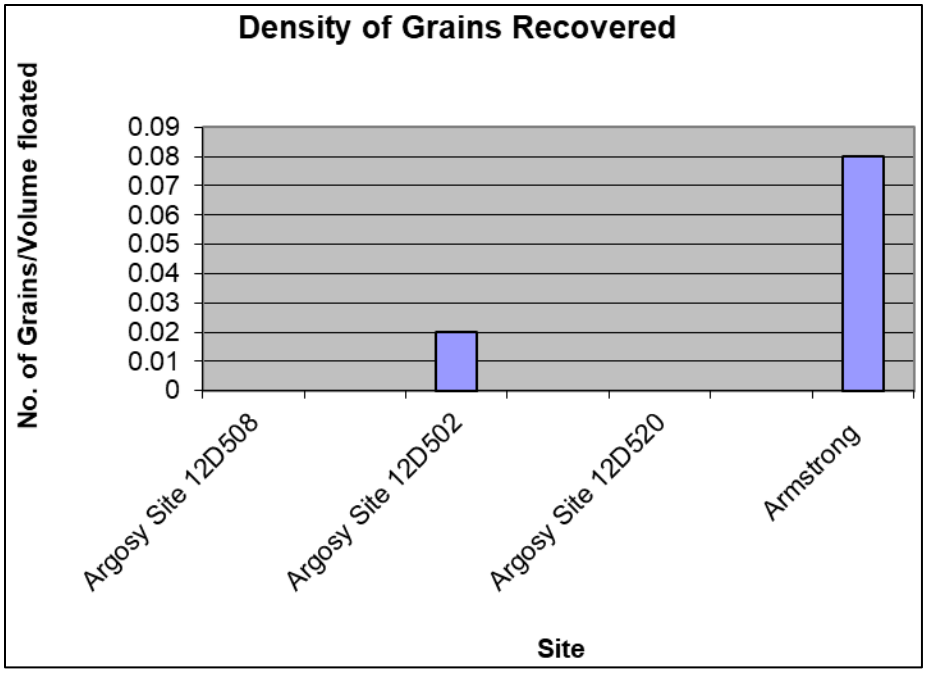

Figure 1. Density of seeds of grains recovered from the Armstrong Farmstead and Argosy sites.

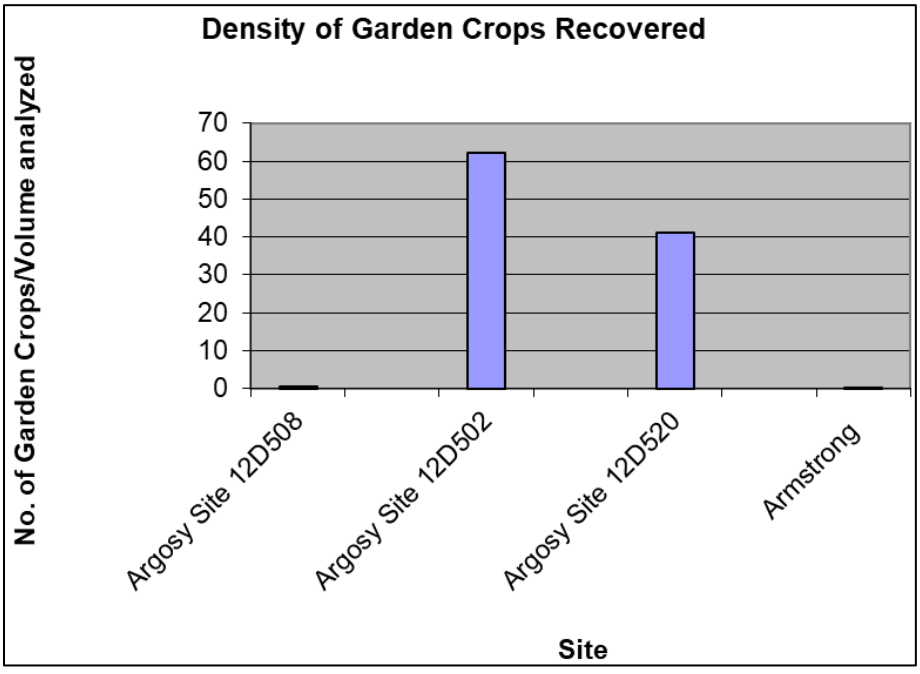

Figure 2. Density of seeds of garden crops recovered from the Armstrong Farmstead and Argosy sites.

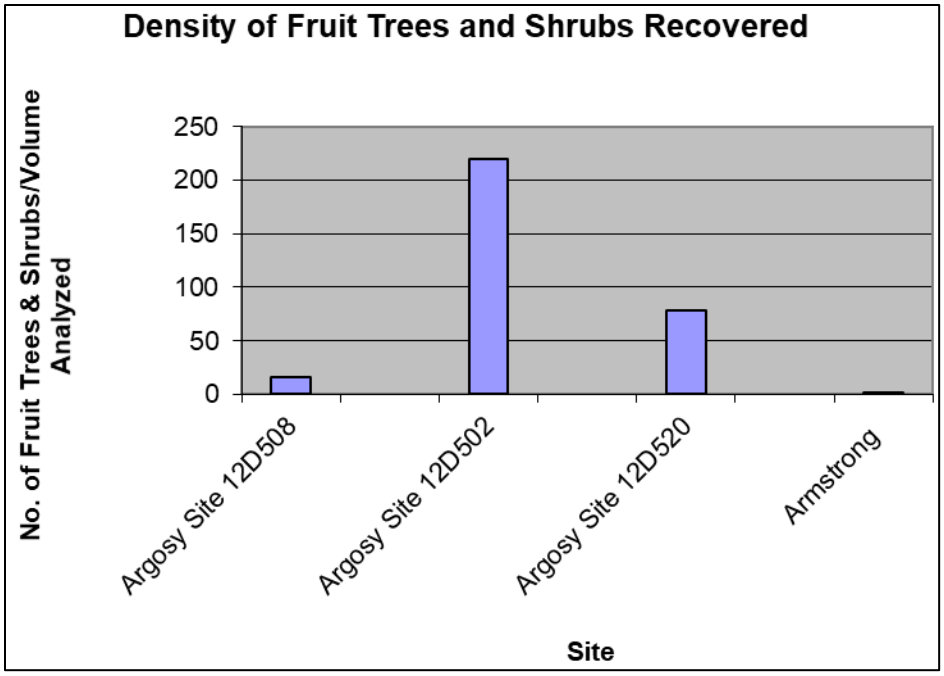

Figure 3. Density of seeds from fruit trees and shrubs recovered from the Armstrong Farmstead and Argosy sites.

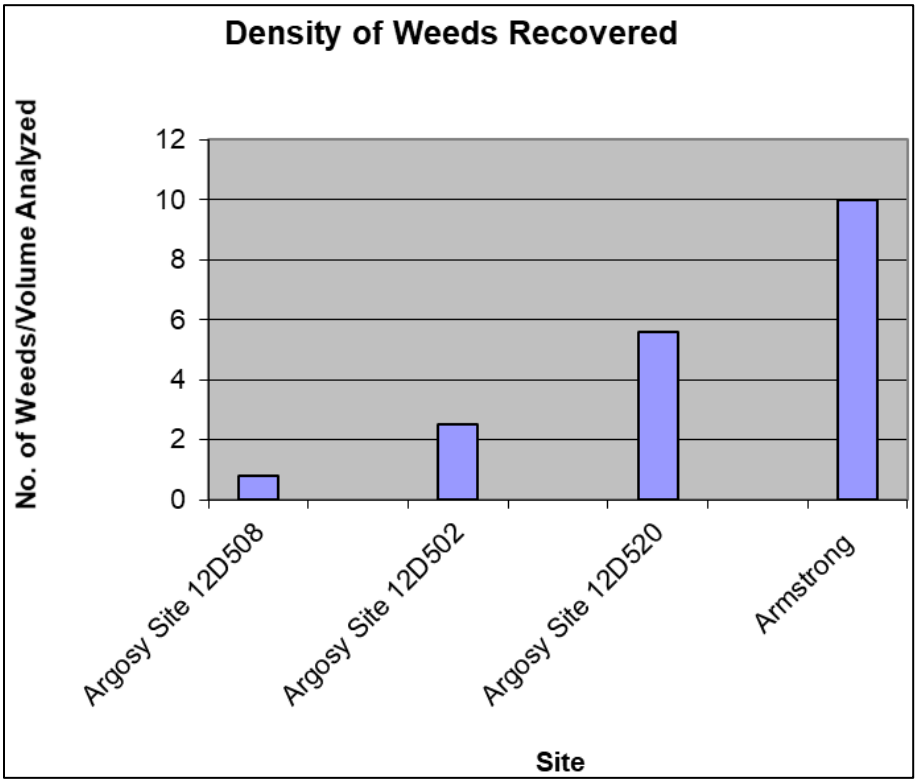

Figure 4. Density of seeds of weeds and other plants recovered from the Armstrong Farmstead and Argosy sites.

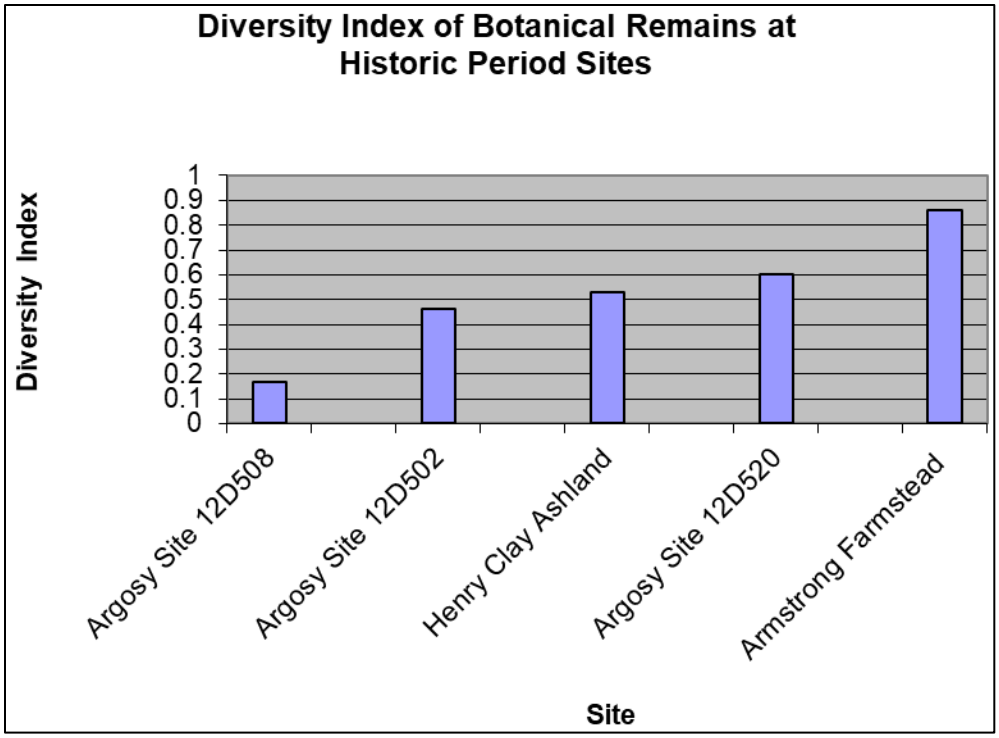

Figure 5. Diversity index of plant remains recovered from the Armstrong Farmstead and Argosy sites.

DISCUSSION

When comparing the densities of grains found at all of the sites under discussion (Figure 1), it is clear that grains are not well-represented at any of the sites. Indeed only at the Armstrong Farmstead was grain recovered in any significant amounts, with only a tentative identification of oats given for one seed from Site 12D502. The three grain crops recovered include corn (*Zea mays*), oats (*Avena sativa*), and wheat (*Triticum aestivum*).

Corn is believed to have had its origins in Mesoamerica and spread into eastern North America during the Middle Woodland period (ca. A.D. 100-400) experiencing only a very low level of use until about A.D. 1000 (Bonzani and Oyuela-Caycedo 2006; Davis et al. 1997:184; Staller et al. 2006). By the Late Prehistoric period corn predominates the archaeobotanical record and is considered the most important crop of Native Americans (Lopinot 1994; Lopinot et al. 1991; Wymer 1992). Corn is recorded at numerous historic period sites including Logan's Fort in Lincoln County, Site 15Ne59 (a probable slave quarters) in Nelson County, the Locust Grove Plantation in Jefferson County, and the Henry Clay's Ashland Estate in Kentucky and Arbuckle's Fort in Greenbrier County, West Virginia (Davis et al. 1997; Roberts 1993; Rossen 2000; Scarry 1993; Young 1995). Analysis of the corn from Logan's Fort indicates that it is morphologically indistinguishable from prehistoric "Eastern Eight" rowed Late Prehistoric (Fort Ancient) corn (Rossen 2000). Rossen (2000:99) suggests that this similarity in size and morphology indicates "a local, direct transfer of the plant to Euro-Americans."

