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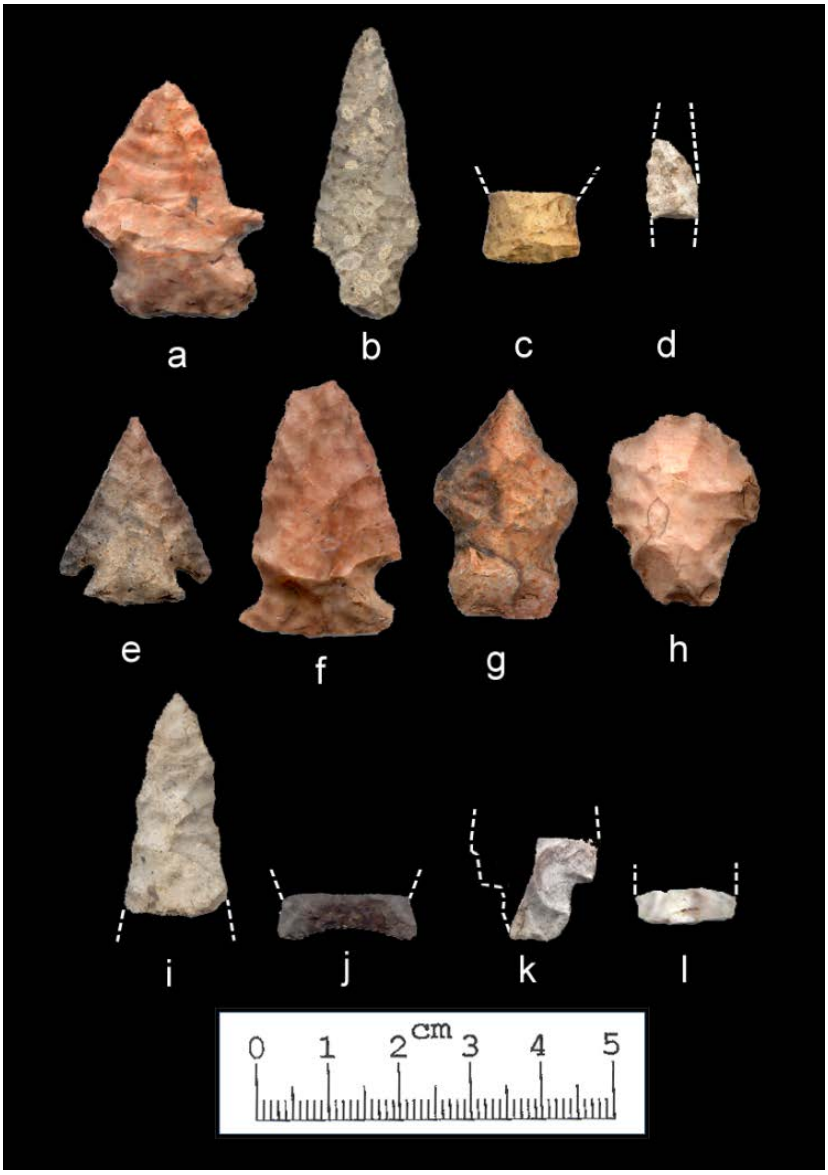

Oklahoma Department of Transportation
Environmental Programs Division
Cultural Resources Program,
200 NE 21st Street
Oklahoma City, Oklahoma

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Introduction

This report describes the results of archeological investigations performed by the Oklahoma Department of Transportation (ODOT) Cultural Resource Program (CRP) in conjunction with a Washington County bridge replacement project over Cotton Creek, Federal-aid Project BRO-174D(023)CO, J/P 19997(04). The project area was initially surveyed in June of 2003 as part of a cultural resource investigation in compliance with Section 106 of the National Historic Preservation Act (NHPA). Based on this initial survey, it was determined that site 34WN27, which lies within the project area, required systematic and intensive investigation before the project proceeded.

Figure 1. Location of 34WN27 in T28N, R14E.

Site 34WN27, situated on a terrace adjacent to Cotton Creek (Figure 1), and was originally recorded by A.H. Rohn in December of 1971. Rohn described the site as a "scatter of stone chips, pot sherds, broken tools, and fire-reddened sandstone chunks covering about five acres."

In addition to artifacts observed at the site, Rohn recorded the collection of Cecil Mills who had collected artifacts from the site. The collection included Scallorn and Fresno projectile points, Snyder-like points, and Cowley Plain pottery. At the time of Rohn's visit the site was a plowed field which had formerly been covered with timber.

In June of 2003, the site was investigated by the ODOT Cultural Resources Program as part of the proposed bridge replacement over Cotton Creek. The project involves a strip of new right-of-way (R/W) approximately 6 m in width and 100 m in length along the eastern edge of the site which is situated north of Cotton Creek. The landowner confirmed that the area had been cleared of timber and was under cultivation for many years, first for crops. After the house was constructed in the mid-1970s, the site area was a garden and continued to be tilled. The landowner retains a small collection of points from the site, which includes 12 to 15 mostly heavily reworked or broken corner-notched and corner removed, stemmed dart points. Several fragments of late stage bifaces, some end and side scrapers, an adz, and two drill tips were also present in the collection.

The 2003 investigation, consisting of a series of shovel tests on a north-south line, identified a prehistoric cultural deposit consisting of a fairly dense concentration of flakes representing late stage biface/tool production and maintenance occurring in the upper 20 to 30 cm of a dark brown sandy loam soil. The investigation also identified the presence of burned sandstone within the new R/W. While small rounded and angular pieces were recovered in the upper 20 to 30 cm containing the cultural material, the sandstone formed a distinct, dense layer beginning 20 to 30 cm below the surface. The sandstone layer, as well as the top soil, appeared to become thinner and more eroded within 15 m of the stream bank. Further subsurface test investigations were recommended to evaluate further the nature of the sandstone. The following investigations at the site were undertaken in two phases.

The first series of test excavations and trenching at the site occurred in September and October of 2005. Five hand-excavated test units and two north-south trenches were excavated. Three natural stratigraphic soil layers were identified. The upper two stratigraphic layers yielded numerous artifacts. The upper 25 to 30 cm contained lithic debitage, fragments of fire cracked rock, and an occasional stone tool. The second layer contained a buried rock midden horizon. While two anomalies were detected in the southern-most trench, the frequency of cultural materials, as well as the layer of burned rock, diminished significantly in the southern portion of the investigated area. The central and northern parts of the area under investigation appeared to hold the most potential for intact deposits. It was determined that a final phase of excavations was needed to fully assess the site.

In January and February of 2006, excavations were renewed at 34WN27. Fifteen test units were hand-excavated and four east-west backhoe trenches were dug at the site. The goals of this final phase of excavations were (1) assess whether discrete occupational deposits existed at the site which could be securely dated; (2) accurately determine the extent and layout of the site in proposed R/W; and (3) identify, record, and excavate any features related to the

prehistoric occupation of the site. The goals of the final phase were expected to yield information directly related to the site's eligibility for the National Register of Historic Places (NRHP).

Excavations at the site revealed a fairly extensive rock midden deposit. Unfortunately, like other rock midden mounds in the area, deposits at 34WN27 appear to be a palimpsest of prehistoric occupation spanning from the Late Archaic (or transitional Woodland period) to the Late Prehistoric (as could be determined based on diagnostic artifacts). Material suitable for radiocarbon assay was sparse. One accepted radiocarbon date was obtained for the site. The date was obtained from a bulk soil sample that came from the contact zone between the bottom of the sandstone layer and underlying sterile deposits. As such, it provides a *terminus post quem* for occupation of the site. Individual component definition and finer-grained dating of the occupation of 34WN27 could not be accomplished. Additionally, fine-grained behavioral and cultural information could not be discerned due to the mixed nature of the deposits. Soil anomalies that were initially thought to be potential features are best explained as by-products of recent or historic disturbance (e.g., tree-clearing).

Based on the findings of this investigation it was determined that although 34WN27 contained substantial prehistoric deposits, the area of the site investigated by this project was unlikely to further our knowledge of prehistoric life ways in the area and lacked contextual integrity in terms of retaining separable components or occupational episodes. Upon completion of this investigation, no further archeological work was recommended for the portion of 34WN27 within the project Area of Potential Effect (APE), and the project was allowed to proceed as planned.

Environmental Setting

The following section describes the modern environmental setting of the project. Included are descriptions of the physiography, geology, hydrology, and soils. A summary of the prehistoric and modern flora and fauna is also presented.

Physiography and Geology

Site 34WN27 is located on an upland surface immediately north of Cotton Creek. The upland is a terrace or eroded ridge formation. The site lies within the Claremore Cuesta Plains geomorphic province between the Eastern Sandstone Cuesta Plains to the west and Neosho Lowlands to the east (Curtis and Ham 1972). Typically, the uplands in this province have relatively deep soils overlying interbedded sandstones and shales. Lowlands typically have deep soils and alluvial fill. Parent material of soils varies by location and can include limestone, shale, or sandstone.

The primary surface rock in the area is shale interspersed with thinner but more resistant sandstones and limestones. The latter form east-facing cuestas overlooking the eroded shale plains. Isolated hills or buttes have been formed when streams have eroded most of an

escarpment leaving an isolated promontory. These hills are locally known as mounds (Oakes 1940).

Exposed rocks in Washington County are part of the Middle Pennsylvanian age Missouri subseries. Surface rock in the study area consists of Torpedo sandstone and overlying shale. The Torpedo sandstone is described as a thin, massive erosional remnant that is reddish-brown and usually non-fossiliferous. The flaggy nature of the Torpedo sandstone exposures along the Little Caney River and Cotton Creek provide an excellent source of stone suited for the production of ground stone tools (Reid and Artz 1984:83-85). The overlying shale is described as a thin dark clay shale with an upper zone that is lighter, calcareous, and fossiliferous (Oakes 1940).

Immediately to the east of the study area, surface outcrops are composed of the Wann formation. The Wann formation is defined by Oakes (1940) as all of the interbedded shales, sandstones and limestones that are stratigraphically below the Torpedo and above the Iola formations. Quaternary deposits are present as stream terraces and alluvial flood plain deposits. Terraces consist of fine sands and silts. Flood plain deposits range from fine sand to clay (Oakes 1940).

Hydrology

The major drainage in Washington County is the Caney River and its primary tributary, the Little Caney River. The study area is located on an upland surface north of Cotton Creek. Cotton Creek is a secondary tributary of the Caney River joining the Little Caney River northwest of Copan. Site 34WN27 is about 13 km east of the Little Caney River. Numerous swamps and lakes occur along the course of the river (Oakes 1940). The Caney River drains about 1,177 square miles (Luza 2008) and flows southeasterly before joining the Verdigris River about 70 km south of 34WN27. The Verdigris River flows southward through the region, and 34WN27 is located about 27 km west of the Verdigris

Soils

The site is formed within the Dennis-Bates-Taloka-Parsons soil association containing mostly clayey and loamy soils (Carter and Gregory 2008). The soil mapped on the site area includes the Bates-Collinsville Complex, 2 to 6 percent slopes, occurring over the southern portion of the site, and Okemah Silt Loam, occurring over the northern portion (USDA 1968). The Bates Collinsville Complex soil consists of an A Horizon of a fine, dark grayish brown (10YR3/2-4/2) sandy loam, approximately 12 inches thick, and a B Horizon of a light yellow brown (10YR5/4-6/4) sandy clay loam. The soils derive from sandstone which occurs 20 to 50 inches below the surface.

Okemah Silt Loam is described as consisting of an A Horizon of dark gray (10YR2/2-4/1) silt loam that is 12 inches thick, a B1 Horizon of dark grayish brown (10YR2/2-5/1) silty clay to 20 inches below the surface, and a B2 Horizon of a light yellow brown (2.5YR5/4-6/4) silty clay. Shale, and sometimes sandstone, occurs at about 60 inches in depth.

The Copan Paleosol has been identified in the study area (Hall 1977). This paleosol is distinct as a buried soil horizon on floodplains. Based on radiocarbon dating, it appears the soil represents a stable land surface between A.D. 1 and A.D. 1000. After A.D. 1000, it appears climatic changes resulted in upland erosion which buried the soil on the floodplains.

Vegetation

The study area is located within the Osage Savanna biotic district (Blair and Hubbell 1938). Major habitat types include post oak-blackjack forest and tallgrass prairie (Hoagland 2008). Minor habitats include oak-hickory forest and bottomland forest. The area is primarily a tallgrass prairie with shorter grasses becoming more abundant in the western part of the district.

Climatic data are available for the Osage Savanna district from Osage County. Mean annual temperature is 59.4EF (15EC). Mean annual precipitation is 36.15 inches (91.82 cm), with 200 frost free days on average.

Natural vegetation in the study area consists primarily of tallgrass prairies broken by interspersed post oak-blackjack forests of varying densities (Albert and Wyckoff 1984:24). Oak-hickory forests grow on protected hillsides. Important constituents of bottomland forests include elm (*Ulmus* spp.), pecan (*Carya illinoinensis*), black walnut (*Juglans nigra*), ash (*Fraxinus* sp.), and hackberry (*Celtis occidentalis*). Other species present in the area are eastern red cedar (*Juniperus virginiana*), Osage orange (*Maclura pomifera*), red mulberry (*Morus rubra*), sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*), sumac (*Rhus* spp.), willow (*Salix* spp. except the prairie willow), and rose (*Rosa* spp.).

Fauna

The Osage Savanna supports a highly diverse set of wildlife. Native large mammals, however, are extirpated or exist in isolated areas. Albert and Wyckoff (1984:26) note that "buffalo [sic] herds once thrived on the grasses, whereas deer roamed the bottomlands and areas of upland forest. Many of the small species...still survive." The same fate that befell the large mammals is shared by most of the top predators that once inhabited the area. This includes black bear (*Euarctos americanus*) and bobcat (*Lynx rufus*).

Small mammals include gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), and blacktailed jackrabbit (*Lepus californicus)*. Mink (*Mustela* sp.), badger (*Taxidea taxus*), skunk (*Mephitis mephitis*), beaver (*Castor canadensis*), and otter (*Lontra canadensis*) are known to occur in forested stream or wetland areas. Native birds include quail (*Colinus virginianus*), greater prairie chicken (*Tympanuchus pallidicinctus*), wild turkey (*Meleagris gallopavo*), and various types of raptors.

Reptiles include the common snapping turtle (*Chelydra serpentina*), Mississippi mud turtle (*Kinosternon subrubrum*), stinkpot turtle (*Sternotherus odoratus*), box turtle (*Terrapene ornata*), eastern collared lizard (*Crotaphytus collaris collaris*), and several varieties of snakes. Fish include gar (*Lepisosteus* spp.), catfish (*Ictalurus* spp. and *Pylodictis* sp.), logperch (*Percina caprodes*), and crappie (*Pomoxis annularis*) (Albert and Wyckoff 1984).

Cultural Background

The prehistoric context of this particular region of Oklahoma is relatively unknown for some time periods. Portions of the following discussion are based on information drawn from other nearby areas where prehistoric cultures are better understood.

Pre-Clovis

The Clovis complex is the earliest well-defined cultural complex in North America. Clovis and related fluted point sites have been found throughout North America and have been securely dated to 11,650-11,000 B.P. based on radiocarbon assays from multiple sites. Numerous claims have been made for sites of greater antiquity in North America for well over a century (see Meltzer 1991). Many of these claims have been discredited, and even those that have not been discredited remain controversial (see for example Adovasio et al. 1990; Dillehay 1997; Haynes 1973, 1980; Lynch 1990; Meltzer 1991).

Recent claims for pre-12,000 B.P. human occupation in North America include Meadowcroft Rockshelter in Pennsylvania (Adovasio and Carlisle 1988; Adovasio et al. 1990), Cactus Hill in Virginia (McAvoy and McAvoy 1997), the Topper site in South Carolina (Goodyear 2001), the Big Eddy site in Missouri (Lopinot et al. 2000), and the Burnham Site in north central Oklahoma (Wyckoff et al. 2003).

About 134 km west of site 34WN27, work at the Burnham site (34WO73) has resulted in intriguing finds concerning Pleistocene occupations on the Southern Plains (Wyckoff et al. 2003). The recovery of lithic artifacts in association with an extinct form of large horned bison within a deposit radiometric dated to 35,000-36,000 years ago has provided tantalizing evidence of potential early human occupations in the area (Wyckoff et al. 2003:249-260). Evidence from the Cooperton site (34KI26) in southwestern Oklahoma suggests human activity in association with a mammoth dated to about 16,000 B.P. (Anderson 1975) and could also be evidence of Pre-Clovis cultural manifestations on the Great Plains.

Paleoindian

The earliest well-documented Paleoindian manifestation is the Clovis cultural complex. No Paleoindian sites are reported for Washington County, so the evidence for this time period comes from the surrounding region.

Evidence for Clovis occupations comes mostly from surface finds of diagnostic projectile points in Oklahoma. However, two notable Clovis sites occur in Oklahoma. The Domebo site (34CD50), in Caddo County, yielded mammoth remains in association with Clovis projectile points and stone tools. The Domebo site was dated to approximately 11,200 B.P. (Leonhardy 1966). Additionally, recent investigations at the Jake Bluff site (34HP60) in northwestern Oklahoma have uncovered the remains of a bison kill site in association with Clovis style projectile points. Radiocarbon assays at Jake Bluff yielded an average date of 10,750 B.P. (Bement and Carter 2005).