It may be that corn fit into the scheduling and cropping patterns that Europeans had already established for wheat, oats, barley and other grains whose origins lie in the Old World. In the Old World both wheat (*Triticum* spp.) and oats (*Avena* sp.) are found in Early Neolithic (6200-5300 B.C.) sites in Greece and by 3000 B.C. cereal cultivation is believed to have reached the British Isles (Dennell 1992). Another possibility is that corn was so productive and unusual in its inflorescences which upon maturity develop into the ear or cob (Mangelsdorf 1974) that Europeans could not afford to ignore this plant. In either case corn, wheat, barley and oats became mainstays in crop production for Euro-Americans and present day North American farmers. Historically, wheat is recorded as being sold at the Locust Grove Plantation in Jefferson County (1790-1878) (Young 1995) and both wheat and oats were recovered archaeologically from Arbuckle's Fort in West Virginia (1774-1783) (Roberts 1993). Wheat, barley, and corn were recovered from the Highbee Tavern Site (15Fa222) in Fayette County, Kentucky (Bonzani 2004). Barley is also found at Site 15Ne59, the possible slave quarters associated with the Thomas Gwynn farm located in Nelson County (Davis et al. 1997).

Historical records for the Armstrong Farmstead indicate that in 1860 wheat, corn, oats, and potatoes were being grown and sold from the farm (Allgood and Kirkwood 2002). All of these plants yielded archaeological remains except for potatoes. Based on this information, clear evidence exists that corn, wheat, and oats were most likely included in meals prepared at the house. Evidence for the use of potato, unfortunately, was not recovered and this is interpreted more as a result of preservation factors for tubers than as evidence that they were not consumed at the farmstead. Interestingly, few grains including corn, wheat, oats or barley were recovered from the Argosy sites (with one possible exception of oats at Site 12D502 and a few corn kernels at Site 12D516) (Bonzani 2002a, 2002b, 2003), the urban Lextran Site in downtown Lexington or from Henry Clay's Ashland Estate also in Fayette County (Rossen 1992; Scarry 1993). Scarry (1993) interprets this absence at the Ashland Estate as indicating the residents bought starch from these grains already prepared for use (i.e., as corn meal, wheat flour or grits). At the Argosy sites this was probably true as well since Lawrenceburg was known as having a large number of flour mills in the area (Creasman and Rotman 2003). In the case of the Armstrong Farmstead, one would expect that grains would be processed into flour and baked into breads, since they were probably grown on the farm. Indeed, breads or products high in carbohydrates, such as potatoes, were likely items served to travelers at a tavern or inn as, once processed, flour can be stored for long periods of time if maintained in a dry state.

When the density of garden crops is compared between sites (Figure 2), a noticeable difference is apparent between the sites that functioned as inns or boarding houses (Site 12D508 and the Armstrong Farmstead) and those that functioned as domestic households (12D502 and 12D520). The domestic household sites have a much higher density of garden crops present than do the inns. These data can be interpreted to indicate that inns or taverns did not normally serve garden fruits and vegetables to clientele.

The garden crops recovered, include squash (*Cucurbita* sp.), pepper (*Capsicum* sp.), tomato (*Lycopersicum esculentum*), grape (*Vitis* sp.), and watermelon (*Citrullus vulgaris).* Squash is a New World domesticate with a long history of indigenous use in North America beginning around 5,100 B. P. (Cowan 1997; Culter and Whitaker 1961; Smith 1992, 2006; Smith and Cowan 2003). The crop appears to have been readily adopted by early colonists into Kentucky as evidenced by

its recovery at Logan's Fort (1776-1790) in Lincoln County (Rossen 2000), at the Highbee Tavern Site (15Fa222) (Bonzani 2004) and at the Henry Clay's Ashland Estate (1860-1920) (Scarry 1993), both in Fayette County.

Pepper is also a New World domesticate with its origins in South America and its introduction into eastern North America occurred most likely in historic times (Pearsall 1992). Pepper seeds were recovered from excavations at Henry Clay's Ashland Estate in similar contexts (privy) and at a similar period of time as the Armstrong Farmstead (1860-1920) and the Argosy sites (Scarry 1993).

Tomatoes are a New World cultigen that was initially thought to be poisonous. This belief was based on their similarity in biological structure to such plants as poisonous nightshades (*Solanum* spp.) that were well known by Europeans (Rossen 2000). It is believed that not until the twentieth century did tomatoes become popular foods. Tomato seeds are, however, recovered in contexts from the 1800-1930s at the Lextran Site located in downtown Lexington and from Henry Clay's Ashland Estate, both in Fayette County, Kentucky (Rossen 1992; Scarry 1993). This information reveals that both the low to middle-income urban residents at the Lextran Site and more upper class rural occupants of Henry Clay's estate utilized tomatoes in the nineteenth and twentieth centuries. Their recovery from the Armstrong Farmstead (tentative identification) and the Argosy sites indicates that by the mid-1800's tomatoes were popular foods in North America.

Grapes were included under the crop category based on the large number of seeds recovered from the Argosy sites and the common practice of households to maintain their own grape vines in their yards. Viticulture is a widespread practice and grapes can also be bought readily at markets (Young and Young 1992). The native fox grape (*Vitis labrusca*) of the United States can also be found growing wild from Maine to Indiana and south to Georgia, Kentucky, Tennessee and Arkansas (Steyermark 1963:1036; Young and Young 1992). Both grapes and blackberry/raspberry accounted for the majority of seeds recovered from the Argosy sites. Both can be made into wines, as of course can strawberry (Moerman 1998). It is cited that Germans were prolific drinkers of wine (Braudel 1985:233-234) and the possibility exists that these fruits were processed into wine and the seeds discarded afterwards into the privies and trash pits at sites such as 12D502.

Watermelon was introduced into the New World, and originated in Africa (Steyermark 1963:1426-1427). The seeds of watermelon were also recovered from the Henry Clay's Ashland Estate (Scarry 1993) and the Highbee Tavern (15Fa222) (Bonzani 2004).

When the density of fruit trees and shrubs is compared between sites (Figure 3), the greatest difference is apparent between the sites that functioned as inns or boarding houses (Site 12D508 and Armstrong Farmstead) and those that functioned as domestic households (12D502 and 12D520). The domestic household sites have a much higher density of fruit tree and shrub remains than do the inns. These data can be interpreted to indicate that inns or taverns did not normally serve fresh fruits and vegetables or products made into jams, jellies, cobblers or pies. This possibility may explain the almost complete lack at the Armstrong Farmstead and Site 12D508 of botanical remains of fruits from trees and shrubs such as apple, blackberry, blueberry, cherry, elderberry, grape, mulberry, peach, pear, plum, raspberry, or strawberry. These fruits can be eaten raw or can be prepared into pies, cobblers or jams. Seeds of blackberry/raspberry, blueberry,

cherry, grape, ground cherry, mulberry, peach, sunflower, and tomato were all recovered from the Lextran Site in downtown Lexington. These remains indicate that the urban inhabitants were preparing the fruits to eat as pies or cobblers due to the brown cast probably resulting from baking (Rossen 1992). Blackberry/raspberry, grape, mulberry, and strawberry were also recovered from the privies at Henry Clay's Ashland Estate and interpreted to indicate the preservation of these fruits into jams or jellies (Scarry 1993). One hypothesis for the lack of these fruits at Armstrong Farmstead and Site 12D508 in the archaeological record is that fresh fruits/vegetables and/or jellies, jams, pies, and cobblers were not the usual type of food served to travelers at an inn or tavern. The reason for this may be due to the difficulty preserving fresh fruits and the potential expense incurred for such preservation techniques.

When the density of weeds and plants classified as other is compared between sites (Figure 4), a difference occurs between the Armstrong Farmstead and the more urban Argosy sites. This difference probably relates to the fact that the Armstrong Farmstead also functioned as a large farm. In such agricultural settings, numerous weed species are found to colonize open areas adding to the archaeological remains found and the diversity index of the sites under study (Pearsall 2000). The higher density of weeds at the Armstrong Farmstead can be explained by this observation. The weedy plants include yellow wood sorrel (*Oxalis stricta*), purslane (*Portulacca oleraceae*), copperleaf (*Acalypha* sp.), spurge (*Euphorbia* sp.), henbit (*Lamium* sp.), fireweed (*Epilobium* cf. *ciliatum*), mouse-ear chickweed (*Cerastium vulgatum*), night-flowering catchfly (*Silene antirrhina*), chickweed (*Stellaria media*), mollugo (*Mollugo verticillata*), various grasses including crabgrass (*Digitaria* sp.), yellow foxtail (*Setaria* cf. *glauca*), paspalum (*Paspalum* sp.), goosefoot (*Chenopodium* sp. and Chenopodiaceae/ Amaranthaceae), and plants tentatively identified as mallow (cf. *Malva* sp.), erect knotweed (cf. *Polygonum erectum*), and violet (cf. Violaceae). The majority of these plants were native species of both the Old and New Worlds (Table 6).

When looking at the results from the analysis of seed category density and site function, the most obvious differences in densities of botanical remains between sites are found in the categories of fruit trees and shrubs and garden crops. Those sites, like the Armstrong Farmstead and Site 12D508, which functioned as inns, boarding houses or taverns, appear not to have served fresh fruits or vegetables or jams, preserves, pies or cobblers made from fruits. On the other hand, the domestic residential sites in the study, 12D502 and 12D520, had very high densities of these types of plants. It can therefore be safely stated that these domestic households relied heavily on garden crops and fruits from trees and shrubs as part of their diets. Other differences include the density of seeds from weeds, with the Armstrong Farmstead having the highest density in this category. This result is most likely due to the site's function as a large farm. The recovery of grains was low; and, therefore, grain use was probably mainly in the form of already processed flour.

The analysis of occupants' status from different sites can be approached using different types of archaeological remains and different types of statistical techniques. Botanical remains from these sites were analyzed using the concept of diversity. Patterns in the diversity of plant remains recovered from sites can begin to illuminate associations with status and potential risk management strategies utilized by occupants.

When the diversity indexes of the different sites under study are analyzed (Figure 5), a tentative pattern can be found to associate plant diversity with status. At the middle to upper class residence at Site 12D502, a medium diversity of plant remains was recovered (0.46). To obtain comparative data from another domestic household of upper class status, the diversity index of the botanical remains recovered from Henry Clay's Ashland Estate (Scarry 1993) was also calculated. The diversity of these remains was similar (0.53). When the diversity of plant remains was calculated for Site 12D520, the lower income household from Lawrenceburg, a higher diversity of plant use was obtained (0.6). Although this pattern is tentative and more domestic/residential households need to be analyzed for this type of data, the results indicate that households of lower income have a more diverse use of plants than do households of upper class status. This association may be due to risk management strategies whereby households of lower status or those most at risk will use various types of plants and other foods as a means to buffer stressful time periods (Cashdan 1990). The slightly higher diversity of plant remains at Site 12D520 may point to the need to buffer risk by preserving, canning or making jellies of different plant resources. Of the sites under study herein, only Site 12D520 had remains of fruit from the trees of apple (*Malus* sp.), cherry (*Prunus* sp.), pear (*Pyrus* sp.), and plum (*Prunus* sp.). Strawberry (*Fragaria* ap.) was also recovered. Historic period references identify the use of fruit trees (apple, cherry, and plum) as a means of overcoming economic depressions (Creasman and Rotman 2003) and point to the need of lower income households to use more subsistence strategies that supplemented wage labor. From the botanical evidence recovered from Site 12D520 the planting and use of fruit trees would have been an important part of the economic activities and diets of the inhabitants of the Argosy sites in the late 1800's.

The results of the study of plant diversity at these sites, however, do point out that a number of factors affect diversity including site function and social/economic status. For instance, Site 12D508 has a very low diversity of plant remains (0.17), most likely related to its function as an inn and the possibility that little food was available at the site itself for people to eat. The Armstrong Farmstead, on the other hand, had a high diversity of plant remains (0.86); and, as previously indicated, this result is most likely due to the density of weedy plants recovered from the site and its functions as a working farm.

As indicated, no direct associations were found between the botanical remains recovered from these sites and the gender of the occupants. More gender specific site contexts may help in the future to elucidate patterns of plant use and gender.

In terms of identifying patterns of plant use and ethnicity, the recovery of plants that indicate food preferences is possible when these plants can be associated with particular locations and peoples (Crosby 1986; Heiser 1985). Plants indicating ethnic food preferences may be a very small percentage of the total botanical remains recovered (i.e., < 1 %). At the Argosy sites these plant remains represented 10 seeds out of 49,430 seeds and nutshell recovered (Bonzani 2002a, 2002b, 2003).

Indeed perhaps some of the most interesting botanical remains recovered from Site 12D520 are the seeds of two plants that can be used as spices or condiments whose origins come from the Old World during European colonization. These seeds are the poppy (*Papaver somniferum*) (n=7) and dill (*Anethum graveolens*) (n=3). The use of these plants can be interpreted as an ethnic

preference or practice introduced by Europeans since neither of these plants is native to the New World (Table 6) (Coombes 1999; Craze 1997; Muenscher 1955; Steyermark 1963). Neither of these plants has been recovered at other Historic period settlements reviewed, including the Armstrong Farmstead which was owned by Irish immigrants (Bonzani 2006; Davis et al. 1997; Roberts 1993; Rossen 1992, 2000; Scarry 1993; Young 1995). Given the German ethnicity of many of the occupants at the Argosy sites, it is likely that the archaeological remains reflect a German ethnic preference for certain types of spices or condiments. Poppy seeds are a well-known addition to pastries and breads and they are listed in the German Corner Cooking Index (German Corner Cooking Index 1996) as being good in breads, cakes, pastries and salad dressing (see also Craze 1997; Hupping 1986). The residents at Site 12D520 must have been either making breads and pastries with poppy seeds or they were buying such goods from a store and consuming them.