Very few early Paleoindian finds are reported for northeastern Oklahoma. Isolated finds of fluted points are reported from collections made along the course of the Arkansas River in Osage and Tulsa counties (Hofman and Wyckoff 1991).

Following Clovis is the Folsom complex in Oklahoma, which has been dated to 10,900-10,200 B.P. Reported Folsom sites and isolated finds occur primarily in western Oklahoma. The Cooper site (34HP45) and the Waugh site (34HP42) are important Folsom sites in Oklahoma attesting to Folsom bison hunting strategies, land use, and possible ritual activity (Bement 1999; Hofman 1991). No Folsom sites or isolated finds have been reported in Washington County, but surface collections have yielded Folsom points from the area around the Arkansas River near Tulsa (Taylor-Montoya n.d.).

Later Paleoindian complexes include the Dalton horizon and other less well studied complexes. Several Dalton sites occur in eastern Oklahoma including the Packard site (34MY66) which is located along Saline Creek approximately 85 km southeast of the study area (Wyckoff 1964, 1985, 1989). The site contains a Dalton component along with a Packard/Agate Basin component and an early side-notched component. These Late Paleoindian/Early Archaic components are dated to around 9400-9800 B.P. The site is interpreted as a camp and lithic workshop where retooling activities happened using locally available Ozarks chert.

Other Late Paleoindian complexes are not as well known for eastern Oklahoma. Projectile points that resemble Plainview, Allen, Cody (Scottsbluff), St. Mary's Hall and other point types have been found in northeastern Oklahoma (Taylor-Montoya n.d.) and southeastern Kansas (Blackmar 2001), but little is known about other aspects of Late Paleoindian lifeways in northeastern Oklahoma.

Several lanceolate styles of Paleoindian bifaces, such as Plainview, are common in western Oklahoma, but sites producing *in situ* assemblages are rare. Many lanceolate bifaces are found in canyon settings (Hofman 1993), and sites producing similar bifaces are known on the Dempsey Divide in Roger Mills County (Thurmond 1990). The Perry Ranch (34JK81) site in southwest Oklahoma has produced Late Paleoindian style lanceolate bifaces similar to those from the Plainview site (41HA1) in association with at least two bison (Saunders and Penman 1979; Hofman and Todd 1997). It appears that bison and the hunting of large mammals remained an important aspect of adaptation throughout the Paleoindian period. While in the early stages of investigations, several sites in the Beaver River drainage in the Oklahoma panhandle manifest Late Paleoindian occupations including campsites and kill sites (Bement et. al. 2007). Further work on such sites will broaden our view of the Late Paleoindian period.

Archaic

The Archaic period is commonly accepted as occurring from ca. 8500-2000 B.P. Adaptations during this time are characterized by a shift, relative to the Paleoindian period, to hunting modern fauna, increased use of local resources, changes in artifact styles, increased use of ground stone, and construction of burned rock middens.

Archaic age materials in Washington County have been included as part of the Grove Focus (e.g., Vaughan 1975). Wyckoff (1984), on the other hand, divides the Archaic of eastern Oklahoma into several complexes but notes that much more information is needed to fully understand the relationships among the complexes.

Very little is known about Early Archaic complexes in eastern Oklahoma. The Early Archaic is defined here as occurring from 8500-6000 B.P. The aforementioned Packard site offers some glimpses into Early Holocene cultural manifestations, but few other sites have been securely dated to this time period. Numerous surface collections from the region contain projectile points that resemble Early Archaic point types, including Big Sandy and Palmer (Wyckoff 1984). The presence of ground stone is typically limited in Early Archaic components. Early Archaic adaptations are considered to have been geared toward hunting and gathering.

The Middle Archaic in eastern Oklahoma is somewhat better defined and is considered to span 6000 - 4000 B.P. As with the Early Archaic, the primary adaptation was hunting and gathering. Midden accumulation at Middle Archaic sites has been interpreted as evidence for long term and/or repeated use of particular locales (Wyckoff 1984). At this period of time, however, burned rock middens, tend to be small relative to those of later periods.

Most sites contain a diverse array of projectile points that resemble types such as Castroville, Frio, Williams, Yarbrough, Table Rock and Calf Creek. Grooved cobbles, sometimes interpreted as net weights, chipped stone adzes, and gouges are also present in assemblages. Ground stone is somewhat limited, with grinding stones and cup stones being the most common classes. Recent study and compilation of Calf Creek materials from several sites in Oklahoma indicate a Middle Archaic cultural horizon occurring from the Ozark Plateau in Oklahoma Arkansas and Missouri and across the prairie plains (entailing Oklahoma, Kansas, and Texas) occurred around 6000-5000 B.P. (Wyckoff 1995). Preliminary studies indicate that a well-developed lithic technology including the production of large, thin basally-notched bifaces is one trait of the horizon. These bifaces include Calf Creek, Andice and Bell type points. Subsistence information is scant, but it appears that bison hunting was a key part of adaptive strategy during this time (Bement et al 2005; Spivey et al 1994). Calf Creek occupations are also documented along the Arkansas River in Kay County, 90 km west of 34WN27 (George 1995; Splawn and Wyckoff 1995). The Kubik site (34KA354) in Kay County contains a buried Calf Creek component and has produced a date of around 4800-5200 B.P. (Neal and Drass 1998).

Several sites in Washington County have yielded projectile points resembling types that date to the Middle Archaic. However, no well-preserved single component Middle Archaic sites are reported in the study area. Indeed, it has been suggested that the area was sparsely inhabited for most of the Archaic period (Vehik and Pailes 1979).

The majority of Archaic age sites in Washington County are thought to date to the Late Archaic or perhaps transitional Late Archaic/Early Woodland period (Vaughan 1975; Vehik and Pailes

1979). This is based on the association of projectile point types at sites and, in some cases, ceramics.

Late Archaic manifestations in the area are included in the Lawrence phase. These tend to include large and small corner-notched and expanding stemmed projectile points. These have been identified as Morhiss, Marshall, Afton, Castroville, and Table Rock, as well as other types. Grooved stones, gorgets, and a variety of ground stone tools are also present in these assemblages. Ground stone includes mullers and grinding basins, paint stones, and other forms. Additionally, some sites have yielded osseous artifacts such as split bone awls and canine tooth pendants.

The Lawrence site (34NW6) and Shetley Shelter (34MY77) site (in Nowata County and Mayes County, respectively) provide a glimpse of other aspects of lifeways during this time. The Lawrence site yielded a faunal assemblage indicating the inhabitants of the site were primarily exploiting the Verdigris River bottomlands (Baldwin 1969). Shetley Shelter contained a flexed burial that has been dated to 1650 B.C. ± 175 (Wyckoff 1984). Furthermore, the Lawrence site yielded examples of obsidian, indicating participation in informal exchange or even trade networks with groups from the west during this time (Baldwin 1969; Wyckoff 1984).

Evidence for structures also becomes more common during this time period. One example occurs at the Mills site (34WN5), approximately 3 km west of the study area, where excavations recovered daub (Vehik and Pailes 1979). Daub was also found at the Lawrence site along with possible postholes (Baldwin 1969).

Many of the Late Archaic sites in the area are mixed or suspected of being mixed with transitional Woodland deposits (Vaughan 1975; Vehik and Pailes 1979). Unfortunately, mixed components are a common occurrence among Late Archaic sites in eastern Oklahoma (Wyckoff 1984).

Plains Woodland

The most intensive occupation of the area appears to have occurred during the Plains Woodland period. The Plains Woodland period extends from about 2000-1100 B.P. and is characterized by the presence of pottery, the beginnings of horticulture, and burial mounds in some cases. Midden accumulation also intensifies during this time. The evidence for structures increases, which has led to the identification of both open camp sites (with less dense occupation debris) and “permanent villages” with deep middens, storage pits and postholes, etc. (Vehik and Pailes 1979).

The Woodland period in northeastern Oklahoma has been divided into Delaware A, Cooper, and Delaware B foci. Vehik (1984), however, raises the concern that these divisions were based on mixed assemblages with few true diagnostics and a paucity of reliable dates.

The sites occur as villages or open, limited occupation sites. Burials occur in rockshelters. There is limited evidence for trade based on ceramics and, to a more limited extent, lithics from outside sources (Vehik 1984).

Delaware A sites tend to have fewer ceramics than later sites and projectile points resembling Gary, Langtry, Marshall, Marcos, Table Rock and other types. Pottery is relatively thick and grit tempered (sometimes shell tempered) plain and cord-marked varieties.

The Cooper focus is interpreted by Vehik (1984) as a possible intrusion of Hopewellian outsiders into the Delaware A area. Cooper focus sites have more "Cooper" points (i.e., Snyder points) and zone-stamped pottery.

Delaware B is essentially an extension of Delaware A with some Caddoan traits. Vehik (1984) interprets this as a second intrusion into the area, this time by Caddoan groups. Delaware Plain along with shell-tempered and other varieties of ceramics commonly occur at Delaware B sites. Projectile point types include Fresno, Haskell, Scallorn, Gary, Williams, Delaware and other styles. Ground stone artifacts include mullers and milling slabs, cup stones, and ear spools. The latter is considered a Caddoan influence). Bone and antler tools are also associated with Delaware B.

Overall, the sequence appears to attest to a continual indigenous presence (i.e., Delaware A) with some changes in material culture that might indicate outside influences or immigration (Cooper and Delaware B). The probable mixing of components, however, raises some concerns about how the Plains Woodland in northeast Oklahoma is currently understood.

A key northeastern Oklahoma Plains Woodland site is located about 5 km west of the study area. The Thomas site (34WN6) was excavated in 1974 as part of a University of Oklahoma field school (Vehik and Pailes 1979). It is identified as an intensively occupied single-component site, one of the large "village" sites typical of this period. Excavations recovered ceramics, abundant lithics, some faunal remains, and daub. Deer and turtle were identified among the sparse faunal remains. Grinding stones for plant and pigment processing were also recovered. Ceramics appear to be Middle Woodland varieties. Projectile point types included Gary, Langtry, Ensor, and Keota styles. The projectile point styles indicate a longer term habitation than the ceramics. Vehik and Pailes (1979) suggest that some of the point styles might reflect intrusive cultural material.

Finally, another set of sites located near the study area should be mentioned. They are described by Vehik (1984; see also Vaughan 1975; Vehik and Pailes 1979:207-210) as burned rock "mounds" set atop bluffs overlooking river valleys. They are not identified with any particular phase or site function. Artifacts are sparse at these "mounds." The point styles found at these sites resemble types that date from the Late Archaic to the Late Plains Woodland/Early Plains Village periods.

Plains Village

Plains Village occupation around the study area appears to have been sparse. Vehik and Pailes (1979) describe Plains Village sites in the Copan Reservoir area as temporary hunting camps and kill/processing sites. The better defined Paoli and Washita River phases, as well as the Custer and Turkey Creek phases, occur west and south of 34WN27 (Drass 1997).

The Copperhead Mounds group (34WN45) is an example of a Plains Village occupation near the study area. This site, which consists of twelve "mounds," is located on top of bluffs west of the Little Caney River, approximately 8 km west of the study area. Studies by Vehik and Pailes (1979) indicate that some of the "mounds" are actually natural features with some evidence for human activity. The other mounds are burned rock middens which yielded the most evidence for human occupation at the site. Two potential periods of occupation were identified at the site. The uppermost occupation appears to date to the Early Plains Village period, while the lower, earlier level might date to the Late Archaic/Plains Woodland time (Vehik and Pailes 1979:180). Chipped and ground stone tools were recovered from the site, along with a few bone and charcoal fragments.

The Harlan site (34CK6) (Bell 1972) and Norman site (34WG2) (Finkelstein 1940), in Cherokee and Wagoner counties respectively, are notable Caddo sites in northeastern Oklahoma. The early Caddo period is characterized by villages and hamlets along major streams with ceremonial centers in central locations. Agriculture and stratified, religiously-focused political organization are believed to have been central to early Caddo social organization. Small arrow points, contracting stemmed dart points, hoes, boatstones, axes, grinding stones, bone beads, clay tempered pottery, and spatulate celts are common at prehistoric Caddo sites. Later in the Caddo period (Fulton aspect), bison bone tools, beveled knives, notched and unnotched arrow points and other Plains-oriented artifacts become more common. Burials during this later period also tend to lack the elaborate grave goods found in earlier Caddo sites (Davis 1970; Wyckoff 1974). Rohn suggested that some sites in Copan Reservoir, approximately 10 km west of the study area, might have prehistoric Caddo components or affiliations (Vaughan 1975:11). While some archeologists find no supporting evidence from investigations in the area (Vaughan 1975; Vehik and Pailes 1979), others, finding similarity of arrow point styles from the Reed site (34DL1) in Delaware County, suggest some sites in the Little Caney drainage may relate to Caddo occupations (Reid and Artz 1984).

Proto-Historic and Historic

The early historic era in this part of Oklahoma begins with the appearance of French traders in the early eighteenth century. The information about this early time is not from Washington County, but nearby areas. Early explorers and traders included La Harpe and Du Tisne, during the early eighteenth century, and the Mallet brothers in the 1740s. Most of this early activity was along the Arkansas, Grand, and Verdigris rivers in Oklahoma. The Bryson-Paddock (34KA5) and Deer Creek (34KA3) sites in Kay County contain evidence of early French

contact with Wichita groups (Bell 1984). The Lasley-Vore site (34TU65), located along the Arkansas River in Tulsa County, also produced evidence of early French contact and may possibly be the village site of Wichita groups visited by La Harpe in 1719 (Odell 2002).

Around the same time as Europeans were making their way into the region, Native American groups were experiencing intertribal conflict and displacement. The Osage, Wichita and Caddo were embroiled in a conflict over hunting lands in northeastern Oklahoma between 1700 and 1800. The Caddo and Wichita would eventually be pushed out of the area. The Wichita and Caddo moved south toward the Red River, while the Osage settled along the Arkansas River and established a fur trade with the French.

Several trading posts were set up in northeastern Oklahoma after the Louisiana Purchase in 1803. One of the earliest was established by Juan Pierre Chouteau in the Three Forks area. According to historic accounts, thousands of Osage from Missouri joined him in establishing a settlement and trading post. The Posey site (34WG19) is considered to be the Chouteau trading post (Wyckoff and Barr 1968:79-84). Juan Pierre's son, Auguste Pierre Chouteau, established the more famous trading post near present day Salina on the Grand River in Mayes County.

The early nineteenth century witnessed a major episode of change with the removal of the Cherokee, Choctaw, Muscogee (Creek), Seminole, and Chickasaw tribes to Oklahoma in 1820s and 1830s. Washington County became part of the Cherokee Nation. Conflict ensued between the Osage and Cherokee (and other native groups) over territory and resources. Escalations in Native American conflicts, along with an increasing presence of white settlers, spurred the construction of Fort Gibson in 1824. The fort was constructed on the Arkansas River at the northwest end of Bayou Manard where it was maintained until 1890 (Drass 1981; Hayes et al. 1985).

The mid-nineteenth century witnessed more conflict and upheaval in the area with the breakout of the Civil War. Along with the hostilities between Union and Confederate sympathizers, the war brought to the surface old schisms between and within Native American groups in Oklahoma. No recorded events of note occurred within Washington County related to the Civil War. However, the battle of Chusto-Talasah (Caving Banks) occurred at the Horseshoe Bend of Bird Creek (in Tulsa County, about 60 km south of the study area) on December 9, 1861. Colonel Douglas H. Cooper led an estimated 1,300 Confederate troops against a small force of Native American Union sympathizers led by Chief Opothleyahola. Opothleyahola's men were driven off eventually and fled with their families to Kansas (Morris et al. 1986).

After the Civil War, the Delaware Tribe immigrated to Oklahoma from Kansas in 1867 as part of agreement with the U.S. government and Native American tribes already in Oklahoma (Prewitt 1981). They settled into separate enclaves but in many ways become a part of the larger community into which they had settled. In fact, under a provision in the treaty resulting in the removal of the Delaware Tribe from Kansas to Oklahoma, Delaware tribal members

were legally considered members of the Cherokee Nation at this time. Many Delaware resisted this loss of sovereign identity. These same tribal members continued the Big House traditions while the remainder converted to Christianity. The portion of the tribe continuing the Big House tradition settled mainly along the Caney River drainage (Obermeyer 2009).

Early Delaware farmsteads often consisted of log cabins with sheds, corrals, pens, and other functional structures. Often, families would later build wood frame houses after becoming established on their plots. Examples of surviving log structures include 34WN29, the Wilson cabin. This is a pre-Civil War era log cabin associated with the prominent Wilson family. An important aspect of Delaware communities was the Big House. The Big House was a log structure probably built in a manner similar to early Delaware log houses.

The early Big Houses were located in the Little Caney valley on the margins of the Copan Lake area (the Wilson cabin is situated between the Big Houses, about 10 km southwest of the study area). Construction of a Big House was a major community event. One of the last Big House structures was constructed sometime in the early twentieth century around 1907 or 1908 (Prewitt 1981:48). The Big House was a focus of ceremonial life for the Delaware and helped keep the fragmented communities together.