As well, the recovery of three dill seeds also suggests that the inhabitants at the site were either cooking or preserving foods using dill or were buying already prepared foods that had this spice in it. Dill seed is listed in the German Corner Cooking Index (German Corner Cooking Index 1996) as being used for pickles and to add taste and aroma to strong vegetables like cauliflower, cabbage and turnips. It is also frequently added to green beans, potato dishes, cheese, soups, salads, seafood, and sauces (see also Craze 1997). Dill is the main spice added to "dill crocks" which are crock pots full of vegetables which are preserved in brine and dill, and are to be eaten over the course of a number of months (Hupping 1986). The recovery of these botanical remains indeed adds "spice" to the reconstruction of how the inhabitants of the Argosy sites were living and what some of their ethnic food preferences may have been. This recovery also indicates that botanical remains can add information about the taste preferences and ethnicity of different people.

CONCLUSION

The use of botanical remains can add to historically documented information by defining differences in diet and food preferences between sites of different function and peoples of different status, gender, and ethnicity. By using various statistical means to analyze the botanical data, patterns can be discerned that associate site function and occupants' status with ethnicity.

The use of density measures of plant categories was particularly useful for identifying differences in plant use between Historic period sites with varying functions. Specifically, sites that functioned as inns, boarding houses or taverns, such as the Armstrong Farmstead (15Fa185) and Site 12D508, lack plant remains in the categories of fruit trees and shrubs and garden crops. The lack of botanical remains of fruits and vegetables indicates that these plants (i.e., blackberry, blueberry, cherry, elderberry, grape, mulberry, peach, pepper, plum, raspberry, squash, strawberry, tomato, and watermelon) were not normally consumed or served at these sites. Botanical remains of fruit trees and shrubs and garden crops are much more common at the two sites, 12D502 and 12D520, identified as domestic/residential households. Gardening, the planting of fruit trees, and buying of vegetables and fruits at local markets are indicated as common practices of Historic period domestic household sites.

The use of diversity indexes to identify the richness and evenness of the botanical remains utilized at a site also led to some tentative patterning about social status. In this study,

domestic/residential sites of lower status occupants appear to have a higher diversity of plant use, than do domestic sites of upper class occupants. This result was identified using data from the historic documents relating to status and the recovered botanical plant remains. Specifically, Site 12D520 had a slightly higher diversity of plants recovered than did Site 12D502 and Henry Clay's Ashland Estate (Scarry 1993), the latter two having higher status occupants than those at Site 12D520. Only tentative in nature, this pattern may be the result of risk management strategies to buffer against or overcome stressful times (Cashdan 1990). Such practices could include the preserving, canning, or preparations of jellies of different plant resources and in particular fruits from trees.

Finally, the recovery of poppy (*Papaver somniferum*) and dill (*Anethum graveolens*) seeds from Site 12D520 adds information about the ethnic food preferences of the residents of the Argosy sites. Both poppy seeds and dill come from the Old World and are frequent additions to European and German cuisine. In German cooking, poppy seeds are added to breads and pastries while dill is added to flavor strong vegetables like cauliflower and cabbage and can be added to vegetables preserved in brine for flavor (Craze 1997; Hupping 1986; Steyermark 1963). Such discoveries are important in that they add "spice" or flavor to the reconstruction of past lifeways and give us an idea as to the tastes or preferences of peoples who lived one hundred years ago or more. The recovery of these types of archaeological remains clearly enhances the reconstruction of past lifeways of both prehistoric and historic period occupants of North America.

ACKNOWLEDGEMENTS

This paper was originally presented at the Twentieth Annual Kentucky Heritage Council Archaeological Conference, Louisville, Kentucky, February 28 - March 2, 2003 (2/12/2003). Permission to present this information in 2003 and to publish these results in 2016 or later was obtained from Charles M. Niquette, RPA, President/CEO, CRAI (Cultural Resource Analysts, Inc.) of Lexington, Kentucky, in conjunction with acknowledgements to Penn National Gaming, Inc. for funding the archaeological investigations at the Argosy sites and the Kentucky Transportation Cabinet for funding archaeological investigations at the Armstrong Farmstead Site and to David M. Waldner, KYTC. CRAI excavated the sites discussed in the paper and I would again like to thank Charles Niquette, Jonathan Kerr, Steven Creasman, Jo Ann Wilson, Heather D. Barras, Deborah Rotman, Rose Moore and staff members of the CRAI for assistance with this project and access to the flotation samples collected from the sites under study. Appreciation for assistance in 2003 is also given to Drs. Augusto Oyuela-Caycedo and Thomas Dillehay and to the Department of Anthropology at the University of Kentucky.

REFERENCES CITED

Allgood, Jessica L. and James T. Kirkwood

2002 The Armstrong Farmstead (15Fa185): Spatial Patterning, Social Relations and Consumer Behavior at a 19th Century Central Bluegrass Farmstead. Paper presented at the 19th Annual Kentucky Heritage Council Archaeological Conference, Frankfort, Kentucky.

Anderson, B.
1991 *Imagined Communities: Reflections on the Origin and Spread of Nationalism.* Revised edition. Verso, London.

Asch, Nancy B. and David L. Asch
1981 Archeobotany of Newbridge, Carlin and Weitzer Sites – The White Hall Components. Appendix B. In *Faunal Exploitation and Resource Selection: Early Late Woodland Subsistence in the Lower Illinois Valley*, by Bonnie Whatley Styles, pp. 275-291. Northwestern University Archeological Program Scientific Papers, Number 3. Evanston, Illinois.

Binford, Lewis R.
1980 Willow Smoke and Dog's Tails: Hunter-Gatherer Settlement Systems and Archaeological Site formation. *American Antiquity* 45 (1):4-20.

1983 *Working at Archaeology*. Academic Press, New York.

Bonzani, Renée M.
1997 Plant Diversity in the Archaeological Record: A Means Toward Defining Hunter-Gatherer Mobility Strategies. *Journal of Archaeological Science* 24: 1129-1139.

2002a The Analysis of Macrofloral Remains. In *The Argosy Lawrenceberg Casino Archaeological Project, Dearborn County, Indiana, Volume 1,* edited by Steven D. Creasman and Deborah L. Rotman, pp. 263-264. Contract Publication Series 02-249. Cultural Resource Analysists, Inc., Lexington.

2002b Flora. In *The Argosy Lawrenceberg Casino Archaeological Project. Volume 10: Summary of Historical Archaeology,* edited by R. Berle Clay and Deborah L. Rotman, pp. 41-51. Contract Publication Series 02-249. Cultural Resource Analysists, Inc., Lexington.

2003 Botanical Analysis. In *The Argosy Lawrenceberg Casino Archaeological Project, Volume 9*, edited by Steven D. Creasman and Deborah Rotman, pp. 131-133. Contract Publication No. 02-249. Cultural Resource Analysts, Inc., Lexington.

2004 Botanical Analysis. In *"Higby's" Tavern Stand: A Phase III Excavation at Higbee's Tavern (15Fa222), Fayette County, Kentucky*, edited by Grant L. Day, pp. 9.1-9.6. Contract Publication Series 03-93. Cultural Resource Analysts, Inc., Lexington.

2006 Botanical Analysis. In *Phase II and III Archaeological Excavations at the Armstrong Farmstead (15Fa185), Fayette County, Kentucky* (Item No. 7-163.00), edited by Jennifer L. Barber, pp. 14.1-14.15. Contract Publication Series 03-62. Cultural Resource Analysts, Inc., Lexington.

Bonzani, Renée M., George M. Crothers, Patrick Trader, Robert H. Ward, and Ronald R. Switzer
2007 Early Sunflower Head Remains from Mammoth Cave, Kentucky, U.S.A. *Journal of Ethnobiology* 27(1):73-87.

Bonzani, Renée M. and Augusto Oyuela-Caycedo
2006 The Gift of the Variation and Dispersion of Maize: Social and Technological Context in Amerindian Societies. In *Histories of Maize: Multidisciplinary Approaches to the Prehistory, Biogeography, Domestication, and Evolution of Maize,* edited by John Staller, Robert Tykot, and Bruce Benz, pp. 343-356. Elsevier/Academic Press, New York.

Braudel, Fernand
1985 *The Structures of Everyday Life: Civilization and Capitalism, 15th-18th Century. Volume 1.* Harper & Row. New York.

Cashdan, Elizabeth
1990 *Risk and Uncertainty in Tribal and Peasant Economies*. Westview Press, Boulder, Colorado.

Coombes, Allen J.
1999 *Dictionary of Plant Names*. Timber Press, Portland, Oregon.

Cowan, C. Wesley
1997 Evolutionary Changes Associated with the Domestication of *Cucurbita pepo*: Evidence from Eastern Kentucky. In *People, Plants, and Landscapes Studies in Paleoethnobotany*, edited by Kristen J. Gremillion, pp. 63-85. University of Alabama Press, Tuscaloosa.

Craze, Richard
1997 *The Spice Companion: The Culinary, Cosmetic and Medicinal Uses of Spices.* People's Medical Society, Allentown, Pennsylvania.

Creasman, Steven D. and Deborah L. Rotman
2003 *The Argosy Lawrenceburg Casino Archaeological Project*. Cultural Resource Analysts, Lexington, Kentucky.

Crosby, Alfred W.
1986 *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. Cambridge University Press, Cambridge.

Culter, Hugh C. and Thomas W. Whitaker
1961 History and Distribution of the Cultivated Cucurbits in the Americas. *American Antiquity* 26(4): 469-485.

D'Altroy, Terence N. and Christine A. Hastorf
2001 *Empire and Domestic Economy*. Kluwer Academic, New York.

D'Arcy, William (editor)
1986 *Solanaceae: Biology and Systematics*. Columbia University Press, New York.

Davis, Daniel B, Leon Lane, Nancy O'Malley, and Jack Rossen
1997 *Phase II Testing and Phase III Mitigation of Three Sites in the Bardstown Industrial Park, Nelson County, Kentucky*. Archaeological Report No. 386. Program for Cultural Resource Assessment, University of Kentucky, Lexington.

Dennell, Robin W.
1992 The Origins of Crop Agriculture in Europe. In *The Origins of Agriculture: An International Perspective*, edited by C. Wesley Cowan and Patty Jo Watson, pp. 71-100. Smithsonian Institution Press, Washington D.C.

German Corner Cooking Index
1996 *Spices and Herbs*. Davitt Publications, electronic document, http://www.germancorner.com/recipes/hints/spice.html

Gero, J. M. and M. W. Conkey
1991 *Engendering Archaeology: Women and Prehistory*. Basil Blackwell, Oxford.

Hastorf, Christine A. and Virginia S. Popper (editors)
1988 *Current Paleoethnobotany: Analytical Methods and Cultural Interpretations of Archaeological Plant Remains*. University of Chicago Press, Chicago.

Heiser, Charles B., Jr.
1985 *Of Plants and People*. University of Oklahoma Press, Norman.

Hodder, Ian
1982 *Symbols in Action: Ethnoarchaeological Studies of Material Culture*. Cambridge University Press, Cambridge.

Hupping, Carol
1986 *Stocking Up III: The All-New Edition of America's Classic Preserving Guide*. Rodale Press, Emmaus, Pennsylvania.

Johannessen, Sissel
1984 Paleoethnobotany. In *American Bottom Archaeology*, edited by Charles J. Bareis and James W. Porter, pp. 197-214. University of Illinois Press, Urbana.

Jones, Glynis, Kenneth Wardle, Paul Halstead, and Diane Wardle
1986 Crop storage at Assiros. *Scientific American* 254(3):96-103.

Kelly, Robert L.
1995 *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*. Smithsonian Institution Press, Washington, D.C.

Lennstrom, Heidi A. and Christine A. Hastorf
1992 Testing Old Wives' Tales in Paleoethnobotany: A Comparison of Bulk and Scatter Sampling Schemes from Pancan, Peru. *Journal of Archaeological Science* 19:205-229.

1995 Interpretation in Context: Sampling and Analysis in Paleoethnobotany. *American Antiquity* 60(4):701-722.

Lopinot, Neal H.
1994 A New Crop of Data on the Cahokian Polity. In *Agricultural Origins and Development in the Midcontinent,* edited by William Green, pp. 127-153. Report 19. Office of the State Archaeologist, The University of Iowa, Iowa City.

Lopinot, Neal H. and David Eric Brussell
1982 Assessing Uncarbonized Seeds from Open-air Sites in Mesic Environments: An Example from Southern Illinois. *Journal of Archaeological Science* 9:95-108.

Lopinot, Neal H., Lucretia S. Kelly, George R. Milner, and Richard Paine
1991 *The Archaeology of the Cahokia Mounds ICT-II: Biological Remains*. Illinois Cultural Resources Study No. 13. Illinois Historic Preservation Agency, Springfield.

Magurran, Anne E.
1988 *Ecological Diversity and Its Measurement*. Princeton University Press, Princeton, New Jersey.

Mangelsdorf, Paul C.
1974 *Corn: Its Origins, Evolution, and Improvement*. The Belknap of Harvard University Press, Cambridge.

Martin, Alexander C. and William D. Barkley
2000 *Seed Identification Manual*. Second edition. The Blackburn Press, Caldwell, New Jersey.

Miller, Naomi F.
1989 What Mean These Seeds: A Comparative Approach to Archaeological Seed Analysis. *Historical Archaeology* 23(2):50-59.

Moerman, Daniel E.
1998 *Native American Ethnobotany.* Timber Press, Portland, Oregon.

Montgomery, Frederick H.
1977 *Seeds and Fruits of Plants of Eastern Canada and Northeastern United States.* University of Toronto Press, Toronto.