After the Civil War, Jacob Bartles established a flour mill and trading post near the present-day site of Bartlesville 22 kms southwest of 34WN27, which became the largest city in Washington County (Sachet 1929). In 1873, Bartles, a Civil War veteran bought an existing grist mill on the north bank of the Caney River and expanded it to include a general store. Bartles would add his family home to the compound as well. Bartles married Nannie Journeycake, daughter of Chief Charles Journeycake of the Delaware.

Two of Bartles' employees, William Johnstone and George Keeler, eventually opened their own store on the south bank of the Caney River. The store would eventually be a central component of the town of Bartlesville which was officially incorporated in 1897. Keeler had worked for E.P. Chouteau since 1871 as manager of the American Fur Company's trading post at the Osage agency near Silver Lake.

Keeler and Johnstone are credited with spearheading business and community development in Bartlesville, including the establishment of the first bank, post office, and train depot. Keeler is credited with facilitating the completion of an Atchison, Topeka and Santa Fe Railroad direct line to Bartlesville in 1899. Keeler is also credited with pioneering the oil industry in the area. In 1893, Keeler obtained a lease on oil rich land and in 1897 the Cudahy Oil Company drilled for oil on Keeler's lease (the well was named the Nellie Johnstone No.1).

The oil boom of the early twentieth century played a large role in the history of the area. The Phillips brothers came in 1904 due to the oil boom. They successfully hit oil and established the Phillips Petroleum Company in 1917. It became Bartlesville's largest employer.

Previous Archeological Work in the Little Caney River Area

The construction of Copan reservoir on the Little Caney River began in 1972 and continued till 1983. During that time several archeological sites were investigated as part of the construction project (Kay 1981; Farley and Keyser 1979; Keyser and Farley 1980; Prewitt 1980; Reid and Artz 1984; Vaughan 1975; Vehik and Pailes 1979). The archeological work has provided archeologists with some understanding of the prehistoric occupations of the Little Caney River drainage in Washington County, Oklahoma. Prehistoric occupations spanning the Late Archaic, Woodland, and Late Prehistoric have been documented along the Little Caney River and adjacent Cotton Creek tributary. Few of the sites have produced organic material suitable for radiometric dating, however, diagnostic tools have aided in attributing sites to certain time periods of occupation.

Many of the sites contain large burned rock features, including small raised mounds (Vaughan 1975; Vehik and Pailes 1979) and dense scatters sometimes described as a "pavement" (Keyser and Farley 1980). Unfortunately, archeological excavations of the features have provided little in the way of associated organic materials, features, or artifacts which provide clues to the activities associated with the accumulations of burned rock. Many of the sites which contain these features also contain artifacts spanning the Late Archaic, Woodland, and Late Prehistoric time periods. However, the archeological investigations of sites along the Little Caney River and Cotton Creek have provided some insights into prehistoric occupations in the area.

Prehistoric sites investigated as part of the Copan Reservoir construction included locations on floodplains, stream terraces, bluff tops and rock shelters (Kay 1981; Farley and Keyser 1979; Keyser and Farley 1980; Prewitt 1980; Reid and Artz 1984; Vaughan 1975; Vehik and Pailes 1979). With the exception of rock shelters, many of the sites contain large burned rock features. On the sites occurring on bluff tops and terraces, the burned rock features often occur in the lowest levels of the site and directly overlay sterile subsoil, or bedrock. The overlaying deposits often contain diagnostic stone artifacts spanning the Late Archaic through Late Prehistoric time periods. Work at 34WN104 documented a stratigraphic sequence of prehistoric hearth features along Cotton Creek just 3.3 km west of 34WN27. While associated artifacts and diagnostics are lacking, several occupations of the site were defined based on radiocarbon dates obtained from charcoal recovered from the excavated features (Reid and Artz 184:104-126). The occupations span the Archaic period from around 5460+/- 930 B.P. to 2030+/- 70 B.P. (Reid and Artz 184:104-126). The features are comprised of discrete hearths rather than burned rock middens and one, Feature 3, was relatively intact and appears to have functioned as a rock oven. The radiocarbon date on this feature is 2600+/-60 B.P.

Bluff top sites, such as Copperhead Mounds (34WN45), Webster Mounds (34WN55) and the D Bar D site (34WN65), contain low mounds formed from burned rock middens (Vaughn 1975; Vehik and Pailes 1979). The features are described as varying from 20 to 40 feet in diameter and are from 1 to 2 feet in maximum height. The upper surface the burned rock features were usually encountered 3 to 10 inches below the surface and varied from 10 to almost 30 inches in thickness. Few artifacts or preserved organics were found within the

features, however, ground stone manos, grinding slabs and occasional anvil stones were often found among the rock. The archeological excavations recovered dart points in the fill above the rock features. The point types include Ensor, Marcos, Langtry and Gary, as well as untyped, heavily reworked and broken specimens. Based on the presence of these items in relation to the features, most of the rock midden mounds are attributed to Woodland occupations (Vaughn 1975; Vehik and Pailes 1979). Other features comprised of dense concentrations of burned rock have been found on sites situated on floodplains and terraces of the Little Caney River and Cotton Creek (Kay 1981; Farley and Keyser 1979; Keyser and Farley 1980; Prewitt 1980). Sites such 34WN68 and the Jackson Fall-Leaf site (34WN42) contained a large concentration of burned rock. Both of these sites also contained Scallorn and side notched arrow points as well, which are indicative of Late Prehistoric occupations. However, the sandstone layer at the Jackson Fall-Leaf site occurred in the lowest occupation level and likely associated with the Woodland occupation of the site (Farley and Keyser 1979; Keyser and Farley 1980). While it is well documented that pottery was in use during Woodland and Late Prehistoric times, pottery is rare at the investigated sites. Ground pieces of hematite are found at many of the site, and most of the sites contained hematite residue on some of the ground stone manos and grinding slabs. While archeological evidence pointing to cultural activities account for the abundance of theories for burned rock midden on the sites along the Little Caney River drainage, plant processing has also been offered as an explanation for the activities which may have taken place.

Work at the Drumming Sauna site (34WN29) on Cotton Creek documented two structures interpreted as representing seasonal occupations (Reid and Artz 1984). Several radiocarbon dates were obtained from the site and the structures likely relate to a Late Woodland occupation, around 750 A.D. Features containing burned rock are associated with the structures, however, these are discreet hearth features rather than large, dense concentrations of burned rock. The archeological investigation of the Drumming Sauna site (34WN29) produced 424 arrow points (Reid and Artz 1984). This large number of projectile points is interpreted as evidence of a shift from plant gathering/processing to hunting activity in the area.

Based on the work at the Drumming Sauna site and other sites in the Copan area, Reid and Artz (1984) as well as other investigators propose that prehistoric occupations here were seasonal occupations associated with specific tasks, such as hunting or plant processing. While it appears that hunting may have been the focus of Late Prehistoric occupations, and Woodland occupations were oriented toward possibly plant processing, base camps or permanent occupations appear to be for the most part absent (Reid and Artz 1984; Vehik and Pailes 1979; Keyser and Farley 1980).

Site Investigations and Field Methodology

Archeological investigations of 34WN27 were conducted in three phases during June of 2003, September of 2005, and January through February of 2006. The goal of investigations was to determine if intact cultural deposits meriting inclusion in the NRHP were present in proposed

R/W. During the initial phases of investigation, the site was subjected to a careful surface examination and collection of exposed artifacts, as well as subsurface testing by shovel tests and hand excavated formal test units.

A grid system was established at the site for the last two phases of investigation. During this time, 1-x-1-m units were excavated in selected areas of the grid. Additionally, several 50-x-50-cm units were excavated along north-south and east-west transects of the grid in the northern portion of the excavation area (Figure 2). Excavation proceeded in 10 cm levels with flat-tipped spades and trowels. Sediment from all excavated units was screened through ¼ inch mesh.

Six backhoe trenches were excavated during the final phase of investigations at the site to assess the areal extent of the cultural deposits, gauge the potential for subsurface features and to gain a more thorough understanding of the geology and stratigraphy at the site.

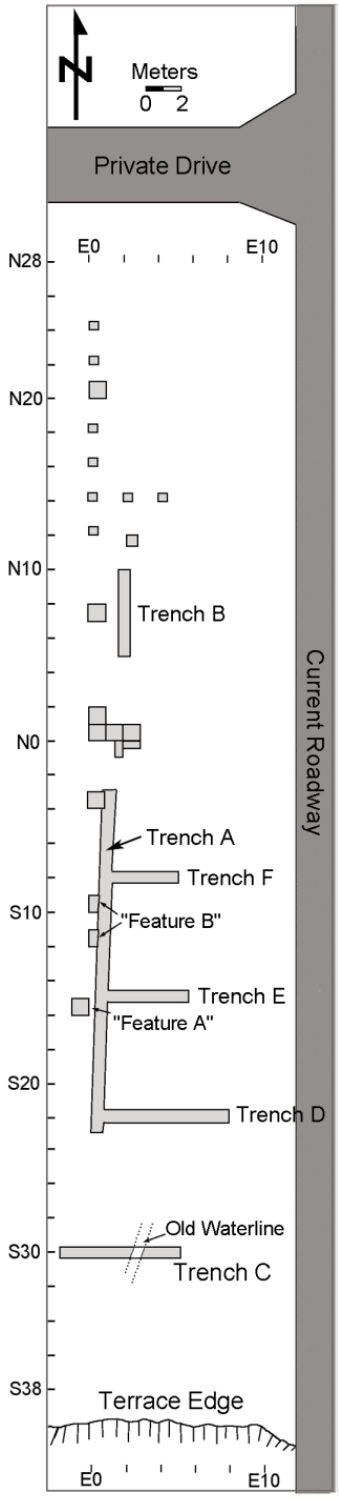


Figure 2. Plan map of test units and trenches at 34WN27.

Excavations

On September 27 and 28, 2005, initial subsurface excavations were undertaken to investigate the nature of the cultural deposit and layer of sandstone encountered during the initial investigation of June of 2003. The investigation consisted of the hand excavation of three 1-x-1-m, one 50-x-50-cm unit, and one 1-x-.5-m unit (Test Units A, B, C, D and E). Test Units A and C are contiguous 1-x-1-m units excavated where the densest concentration of burned rock was indicated. Test Unit E is a 1-x-.5-m unit excavated on the south edge of Test Unit C. Test Unit B, a 1-x-1-m unit was placed 3 m south of Test Unit A to investigate the southern extent of the rock midden and Test Unit D, a 50-x-50-cm unit was excavated 11 m north of Test Unit C to sample the extent of cultural deposit north of the rock midden. Excavations of the Test units were carried to the top of the burned rock midden which occurred around 25 cm to 30 cm below the surface. Along with artifacts including flakes and an occasional stone tool, loose pieces of burned sandstone were recovered in the upper 10 to 30 cm. Since the area was known to have been plowed it remains unknown if the top of midden originally extended up in to the plow zone.

At this point portions of Test Units A, C, and B were excavated through the sandstone layer to assess the depth of the layer of burned rock. The testing confirmed that the densest concentration of burned rock occurred in the area of Test Units A, C, and E where the layer was 20 to 25 cm in thickness. Test Unit B, 3 m south of Test Unit A, did encounter the layer of rock, indicating the midden extended south, however was less than 10 cm in thickness. Test Unit D to the north encountered burned rock, however, the rock was not as dense. The results of these findings were used to guide the next stage of investigations.

On October 21 and 22, 2005, two 1 m wide north/south machine trenches were excavated (Trench A and B). Trench A, a 22 m long trench was excavated from Test Unit B extending south to determine the southern extent of the burned rock layer as well investigate the potential for associated features and deposits south of the midden. Trench B, a 5 m long trench was excavated from a point about 3 m north of the test units A and C and extended north. Trench B was designed to determine the potential for features and intact deposits north of the rock midden. Two small anomalies were detected in the wall of Trench A and none in Trench B. The two anomalies were labeled Feature A and B and marked for the next stage of investigations.

Between January 23 and February 3, 2006, nine .5-x-.5-m, five 1-x-1-m, one 1-x-.5-m and four east/west machine trenches were excavated (Trenches C, D, E and F). Trenches D, E and F were excavated from the east wall of Trench A, eastward to the edge of previously disturbed R/W. They were spaced at 7 m intervals and ranged from 5 m to 10 m in length, increasing in length to the south. Trench C, a 10 m long trench was excavated near the south edge of the stream terrace. The goal of the east west trenches was to assess the potential for features. All trenching was dug in approximate 10 cm levels which were monitored by an archeologist. At this stage the investigation also established a grid over the site by establishing a north south line. The previously excavated units A, B, C, D, and E were tied into the grid and relabeled

according to the grid and all new units were established along grid lines. Two 1-x-1m units were opened adjacent to Former Test Units A and C, (now N0/E0 and N0/E1). In addition test units were opened to examine the anomalies (features A and B) present in the west wall of Trench A. A 1-x-1-m Test Unit was also opened adjacent to Trench B. To further investigate the northern portion of the site, a series of .5-x-.5-m units were excavated along the N0 line every 2 m. An additional 1-x-1-m units was excavated at N20/E0 and two additional .5-x-.5-m units opened eastward along the N14 line. In addition, all 1-x-1-m units previously excavated down to the rock layer were excavated through the rock layer. All the test units were dug in 10 cm levels and screened through ¼ inch mesh.

The area excavated on September 27 and 28, 2005 including Test Units A, C, and E are included in the area referred to as the Central excavation block after the establishment of a grid. On January 23, 2006, the southwestern corner of Test Unit A was set up as the N0/E0 point and a north/south line set up for completion of the investigations. These units, now re-labeled as part of the grid as well three others (N1/E0; N0/E2; S1/E2) were excavated in January 23 through February 3, 2006 and are referred to as the Central excavation block. This area contained the densest concentration of cultural material, as well as the densest portion of the thick layer of burned sandstone. These Central block units are described below with both the original alphabetical designations, as well as grid designations**.**

Central Block

Within the Central excavation block, all the previously excavated units [Test Units A (N0/E0), B (S4/E0), C (N0/E1), and E (S1/E1)] were excavated through the burned rock layer, and two more units (N1/E0 and N0/E2) were excavated through the rock layer (25 to 50 cm below ground surface [BGS]) to 60 cm BGS. Unit N0/E2 was excavated to 70 cm BGS. The cultural material in the upper 25 cm of the A horizon produced two more diagnostic dart points including an Ensor like point and a small Marcos-like point. No features were encountered within the midden or underneath the midden. The rock midden was also found to be devoid of organic material. A total of two heavily reworked stone points and one point with an intact blade, but damaged base, were found within the midden. While none of these items could be described according to a defined type, they appear to be typical of Late Archaic and Early Woodland styles.

N0/E0 (Test Unit A). This unit was excavated where the 2003 investigation indicated the thickest soil and most intact sandstone layer occurred. Level 1 produced flakes, and a side-notched dart point. Level 2 produced flakes and three fragments of late stage bifaces. Level 3 produced flakes and ended on top of the burned sandstone layer. Levels 4 and 5 were excavated through the sandstone layer and while some flakes and one dart point were recovered the frequency of artifacts dropped significantly from that recovered above the burned rock. The excavation was carried to 60 cm below ground surface (BGS), and the burned rock layer was found to be approximately 25 cm thick (25-50 cm BGS). The level below the burned rock contained only a sparse number of flakes.

S4/E0 (Test Unit B). This unit was excavated 3 m south of Test Unit A. The upper A soil horizon (Unit 1) in Test Unit B is approximately 20 to 25 cm thick (approximately 10 cm less than in Test Unit A) with the sandstone layer encountered from 25 to 27 cm below the surface. Levels 1-3 produced flakes. Level 3 was excavated only to uncover the sandstone layer which lay 25-27 cm below the surface. Level 4 was excavated through the sandstone layer which ended by 40 cm BGS. The artifact frequency was found to drop within the rock layer as well as below it. The subsoil below the sandstone is the same observed in Test Unit A.

N0/E1 (Test Unit C). This unit was excavated adjacent to the east side of N0/E0. The soil profile and depth of the sandstone layer is consistent with that of N0/E0. The cultural material recovered from the upper soil horizon also reflects that of N0/E0 (Test Unit A). Levels 4 and 5 were excavated through the layer of burned sandstone. The sandstone layer and artifact frequency reflected that seen in N0/E0. One point base was recovered from the rock layer approximately 40 cm BGS**.**

N1/E0. This unit was opened in the final phase of the investigations. Two projectile points were recovered from Levels 1 and 3 above the rock layer. One is a corner-notched point comparable to Marcos type, while the other is side-notched comparable to Ensor type points. In addition, two heavily reworked projectile points were recovered from within the rock layer. The reworking inhibited any comparison to defined types, however they appear typical of Late Archaic/Early Woodland manufacture. The rock layer in this unit mirrored that of the adjacent units and excavation ended at 60 cm BGS.

N0/E2. This unit was opened in the final phase of the investigation. This unit contained the deepest part of the burned sandstone layer with the rock extending below 50 cm BGS. This unit was excavated to 70 cm BGS. Flakes were recovered throughout the excavated levels, however, the frequency of flakes dropped through the layer of burned rock as well underneath it.

S1/E2 (1-x-.5-m). This unit was also opened in the final phase of the investigation. The upper levels contain a similar frequency of flakes as that observed in the adjacent units. The layer of burned sandstone ended by 50 cm BGS and a mano and two fragments of a metate were recovered in Level 6 below the rock layer.

S1/E1 (Test Unit E) (1-x-.5-m). This unit was excavated south from the southeast corner of N0/E1. The soil profile, depth to sandstone, the recovered cultural material and the thickness of the rock layer is consistent with that of the adjacent units. The excavation was carried to 60 cm BGS.

Investigations North and South of Central Excavation Block

On October 21 and 22, 2005, two approximately 1 m wide machine trenches were excavated (Trench A and B). The trench excavations confirmed the presence of a rock midden in the main excavation block and extending north for an unknown distance and south a couple of meters south of Test Unit B. Trench A, a long roughly north/south trench excavated along the west

edge of the R/W from Test Unit B south for 22 m, revealed the upper mantle of top soil (Unit I) containing the bulk of the cultural material thins to the south. The trench also uncovered evidence of two possible subsurface features. Trench B, a 5 m long trench excavated 4 m north of the main excavation block revealed a layer of burned sandstone extending north through this area. The results of this phase of testing suggested that the burned rock layer represents an intact midden of burned rock.

From January 3 through February 3, 2006, further investigations were conducted to better determine the potential integrity of the deposits and in particular the nature and extent of the burned rock midden. This last phase of investigation included establishing of a grid, machine digging of four east/west trenches south of the Central excavation block, establishing a line of .5-x-.5-m hand dug units north of the Central excavation block, expansion of the main excavation block, mapping of the site area, and carrying the excavations through the burned rock midden in an effort to determine its cultural affiliation and the potential for preserved organic material which would provide significant information. In addition, hand excavations were preformed to investigate the two subsurface anomalies (Features A and B) detected in Trench A in October of 2005.

A series of eight .5-x-.5-m test units were excavated from N12/E0 north to N24/E0. In addition, two .5-x-.5-m units were excavated on and east line from N14 to the edge of the road cut. One unit (N20/E0) was expanded to a 1-x-1-m unit. The excavation of these units revealed that the layer of burned sandstone extended north to N 24/E0, however, became much thinner and more scattered to the north of the Central block. In addition the cultural material recovered above the layer of burned rock became less dense relative to the Central excavation block. The excavation of the 1-x-1-m unit N20/E0 revealed the rock layer to occur mostly from 30-40 cm BGS. This level also produced five flakes and two drill bases. A 1-x-1-m unit was excavated at N7/E0 just west of Trench B. The unit revealed the layer burned rock to occur between 30-40 cm BGS and to be scattered throughout the unit at that level. The dense layer encountered in the Central Block becomes a thin, dispersed scatter to the north, albeit at the same level as the dense layer. In addition, the upper levels contained approximately half the number of flakes as those in the Central excavation block 4 m to the south.

South of the main excavation block, the four east/west trenches were excavated from the edge of the road cut west to intersect with Trench A. The trenches were dug approximately at S28 (Trench C), S20 (Trench D), S15 (Trench E), and S8 (Trench F). Trench C indicated very little in the way of cultural materials present in the southern most portion of the investigated area. Trench D revealed some scattered burned sandstone present in this area with a small concentration within 1 m of the existing road cut. This concentration appeared in the upper 20 cm of the A Horizon and appeared to have been disturbed. Trench E was very similar to Trench D with a scattered of burned sandstone visible in the trench walls and a concentration in the eastern most 1 m of the trench. Trench F also revealed a scatter of burned sandstone, however no concentration was evident. No evidence for other features was found.

The anomalies detected in the west wall of Trench A in October were investigated during the last phase of the investigation. The southernmost anomaly referred to as Feature A, presented as a narrow anomaly containing darker soil and extending to about 90 cm BGS into the yellow clay subsoil. A 1-x-1-m unit (S16/W1) was excavated adjacent to the west wall of Trench A to investigate Feature A. The unit was excavated to 70 cm BGS and did not encounter the anomaly. However the feature was detected in the east wall of the unit. An approximately 15 cm wide wall between Trench A and S16/W1 was excavated to further investigate the nature of the anomaly. Other than a couple of pieces of burned sandstone, no cultural material was present in the soil within the anomaly. One piece of charcoal was recovered. The second anomaly detected in Trench A, referred to as Feature B was observed as very slight 30 cm wide depression extending from the B horizon slightly into the yellow clay subsoil. This anomaly was investigated with 1-x-.5-m unit (S12/E0) excavated off the west wall of Trench A directly over the anomaly. The anomaly contained no cultural material and its presence weakened and became non delectable by 60 cm BGS.

Soils and Stratigraphy

Generalized Description of Stratigraphy

The following soil profiles are described in soil units. Soil profiles were taken from sediments exposed in the walls of Trench A and adjacent units. Although absolute elevations and thicknesses of the units varied slightly in each block (on the order of centimeters in most cases), the stratigraphy and composition of soils at the site were consistent throughout. It is possible, therefore to give a general description of the stratigraphy at the site.

Figure 3 is an idealized schematic profile of the stratigraphy at 34WN27. The stratigraphy at the site followed this idealized pattern throughout the excavation units and trenches.

Unit I comprises the A horizon topsoil unit from current ground surface to a depth of approximately 20-30 cm BGS. Unit I is a dark to very dark grayish brown (10YR3/2-4/2) fine sandy loam. Unit II comprises the B horizon subsoil unit occurring from about 25-35 to 50-60 cm BLS. The boundary between this unit and the overlying A horizon is wavy, abrupt and smooth. Unit II is a dark yellowish brown (10YR3/4-3/6) layer of silty clay loam. This layer contains the burned rock midden deposits at the site. Consequently, the highest densities of burned rock and artifacts occur in this layer as well. The presence of the midden does not appear to have altered the color of the subsoil. There are small patches of mottling in some areas and weak soil darkening in the midden deposits. These occurrences of patchy discoloration may well have been caused by root action or other natural processes.

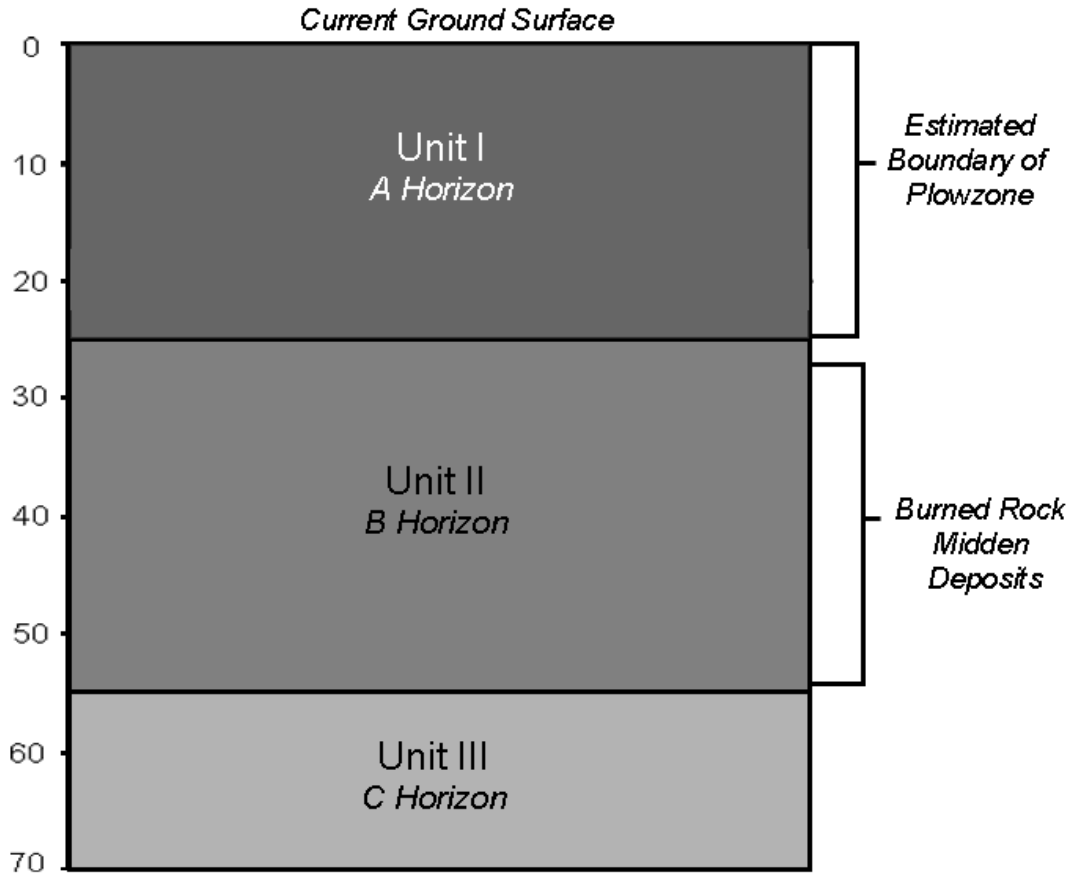


Figure 3. Generalized soil profile at 34WN27.

Midden deposits thinned out in the North and South block. In these areas, sparse scatters of burned rock occurred in the B horizon but were not as thick or concentrated as in the Central block.

Unit III comprises the C horizon. This unit is a yellowish brown (10YR5/6) gravelly clay. The gravels are cobbles of decomposed bedrock. The boundary between this horizon and the overlying B horizon was wavy and abrupt. The horizon is culturally sterile, the rock midden layer ends near the boundary of the B and C horizons.

Trench A: Features A and B

The following soil profiles were taken from Trench A. The profiles illustrate two soil "anomalies" encountered in the field. These anomalies appeared as filled depressions in soil Unit II and III. The fill consisted of Unit II or mottled Unit I/II sediments. The anomalies were

labeled Feature A and B in the field. The profiles also provide a detailed look at the general stratigraphy of the site.

Feature A.

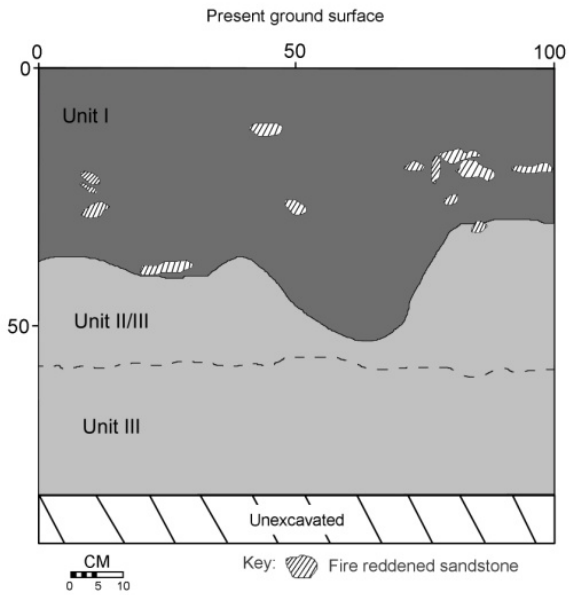
This feature is the southernmost feature investigated. It was expressed in the west wall of Trench A as a narrow, deep depression extending to approximately 90 cm BGS into Unit III (Figure 4). The boundaries of the depression were somewhat diffuse but could be traced in the profile. Fill in the depression consisted of Unit I matrix and burned sandstone near the top of the anomaly overlying mottled fill consisting of dark brown matrix from Unit I and reddish brown matrix from Unit II.

A 1-x-1-m unit, S16W1, was excavated adjacent to the west wall of Trench A. Excavation extended to 70 cm BGS and failed to further define the feature horizontally. However, the feature was detected in the profiles of the east and west walls of the unit. As with the initial profile in Trench A, the boundaries of the feature were somewhat diffuse barely detectable in the west wall of S16/W1. It manifested as a depression with fill from Unit II extending to the floor of the unit. Dispersed pieces of burned sandstone were also found in the feature.

On the west wall of S16W1, the anomaly was detected as a slight depression extending to about 50 cm BGS and filled with Unit I matrix and a few pieces of burned sandstone. Unit II is not well expressed in this profile. Below Unit I was a layer of mottled subsoil that appeared to be composed of Unit II and Unit III matrix. Most of the burned sandstone in this profile was encountered in Unit I. No concentrations of charcoal, ash, or other cultural material were detected in the anomaly in any of the excavations or profiles.

To further investigate the nature of the anomaly, the approximately 15 cm-wide balk between S16W1 and Trench A was excavated. The anomaly was detected in excavations but little more was revealed. A few pieces of burned sandstone and one small piece of charcoal were recovered. A sediment sample was taken from Feature A and subjected to flotation analysis. Flecks of carbonized plant material and rootlets were recovered in the light fraction but no conclusive artifacts were recovered.

To summarize, Feature A extends laterally east to west for over a meter and increases in depth to the east. It does not appear to be an archeological feature associated with habitation activities related to the formation of the rock midden. Typically, archeological features such as storage pits, trash pits, or hearths that have been encountered in burned rock middens contain noticeable concentrations of artifacts, charcoal, and/or ash which are absent from this anomaly.



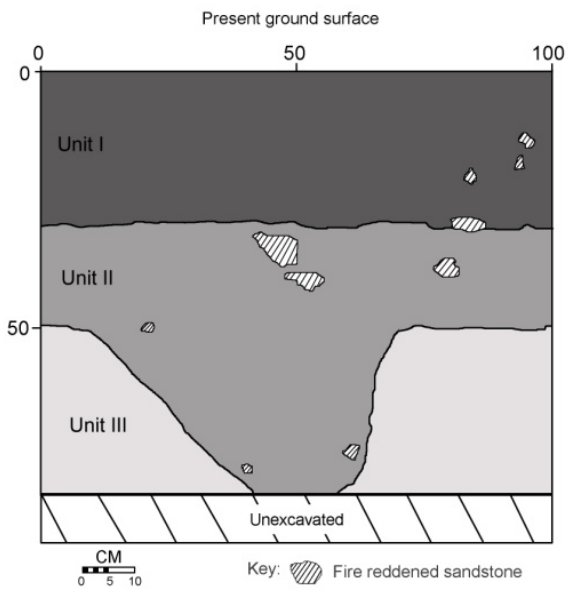


Figure 4. Profiles of soil anomaly Feature A. Upper profile is from the west wall of Trench A at S16/E0. Lower view is profile the east wall of S16/W1.

Feature B.

The second anomaly detected in Trench A is north of Feature A and was labeled "Feature B" in the field. Similar to Feature A, Feature B manifests as a small depression; however, Feature B is much less pronounced than Feature A. Feature B is a slight depression about 30 cm wide extending from Unit II into Unit III (Figure 5).

A 1-x-.5-m unit (S12/E0) was excavated directly over the anomaly. The anomaly was undetectable after approximately 60 cm BGS. A small amount of debitage and burned sandstone was recovered from the unit but no other cultural material was recovered. As with Feature A, there was no darkened matrix, charcoal, or ash in the anomaly indicating a cultural feature.

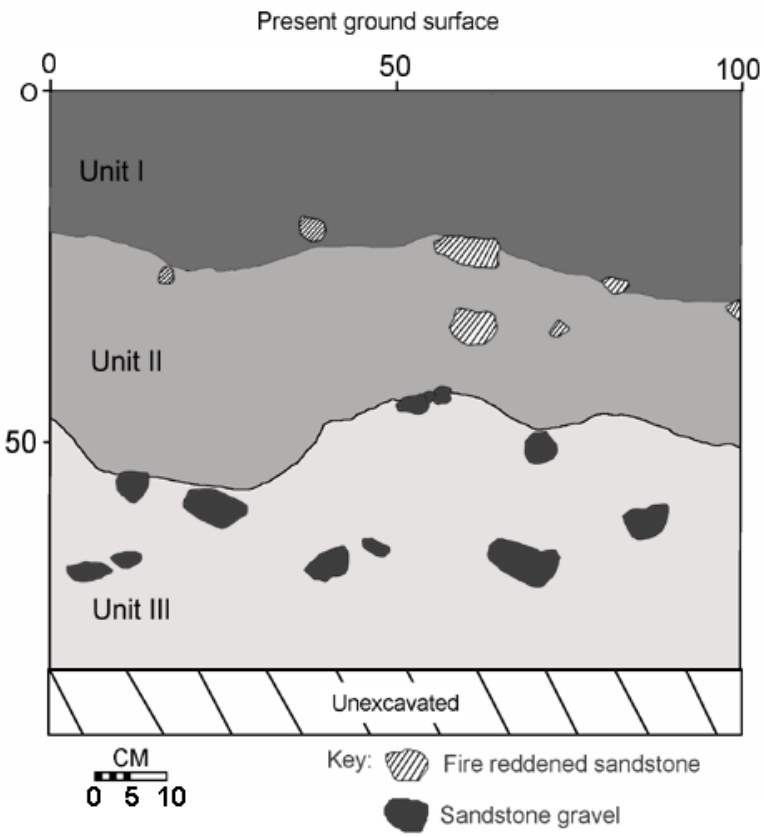


Figure 5. Profile of soil anomaly Feature B in west wall of S12/E0.

Burned Rock Midden

The information gathered by this investigation indicates that 34WN27 contains a prehistoric cultural deposit present in the upper A and B Horizons of soil (soil Units I and II). The A Horizon, (soil Unit I), varies from 20 to 35 cm in depth and contains flakes and some diagnostic

cultural materials. The dense layer of burned rock consistently occurs at the base of the A horizon, and in the area of the Central excavation block, occupies much of the B Horizon (Unit II) and directly overlies soil Unit III. The occurrence of burned rock, as well as other artifacts, diminishes significantly in soil Unit III. The material contained in soil Unit I reflects an occupation resulting in the deposition of artifacts suggesting multiple activities occurred on the site. The cultural deposit appears to be mixed in the A Horizon with artifacts diagnostic of Late Archaic, Woodland and likely Late Prehistoric (as reported on the original site form by Rohn) present throughout the deposit.