Moore, Rose G. and Deborah L. Rotman
2002 The Armstrong Farmstead (15Fa185): Stonewares and Refined Earthenwares as Indicators of Consumer Behavior and Economic Systems. Paper presented at the 20th Annual Symposium on Ohio Valley Urban and Historical Archaeology, Transylvania University, Lexington, Kentucky.

Muenscher, Walter Conrad
1955 *Weeds*. 2nd ed. Cornell University Press, Ithaca.

O'Malley, Nancy
1987 *A Cultural Evaluation of Archaeological Resources along Paris Pike, Bourbon and Fayette Counties, Kentucky*. Program for Cultural Resource Assessment, Department of Anthropology, University of Kentucky, Lexington. Submitted to H.W. Lochner.

Oyuela-Caycedo, Augusto
1998 Seasonality in the Tropical Lowlands of Northwest South America: The Case of San Jacinto 1, Colombia. In *Seasonality and Sedentism: Archaeological Perspectives from Old and New World Sites*, edited by Tom R. Rocek and Ofer Bar-Yosef, pp. 165-180. Peabody Museum Bulletin 6. Peabody Museum of Archaeology and Ethnology. Harvard University, Cambridge.

Panshin, Alexis J. and Carl de Zeeuw
1980 *Textbook of Wood Technology: Structure, Identification, Properties and Uses of the Commercial Woods of the United States and Canada*. 4th ed. McGraw-Hill Publishing Co., New York.

Pearsall, Deborah M.
1983 Evaluating the Stability of Subsistence Strategies by Use of Paleoethnobotanical Data. *Journal of Ethnobiology* 3(2):121-137.

1992 The Origins of Plant Cultivation in South America. In *The Origins of Agriculture: An International Perspective*, edited by C. Wesley Cowan and Patty Jo Watson, pp. 173-206. Smithsonian Institution Press, Washington, D.C.

2000 *Paleoethnobotany: A Handbook of Procedures*. 2nd ed. Academic Press, New York.

Roberts, Katherine M.
1993 Appendix 3. Arbuckle's Fort (46GB13) Plant Remains. In *Forting-up on the Greenbrier: Archaeological Investigations of Arbuckle's Fort, 46GB13, Greenbrier County, West Virginia*, edited by W. Stephen McBride and Kim A. McBride, pp. 36-40. Report No. 312. Program for Cultural Resource Assessment, University of Kentucky, Lexington.

Rossen, Jack
1992 Archaeological Contexts and Associations: The Lextran Archaeobotanical Collection. In *Current Archaeological Research in Kentucky:Volume Two*, edited by David Pollack and A. Gwynn Henderson, pp. 241-250. Kentucky Heritage Council, Frankfort.

2000 Archaebotanical Remains from Logan's Fort. In *Archaeological Investigations at Logan's Fort, Lincoln County, Kentucky*, edited by Kim A. McBride and W. Stephen McBride, pp. 95-105. Research Report No. 3. Kentucky Archaeological Survey, Lexington.

Scarry, C. Margaret
1993 Appendix B: Food Plant Remains from the Ashland Privy. In *Archaeology at Henry Clay's Ashland Estate: Investigations of the Mansion, Yard and Privy*, edited by W. Stephen McBride, pp. 101-111. Report 281. Program for Cultural Resource Assessment, University of Kentucky, Lexington.

Smith, Bruce
1992 *Rivers of Change: Essays on Early Agriculture in Eastern North America*. Smithsonian Institution Press, Washington.

2006 Eastern North America as an independent center of plant domestication. *Proceedings of the National Academy of Sciences (PNAS)* 10333:12223-12228.

Smith, Bruce D. and C. W. Cowan
2003 Domesticated crop plants and the evolution of food production economies in eastern North America. In *People and plants in ancient eastern North America*, edited by P. E. Minnis, pp. 105-125. Smithsonian Books, Washington, D.C.

Staller, John, Robert Tykot, and Bruce Benz (editors)
2006 *Histories of Maize: Multidisciplinary Approaches to the Prehistory, Biogeography, Domestication, and Evolution of Maize.* Elsevier/Academic Press, New York.

Steyermark, Julian A.
1963 *Flora of Missouri*. The Iowa State University Press, Ames.

Taylor, Walter W.
1983 *A Study of Archaeology*. 2nd ed. [1948]. Southern Illinois University, Carbondale.

Thompson, G. B.
1994 Wood Charcoals from Tropical Sites: A Contribution to Methodology and Interpretation. In *Tropical Archaeobotany: Applications and New Developments,* edited by Jon G. Hather, pp. 9-33. Routledge, New York.

Trigger, Bruce, G.
1989 *A History of Archaeological Thought*. Cambridge University Press, Cambridge.

Wagner, Gail
1982 Testing Flotation Recovery Rates. *American Antiquity* 47:127-132.

Welch, Paul D. and C. Margaret Scarry
1995 Status-Related Variation in Foodways in the Moundville Chiefdom. *American Antiquity* 60(3):397-419.

Willey, Gordon and Jeremy Sabloff
1974 *A History of American Archaeology*. Thames and Hudson, London.

Wymer, Dee Anne
1992 Trends and Disparities: The Woodland Paleoethnobotanical Record of the Mid-Ohio Valley. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*, edited by Mark F. Seeman, pp. 65-76. Midcontinental Journal of Archaeology Special Paper No. 7. The Kent State University Press, Kent, Ohio.

Young, Amy L.
1995 Archaeology at Locust Grove Plantation, Jefferson County, Kentucky. In *Current Archaeological Research in Kentucky: Volume Three*, edited by John F. Doershuk, Christopher A. Bergman, and David Pollack, pp. 279-296. Kentucky Heritage Council, Frankfort.

Young, James A. and Cheryl G. Young
1992 *Seeds of Woody Plants in North America.* Dioscorides Press, Portland, Oregon.

THE ALLEN BRICK YARD: A NINETEENTH CENTURY BRICK MANUFACTURING SITE IN PADUCAH, McCRACKEN COUNTY, KENTUCKY

By

Charles D. Hockensmith
(retired from)
Kentucky Heritage Council
Frankfort, Kentucky

and

William R. Black, Jr.
Ray Black & Son, Inc.
Paducah, Kentucky

ABSTRACT

The Allen Brick Yard (15McN115) is a nineteenth century brick manufacturing site in Paducah, Kentucky. The company was mentioned in sources dating between 1859 and 1890. Individuals associated with the company included Richard E. Allen, Samuel Allen, and William E. Allen. The brick yard produced dense well-made soft-mud bricks without brand names. This paper presents the results of an archaeological reconnaissance and archival research for the brick yard. This important industrial site and a sample of the bricks from the site are described.

INTRODUCTION

The Allen Brick Yard was a producer of common building bricks for McCracken County, Kentucky. Paducah, the county seat, is an Ohio River town located in extreme western Kentucky within the Jackson Purchase region, and is located in the northeastern portion of the county west of the confluence of the Tennessee and Ohio rivers. The brick yard remains are situated off Broad Street. Bricks and brick fragments are located in the back yard of the McCarty residence and on the adjacent floodplain of Island Creek. Landowner, Mike McCarty, noted that his back yard had been in forest for many years when he acquired the property (Mike McCarty, personal communication 1997). He gradually cleared the forest by hand to create a back yard. McCarty's careful clearing of the property resulted in little ground disturbance and ensured that the brick yard remains were preserved. The back yard area is still littered with bricks and brick fragments. McCarty related that everywhere he digs in the yard he encounters bricks. The bricks from the site are typical of those expected at a brick yard. Most of the complete specimens have obvious flaws while the better quality bricks are only represented by fragments. Typically, good quality whole

bricks are rare on brick yard sites since they were sold to customers and the rejected bricks were discarded on-site.

The exact beginning date of the Allen Brick Yard is not currently known. Richard Allen was listed in the 1859 Paducah City Directory as a brick manufacturer (Byers and Clements 1859:23). This listing suggests that Allen was operating the brick yard by 1859 or possibly sometime before that date. The brick yard appears to have been operated by family members until at least 1890.

Two other brick companies also operated in the same area of Paducah during the late 19th century. The Chamblin and Murray Brick Yard (later known as the Paducah Brick and Tile Company) was located about 700 m to the west of the Allen Brick Yard. The Katterjohn Brick Company had two locations, one about 1.2 km to the northwest, and the other about 1.2 km to the west of the Allen Brick Yard. All three brick yards exploited the alluvial clays found within the Ohio River floodplain. The authors have reported previously on the Katterjohn Brick Yards (Hockensmith and Black 2004a) and the Paducah Brick and Tile Company/Chamblin and Murray Brick Yard (Hockensmith and Black 2004b). Another article examined the Paducah Brick and Tile Company/Chamblin and Murray Brick Yard plus other companies that subsequently operated on the same property, the Paducah Brick Works and the Paducah Brick and Supply Company (Hockensmith and Black 2008, 2009a, 2009b). Several other brick yards also once operated in Paducah and were discussed in an overview article (Hockensmith 2007).

The authors visited the Allen Brick Yard Site on April 25, 1997. The visible surface remains associated with this brick yard were documented at this time. In this paper, we discuss the history of the Allen Brick Yard and the surviving archaeological remains. A sample of the bricks found at the site were analyzed and are described in detail. The paper ends with some brief summary comments and makes some comparisons to other sites.

THE HISTORY OF THE ALLEN BRICK YARD

Information about the history of the Allen Brick Yard is scanty with only scattered bits of information available. In 1859, *Williams' Paducah Directory, City Guide, and Business Mirror* included the following listing "Allen, Richard, brick manufacturer. h e s Public Square, Jersey City" (Byers and Clements 1859:23). R. E. Allen was listed as a farmer in the 1850 Population Census (United States Federal Census 1850). Birchfield (n.d.:5) noted that Richard E. Allen married Julia E. Flourney on December 14, 1835. Julia was listed as a 45-year-old woman in 1850 who was born in Virginia (Simmons 1974:67). In 1870, the U.S. Population Census for McCracken County listed Richard E. Allen as a 65-year-old (born ca. 1805) brick maker born in Virginia with $25,000 of real estate and $1,000 of personal estate (United States Federal Census 1870). Living in the same household was 33 year old Samuel Allen, born (ca. 1837) in Kentucky (United States Federal Census 1870). Samuel Allen, also a brick maker, was Richard Allen's son. In fact, the earlier 1850 U.S. Population Census listed Samuel M. Allen (13 years old) as the oldest of R. E. Allen's three children (Simmons 1974:67). For some unknown reason, Samuel was not listed in the 1880 Population Census for McCracken County, Kentucky. The 1871-1872 Paducah City Directory listed R. E. Allen as a brick maker living on Broad Street near the city limits (Wiggins and Weavers 1871:358). A change of management occurred sometime between 1872 and 1880 as

the names associated with the brick yard changed from Richard E. Allen to William E. Allen.

The 1880 U.S. Manufacturing Census provided useful information about William E. Allen's brick yard (United States Federal Census 1880a). Allen invested $2,500 of capital in his business and employed a maximum of 22 persons including 18 males, one female, and three children. The brick yard operated six months per year with employees typically working 10-hour days. Dailey wages ranged from $1.50 for skilled laborers to $1.25 for ordinary laborers. The total yearly labor costs for 1879-1880 amounted to $2,500. Allen purchased 450 cords of wood valued at $300 for burning bricks. His material expenses totaled $1,200 per year. In terms of equipment, the 1880 Census mentioned a 6 ½ foot wheel powered by two horses. During the work season, Allen produced 957,000 bricks valued at $5,000. The 1880 Population Census for McCracken County listed William E. Allen as a 43-year old (born ca. 1837) brick maker born in Kentucky (United States Federal Census 1880b). He was married to Mollie L. Allen (28 years old and born in Virginia) with children Nellie (two years old) and William (two months old). The 1880 Population Census for McCracken County listed three different men named William Allen.

The Allen Brick Yard was mentioned in the city directories dating between 1881 and 1890. *Jno. B. Gaines' Paducah City Directory, 1881*-82 listed W. E. Allen as a brick burner who resided on the west side of Broad Street near Elizabeth Street (Gardner 1881:112). In the 1886-1887 Paducah City Directory (Bennett 1886:20), W. E. Allen was listed as a manufacturer of brick with his office, yard, and residence on the south side of Broad Street, west of 5th Street. The 1890 Paducah City Directory listed William E. Allen as a manufacturer of brick. His brick yard being located on the south side of Broad Street, opposite 6th Street with his office and residence at 1900 Broad Street (Bennett and Company 1890:25 and 195). Finally, Harvey Allen was listed as a brick setter residing at 623 South 11th Street in the 1890 Paducah City Directory (Bennett and Company 1890:25). It is not known whether Harvey was an employee of William Allen's brick yard or worked at another local brick yard. Also, we don't know Harvey's relationship to W. E. Allen. The 1894-1895 Paducah city directory did not list the Allen brick yard (Olcott & Wilcox 1894). A William E. Allen died September 14, 1900 but the obituary did not mention his occupation (Birchfield 1994:57). Thus, it is uncertain if this William Allen was the brick maker or one of the other two men in McCracken County with the same name.

THE ARCHAEOLOGICAL REMAINS

The Allen Brick Yard Site (15McN115) is located in Paducah, McCracken County, Kentucky, behind Mike and Dru Ann McCarty's House at 1822 Broad Street, about 60 m west-northwest of its intersection with 6th Street. The site is situated about 110 m southeast of Island Creek, which flows into the Ohio River ca. 640 m further north. Bricks associated with the brick yard (Figure 1) were observed over an area approximately 75 m north-south and 90 m east-west (6,750 m^2). Additional bricks are scattered beyond the end of the McCarty yard on the much lower floodplain and extend another 40 m to the west on the floodplain. The site may extend even further to the west from Mr. McCarty's yard but permission was not available to explore this area. Unrelated remains noted at the northeast end of the site but not documented included a small foundation, a pile of bricks from a demolished structure, and a large depression filled in by Mr. McCarty (see Figure 1). Fortunately, the brick yard site has not experienced any significant disturbance in recent

years. Adjacent property owner, Charles McClure (in his 80s during April 1997) shared that the brick yard was already gone when he was a boy (Charles McClure, personal communication 1997). Mr. McClure remembers seeing brick piles along the creek during his youth. Very few whole bricks were observed at the site. Most of the observed specimens are fragments of good quality dense, well-fired, common building bricks. However, the sample also includes warped and cracked bricks. It appears that the brick yard owners were discarding flawed bricks by dumping them over the steep bank since these bricks could not be sold.

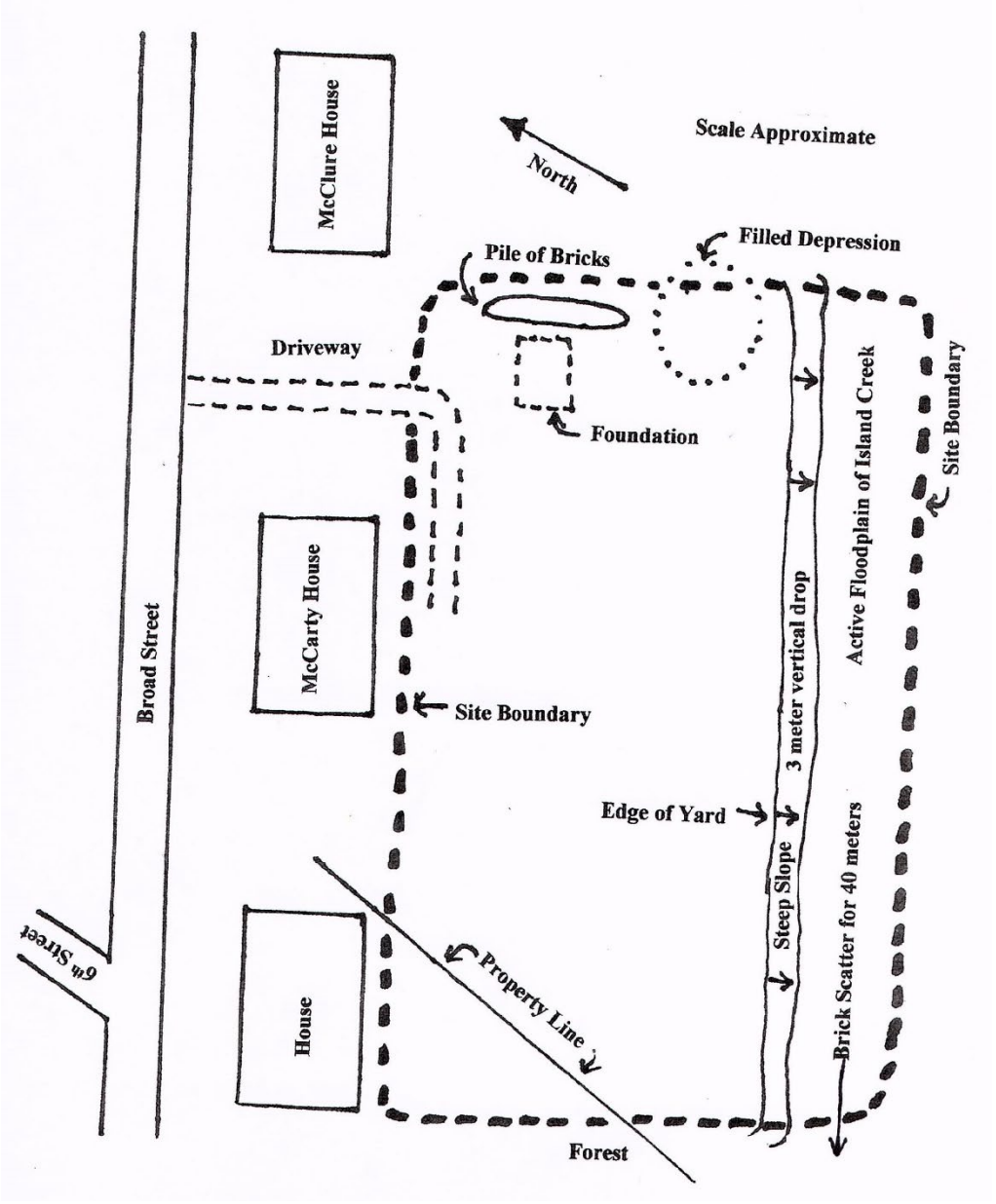

Figure 1. Sketch map of the Allen Brick Yard Site (15McN115) in Paducah, McCracken County, Kentucky. The scale is approximate.

THE BRICK SAMPLE

During the survey, 22 bricks and fragments were collected from across the site for analysis (Tables 1 and 2). Most of the bricks (n=17) are rejected common building bricks produced at the brick yard. Five fragmentary fire bricks were also included in the sample. Since most of the bricks at the site were fragmentary, an effort was made to include bricks in the sample that could yield the most information. Thus, the nearly complete rejected bricks and the larger fragments of well-fired bricks were selected. Likewise, the larger fragments of fire bricks with brand names were selected. None of the common building bricks had brand names. Fortunately, most of the fire bricks collected did have brand names. The different categories of bricks and archaeological examples recovered are discussed below with some information on how they were manufactured.

COMMON BUILDING BRICKS

Common building bricks, as the name indicates, are simply common bricks used in the construction of residential and commercial structures. They are made from locally available clays and are typically a reddish brown color. A total of 17 common bricks and fragments were collected from the brick yard area. They were all made by the soft-mud technique but it is unknown whether they were hand-made or machine-made bricks.

Soft-mud bricks were initially produced in molds by hand. By the mid-19th century, machines were invented that duplicated the hand molding process. During the early 20th century, most brick manufacturers were using very efficient brick making machines and hand molding of bricks became uncommon. The molding of bricks by hand involved placing the wet clay into simple wooden molds containing several compartments. The excess clay was struck off by pulling a board or some other straight edge across the top of the mold. This process leaves distinctive parallel lines and sometimes deep gouges where pebbles in the paste were pulled across the struck surface. Bricks produced by this method can vary greatly in size due to variations in wooden molds and the gradual wearing away of molds by abrasion. Also, hand-made bricks may vary in hardness and color since they were usually fired in crude up-draft kilns which exposed the bricks to uneven heat during the firing process.

Machine-made soft-mud bricks were produced in machines that forced wet clay into a series of molds and then automatically removed the excess clay from the top of the molds (Gurcke 1987:19). The removal of excess clay from molds is called a strike. Like hand-made bricks, machine-made specimens have distinctive strike lines on the surface where the excess clay was pulled across the top of the mold. Often small pebbles are pulled across the struck surface producing parallel grooves. Soft-mud bricks made by machines can vary depending on the type of machine used to produce them. Soft-mud machines were used in Paducah during the early 1920's at the Paducah Brick and Tile Company as well as the Hill and Karnes brick yard (Ries 1922:58-59). However, the exact date that soft-mud brick machines were introduced in western Kentucky is not known currently.

Seventeen standard size soft-mud bricks (Figures 2-3) without any markings were collected for study (Table 1). These were the largest specimens observed at the site. Five of these bricks were well-fired and 12 bricks were over-fired. Most of these bricks were dense and well made.

Figure 2. Two dense, well-made bricks from the Allen Brick Yard Site. The top brick is specimen SP-2 and the bottom brick is specimen SP-13.
Note the strike lines running length-wise.

Figure 3. Two complete bricks from the Allen Brick Yard Site.
The top brick is specimen SP-4 and the bottom brick is specimen SP-5.

Sixteen of the bricks were struck along the long axis of the brick and one brick was struck along the short axis (Figure 4). Lips (excess clay pulled over the edges of the molds) resulting from the striking were visible on 12 bricks. In terms of length, these bricks ranged in size from 19.5 to 21.4 cm (7 ¾ to 8 ½ inches), most were 19.5 to 20.5 cm (7 ¾ to 8 1/8 inches). Brick width ranged from 8 to 10.4 cm (3 1/8 to 4 1/8 inches) with most clustering between 8.5 and 9.5 cm (3 3/8 to 3 ¾ inches). Thickness ranged from 5.2 to 6.3 cm (2 1/16 to 2 ½ inches) with most specimens between 5.4 and 6 cm (2 1/8 to 2 3/8 inches). In terms of color, nearly half of the bricks (n=8) were a light reddish brown while eight were light grayish brown, and one specimen ranged from dark grayish brown to orange. All the specimens have a sandy texture indicating sand was used to lubricate the brick molds to prevent sticking.

Figure 4. Common brick struck across the short axis from the Allen Brick Yard Site (Specimen SP-15). Note the strike lines across the short axis of the brick.

Several specimens had shallow depressions (Figure 5) on one or both edges revealing how the bricks were stacked prior to firing. These depressions illustrate the stacking patterns employed when the green bricks were either stacked for drying or when placed in a kiln. As the height of the stack increased, the weight greatly increased on the lower courses of bricks. The weight of the bricks created shallow depressions where they made contact. Also, the spacing of the bricks is revealed by the distance between the depressions. Seven bricks exhibited depressions showing cross-wise stacking patterns (turned 90º from the course below). These depressions ranged in width from 4.5 to 7 cm (1 ¾ to 2 ¾ inches) with most depressions ranging between 5 and 6.5 cm (2 and 9/16 inches) in width. The spacing between the cross-wise depressions ranged between 1 and 4.5 cm (3/8 and 1 ¾ inches) with most specimens ranging between 2 and 2.5 cm (¾ and 1 inch). Five bricks had length-wise depressions. These bricks were placed on edge in a parallel configuration where the bricks overlap with those on the course below. The length-wise depressions varied in width for some specimens since some were placed at a slight angle. Width ranged from 1-3.1 cm (3/8 to 1 ½ inches) to 3.5-5.3 cm (1 3/8 to 2 1/8 inches) while length ranged from 10.6 to 16.2 cm (4 1/8 to 6 3/8 inches). For illustrations of these two stacking patterns, the reader is directed to studies of Frankfort bricks by the senior author (Hockensmith 1997:143, 1998:21). Several specimens (Figure 6) exhibited evidence of bricks that had been fused together in the kiln and were broken apart after firing.

Figure 5. Side-view of the common bricks from the Allen Brick Yard Site. The top brick (SP-8) has a length-wise stacking impressions. The center brick (SP-1) has cross-wise stacking impressions. The bottom brick (SP-2) has portions of adhering bricks that fused during the firing process.

Figure 6. Side-view of two common bricks from the Allen Brick Yard Site. The top brick (SP-10) and the bottom brick (SP-9) have warped by intense heat and have portions of adhering bricks that fused to them. The bottom brick also has areas of heavy glazing.

Table 1. Soft-mud building brick measurements and degree of firing for the Allen Brick Yard Site Sample.

Specimen No.	Firing	Length (Cm)	Length (Inches)	Width (Cm)	Width (Inches)	Thickness (Cm)	Thickness (Inches)
SP-1	OF	19.6-20.5	7 ¾ - 8 1/8	8-9	3 1/8 - 3 9/16	5.5-6	2 3/16– 3 3/8
SP-2	OF	19.5-20.5	7 ¾ - 8	7.5-9	3 – 3 9/16	5.7	2 ¼
SP-3	OF	20.4-21.4	8 1/8 - 8 ½	8.5-9	3 3/8 - 3 9/16	5.4-6	2 1/8 - 2 3/8
SP-4	OF	20-21	7 1/8	9.8-10.4	3 7/8 - 4 1/8	5.5-5.9	2 3/16 - 2 ¼
SP-5	OF	19.5	7 5/8	9.3-9.6	3 9/16 - 3 ¾	5.6	2 ¼
SP-6	WF	20	7 7/8	9-9.4	3 9/16 - 3 ¾	5.7-5.9	2 ¼
SP-7	OF	20-20.5	7 7/8 - 8	8.2-9	3 ¼ - 3 9/16	5.5-6	2 3/16 - 2 3/8
SP-8	OF	20-20.2	8 - 8 1/16	9-9.5	3 9/16 - 3 ¾	5.4-6	2 1/8 b - 2 3/8
SP-9	OF	19.8-20.2	7 1/8 - 8	8.3-9.5	3 ¾ - 3 ¾	5.5-6.2	2 3/16 - 2 7/16
SP-10	OF	19.5-21	2 5/16 - 8 ¼	8.5-9.2	3 3/8 - 3 5/8	5.5-6	2 3/16 - 2 3/8
SP-11	OF	18*	7 1/8	8.7-9	3 3/8 -3 9/16	5.7-5.9	2 ¼
SP-12	WF	17*	6 ¾	9.3-9.5	3 5/8 - 3 ¾	5.7-6	2 ¼ - 2 3/8
SP-13	WF	18.3*	7 1/8	9-9.5	3 9/16 -3 ¾	5.7-5.9	2 ¼
SP-14	OF	14.5*	5 ¾	8.7-9.5	3 3/8 - 3 ¾	5.5	2 3/16
SP-15	WF	17.5*	6 7/8	9.5-9.9	3 ¾ - 3 7/8	6.3	2 ½
SP-16	WF	12.1*	8 5/16	8.5	3 3/8	5.3-5.5	2 ¼ - 2 3/16
SP-17	OF	12*	4 ¾	9-9.2	3 9/16 -3 5/8	5.2-5.4	2 1/16 - 2 1/8

Key: OF=Over-Fired, WF=Well-Fired, and *= lengths of incomplete bricks.