At the base of the A horizon, containing most of the artifacts, exists a dense, compact layer of burned sandstone. The sandstone layer is thickest within the Center excavation block. Here the dense rock begins around 25 cm BGS. Based on the findings of this investigation, it would appear that the thickest potion of the burned rock midden within the project area is approximately 6 m north/south and 6 m east/west. The thickness of the burned rock layer varies from 20 cm to 30 cm with the densest portion occurring from 25 to 40 cm BGS (Table 1). While the total number and weight of burned rock recovered varies from each level within each test unit, overall the density by weight steadily decreases with depth. This is particularly evident when considering that in most of the test units the rock recovered from Level 3 the rock layer varied from 5 to 8 cm in thickness within the 10 cm level. South of the Central excavation block, the burned rock midden begins about 25 to 27 cm BGS and thins to about 10 cm in thickness for about 2 m to 4 m where the burned rock becomes only a scatter mixed with the other cultural material consisting mostly of flakes. North of the main midden area, the burned sandstone becomes a thin, somewhat scattered layer present 30 to 40 cm BGS for at least 18 m north/south and 4 m east west. The cultural material immediately above and also associated with the layer becomes noticeably thinner to the north. While flakes and some heavily reworked stone tools were found in direct association with the rock midden, no organic materials, such as charcoal, seeds or faunal remains, were found. The presence of burned sandstone fragments between 0 to 25 BGS (Figures 6 and 7) suggests the rock midden may have extended further up into soil Unit I but has been disturbed by plowing, bioturbation, and tree removal.

Prov. (Level)	**N0/E0 (1-x-.5-m)**		**N0/E1**		**N0/E2**		**N1/E0**		**S4/E0**		**Total**	
	No	Weight (kg)	No	Weight (kg)	No	Weight (kg)	No	Weight (kg)	No	Weight (kg)	No	Weight (kg)
3	71	8.6	222	34.2	60	27.2	238	31.7	33	5.4	624	107.1
4	110	13.6	110	18.1	270	27.2	85	11.8	114	18.6	689	89.3
5	131	18.1	100	13.1	135	8.6	61	8.6	14	1.8	441	50.2
6	34	4.8	32	3.8	143	13.6	17	2.7	-	-	226	24.9
7	-	-	-	-	30	6.3	-	-	-	-	30	6.3
Total	346	45.1	464	69.2	638	82.9	401	54.8	161	25.8	2,010	277.8

Table 1. Burned Rock from 34WN27 excavations

Figure 6. View of Central excavation block looking east. Test Units N1/E0 and N0/E0 in foreground. Note soil horizons and layer of burned rock and in situ metate fragments on the floor of Test Unit N0/E2.

Figure 7. View of burned rock layer in Test Units N0/E0 and N0/E1 (Test Units A and C) looking east.

Radiocarbon Dates

Radiocarbon assays were obtained on two samples from separate areas of the site. One sample consisted of a small amount (~1 g) of charcoal while the other was a bulk sediment sample (~1000 g). Both samples were analyzed using AMS.

The charcoal sample was recovered from the northern excavation block in unit N20/E0 from a depth of roughly 50 cm BGS. The level contained small clusters of burned sandstone and yielded a small number of artifacts including a biface and lithic debitage (see preceding chapter). The charcoal consisted of small flecks of charred plant material that could not be identified to class or species. The sample yielded a radiocarbon age of 350±40 B.P. (Beta-219630). This date calibrates to A.D. 1450-1650 (calibrated at 2σ with the program CALIB 5.0 [Stuiver et al. 2005; also Reimer et al. 2004]).

This charcoal date is not in accordance with the context of recovery or artifacts associated with the site. While arrow points have been reported at the site, indicating a Late Prehistoric occupation, the radiocarbon date, if accurate, is protohistoric. This is too recent for any of the associated diagnostic artifacts. There are several possible explanations for this date. Relatively extensive root disturbance occurred in the unit. Translocation of more recent detrital charcoal from the upper soil horizon could have occurred as a result of root action. Contamination, by humic acids or other agents, is another possible explanation.

The soil sample was taken from the Central excavation block in unit S1/E2 from the floor of Level 6 (50 to 60 cm BGS). This level represents the bottom of the rock midden deposits in the unit. The sample, therefore, consisted of sediment resting just below the lowermost rock midden deposits at the boundary of Soil Units II and III. The sample yielded a radiocarbon age of 2590±40 B.P. (Beta-219631). This date calibrates to 820-770 B.C. (calibrated at 2σ with the program CALIB 5.0 [Stuiver et al. 2005; also Reimer et al. 2004]).

This date fits well with interpretations of the site based on diagnostic artifacts and stratigraphic position of the sample that was dated. Diagnostic artifacts consist of projectile points, many of which resemble point types attributed to the Late Archaic and Plains Woodland periods. Thus the earliest occupation at the site was hypothesized to have occurred during the Late Archaic or perhaps the Late Archaic/Early Woodland transition. The soil date of 2590±40 B.P. is intermediate between accepted dates for Late Archaic and Plains Woodland sites in northeastern Oklahoma (Figure 8). The date should be viewed as a *terminus post quem* for the rock midden deposition. Keeping in mind the vagaries of dating soil organic matter, the date provides a reasonable lower boundary estimate for initial occupation of the site.

Discussion

Soil stratigraphy at 34WN27 is relatively uniform across the excavation blocks. A developed dark brown A horizon occurs throughout the site and overlies a reddish-brown B horizon, the upper portion of which contained the remains of the burned rock midden and most of the archeological material. This was underlain by a yellow clay C horizon.

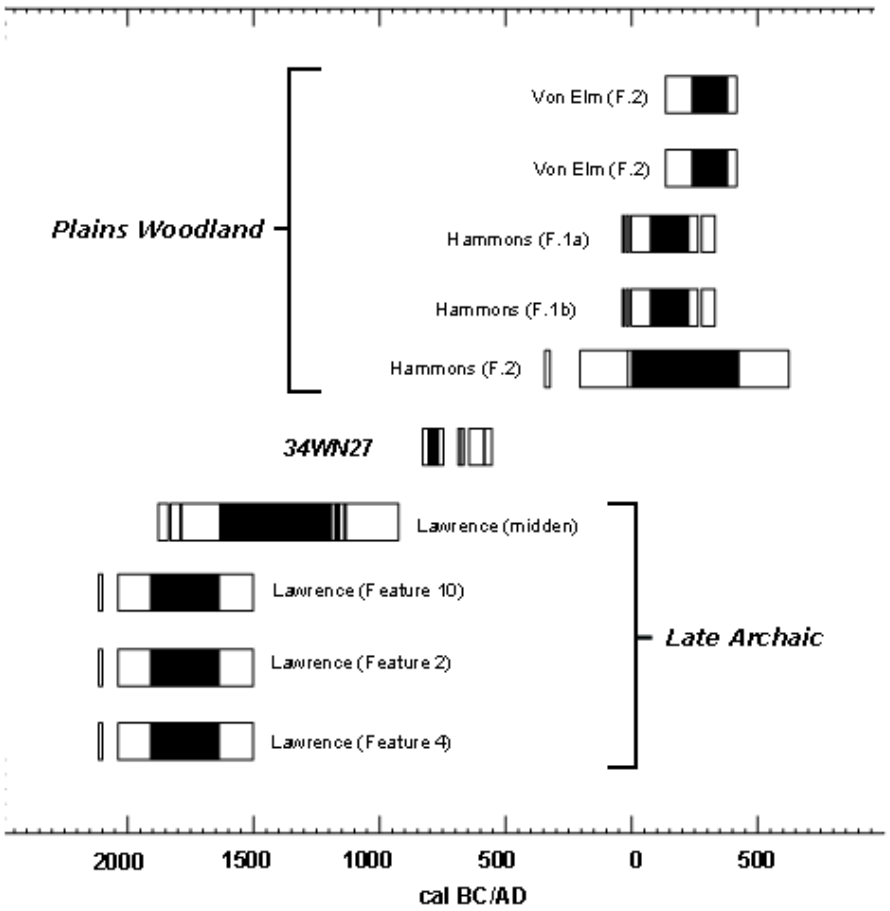


Figure 8. Comparison of select calibrated radiocarbon dates from Late Archaic and Plains Woodland sites in northeastern Oklahoma with date from 34WN27. Data from Wyckoff (1984:124-125) and Vehik (1984:180-181).

The different soil layers could be traced throughout the site, differing only in terms of natural changes in elevation. However, as described above, the densest layer of burned rock is confined to the area of the Central block excavations. Two small anomalies were observed and recorded as Feature A and Feature B. Upon examination, the anomalies are determined not to be archeological features. The most parsimonious explanation at this juncture is that they are tree-throws or some other natural or post-depositional disturbance to the site.

There were a few areas where sediments were mottled and one or more horizons appeared to be mixed or reworked. In all cases, this appears to be the result of natural or recent human disturbances due to land clearing, development and cultivation. Mixing of historic/recent artifacts with artifacts from the rock midden layer occurred in the upper 20 cm of deposits at the site, primarily due to plowing.

Laboratory Analysis

All recovered materials were cleaned and processed in the laboratory at the Oklahoma Archeological Survey. Items were washed, cataloged, and boxed according to site and provenience.

Lithic Analysis

Lithic artifacts form the bulk of the assemblage. The assemblage is divided into tool and debitage categories and raw material types were identified. Tools were categorized according to a simplified system based on morphology, inferred function, edge modification, and technological characteristics (after Andrefsky 1998). Debitage was classified according to several characteristics including completeness, platform morphology, and size class. The attributes of each flake were recorded on paper and then transferred to a computer spreadsheet. The data were then subjected to three different types of analysis: mass analysis, attribute analysis and technological analysis. The results of these analyses were used to determine the nature of stone tool reduction at 34WN27. The details of the analysis are discussed further below. Specific analyses methodologies are presented in Appendix A.

Miscellaneous Cultural Materials

Other cultural materials recovered include ground stone (manos), ochre, one ceramic sherd, and historic debris (e.g., rusty metal wire) from the upper plow zone.

Faunal Remains

The few faunal remains that were recovered were fragmentary and could not be identified to species. Faunal remains at the site were recovered exclusively in the upper plow zone and are most likely recent or historic in origin.

Macrobotanical

Soil samples collected for flotation were processed in the wet lab at the Oklahoma Archeological Survey. Both light and heavy fractions were processed by passing through nested geologic screens. The samples were packed with root fragments, rootlets and detritus. No prehistoric material relating to the occupation of 34WN27 was observed.

Recovered Artifacts

Over 2,900 artifacts were recovered from surface collections, shovel tests, and test units at 34WN27. The items include worked hematite, hematite nodules, ground stone manos, fire reddened sandstone, and chipped stone tools. A small percentage of the assemblage is composed of recent and historic debris found in the upper plow zone levels.

For the purposes of this analysis, artifact descriptions are divided by provenience and grouped according to general excavation area. Excavation areas were named according to their

corresponding location: the North block, consisting of ten test units in the northernmost portion of the excavated area; the Central block, where the most intensive excavation took place; and the South block, consisting primarily of trenches A and C-F and three test units (Table 2; see Figure 2). As will be shown below, this division is not simply a convenient analytical tool but also closely follows artifact distributions at the site.

Block	Test Units and Trenches
North Block	N7/E0; N11/E2; N12/E0; N14/E0; N14/E2; N14/E4; N16/E0; N18/E0; N20/E0; N22/E0; N24/E0; Trench B
Central Block	N0/E0; NO/E1; NO/E2; N1/E0; S1/E1; S1/E2
South Block	S4/E0; S16/W1 ;S12/E0; Trench A, Trenches C-F

Table 2. Excavation Units and Trenches per Block.

General Artifact Distribution

One goal of the fieldwork at 34WN27 was to define the boundaries of the rock midden. It was hypothesized that the area comprised of the central excavation block had the densest artifact concentrations and that midden deposits thinned out gradually to the south and north. The data from excavations bears this expectation out.

Figure 9 shows the total number of lithic flakes per unit along a north-south axis on the E0 grid line. Units from the central excavation block by far have the densest concentration of flakes. A similar pattern obtained for burned rock as well, but burned rock was not quantified for all units in the field. It should be noted that some of the units were not full 1-x-1-m units, but were 1-m-x-50-cm or 50-x-50-cm test units. Thus the absolute values for some of the units are skewed. The general trend illustrated in Figure 7, however, does not appear to be a byproduct of sampling because adjacent units show similar values irrespective of actual excavated volume. For example, units N7/E0 and N20/E0 are 1-x-1-m units and while yielding more artifacts than adjacent 50-x-50-cm units they clearly follow the trend of declining artifact density of nearby units (see Figure 8). Moreover, the magnitude of difference between the number of artifacts recovered from N20/E0 and adjacent units is minimal.

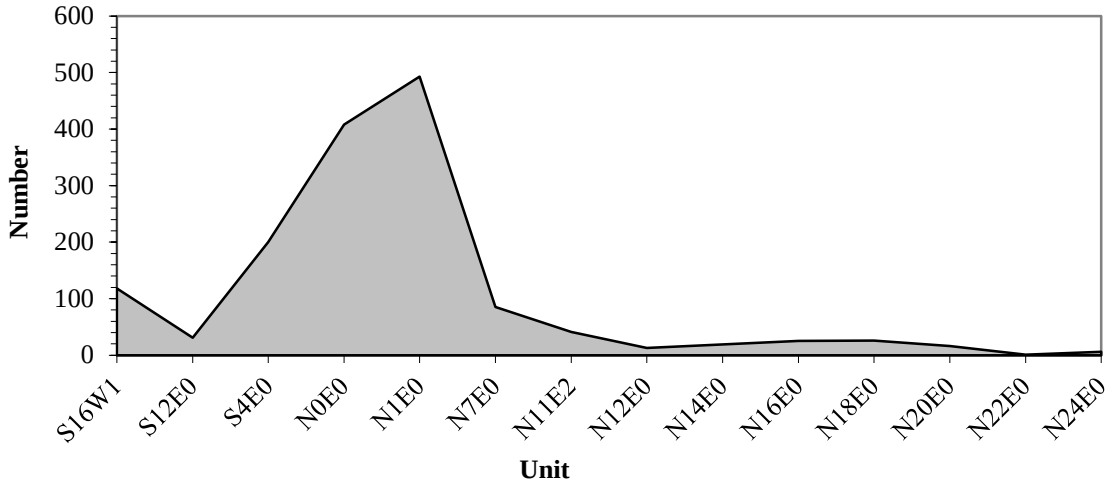


Figure 9. Number of lithic flakes per unit along a north-south axis on the E0 grid line.

Other artifact classes tend to follow this trend as well. Even those classes that are distributed throughout the site have the highest occurrence in the central excavation block. For example, bifaces and biface fragments were recovered throughout the site (but not in every unit). However, the highest concentrations of bifaces occur in the central excavation block. A similar pattern obtains for modified flakes and projectile points as well. It appears, then, that the Central block was indeed the highest density locus in the excavated area.

Another notable pattern that emerges is the fact that the South block, while less dense than the Central block, yielded more artifacts on average than the North block. The frequency of artifacts drops fairly quickly in both directions, however. The frequency of artifacts (total number) drops by half in just 3 m to south of the Central block (approximately 70 artifacts/m). Artifact frequency drops to north by upwards of 80 percent in just 5 m (approximately 81 artifacts per m).

The evidence is strongly suggestive of a concentrated midden accumulation located in the area of the Central block. The evidence should not, however, be taken as suggestive of a single episode of midden accumulation. The diagnostic artifacts at the site indicate multiple episodes of occupation over a substantial time span. Furthermore, midden deposits are not necessarily intact accumulations of one or more depositional episodes. In addition to simply depositing material, people more than likely modified any existing deposits by peeling back top layers before depositing new material, digging pits, and borrowing soil (with previously deposited artifacts) to create an adequate cap for cooking ovens (Leach et al. 2005).

Furthermore, at 34WN27 the upper soil layer has been subjected to tree clearing and cultivation which has unearthed and re-deposited an unknown quantity of the archeological material.

Surface Collection

The following section present a discussion of the artifacts recovered during the pedestrian archeological survey at the site. Artifacts documented on the surface were collected during initial surveys 34WN27 and analyzed as part of the investigations.

Ceramics

Pottery Sherd (N=1) Figure 10. One ceramic sherd (50.9 mm x 42.5 mm) was recovered from the site during this investigation. The sherd has a sharp curvature at one end. The piece is thick and has a mean thickness of 10.8 mm (average of three thickness measurements at different loci). It has a buff slip and gray paste. The inner surface is blackened and has visible striations from the shaping process. The outer surface has been smoothed. The temper consists of a very fine grit.

Figure 10. Ceramic sherd recovered during surface investigation. Upper view shows outer slipped surface, lower view shows cross-section with gray clay paste.

Lithic Artifacts

Debitage (N=22). The chipped stone sample is dominated by flakes made out of Florence-A chert (86 percent), with one piece each of Oolagah, Wreford, and one flake made out of an unidentified chert. The majority of flakes (63.6 percent) have been thermally altered. Only one flake exhibits dorsal cortex (covering less than 50% of the dorsal surface).