Of the 17 common bricks recovered (Tables 1), ten were complete bricks (some of these were warped), three were portions about two-thirds complete, and four specimens represented halves. A number of these bricks (Figure 7) were obvious rejects as evidenced by their flaws. The flaws include warping (n=12) during exposure intense temperatures, glazing from over-firing (n=8), and cracking (n=10). Usually, two or three of these flaws occur in combination on the specimens and are all due to being over-fired. Two specimens were greatly distorted by the intense heat they were exposed to during the firing process. Glaze colors on these bricks is usually a reddish brown to light reddish brown color. A few specimens have light gray to dark gray glazing, which ranges from a dull color to a very shiny glaze. During a visit to Colonial Williamsburg, Virginia, the senior author talked with brick maker Kenneth Tappan (personal communication 2017) about various aspects of brick making. Tappan indicated that gray glazes on bricks can be caused by potash contained in the wood used as fuel. Further, the black glazes occurring on bricks are where the fire is more intense. Another flaw in some of the bricks was compaction lines. According to Tappan (personal communication 2017), the compaction or fold marks on bricks are results of insufficiently compacted clay in the molds or where clay with sand on it was folded over.

The brick sample from the Allen Brick Yard did not exhibit any unusual characteristics. In other words, no accidental imprints (i.e., finger prints, animal tracks, etc.) or other imprints (i.e., writing, etc.) were observed on the bricks in the sample. It is not uncommon for soft-mud bricks to become accidently impressed before they are dried and fired. Black (1987) discusses several types of impressions found on Paducah bricks. Three specimens (SP-7, SP-9, and SP-17) from our sample had rough surfaces opposite the struck surface. Possible explanations include green bricks

getting rained on (Figure 8) or the green bricks being laid on a very rough surface to dry. Another possibility is that a coarse sand (with some pebbles) was placed in the bottom of brick molds to prevent the clay from sticking. Kenneth Tappan (personal communication 2017) when asked about rain damage to bricks, responded that the rain washes away the exposed clay on green bricks which leaves the inclusions in the paste exposed. The exposed inclusions on the rained on surface makes the bricks appear very rough in texture.

Figure 7. Two common bricks from the Allen Brick Yard Site that have been warped. The top brick (SP-10) and the bottom brick (SP-9). Note the glazing on the bottom brick.

Figure 8. Two common bricks from the Allen Brick Yard Site that may have been rained on prior to firing. The top brick is SP-7 and the bottom brick is SP-17.

FIRE BRICKS

Fire bricks are specialized bricks made to withstand great heat. They are manufactured from special clays and are usually slightly larger than common bricks. The heat-resistant nature of these bricks permits their use in fire places, stove liners, and furnaces. They were used by many industries that converted raw materials into finished products using great heat (Havard 1912:10). Early fire brick were made by the soft-mud technique and have strike lines. Later fire bricks were manufactured by the stiff-mud and dry press methods. Usually, these bricks have a brand name on one face to identify their heat resistance qualities and their manufacturer. Fire bricks can be made in hundreds of different shapes to meet the needs of individual clients or for specific industries.

Five fire bricks were recovered from the Allen Brick Yard (Table 2). These bricks appear to have been made in presses but they were largely covered with mortar which obscured most of their manufacturing marks. Recovered brand names include L F B Wks/ LOUISVILLE, L F B WKS/ STANDARD, and A. P. GREEN/ OZARK D. P., which were produced in Kentucky and Missouri. These bricks were probably used in the construction of the firing tunnels in updraft kilns dating to the later years of the brick yard.

Kentucky Fire Brick Brands

Two of the recovered bricks were produced by the Louisville Fire Brick Works in Louisville, Kentucky: L F B WKS/ LOUISVILLE and L F B WKS/ STANDARD. The words before the slash are placed on the brick above the words after the slash. The Louisville Fire Bricks Works operated plants in Grahn (Carter County) and in Louisville (Jefferson County), Kentucky. During 1921, the

Louisville plant was producing 50,000 nine-inch (23 cm long) bricks per day (Ries 1922:133) while the two plants at Grahn had the potential to produce a combined total of 60,000 nine-inch bricks per day (Ries 1922:190). The Louisville plant ceased production in 1959 and currently serves as the company's sales office. One plant in Grahn is still producing fire bricks. Unfortunately, specific production dates for the Louisville Fire Brick Works brands are not available since old records were discarded during a series of office moves (Bill Shuck, Louisville Fire Brick Works President, personal communication 1996). The recovered specimens are described in the subsequent paragraphs.

Table 2. Measurements and brand names for the fire bricks recovered at the Allen Brick Yard.

Specimen No.	Brand	Length (Cm)	Length (Inches)	Width (Cm)	Width (Inches)	Thickness (Cm)	Thickness (Inches)
SP-18	L F B WKS LOUISVILLE	13.2*	5 7/16	11	4 3/8	3.8-6	1 ½- 2 3/8
SP-19	L F B WKS STANDARD	13.5*	5 3/8	11.1	4 3/8	6	2 3/8
SP-20	L F B WKS STANDARD	10.1*	4	11.1	4 3/8	6	2 3/8
SP-21	None	16.2*	6 3/8	13 - 14.5	5 ¼ - 5 ¾	5	2
SP-22	A. P. GREEN OZARK D. P.	12.5*	4 7/8	11	4 3/8	6.2	2 7/16

Key: *= lengths of incomplete bricks.

One fragmentary "**L F B WKS/ LOUISVILLE**" fire brick (SP-18) was recovered from the Allen Brick Yard (Figure 9). The "L F B WKS" is on the upper line and "LOUISVILLE" is on the second line. This specimen is wedge shaped and was probably used in an arch. The letters in the name are 2 to 2.2 cm (3/4 to 7/8 inch) high, 1.5 to 2 cm (9/16 to ¾ inch) wide, 6 mm to 1 cm (1/4 to 7/16 inch) apart, and ca. 3 mm (1/8 inch) deep. It is a yellowish brown color. Broken areas on the brick revealed that the interior paste was a gray color. In terms of size, this broken specimen is 13.2 cm (5 7/16 inches) long, 11 cm (4 3/8 inches) wide, and ranges in thickness from 3.8 to 6 cm (1 ½ - 2 3/8 inches) thick. The L F B WKS/ LOUISVILLE brand was used by the Louisville Fire Brick Works in Louisville, Kentucky about 1935 (Gurcke 1987:260-261). The LOUISVILLE brand produced by Louisville Fire Brick Works has a date range between 1921 and 1942. The two names combined on bricks may have a longer period of production. A 1910 catalogue by the Henry A. Petter Supply Company of Paducah indicates that the L F B WKS brand is much earlier than suggested by Gurcke (Petter 1910:297). The catalogue stated that "grade L. F. B. Wks. is somewhat smaller than the standard size brick, of the same material as the A grade" (Petter 1910:297). Further, "the A Brick will answer for ordinary heat exposures…" (Petter 1910:297).

Two "**L F B WKS/ STANDARD**" fire bricks (ca. ½ specimens) were recovered from the site (Figures 9-10). These specimens had "L F B WKS" on the upper line and "STANDARD" appearing on the second line. The letters in the name are 1.8- 2 cm (5/8 – 13/16 inch) high, 1.5 cm (5/8 inch) wide, 8 mm to 1.8 cm (5/16 to 11/16 inch) apart, and 2-3 mm (1/16 -1/8 inch) deep. Both specimens are a yellowish brown color with some gray discoloration from burning. The method

of manufacture was not obvious but they were probably pressed. Their dimensions are 10.1 to 13.5 cm (4 to 5 $^{3}/_{8}$ inches) long, 11.1 cm (4 $^{3}/_{8}$ inches) wide, and 6 cm (2 $^{3}/_{8}$ inches) thick. The STANDARD brand was made by the Louisville Fire Brick Works in Louisville, Kentucky between 1921 and 1930 (Gurcke 1987:298-299). Judging from the drawings and information published in the Henry A. Petter Supply Company catalogue, the STANDARD brand may refer to the standard size of the brick while the L. F. B. Wks. refers to its level of heat resistance (Petter 1910:297). The standard brick brand is shown as being 9 inches long, 4.5 inches wide and 2.5 inches thick (Petter 1910:297). The L. F. B. Wks. Brand is shown as being 8.25 inches long, 4 inches wide and 2.25 inches thick (Petter 1910:297).

Missouri Fire Brick Brands

One fire brick (SP-22) was made in Missouri by the A. P. Green Fire Brick Company. The single fragment contained the brand "**A. P. GREEN/ OZARK D. P.**" (Figure 10). This specimen has "A. P. GREEN" on the upper line and "OZARK D. P." on the second line. This was probably a pressed brick. The letters in the name are 1.8 cm ($^{11}/_{16}$ inch) high, 1 to 1.7 cm ($^{3}/_{8}$ to $^{5}/_{8}$ inch) wide, 8 mm to 1.8 cm ($^{5}/_{16}$ to $^{11}/_{16}$ inch) apart, and ca. 1.5 mm ($^{9}/_{16}$ inch) deep. This light yellowish brown brick has been burned to a red color on one side. This specimen is 12.5 cm (4 $^{7}/_{8}$ inches) long, 11 cm (4 $^{3}/_{8}$ inches) wide, and 6.2 cm (2 $^{7}/_{16}$ inches) thick. Gurcke (1987:278-279) stated that the A. P. Green Fire Brick Company of Missouri produced the Ozark brand between 1927 and 1942. The D. P. brand was produced by A. P. Green Fire Brick Company between 1920 and 1923 (Gurcke 1987:228-229). Since the date ranges are different, the date of the two brand names combined together is unknown.

Figure 9. Two fragmentary fire bricks from the Allen Brick Yard Site. On the left (SP-20) is a LFB WKS/STANDARD Fire Brick and on the right (SP-18) is a LFB WKS/LOUISVILLE Fire Brick.

Figure 10. Two fragmentary fire brick from the Allen Brick Yard Site. The specimen on the left (SP-20) is a LFB WKS/STANDARD and on the right (SP-22) is an A. P. GREEN/OZARK D. P.

Unmarked Fire Brick

One unmarked fire brick (SP-21) was recovered from the site. This light yellowish brown brick been burned to a reddish brown color in some areas. It was probably produced by the dry press method but lacks a brand name. One side of the brick has a slight curve. This specimen is 16.2 cm (6 3/8 inches) long, 13 to 14.5 cm (5 ¼ to 5 ¾ inches) wide, and 5 cm (2 inches) thick. It has some reddish brown glazing from being used in a kiln.

BRICK DISCUSSION

The bricks from the Allen Brick Yard are briefly compared to samples collected from The Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard (15McN114) and the two locations of The Katterjohn Brick Company (15McN120) in this section. The Katterjohn Brick Company overlaps with the Allen Brick Yard for a period of about 20 years. The Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard started approximately three years after the Allen Brick Yard closed. The common soft-mud bricks are discussed first and then the fire bricks recovered from the three brick yards are discussed. Finally, some brief comparisons are made.

COMMON BRICKS

Seventeen standard size soft-mud bricks were collected from the Allen Brick Yard. These include ten complete bricks, three bricks about two-thirds complete, and four halves. Five of these bricks were well-fired and 12 were over-fired. Most of these bricks were dense and well made. Sixteen bricks were struck along the long axis and one was struck along the short axis. Lips resulting from the striking were visible on 12 bricks. In terms of length, these bricks ranged in size from 19.5 to 21.4 cm (7 5/8 to 8 ½ inches), most were 19.5 to 20.5 cm (7 5/8 to 8 inches). Brick width ranged from 8 to 10.4 cm (3 1/8 to 4 inches) with most clustering between 8.5 and 9.5 cm (3 3/8 to 3 ¾ inches). Thickness ranged from 5.2 to 6.3 cm (2 1/16 to 2 ½ inches) with most specimens between 5.4 and 6 cm (2 1/8 to 2 3/8 inches). In terms of color, nearly half of the bricks (n=8) were

a light reddish brown while eight were light grayish brown, and one specimen ranged from dark grayish brown to orange. Flaws included warping (n=12), glazing from over-firing (n=8), and cracking (n=10). Usually, two or three of these flaws occur in combination on the specimens. Seven bricks exhibited depressions showing cross-wise stacking patterns while five bricks had length-wise stacking depressions. They all have a sandy texture indicating sand was used to lubricate the brick molds to prevent sticking.

At The Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard, 12 standard size soft-mud bricks were selected for study (Hockensmith and Black 2004b:326-329). Ten of these bricks were well-fired and only two were over-fired. Most of these bricks were dense and well made. All 12 of the bricks were struck along the long axis of the brick and nearly all the specimens have one or more lips resulting from the strikes. In terms of length, these bricks range in size from 19.3 to 21 cm (7 $^{5}/_{8}$ to 8 ¼ inches). Brick width ranged from 9 to 10.2 cm (3 $^{5}/_{8}$ to 4 inches). Thickness ranged from 5.6 to 6.2 cm (2 ¼ to 2 $^{3}/_{8}$ inches). Colors included dark reddish brown (n=9) and medium reddish brown (n=3). They all have a sandy texture indicating sand was used to lubricate the brick molds. Flaws were rare, only three bricks exhibited cracking, one brick was slightly warped, and only one brick had glazing from the firing process. One brick had shallow depressions on both edges revealing that the bricks were stacked length-wise in the kiln. All specimens had various amounts of mortar on them indicating that they were used in construction projects at the brick yard. In fact, some of these specimens were recovered from brick walls at the site.