Mano/Nutting stone. This example is an ovate shaped mano made of locally available sandstone (Figure 11). The edges have been pecked indicating some shaping of the implement. There are two ground faces, one has a much larger and more intensively ground surface. It is slightly convex but does not exhibit the pronounced wear indicative of directional use (see Adams 2002). The other face has a small depression 2 mm deep in the middle of the face. The implement was used as an anvil, probably for soft or vegetal material since striations and other features associated with lithic reduction on an anvil are not present (Adams 2002). It is very similar in manufacture to ground stone from other midden mound sites in the region (e.g., Vehik and Pailes 1979: Plate 9A).

Figure 11. Mano/nutting stone. Photo shows both smoothed faces, the upper view clearly shows the depression on one face likely from use as a nutting stone.

Mano/Pestle. This example is a sub-triangular grinding stone with one extensively ground face and an adjacent lightly ground face (Figure 12). The heavily ground surface has a darkly stained surface and relatively deep gouge in the middle of the face. Lodged in the gouge was a small piece of soft hematite. Further, in a depression on the same face, approximately 1.5 cm from the gouge, is powdered hematite. The surface was further inspected under a microscope (10x and 20x) and other small deposits of powdered hematite were identified on the same face in various locations. The function of the tool is interpreted as a pigment grinder. It may well have served to grind other materials but the adhering powdered ochre is suggestive of use specifically to grind the mineral.

Ochre is known to have been powdered and then combined with a binding agent to make pigments. It was also used sometimes during the hide curing process. Implements that were most likely used for grinding pigments have been found at other sites in the area. One example comes from the Copperhead Mounds (34WN45) site where a "paint palette" (pigment grinding basin) was found. The grinding basin exhibited red ochre powder adhering to the surface (Vehik and Pailes 1979). A mano/pestle in Figure 12 may represent another component in the process – a pestle or grinding stone with adhering hematite.

Figure 12. Mano/Pestle from the surface of 34WN27. Note deposits of red hematite

Excavated Artifacts from Northern Block

As mentioned above, artifact densities were low in the northern block. Densities drop considerably as one moves north from the Central block at a fairly steady rate (see Figure 8).

The burned rock layer in the northern units also tended to be thin (±10 cm with sparse small FCR above and below) and consisted of scattered clusters of burned rocks with no observed patterning. A total of 287 artifacts were recovered during excavations in the North Block.

Lithic Artifacts

A total of 242 lithic artifacts were recovered in the northern block. These include seven bifaces, two drills, one modified flake, and 232 pieces of debitage.

Bifaces (N=7). Five of the bifaces are from one unit, N7/E0. All of these specimens are fragments and made out of Florence-A chert. With one exception, all bifaces have evidence of being thermally altered. Most appear to be failed bifaces that were undergoing reduction geared toward making formal tools (i.e., projectile points) when they broke and were discarded. One exception appears to be a fragment of a drill bit.

The one specimen complete enough for measurement has a width:thickness ratio of 2.58 and intrusive flaking (flakes cover the entire visible face). These characteristics indicate a middle stage of reduction when the piece broke (Stage 3 of Callahan 1979).

The two other bifaces were recovered from N20/E0. Both of the specimens are fragments and both are made out of heat treated Florence-A chert. One piece shows evidence for formal shaping of one edge before breakage and discard. The artifact exhibits steep, non-intrusive flaking with deep bulbar facets resulting in a steeply beveled edge. The piece may well have been a recycled projectile point but is very narrow and thin (width = 10.7, thickness = 3.2) relative to other projectile points at the site.

Drills/Perforators (N=2). As with the bifaces, both drills were recovered from units N7/E0 and N20/E0. One is made from Florence-A chert and the other is made out of Oolagah. Both are the proximal portions of the tool with hafts and partial blades still present. The specimen from N7/E0 exhibits blade edges with steep, non-intrusive retouch forming alternately beveled edges. The specimen from N20/E0 shows a heavily reworked blade with intrusive, steep flaking creating steep edges. Relatively heavy microflaking edge damage is also evident.

Unit	**RM**	**Th**	**W**	**Bl W**	**St Th**	**St W**
N7E0	FA	8	25.1	14.7	7.6	19.1
N20E0	OG	7.5	15.4	12.8	4.6	-

Table 3. Metric attributes of drills from North Block.

RM: raw material (FA = Florence-A; OG = Oolagah); L: length; Th: maximum thickness; W: maximum width; Bl W: blade width; St Th: stem thickness; St W: distal stem width.

Modified Flake (N=1). One modified flake was recovered from the North block. It is a fragment of a thick flake (thickness = 5.5) tool with one modified edge. It is made out of Oolagah chert. Retouch consists of continuous, non-intrusive, shallow flaking creating a working edge with an acute edge angle.

Debitage (N=232). Lithic waste flakes in this part of the site follow the general pattern seen throughout other parts of the site. The majority of raw material is Florence-A chert. Other types that are present include Foraker, Wreford, Oolagah, Keokuk and Tahlequah. The Ozarks cherts (Keokuk and Tahlequah) are the least numerous. Most of the flakes have been thermally altered and only a few are complete. The sample is dominated by small flakes (1 cm - 1.75 cm in maximum dimension) with no dorsal cortex cover. A very small portion of the sample (approximately 3.9 percent) is made up of flakes with greater than 50 percent of the dorsal surface covered by cortex. The implications of the debitage analysis are discussed further below.

Historic-Aged Debris

All of the historic debris was found in the upper layers of the North block units (levels 1-3). With a few exceptions, almost all were found in the upper 20 cm plow zone levels. Artifacts recovered from within this category include three rusted nails, one length of metal wire, 19 fragments of coal, and one cotter pin in the upper depths of N7/E0. Ten fragments of glass were recovered during excavations including one piece of aquamarine flat glass, two aquamarine glass fragments, one amber glass bottle fragment, and one frosted glass fragment. The highly fragmented nature of some of the pieces (such as the aquamarine fragments) prevented identification of the source of the debris (i.e., bottle, window, etc.).

Faunal Remains

Eleven bone fragments were recovered from the northern block. The highly fragmented metapoid of a medium sized mammal was found in the upper layer of N7E0 mixed with other historic and prehistoric debris. No clear evidence of cut marks, burning, or other evidence that the bones were used as food were observed. Tooth marks on what remains of the articular end are signs that the bone was gnawed by animals. Furthermore, it is not clear if these remains are associated with recovered cultural material, but considering the poor preservation throughout the site, they are most likely recent remains that have been mixed with cultural materials through plowing and other activities.

Excavated artifacts from Central Block

As noted above, the Central block has the highest densities of artifacts at the site and a thick burned rock layer (~20-30 cm vertical thickness). The majority of formal lithic artifacts recovered during excavation were found in the Central block (80 percent). This includes nearly all of the projectile points (12 of 13) and the majority of bifaces (74.7 percent) and modified flakes (86.7 percent).

Lithic Artifacts

A total of 2,197 lithic artifacts were recovered from the Central block including 12 projectile points, 20 bifaces, one drill, 13 modified flakes, two unifacial tools, two core fragments, and 2,147 pieces of debitage. The projectile points are presented in Figure 12. The discussion below describes these examples.

Projectile Points: Ensor-like (N=2). Two projectile points were identified as resembling the Ensor type. Typical of the type the points exhibit short, wide expanding stems with wide necks (>20mm in both cases) due to shallow notching (Bell 1960).

N0/E0-A. Example N0/E-A (Figure 13a) exhibits a haft element that varies from the type description listed above. The example is relatively thick and symmetrical (given the apparent attrition and retouch). Flaking is regular but not well executed. Flaking on the blade is in a "chevron" pattern where visible. This "pattern" is most likely the result of refurbishing. The point was barbed but both barbs have been damaged, one is completely missing. The haft is slightly expanding with rounded "lobe" ears. Basal thinning was accomplished using two to three relatively steep, deep, thinning flakes on both faces. Notches are wide and relatively shallow.

The point exhibits a pronounced "reverse flute" that most likely resulted from impact. The point was subsequently repointed as evidenced by retouch flakes that are invasive to the impact scar. Additionally, the remnant scar from a large burin-like removal is evident on one lateral edge. The removal was initiated from the distal end. It is possible that the impact episode that resulted in the "reverse flute" also removed this burin-like flake. Subsequently, the burin-like flake scar was retouched leaving only the distal end of the facet. Retouch consists of steep, non-intrusive flaking.

It is difficult to say with complete confidence whether the modifications made to the point, particularly the beveling of the burin facet, are evidence of recycling. The way the retouch was executed might well have reduced the point's efficiency of penetration. However, it was repointed, as well as re-edged. Microscopic examination of use-wear traces would go a long way toward clearing up this problem. It would not be surprising if the point had been recycled and used as both a projectile and cutting tool.

N1/E0-B. Example N1/E0-B (Figure 13f) is thinned with broad, flat flakes. Shaping was accomplished with unpatterned, shallow flaking. The haft is expanding with a slightly convex base. The haft edges are concave due to broad steep notching and end in sharp "ears". The haft was thinned with steep, relatively deep parallel thinning flakes on both faces.

The tip is missing and a small impact "reverse flute" occurs on one face at the distal end. Based on the way the tip broke, however, it appears the point was retipped and broken again. The last break was a bending snap in the opposite direction of the "flute" (i.e., the break initiated on the face with the "flute" and terminated on the opposite face). The blade is slightly asymmetrical which might be due to refurbishing, but obvious signs of reuse are not evident.

Projectile Points: Square stemmed points (N=3). These points exhibit straight sided stems and flat to slightly indented bases. They do not fit well into defined typological categories but one bears some resemblance to points referred to as Yarbrough that have been found in the region.

N0/E1-A. Example N0/E1-A (Figure 13c) is the haft element of a projectile point. It is slightly expanding with straight sides and a flat base. The haft is relatively narrow and thick (basal width=15.9mm, thickness = 5.7mm). The point is made out of Florence-A chert.

N1/E0-D. Example N1/E0-D (Figure 13h) underwent considerable recycling during its use-life. Flaking is primarily broad, large shallow flaking that did little to thin the piece. Cross-section is plano-convex. The haft is straight edged and slightly contracting. The base is indented due to thinning via small, steep basal thinning flaking. Notches are very broad and shallow producing more of a shouldered point than a true notched point (but see below).

The point has been recycled into a steep-edged tool that has the appearance of a wedge or scraping tool. The distal end had been reshaped into an irregularly rounded edge via large, shallow, steep flaking. This is not the typical flaking associated with scraper bits. The shoulders are broken. The base might have been expanding but the ears appear to have been broken.

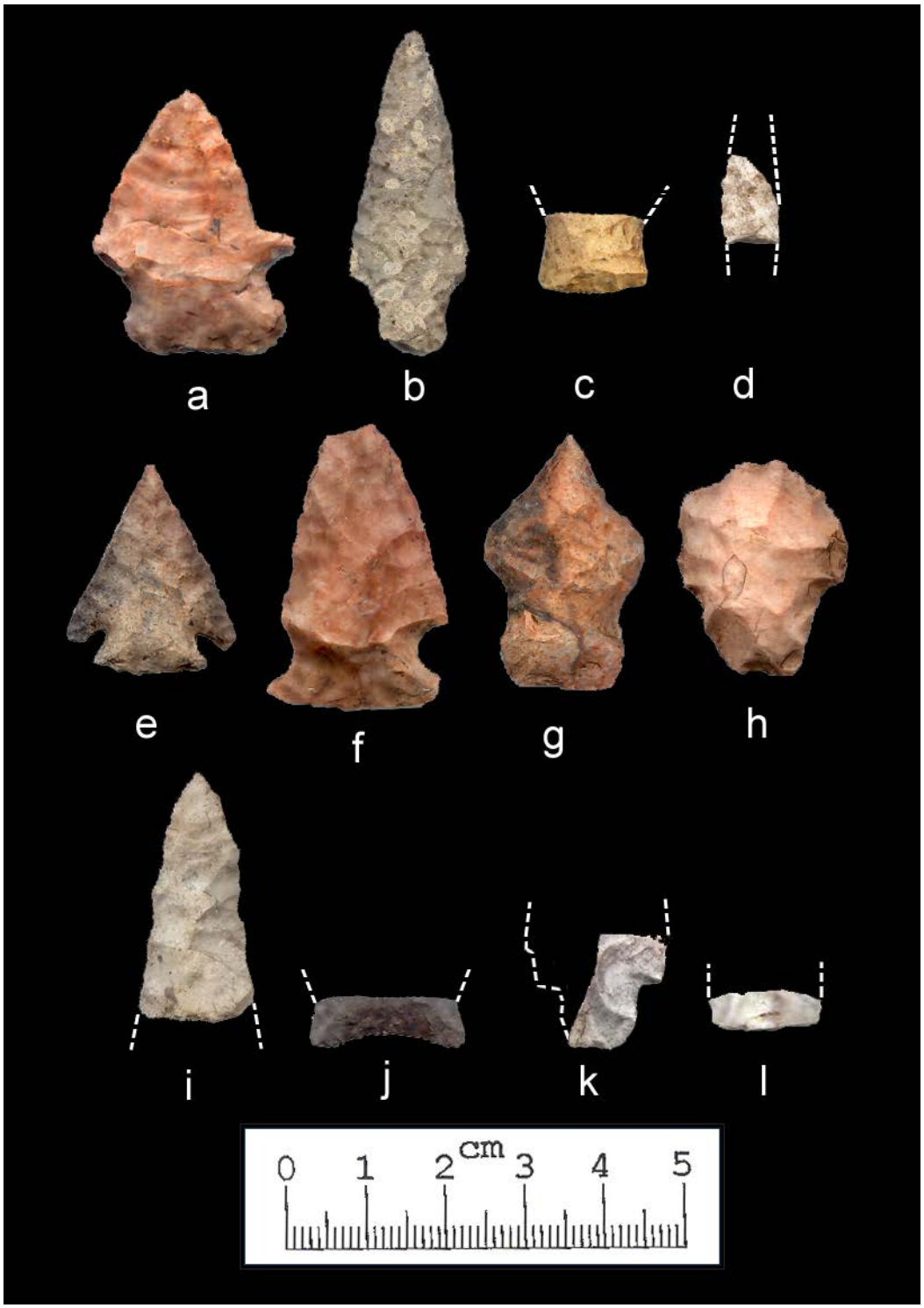


Figure 13. Projectile points recovered from the Central Block excavations at 34WN27.

Test Unit	Type	Raw Material	Length	Width	Medial Length	Shoulder width	Thickness	Base width	Distal stem width	Stem Thickness	Figure
N0/E0 (n=2)	Ensor-like -	Florence-A chert	39.8	31.1	38.7	31.1	6.5	23.3	21.1	5.7	13a
	Triangular blade-stemmed	Foraker chert	-	17.8	-	-	7.2	-	12.1	-	13b
N0/E1 (n=2)	Slightly expanding square-stemmed	Florence-A chert	-	-	-	-	-	15.9	13.7	5.7	13c
	Indeterminate	Tahlequah chert	23	-	20.3	-	4	-	-	-	13d
N1/E0 (n=6)	Small corner-notched	Florence-A chert	31.8	25.6	31.8	25.6	4.7	16.8	12.1	3.1	13e
	Ensor-like	Florence-A chert	-	25.2	-	-	6.2	-	28.9	4.3	13f
	Large side-notched	Florence-A chert	38.5	25.1	37.5	25.1	7.4	-	17.7	5.9	13g
	Slightly contracting square-stemmed	Tahlequah chert	32.4	26	30.7	-	7.8	-	16.7	6.4	13h
	Indeterminate	Florence-A chert	-	18.2	-	-	4.9	-	-	-	13i
	Concave base	Oolagah chert	-	-	-	-	5.3	23.8	-	-	13j
N0/E2 (n=2)	Large side-notched	Wreford chert	-	-	-	-	5	-	-	-	13k
	Indeterminate	Keokuk	-	-	-	-	5	15.9	-	-	13*l*

Table 4. Metric Attributes of Projectile Points from Central Block (measurements in mm).

N0/E0-B. Example N0/E0-B (Figure 13b) has a triangular blade and slightly expanding straight-edged stem and resembles points described as Yarbrough to some extent. The point, manufactured of Foraker chert, was shaped into its present state using steep, broad expanding flaking that was fairly shallow. Flaking is directed perpendicular to the long axis of the point and terminates at or near the middle of each face producing a medial ridge and "diamond" cross-section. Workmanship is somewhat crude, but this could be due to raw material constraints.

The base is missing. The remaining haft element is slightly expanding, relatively narrow, and thick. The point is shouldered but one of the shoulders is missing. No diagnostic evidence of refurbishing was noticed, although the steep flaking on the blade, the narrowness of the blade, and the sinuous edges (from flaking) could be due to refurbishing and not initial manufacture.

Large Side-Notched (N=2). Two points were recovered that fit into this category. Both exhibit wide, shallow notches. Other attributes are obscured or have been heavily modified from use and reuse.

N1/E0-C. Example N1/E0-C (Figure 13g) is heavily resharpened and retipped point. The point has a thick slightly expanding haft. The base is slightly concave. Basal thinning was accomplished with shallow, steep thinning flakes. Notches are shallow and very broad.