Twenty-two common soft-mud bricks were recovered from The Katterjohn Brick Company locations (Hockensmith and Black 2004a:76-79). A total of 17 common bricks were recovered from Brick Yard # 1. These specimens include ten complete bricks, six end portions, and one upper (face) portion. A number of these bricks are obviously rejects discarded at the brick yard as evidenced by their flaws. These flaws include warping (n=6), glazing from over-firing (n=4), and cracking (n=6). Usually, two or three of these flaws occur in combination on the specimens. The glaze colors on these bricks is either brown or reddish brown. Some specimens were extremely distorted by the intense heat that they were exposed to during the firing process. Most of these specimens (n=14) were struck across the short axis of the brick. Two specimens were struck across the long axis and one specimen was missing the struck surface. Lips resulting from the striking were visible on nine bricks. In terms of color, most of the bricks (n=12) were a light reddish brown while the others included one medium reddish brown, one dark reddish brown, two medium grayish brown, and one dark grayish brown. Only two of the bricks in the sample had a trace of mortar on them suggesting that they had been used in a wall. Further, the sandy texture of the bricks indicates that sand was used to coat the molds to prevent the bricks from sticking.

Brick size varies slightly as expected (Hockensmith and Black 2004a:77-78). The specimens with cross-wise strikes had the following size ranges: length, 19.2- 20 cm (7 ½ - 7 $^{7}/_{8}$ inches); width, 8.3- 10.3 cm (3 $^{3}/_{16}$ - 4 inches); and thickness, 5.5- 6.3 cm (2 $^{3}/_{16}$- 2 ½ inches). The measurements for the specimens with length-wise strikes were: length, 19.1 (7 ½ inches); width, 9- 9.1 cm (3 $^{9}/_{16}$ - 3 $^{5}/_{8}$ inches); and thickness, 5.7- 6 cm (2 ¼ - 2 $^{3}/_{8}$ inches).

Six bricks from the Katterjohn Brick Yard # 1 exhibit marks that reveal the stacking patterns used during firing. After firing, the depressions (that show the outline of adjacent bricks that sunk

into them) are permanently recorded in the finished bricks. These depressions show the orientation and spacing of the bricks as they were stacked in the kiln. This patterning may be further illustrated by adhering portions of adjacent bricks that fused to other bricks during the firing process. There were three examples of such fusing in the present sample. Of the specimens with depressions, three were stacked on edge at a 90-degree angle to those bricks on the lower course. Two specimens were placed on edge in a parallel configuration where the bricks overlap with those on the lower course. Spacing between the bricks in the kiln ranged between 2 and 2.2 cm ($^{13}/_{16}$ and $^{7}/_{8}$ inch).

Five common bricks were recovered from the Katterjohn Brick Yard # 2 (Hockensmith and Black 2004a:79). These included one complete brick, one nearly complete specimen, two halves, and one length-wise fragment. Two of the bricks are rejects that have been warped by over-firing and contain some glazing (reddish brown and black). One of these rejected bricks also has some cracking. Their colors vary, three are a dull reddish brown to grayish brown, one is a medium reddish brown, and one is a dark reddish brown. These bricks were formed in molds that were coated in sand to prevent sticking. Four of the five specimens were struck across the short axis of the brick. The fifth specimen was struck across the long axis of the brick. Two of the specimens have visible lips from the strike. Stacking impressions are present on two bricks. These impressions reveal that the bricks were stacked parallel to the long axis (1.8 to 2 cm apart) in the kiln. The same two bricks also have adhering portions of adjacent bricks that fused to them during the firing process. Only the specimen with the length-wise strike had a trace of mortar on it, which revealed that it had been used in a wall.

The distorted and fragmentary nature of the small brick sample from the Katterjohn Brick Yard # 2 made it difficult to accurately determine size ranges. The cross-wise struck bricks have the following size ranges: length, 20-20.2 cm (7 $^{7}/_{8}$- 8 inches); width, 7.8- 9.5 cm (3 $^{1}/_{8}$- 3 ¾ inches); and thickness, 5.5- 6.2 cm (2 $^{1}/_{8}$- 2 ½ inches). The length-wise struck specimen is only half a brick. It is 9.8-10 cm (3 $^{7}/_{8}$ inches) wide and 5.5- 5.7 cm (2 ¼ - 2 $^{5}/_{16}$ inches) thick. None of the bricks exhibit any accidental imprints.

The common building bricks from the Allen Brick Yard are very comparable to those from the Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard and the two locations of the Katterjohn Brick Company. In terms of size, the bricks from all four yards fall within the same size ranges. Likewise, all the companies were producing soft-mud bricks with sandy textures. One minor difference is the direction of the strike lines on the bricks. At the Allen Brick Yard and Paducah Brick and Tile Company, the bricks are usually struck length-wise. On the contrary, the bricks from the two locations of the Katterjohn Brick Company are struck across the short axis. This may be due to different brands of brick machines in use, different mold designs or the techniques used by brick molders. Currently, there is no evidence that the Allen Brick Yard and the two Katterjohn yards ever used brand names on their bricks. The Chamblin and Murray Brick Yard did use a C & M brand. As expected, all the brick yards yielded bricks that would be classified as rejects - cracked, warped, and glazed specimens. Also, there were few whole bricks but many broken fragments. Overall, there is not a lot of difference in the common bricks manufactured at these brick yards.

FIRE BRICKS

Five fire bricks were recovered from the Allen Brick Yard. These bricks are most likely made in presses but they were largely covered in mortar making it difficult to see manufacturing marks. Recovered brand names include L F B Wks/ LOUISVILLE, L F B WKS/ STANDARD, and A. P. GREEN/ OZARK D. P. The first two specimens were manufactured in Louisville, Kentucky while the third was produced in Mexico, Missouri. Also, one unmarked fire brick was recovered.

Fifteen fire bricks were recovered from The Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard (Hockensmith and Black 2004b:339-347). These bricks are primarily dry pressed types but also include wire-cut stiff-mud specimens that were subsequently pressed to add the brand name. Three of the recovered brand names were produced by the Louisville Fire Brick Works in Louisville, Kentucky: L F B WKS/ LOUISVILLE, LFB Wks /No 1, and L F B WKS/ STANDARD. Five fire bricks made in Missouri by three companies were recovered: A. P. GREEN/ OZARK D. P., EVENS & HOWARD/ ST. LOUIS, LACLEDE/ ST. LOUIS, and MEXICO MO/ STANDARD. Two "CANNELTON" brand bricks made in Indiana were recovered also.

One unmarked fire brick was recovered from The Paducah Brick and Tile Company. This light yellowish brown brick has a coarse yellowish brown paste with white inclusions. It was produced by the dry press method but lacks a brand name. This specimen is 21 cm (8 ¼ inches) long, 10.4 cm (4 ¼ inches) wide, and 5.7 cm (2 ¼ inches) thick. It has some glazing from being used in a kiln at the brick yard. It is not possible to determine the manufacturer for this brick.

Nine fragmentary fire bricks were recovered from the Katterjohn Brick Company (Hockensmith and Black 2004a:79-81). At Katterjohn Brick Yard # 1, seven fire brick fragments were recovered and two fragments were found at Katterjohn Brick Yard # 2. These bricks were probably used to line the firing tunnels of the brick kilns. Since none of these bricks are whole, little can be said about them. The recovered specimens include one fragment with a single letter of a brand name partially visible. Consequently, it is not yet possible to determine who manufactured the fire bricks used by the Katterjohns. However, based on the fire brick sample recovered from the nearby Paducah Brick and Tile Company, it is probable that the Katterjohns purchased their bricks from the Louisville Fire Brick Works in Louisville or a manufacturer in Illinois, Indiana, or Missouri. The following paragraphs will provide some descriptive information on these specimens.

The seven fire brick fragments from the Katterjohn Brick Yard # 1 include four mid-sections, two ends, and one corner (Hockensmith and Black 2004a:79-80). Because of their fragmentary nature, no lengths were available. Widths range from 10.2 to 11 cm (4 to 4 ¼ inches) with most specimens falling between 10.2 and 10.5 cm (4 to 4 $^{1}/_{8}$ inches). Thickness ranged from 4.3 to 6.4 cm (1 ¾ to 2 ½ inches) with most specimens ranging between 6.3 and 6.4 cm (2 ½ inches). The fire bricks were so fragmentary that it was not possible to determine the type of manufacture for most specimens. Three of the specimens appear to have been made by the soft-mud method. All the specimens have evidence of being burned to various degrees suggesting that they were used in the Katterjohn Company's brick kilns. Most of the bricks were yellow but some were discolored to a reddish brown by burning. Intense heat from their use in kilns left a reddish brown, brown,

black, purple or dark gray glaze. Specimen B-2 had part of one letter of a brand name visible but it was not exposed enough to read.

Two fire brick fragments, a mid-section and a corner were recovered from the Katterjohn Brick Yard # 2 (Hockensmith and Black 2004a:80-81). The mid-section is 10.2 cm (4 inches) wide and 6.5 cm (2 ½ inches) thick while the corner fragment is 6 cm (2 $^{3}/_{8}$ inches) thick. Both specimens are yellow in color. The mid-section has a dark gray to purple glaze on it. Because of their fragmentary condition, it was not possible to determine the method of manufacture for these specimens. Likewise, their small size and lack of brand names made it impossible to identify the company that made them. Traces of mortar are present on both specimens suggesting that they were used in a brick kiln.

Most late 19th century brick yards required fire bricks for use in the bases of their kilns. These fire bricks typically were utilized in lining the firing tunnels of kilns and were used in fire boxes for steam engines that operated equipment. Since these were very specialized bricks, they were usually purchased from regional fire brick manufactures. We have a small sample of fire bricks used at the Allen Brick Yard but only very small fragmentary specimens from the two locations of the Katterjohn Brick Company. Thus, only the Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard has a sample that can be compared to the Allen Brick Yard. These two brick yards were purchasing fire bricks from the Louisville Fire Brick Works in Louisville, Kentucky and from the A. P. Green Company at Mexico, Missouri. Since the Paducah Brick and Tile Company operated to a later date, it also acquired fire bricks from Cannelton, Indiana and St. Louis, Missouri. Being situated on the Ohio River, the brick yards of Paducah could easily obtain fire bricks shipped on the river and later on fire bricks were undoubtedly shipped on local railroads.

CONCLUSIONS

Established sometime before 1859, the Allen Brick Yard was a Paducah brick manufacturing establishment during the mid to late 19th century. The brick yard was located at 1900 Broad Street. Since Allen's office and residence were both located on Broad Street, it has not yet been determined whether the office was located in his house or elsewhere on the property. Allen's yard produced 957,000 bricks in 1880 and we assume he had similar production figures for earlier years. No bricks with an Allen brand name have been discovered in Paducah to date. Thus, it is assumed that all the bricks produced by the company were plain soft-mud specimens without brand names.

The Allen Brick Yard was just one of several brick yards located in Paducah (Hockensmith 2007). During Allen's 31-year plus history, other local brick yards were competing with the Allens including J. M. Grace (1856-1870), Frederick Katterjohn (1871-1912), Thomas Spidell (1880), Spidel & Company (1880), Albert Hymarsch & Company (1881-1890), T. C. Edwards (1883-1888), G. W. Baldwin (1886-1896), J. W. Fisher (1886-1895), and Chamblein and Murray (1897-1906). Some of these brick making operations appear to have been very short-lived businesses. Other companies may have furnished bricks for certain neighborhoods or areas of Paducah. See Hockensmith (2007) for available archival information on these other Paducah brick yards.

For a reason yet to be determined, the Paducah brick yards were only listed in the 1880 U.S.

Manufacturing Census. No Paducah brick yards were included in the available U.S. Manufacturing Census schedules for 1850, 1860, and 1870. It is not known whether they were such minor businesses that were too small (insufficient income) to be included in the Manufacturing Census or were simply overlooked by the enumerator. However, some other Paducah brick yards were included in city directories and *Kentucky State Gazetteer and Business Directories* for these earlier years. This lack of Census coverage greatly restricts comparisons between the Paducah brick yards. Tables 3 and 4 present information extracted from the 1880 U.S. Manufacturing Census for Paducah. This information allows some comparisons between the Allen Brick Yard and other brick yards operating in 1880.

Some similarities and differences are apparent between the Allen Brick Yard and the four other brick yards included in the U.S. Manufacturing Census schedules for 1880 in McCracken County. The Allen Brick Yard had the smallest amount of capital invested among the companies included in the Census. This brick yard was a seasonal business that operated only six months per year. Of the other brick yards, only Thomas Spidell's brick yard operated six months each year while two other yards operated six months on a full time basis and three to five months on a part time basis. In terms of their maximum labor force, Allen ranked third overall but was tied with Thomas Spidell for the largest number of male employees. Allen had second lowest number of children working at their brick yard. The 10-hour workday by Allen was only shared with Spidell & Co. while the other brick yards worked a shorter 8-hour days. When looking at both skilled and ordinary wage levels, the Allen Brick Yard paid the lowest daily wages but was ranked fourth in annual labor cost. A major expense associated with brick making was the cost of purchasing fuel to burn the bricks. Allen's consumption of 450 cords of wood per season placed them second in the quantity of fuel used at the five brick yards. The large quantities of wood used by both Allen and Thomas Spidell which was surprising since these brick yards had the shortest production seasons. In terms of overall expenses, Allen was at the midpoint of the brick yard figures. The 957,000 bricks produced by Allen put them in third place in overall production for Paducah. The value of the bricks produced resulted in the Allen Brick Yard being tied for third place in annual earnings. Finally, Allen's use of two horses as a power source was the same as the two other brick yards reporting for this category in the census.