The point exhibits evidence for extensive refurbishing. The blade had been repointed almost to a needle-like tip. Blade retouch consists of a series of non-intrusive, steep flaking which resulted in a bi-beveled edge that is slightly concave in outline. The point might have had pronounced shoulders but both are broken. The haft appears to have had lobes but both ears have been broken.

N0/E2-A. Example N0/E2-A (Figure 13k) is a fragment of the haft element. The haft snapped off the blade and was also snapped in half. The point may have originally had an expanding haft but the ear is broken so it is difficult to discern. Base shape is indeterminate but was possibly convex. The present notch is wide and shallow, creating the look of a square shouldered point.

Small Corner-notched (N=1). Represented by one specimen, N1/E0-A (Figure 13e), this point is a small corner-notched dart point resembling types associated with the Plains Woodland period. The point is relatively thin, symmetrical, and well-made. Flaking on the blade is in a "chevron" pattern. Secondary retouch on one face consists of broad, parallel, serial flaking with deep negative bulbar scars producing a nearly serrated edge.

The haft area exhibits flat, wide flaking that was probably part of the initial biface thinning, with smaller, non-intrusive flaking used to shape the haft. Basal thinning was accomplished via steep, non-intrusive flaking (beveling) on one face and larger, shallow thinning flakes on the other face. The barbs are long and narrow with rounded ends. Notches are long and relatively narrow. The haft is expanding with sharp edges.

Macroscopic evidence for use was not observed. The secondary retouch mentioned above may well be from a refurbishing episode, but this is not obviously the case.

Concave base (N=1). Represented by one fragmentary specimen, N1/E0-H (Figure 13j), this point is not typical of the rest of the assemblage. Only the proximal portion of the haft remains. It is wide and thin (see Table 4) and exhibits a shallow concavity (approximately 1.4 mm deep). The ears flare out slightly. Considering the fragmentary nature of the specimen, it is difficult to place in any typological category. In some respects, it resembles some Paleoindian types (such as Dalton), but lacks lateral or base grinding.

Indeterminate (N=3). This category represents those specimens that are too fragmentary to be securely placed in any specific category.

N0/E1-E. Example N0/E1-E (Figure 13d) is a small medial fragment of a projectile point made out of Tahlequah chert. The point was likely an arrow point. One lateral edge shows evidence of serration. The point is broken on both the proximal and distal ends. Other signs of use are not evident.

N1/E0-G. Example N1/E0-G (Figure 13i) is the blade element of a projectile point. Flaking is somewhat irregular and might be due to refurbishing, but there is no clear evidence for such. The blade is long and thin and sub-triangular. Flaking terminates mostly near the middle of each face creating a medial ridge. No clear macroscopic evidence for specific use or refurbishing is obvious but the irregular flaking is likely evidence of both.

N0/E2-B. Example N0/E2-B (Figure 13*l*) is a fragment of the haft of a projectile point. Only the extreme proximal portion of the haft is present. The haft had a flat base and slightly contracting sides. Flaking has damaged the base as well.

Bifaces (N=20). Bifaces that were recovered are varied in their characteristics (Figure 14; Table 5). The majority of bifaces have been thermally altered, many of which appear to have been intentionally heat treated. Many of the pieces are small fragments making it difficult to discern much about their use, stage of reduction, or other pertinent data.

All bifaces were broken or fragments, therefore maximum length measurements were not taken on any specimens. Some of the thicker specimens appear to be failed preforms. Two of the specimens, N0E1-B and C, may well be fragments of projectile points but it is difficult to discern. N0E1-A is a medial fragment of a thick biface with steep flaking along one edge. The flaking is large and irregular with deep bulbar scars, producing projections. This might represent intentional retouch for use as a tool, but given the fragmentary condition of the specimen, it is difficult to discern whether the piece was modified for use as a tool or whether the flaking pattern was simply part of the reduction process.

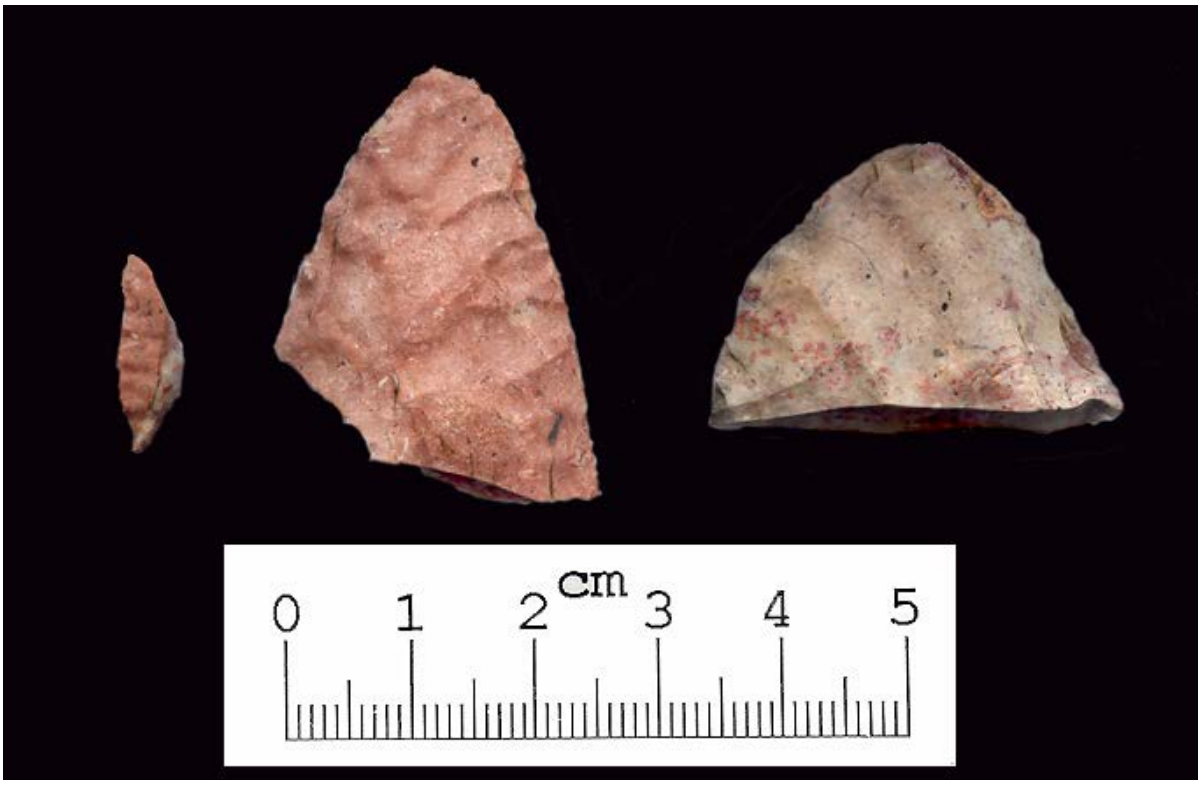


Figure 14. Selected examples of fragmentary bifaces from 34WN27, from left to right specimens from North, Central and South Blocks

Test Unit	Raw Material	Element	Heated	Width	Thickness
N0/E0 (n=4)	Florence-A chert	Distal	Y	24.9	5.8
	Wreford chert	Distal	Y	31.9	7.5
	Wreford chert	Distal	N	-	6.3
	Florence-A chert	Distal	N	41.3	10
N0/E (n=6)	Florence-A chert	Medial	Y	28.2	10.2
	Tahlequah	Medial	N	9.4	2.2
	Florence-A chert	Medial	Y	10.3	2.3
	Florence-A chert	Distal	Y	35.3	5.8
	Florence-A chert	Distal	Y	-	5.8
	Wreford chert	Distal	N	-	5.5
N0/E2 (n=2)	Florence-A chert	Distal	Y	-	-
	Florence-A chert	Longitudinal split	Y	-	-
N1/E0 (n=5)	Florence-A chert	Longitudinal split	Y	-	-
	Florence-A chert	Medial	N	-	8.5
	Wreford chert	Medial	Y	-	8.6
	Florence-A chert	Medial	Y	23.8	7.1
	Oolagah	Longitudinal split	Y	-	6

Table 5. Attributes of Bifaces from Central Block.

Drill (N=1). This specimen (Figure 15) is made out of Florence-A chert and may be a recycled projectile point. The haft has flaring ears and is slightly expanding – similar to some projectile points at the site. The piece has been completely reworked, however. It has a long tapering bit that is alternately beveled. The bevels converge at the tip. The "bit" exhibits multiple stacked microflake scars with step/hinge terminations and dulled edges indicating use on resistant or hard material(s).

The artifact has been thermally altered but this does not appear to have been purposeful heat treatment. Rather, the piece is blackened and this discoloration occurs on top of the final flaking sequences. This suggests that the piece was burned after it was discarded. The measurements (mm) for this example are as follows: length=41.5; blade width=10; maximum width=20.3; thickness=6.5.

Figure 15. Stone drills recovered from 34WN27, specimen on the left is from the Central Block, the drill base on the right is from the North Block

Edge modified and utilized flakes (N=13). A number of modified flakes were recovered from the Central block (Table 6). Modified flakes are defined here as those exhibiting consistently applied secondary retouch typical of shaping or refurbishing of an edge. Utilized flakes are those that exhibit clear signs of use in the form of microflaking but no clear signs of shaping/refurbishing. One example of the latter was recovered from N0/E0 during excavations.

Most of the modified flakes were made on Florence-A chert, with a few examples of Oolagah and Ozarks cherts as well. Fragments comprise 61.5 percent of the sample (often medial fragments). The breaks on these pieces interrupt the retouch indicating that breakage occurred after initial shaping and perhaps subsequent to discard.

Most of the pieces exhibit retouch on only one edge (or at least on one of the remaining edges). A few have retouch on multiple edges. Retouch consists predominantly of non-invasive flaking creating steep edges. Only three specimens exhibit acute working edge angles. The flaking in the latter cases was also non-invasive.

Test Unit	Class	Length	Width	Thickness	Modified Edges
N0/E0	Utilized flake	-	-	-	-
N0/E1	Modified flake	15.8	18.1	1.5	5,6
	Modified flake	14.3	15.2	1.5	3,4
	Modified flake	20.1	19.5	2.5	1,2
	Modified flake	-	16.0	1.5	3,4,7,8
	Modified flake	21.3	18.1	3.6	3-8
N0/E2	Modified flake	26.2	20.3	6.9	6-8
	Modified flake	-	20.9	-	2.3
N1/E0	Modified flake	-	16.8	2.1	3,4
	Modified flake	-	13.3	1.2	1,2
	Modified flake	-	-	2.7	7,8
	Modified flake	41.8	28.3	4.3	3-7
S1/E1	Modified flake	-	14.7	3	3,4

Table 6. Metric Attributes of Modified Flakes from the Central Block

Unifacial tools (N=1). This flake tool was made on a flake blank that was retouched on multiple edges. Retouch consists of large, steep flaking with deep bulbar scars producing a denticulate edge. Use-wear consists of stacked microflaking with step/hinge terminations. The microflaking is indicative of use on resistant medium or hard materials. Measurements are as follows (mm): length=42.1; width=18.1; thickness=3.4. Most of the edges are retouched (quadrants 3-8).

Cores (N=2). Two small core fragments were recovered (Table 7). Both are made of heat treated Florence-A chert. Both specimens exhibit multidirectional flaking.

Test Unit	Length	Width	Thickness
N0/E2	17.5	15.4	8.2
S1/E1	18.2	14.7	9.6

Table 7. Metric Attributes of Cores from Central Block (measurements in mm).

Debitage (N=2147). The waste flakes are predominantly made out of Florence-A chert (79 percent) with small samples of Keokuk, Foraker, Wreford, Tahlequah, and Oolagah. The majority of the flakes have been heat treated (67 percent), and almost all (94 percent) have no dorsal cortex cover (85 percent). Almost all of the flakes are broken (85 percent) and small (.5-1.75 cm in maximum dimension), 52 percent being 1-1.75 cm in maximum dimension.

Of the flakes with intact platforms, only about 9 percent show evidence for preparation in the form of abrasion and isolation. Most of the platforms are faceted, the next most numerous are plain platforms and crushed platforms. A small percentage of flakes have edge-collapsed platforms. The vast majority of flakes exhibit evidence of bending initiations (75 percent).

Hematite (N=6). Several hematite nodules were recovered during excavations. They are generally small (15 mm x 8 mm x 2.7 mm on average). One specimen has a smoothed, faceted face with small, fine striae running perpendicular to the long axis of the specimen (Figure 16). The smoothed face is heavily ground to the point of appearing polished. The other examples do not exhibit clear macroscopic evidence for use.

Historic Aged Artifacts

Plastic knob (N=1). A broken white plastic knob was recovered in the Central Block. Possibly a cabinet handle, it appears to be recent debris.

Rusted metal fragment (N=1). A piece of rusted metal was recovered. The object that it was derived from could not be identified.

Brown bottle glass (N=1). A small fragment of brown bottle glass was recovered. No distinguishing features are preserved on the fragment.

Lavender glass (N=1). One fragment of lavender glass was recovered. It is flat and has no distinguishing marks or features.

Clear glass (N=1). One clear fragment of glass was recovered. No distinguishing marks or features were observed.

Wire nail (N=1). One rusted wire nail was recovered.

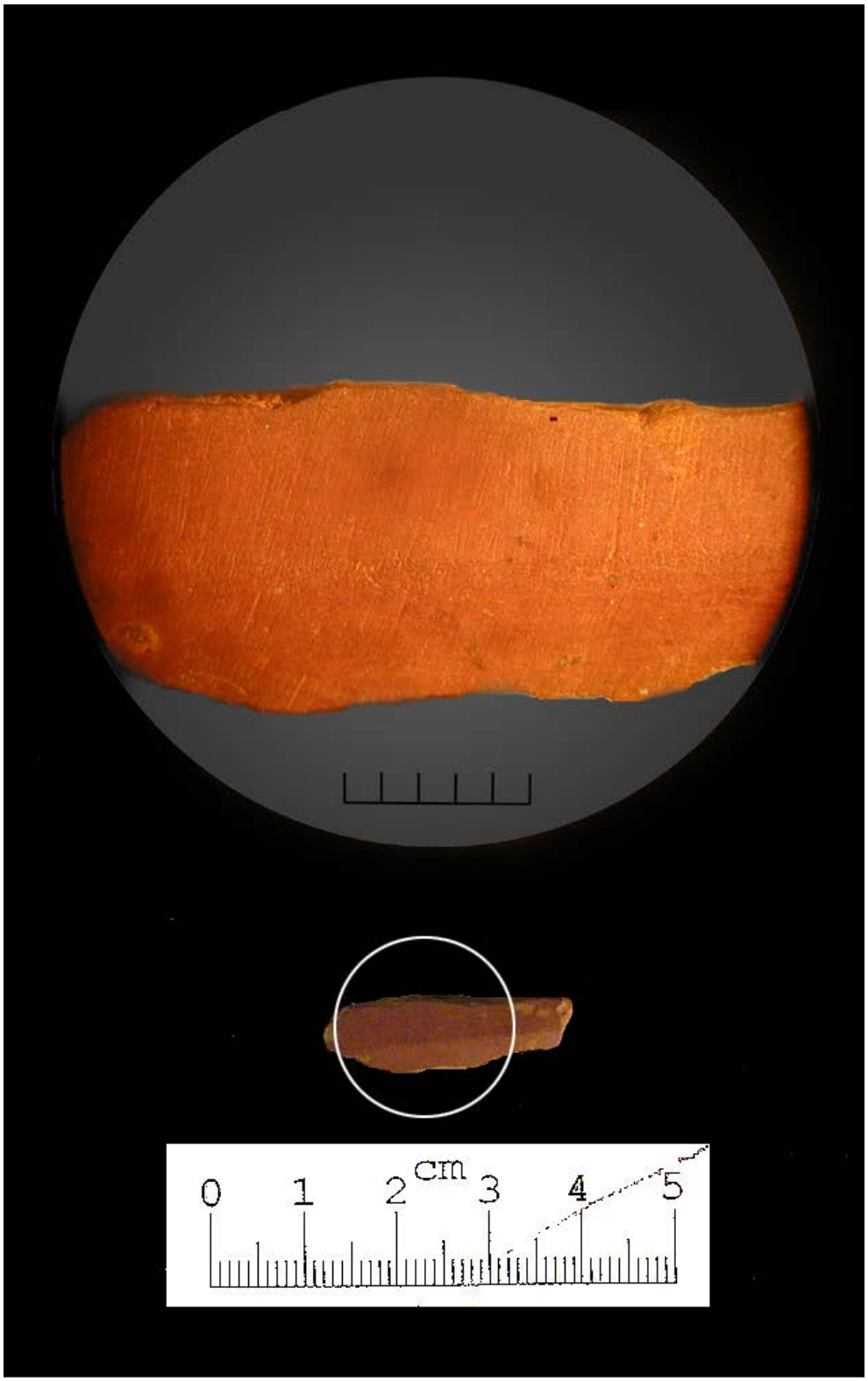


Figure 16. Modified piece of hematite View is of highly polished surface. Top view is detail of modified surface, note striae (upper scale is mm).

Excavated Artifacts from South Block

Generally, artifact distributions drop dramatically in the South block relative to the Central block. They are, however, more dense than the North block. The rock layer extended into the South block, but similar to the North Block, thinned out as one moved away from the Central block.