The Allen Brick Yard also can be examined within a larger context of brick makers in Kentucky during 1880. Information is available for 119 brick makers across the Commonwealth within 44 counties as recorded by Census takers for the 1880 U.S. Manufacturing Census (Hockensmith 2002:79). These brick manufacturing establishments ranged from small seasonal operations to large urban companies. In terms of capital invested, the Allen Brick Yard falls within the 52% of Kentucky brick yards reporting between $1,000 and $5,000 of capital (Hockensmith 2002:79). The maximum number of employees (during peak season) for Kentucky brick yards ranged in size from one person to 150 workers, with Allen's maximum crew falling between the 5th and 6th most common number of laborers (Hockensmith 2002:79). When looking at the average number of men employed (ranging from one to 70 men) at Kentucky brick yards, the Allen yard was at the upper end of the most common frequencies (3-20 men) (Hockensmith 2002:79). Most brick yards of 1880 employed children (from 1 to 11 per yard). The three children working for Allen was also the second most frequent number of children employed in Kentucky (Hockensmith 2002:79). The 10-hour workday used at Allen's yard was used by 65% of the yards across Kentucky while only 16% of the yards worked an 8-hour day (Hockensmith 2002:80). Skilled

wages in Kentucky ranged between 75 cents and $4.50 daily with most brick yards paying $1.50 per day (Hockensmith 2002:79). The average or ordinary brick yard worker made between 50 cents and $1.75 daily with $1.00 per day being the most common wage paid (Hockensmith 2002:79). Thus, the Allen Brick Yard's pay scale was consistent with the most common wages paid in 1880. The $2,500 of annual wages paid by Allen was the fifth largest amount paid by Kentucky brick yards which ranged from $100 to $14,000 annually (Hockensmith 2002:79).

The U.S. Manufacturing Census schedules for 1880 also provides information on seasons of operation, usage of fuels, the quantities of bricks produced, and the annual income (Tables 3 and 4). The six month long work season at the Allen yard was also the length of time the majority of Kentucky brick yards operated (Hockensmith 2002:79). In 1880, most Kentucky brick yards used wood for firing their bricks, with statewide consumption of wood ranging between 25 and 2,000 cords of wood per brick yard (Hockensmith 2002:79). The use of wood at the Allen Brick Yard was a little higher than the most common quantities consumed statewide (50-400 cords per brick yard) (Hockensmith 2002:79). Kentucky brick yards operating in 1880 produced between 20,000 and 4,400,000 bricks annually (Hockensmith 2002:80). The Allen Brick Yard had the greatest production figure for those brick yards (15% of Kentucky brick yards) that produced between 525,000 and 957,000 bricks (Hockensmith 2002:80). Their yield of bricks was good when one considers that 45% of all Kentucky brick yards produced 500,000 or less bricks in 1880 (Hockensmith 2002:80). Finally, in terms of annual income, brick yards in Kentucky during 1880 earned from a low of $500 to a high of $35,000 (Hockensmith 2002:80). The Allen yard fell within a group of eight brick yards earning between $4,250 and $5,000. Within the state as a whole, Allen earned more than 73 other brick yards and less than 38 brick yards (Hockensmith 2002:80).

The very limited archaeological investigations conducted at the Allen Brick Yard revealed that the brick yard site has survived 20th century development activities. Since the survey did not include any subsurface investigations, the archaeological potential of this brick yard remains unevaluated. Future investigations using systematic shovel probes, remote sensing or excavation units could determine whether intact remains have survived at the site. It is possible that the kiln bases and foundations associated with other structures may be *in situ* below the existing ground surface. Since the brick yard appears to date to the 19th century, substantial foundations are not expected at the site. It is very possible that the earliest kilns at the site were temporary structures built from the green bricks before they were fired. Following the firing of temporary kilns, the anticipated remains would include burned soil, cinders, charcoal, and rejected bricks. More permanent kilns, utilizing fire bricks, may have been in use during the later years of the operation. Fire bricks would have been used to line the firing tunnel of such kilns. See Hockensmith and Stottman (1996, 1997) for examples of such kiln firing tunnels. Even if the archaeological remains are limited, the bricks and possibly other artifacts associated with the brick yard could provide new information about the Allen Brick Yard's operation. It is essential that archaeologists continue to document sites such as the Allen Brick Yard to ensure that our industrial past is recorded for future generations (see Hockensmith 2001). By documenting brick yard sites, our overall understanding of the history of Kentucky's brick and clay industry is expanded and new information is available for researchers.

Table 3. Brick companies in McCracken County listed in 1880 U.S. Manufacturing Census. Including information on capital invested, workers, hours, wages, and months of operation.

Company	Capital Invested	Maximum Hands	Males	Children	Hours	Dailey Wages	Months Operating
Allen, William E.	$2,500	22	18	3	10	$1.50 s $1.00 o	6
Katterjohn, Frederick W.	$3,000	19	9	4	8	$2.00 s $1.25 o	9 full and 3 part time
Spidell, Thomas	$5,000	26	18	8	8	$1.65 s $1.10 o	6 full time
Katterjohn & Son	$3,000	16	16	0	8	$2.50 s $1.25 o	6 full time, 3 ¾ time, 2 ½ time
Spidel & Co.	$5,000	24	16	8	10	$1.65 s $1.15 o	6 full time, 3 ¾ time

Key for wages: s=Skilled worker and o=ordinary worker.

Table 4. Brick companies in McCracken County listed in 1880 U.S. Manufacturing Census. Including information on the cords of wood purchased, value of materials, number of bricks produced, value of products, total wages, and horse power.

Company	Cords of Wood	Value of Material	Value of all Material	Number of Bricks	Value of Products	Total Wages	Horse Power
Allen, William E.	450	$300	$1,200	957,000	$5,000	$2,500	2 horses
Katterjohn, Frederick W.	350	$200	$1,075	700,000	$4,500	1,250	2 horses
Spidell, Thomas	650	$315	$1,215	1,350,000	$6,500	$3,100	2 horses
Katterjohn & Son	260	---	$ 750	800,000	$5,000	$3,000	-----
Spidel & Co.	400	---	$1,350	1,000,000	$6,500	$5,000	-----

ACKNOWLEDGMENTS

We would like to express our gratitude to the Kentucky Heritage Council for funding this research. Special thanks are due to former Executive Director David L. Morgan and former Site Protection Manager Thomas N. Sanders who permitted the senior author to study the brick industry in Paducah. Also, we are indebted to Mike and Dru Ann McCarty who graciously allowed us to document the brick yard on their property. Dr. Richard Taylor, owner of Poor Richard's Books in Frankfort, graciously loaned the senior author his copy of Petter's catalogue for Paducah. A special is due to Ms. Vonnie Shelton who was in charge of Special Collections at the Paducah Public

Library in 1997. Ms. Shelton was extremely helpful in locating directories, maps, and books that were of great utility on Paducah brick making. Finally, Dr. Kenneth C. Carstens, with Murray State University, provided many helpful editorial comments on the paper.

The senior author dedicates this paper on the Allen Brick Yard to the memory of his coauthor William R. Black, Jr. We had been friends since early 1997. Bill was a true gentleman and a very intelligent person. Had it not been for Bill's interest in bricks, we would have never collaborated on research which resulted in several publications on the brick yards of Paducah, Kentucky. Thanks to Bill's interest, the brick industry in Paducah is now documented for future generations to read about.

REFERENCES CITED

Bennett, H. Thornton
1886 *Bennett & Co.'s Paducah City Directory, For 1886-'87*. First Issue. Bennett & Co. Directory Publishers, Evansville, Indiana.

Bennett and Company
1890 *Bennett & Co.'s Paducah City Directory, For 1890-91*. Third Issue. H. Thornton Bennett & Co. Directory Publishers, Evansville, Indiana.

Birchfield, Steven A.
1994 *McCracken Co., Kentucky Newspaper Genealogical Abstracts Volume Three*. Simmons Historical Publications, Melber, Kentucky.

n.d. *McCracken County, Kentucky Marriage Records 1825-1875*. Simmons Historical Publications, Melber, Kentucky.

Black, William R., Jr.
1987 Anomalous Marks in Nineteenth Century Paducah Bricks. In *Proceedings of the Symposium on Ohio Valley Urban and Historic Archaeology Volume 5*, edited by Donald B. Ball and Philip J. DiBlasi, pp. 96-104. Louisville.

Byers & Clements
1859 *Williams' Paducah Directory, City Guide, and Business Mirror. Volume 1- 1859-60*. Byers & Clements, Paducah, Kentucky.

Gardner, J. B. (compiler)
1881 *Jno. B. Gaines' Paducah City Directory, 1881-82*. Volume 1. Daily Enterprise Steam Print, Paducah, Kentucky.

Gurcke, Karl
1987 *Bricks and Brickmaking: A Handbook for Historical Archaeology*. The University of Idaho Press, Moscow.

Havard, F. T.
1912 *Refractories and Furnaces: Properties, Preparation, and Application of Materials Used in the Construction and Operation of Furnaces*. McGraw-Hill Book, New York.

Hockensmith, Charles D.
1997 A Study of Frankfort Bricks and Brickmaking, Franklin County, Kentucky. *Tennessee Anthropologist* 22(2):121-176.

1998 *A Study of Bricks From the Kentucky River Mills Site, Frankfort, Franklin County*. Kentucky Heritage Council Brick Notes, Number 1, Frankfort.

2001 The Value of Studying Bricks and Brick Yards: Some Suggestions From Kentucky. *Material Culture* 33(3):1-28.

2002 A Brief History of the Brick and Clay Products Industries in Kentucky: 1788-2002. *Ohio Valley Historical Archaeology* 17:73-90.

2007 A Century of Brick Making in Paducah, Kentucky: An Overview of Brick Companies and Brick Makers (1850-1950). *Ohio Valley Historical Archaeology* 22:103-120.

Hockensmith, Charles D. and William R. Black, Jr.
2004a The Katterjohn Brick Company and Their Two Brick Yards in Paducah, McCracken County, Kentucky. *Ohio Valley Historical Archaeology* 19:62-84.

2004b Archaeological Investigations at the Paducah Brick and Tile Company/ Chamblin and Murray Brick Yard, Paducah, Kentucky. In *Current Archaeological Research in Kentucky: Volume Seven*, edited by Charles D. Hockensmith and Kenneth C. Carstens, pp. 305-366. Kentucky Heritage Council, Frankfort.

2008 The Paducah Brick Works and Its Three Successors: The Growth and Development of a Major Western Kentucky Brick Yard. *Journal of the International Brick Collectors Association, Part 1* 26(3):135-143.

2009a The Paducah Brick Works and Its Three Successors: The Growth and Development of a Major Western Kentucky Brick Yard. *Journal of the International Brick Collectors Association, Part 2* 27(1):45-46; Part 3:27 (2):77-94.

2009b The Paducah Brick Works and Its Three Successors: The Growth and Development of a Major Western Kentucky Brick Yard. *Journal of the International Brick Collectors Association, Part 3* 27(2):77-94.

Hockensmith, Charles D. and M. Jay Stottman
1996 The Maysville Brick Company, Mason County, Kentucky. *Journal of the International Brick Collectors Association* 14(1): 3-16.

1997 Investigations at the Maysville Brick Company: An Example of Industrial Archaeology in Kentucky. *Ohio Valley Historical Archaeology* 12:89-111.

Olcott & Wilcox
1894 Olcott *& Wilcox Directory for Paducah, Kentucky 1894-95*. Olcott & Wilcox, Paducah, Kentucky.

Petter, Henry A. Supply Company
1910 *Henry A. Petter Supply Company, Paducah, Kentucky* catalogue. R. R. Donnelley & Sons Company, Chicago.

Ries, Heinrich
1922 *The Clay Deposits of Kentucky: An Economic Consideration of the Pottery, Brick, and Tile Clays, and Shales of Kentucky, With Notes on their Industrial Development*. Kentucky Geological Survey, Series 6, Volume 8, Frankfort.

Simmons, Don
1974 *McCracken County, Ky. Census 1850*. Privately printed.

United States Federal Census
1850 Original unpublished manufacturing schedules for the Seventh Census of the United States: McCracken Kentucky. Microfilm on file, Kentucky Department of Libraries and Archives, Frankfort.

1870 Original unpublished population schedules for the Ninth Census of the United States: McCracken County, Kentucky. Microfilm on file, Kentucky Historical Society, Frankfort.

1880a Original unpublished manufacturing census schedules for the Tenth Census of the United States: McCracken County, Kentucky. Microfilm on file, Kentucky Department of Libraries and Archives, Frankfort.

1880b Original unpublished population schedules for the Tenth Census of the United States: McCracken County, Kentucky. Microfilm on file, Kentucky Historical Society, Frankfort.

Wiggins & Weavers
1871 *Wiggins & Weaver's Ohio River Directory for 1871-72*. Fairbanks, Benedict & Company, Cleveland.