Lithic Artifacts

A total of 471 lithic artifacts were recovered from excavations in the South block. These include one projectile point fragment, two bifaces, two modified flakes, one scraper, one core fragment, and 464 pieces of debitage.

Projectile Point (N=1). The extreme distal tip of a projectile point was recovered during excavations. Typological or morphological description is impossible given the fragmentary nature. It is made of Florence-A chert.

Biface (N=2). Two biface fragments were recovered from the South block. Both are distal portions. Table 8 lists attributes of the bifaces. All bifaces were broken or fragments; therefore maximum length measurements were not taken on any specimens.

Raw Material	Heated	Width	Thickness
Florence A	Y	-	3.7
Keokuk	N	29.5	9.2

Table 8. Attributes of Bifaces from the South Block (measurements in mm).

Core Fragment (N=1). One medium sized blocky multidirectional core fragment (38.5mm x 24.4 mm x 17.2 mm) was recovered from the South block. The core appears to be heavily damaged by thermal shock. Large, irregular spalls pock the surface. They do not have the typical appearance of potlids, but spalling from thermal shock is the most parsimonious explanation for these features.

Scraper (N=1). A fragment of a scraper made of Oolagah chert was recovered from unit S4E0. Part of the working edge is intact and was formed by steep unifacial flaking. Maximum dimensions are as follows: length=26 mm; width=12 mm; thickness=7 mm.

Edge modified flakes (N=1). One modified flake was recovered from the South block. It is a platform-bearing flake with steep, non-invasive retouch on all edges except the proximal end. The flake is relatively small and thin: length= 21.3mm; width=18.1mm; thickness=3.4mm.

Historic-Aged Artifacts

As with the other areas of the site, historic/recent artifacts were found primarily in the upper 20 cm plow zone levels at the site.

Metal Fragment (N=1). One rusted fragment of metal was recovered from the South block. The type of artifact it derived from could not be determined.

Aquamarine Glass Fragment (N=1). Small fragment of glass, source could not be determined (likely bottle glass).

Wire Nail (N=1). One rusted wire nail was recovered.

Faunal Remains

Bone fragments (N=2). Two fragments of bone were recovered from level 2 in unit S4E0. The two pieces refit. The specimen is identified as medium sized mammal bone, species undetermined. As with the bone fragments in the North block, the association between these remains and the archeological artifacts is unclear due to the context in which they were discovered (i.e., upper plow zone).

Additional Analyses

The following analyses entail more detailed studies of the recovered lithic debitage.

Debitage Analysis

The lithic waste flakes from 34WN27 were analyzed using a system of 13 different variables. The variables include some commonly recorded flake attributes, such as flake size, completeness, platform type and so forth. See Appendix A for a complete list of the variables recorded during analysis. The object of the study was to identify the reduction trajectories carried out at 34WN27. As such, the variables were chosen with this goal in mind based on previous studies.

As the analysis progressed some of the variables exhibited remarkably little deviation throughout the sample. This is somewhat surprising given the long span of occupation at the site. One might expect on-site activities to vary through time and affect the archeological signature of the site. On the other hand, the results conform to expectations based on previous research in the area. Similar sites have been identified as special task sites associated with hunting and retooling activities (Vehik and Pailes 1979). The debitage from 34WN27 indicates similar activities took place at this site.

General patterns that apply to the entire assemblage are as follows. More than half of the assemblage (52 percent) is composed of flakes that are between 1 cm and 1.75 cm in maximum dimension. Nearly the entire assemblage (85 percent) is composed of flakes that are between .5 cm and 1.75 cm in maximum dimension. The vast majority of the assemblage (80 percent) is composed of flakes made on Florence-A chert, and most flakes (67 percent) have been thermally altered. A very small percentage (6 percent) exhibit cortex.

Raw Material

Raw material utilized at the site is almost entirely Florence-A chert. Florence-A is a variety of Flint Hills chert that outcrops approximately 70 km to the west of the study area in Kay County (Figure 17). The vast majority of the Florence-A sample (78.7 percent) has been thermally altered, most likely the result of heat treatment. Some specimens, however, exhibited indications of thermal shock which might be due to post-depositional processes and not a part of the reduction strategy.

Wreford and Foraker, two other varieties of Flint Hills cherts that are found west of the study area, comprise 7.2 percent of the sample combined. Unlike the Florence-A chert, the majority of flakes made of Wreford and Foraker do not show evidence for thermal alteration. A behavioral explanation for this is not readily apparent. The flintknapping qualities of Florence-A improve markedly with heat treatment, and the same could be said for Foraker and Wreford. It is not clear why there would be a preference for heat treating one material over another.

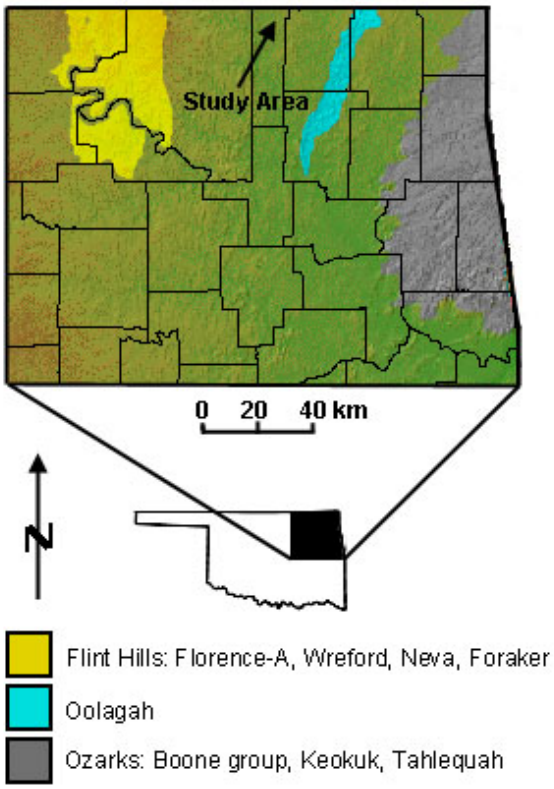


Figure 17. Map showing geological distribution of chert bearing formations near the study area. Tool stone from all three sources appear at 34WN27.

The next most frequent type of material is Keokuk chert comprising 5.9 percent of the sample. Keokuk is a variety of chert originating in Boone Group rocks of the Ozark Uplift. The nearest outcrops of Boone cherts occur approximately 75 km east of the study area. Only 16.5 percent of the sample shows evidence for thermal alteration. Tahlequah chert, another variety of Ozark silicate, makes up about 1 percent of the sample. Of this, less than 20 percent shows evidence for thermal alteration. The low percentage of thermally altered Ozarks chert debitage suggests that heat treating was not a part of the reduction strategy for this raw material.

Oolagah chert, which outcrops approximately 40 km to the east of the study area, accounts for about 3.8 percent of the debitage sample. The relative paucity of this Oolagah might appear counterintuitive given the proximity of the raw material. However, Oolagah chert is generally a lower quality material than the Flint Hills or the Ozarks cherts. Quartzite and siltstone,

possibly from the Webber Falls area, make up less than 1 percent of the sample. Neither show any signs of being thermally altered.

A variety of cherts that could not identified to source were also encountered in the sample. The most likely source for these materials are local fluvial gravels. Previous studies have identified locally occurring Cenozoic gravels as a source of tool stone for prehistoric inhabitants of the area (Kay 1981; Reid and Artz 1984). It is likely that the flakes in this category represent the use of these local gravel sources. This is supported by the fact that 3 percent or less of other raw material types have specimens with cortex, yet more than 25 percent of flakes made out of local gravels exhibit dorsal cortex cover. The implication is that local gravels were brought into the site unmodified (or with little prior reduction), while non-local stone had been extensively modified before being brought to the site.

Whole Assemblage Analysis: MSRT

The Modified Sullivan-Rosen typology (or MSRT; after Prentiss 1998, 2001) was used to analyze the debitage assemblage as a unit. As the name implies, it is a modified version of the analytical method introduced by Sullivan and Rosen (1985). The Sullivan-Rosen typology (SRT) was formulated as a method to measure variation in lithic debitage assemblages based on the differential completeness of flakes. The original formulation only looked at flake completeness as it might apply to identifying core versus tool production at archeological sites (Sullivan and Rosen 1985). Since its introduction into the field of lithic analysis, the SRT has undergone multiple tests and repeated criticism. In particular, researchers found that the typology could not account for variation due to raw material, size sorting, trampling, and flake culling (see Prentiss 2001 for a review).

Recently, Prentiss (2001) proposed a revised method using the same basic principles, but adding flake size as an additional variable. He found that this new technique (what he termed the MSRT) more accurately predicted variation in experimentally produced debitage assemblages. More specifically, core versus tool (or biface) reduction resulted in distinctive assemblage patterns that can be successfully sorted out using the MSRT (Prentiss 1998, 2001). The MSRT was chosen for this analysis because its application and interpretation are straightforward.

Any debitage analysis, though, should pursue a number of different lines of evidence as part of an effort to increase the accuracy of the results and quality of data (Carr and Bradbury 2001:146). To this end, in addition to the general application of the MSRT, more detailed treatments of observations will be undertaken below. The end result is a comprehensive and, hopefully, more accurate depiction of lithic reduction activities that occurred at 34WN27 in the past.

The size of each flake was recorded during analysis according to standardized size classes numbered 1 to 6 (see Table 9). These correspond to Prentiss' size classes as follows: 1-3 = "small"; 4-5 = "medium"; 6 = "large". Completeness was recorded in terms of the flake portion represented by the specimen. In general, the method of flake portion classification used here follows Andrefsky (1998:87-88). Complete flakes exhibit an intact platform and distal termination; proximal flakes have an intact platform but no distal end; medial flakes are

missing both proximal (platform) and distal (termination) portions; distal flakes are missing the platform; longitudinally split flakes lack one lateral edge; blocky debris lacks defined, single exterior and interior faces, as well as platform and termination.

According to Prentiss' model, core reduction should result in higher frequencies of "larger, complete, proximal and split flakes, in addition to medium medial-distal and nonorientable fragments and small nonorientable fragments" (Prentiss 2001:171). Bifacial tool reduction, on the other hand, should result in higher frequencies of "small, medial-distal and proximal fragments and very few to no nonorientable fragments" (Prentiss 2001:171). Additionally, Prentiss's experimental samples produced during biface reduction produced over 80 percent small flakes of which most are medial, distal, or proximal fragments (approximately 64 percent of the total samples; see Prentiss 1998).

As Table 9 shows, the debitage assemblage from 34WN27 contains a high number of small medial, distal, and proximal flakes (73.2 percent). A low percentage of complete flakes are also present (16 percent), almost all of which fall into Prentiss' small category. A *very* small percentage (1.7 percent) of the sample is comprised of blocky debris (equivalent in this analysis to Prentiss' "nonorientable" category). The assemblage, therefore, conforms almost precisely to the model's prediction for debitage produced by bifacial tool production.

Size Class

	1		2		3		4		5		6		Total
Element	#	%	#	%	#	%	#	%	#	%	#	%	%
CO	2	0.0	87	4.1	174	8.1	57	2.7	22	1.0	1	<0.1	16.0
DB	0	0.0	9	0.4	23	1.1	5	0.2	0	0.0	0	0.0	1.7
DS	0	0.0	52	2.4	69	3.2	24	1.1	9	0.4	0	0.0	7.2
LS	0	0.0	2	0.1	10	0.5	3	0.1	1	0.0*	1	0.0*	0.9
ME	1	0.0	355	16.5	503	23.4	85	4.0	7	0.3	0	0.0	44.3
PR	0	0.0	223	10.4	347	16.2	64	3.0	7	0.3	0	0.0	29.9
***Percentage is less than 0.01.** **See Appendix A; Table A-1 for descriptions of codes and size classes.**													100

Table 9. Frequencies of Debitage Types by Size Class.

It should be noted here that the analysis does not presuppose, nor is it meant to imply, that only bifacial tool production occurred at the site. At any site where occupation occurred and was not associated with a specialized task, we can expect both formal and informal tool production and use. Indeed, the recovered artifacts at the site attest to this expectation. Numerous unifacial flake tools and modified flakes were recovered during excavations. Nonetheless, the evidence strongly suggests that bifacial tool production was the primary reduction trajectory at 34WN27.

Debitage Attribute Analysis

The results of the mass analysis discussed in the previous section indicated that biface reduction formed a significant part of the stone tool making activities carried out at 34WN27. We can also examine specific attributes of debitage specimens to explore this hypothesis further. Replication studies have shown that patterned frequencies of particular debitage attributes occur in assemblages produced by different reduction strategies (for examples see Andrefsky 2001).

The type of platform present on a flake can often give us clues about the reduction strategy involved in producing the flake. For example, cortical flakes (those covered in cortex) and "plain" platforms (those without flake scars) are more frequent among waste flakes removed early in the reduction process. They are also more likely to be present in high quantities in assemblages where core reduction was predominant (Andrefsky 1998). On the other hand, biface reduction, particularly during later stages, tends to produce more flakes with faceted platforms. Furthermore, cortex cover is considerably reduced and often absent in flakes produced during bifacial reduction, particularly in latter stages.

Furthermore, certain types of fracture initiation types are more likely to occur under different reduction strategies. Hertzian initiations are more common in core reduction where the percussor is used on a relatively flat platform and away from the exterior edge of the platform. Bending initiations, alternatively, are produced when fracture forces initiate away from the percussor, usually as a result of load application occuring on or very near the exterior edge of the platform (Cotterel and Kamminga 1987; Whitaker 1994). This typically occurs with a soft percussor but can also occur with hard percussors when exterior edge angles are small (Cotterel and Kamminga 1987:688-689). In either case, bending initiations are expected to occur more frequently during biface reduction. Additionally, flakes from biface reduction frequently have faceted platforms and sometimes exhibit "collapsed edges" (called edge-collapsed flakes or ECFs). ECFs occur when a bending initiation occurs well beyond the edge of the objective piece, thus removing a good portion of the initiation face (cf. Whittaker 1994:190). The amount of the initiation face removed in these cases is well beyond that normally removed via bending initiations. These flakes are distinctive and easily identified in an assemblage. ECFs typically are errors resulting from misplacement of the blow delivered by the percusor and/or insufficient platform preparation before flake removal.

An example of applying this attribute based approach to samples produced from replicated biface and core reduction can be found in Carr and Bradbury (2001). Carr and Bradbury (2001) demonstrated that the percent of flakes with faceted platforms is inversely proportional to the percentage of biface production represented in an assemblage. In general, experimental assemblages resulting from reduction episodes comprised of 60 percent or more biface production exhibited more than 60 percent faceted platforms.

Slightly less than half (48 percent) of the waste flakes from 34WN27 retain platforms. The majority of these (63 percent) have faceted or edge collapsed platforms, fewer than 20 percent have plain (or cortical unfaceted) platforms. A chi-square goodness-of-fit test indicates that these frequencies are significantly different from those expected due to random sorting or sampling error (X^2 = 2700.69; df =5; p <<.001). Finally, more than 75 percent of the sample

exhibits evidence for bending initiations. These results conform to the expectations derived from Carr and Bradbury's model for assemblages dominated by debris from biface reduction and lend further support to the notion that biface reduction was the primary technological activity carried out at 34WN27.

Technological Analysis

We can take the analysis a step further by examining how particular flake characteristics co-vary. As Carr and Bradbury (2001) note, it is best to look at multiple characteristics during analysis. Moreover, it has been shown that debitage samples can be effectively sorted into flake types indicative of particular reduction strategies (i.e., bipolar, biface, prepared core, etc.). This is referred to as technological analysis.

The most common types of technological analyses are attempts to identify bifacial or bipolar technology (Andrefsky 1998:118-120). In this case, we will focus on testing further the hypothesis that bifacial reduction (Figure 18) was the primary technological activity undertaken at 34WN27. To this end, the debitage was sorted according to characteristics that can be used to identify biface thinning flakes (BTFs). Furthermore, diagnostic flake types indicative of final stage projectile point production were identified during the analysis.

Based on previous research, we expect BTFs, on average, to have all or most of the following characteristics: curved longitudinal cross-sections, faceted platforms, little to no dorsal cortex cover, and a "lip" as a result of being removed via a bending initiation (Andrefsky 1998:118; Frison 1968:149-150; Root 1992:83). This analysis focuses on platform bearing flakes because these retain two key criteria for this analysis: platform morphology and fracture initiation type.

The majority of platform bearing flakes (60 percent) can be classified as BTFs. More than a third of these conform to all four criteria listed above. The other flakes vary in terms of longitudinal cross-section (being flat rather than curved), or having crushed platforms. An additional 122 flakes exhibit most characteristics of BTFs but retain unfaceted platforms. If this sub-sample is added to the count of BTFs, fully 75 percent of platform bearing flakes can be classified as BTFs.

Final stages of projectile point production are evident at 34WN27 in the form of notching flakes. A total of five notching flakes were observed during analysis. Notching flakes are a readily recognizable by-product of the final stages of notched point production (Towner and Warburton 1990). This type of flake often retains remnants of previous notch flake removals in the form of an incipient notch at the proximal end and a deep negative bulbar scar on the dorsal surface. Likewise, the flake itself exhibits a pronounced bulb of force and distinctive short, wide crescentic outline. In cross-section or side-view, the flakes exhibit a distinctive "gull-wing" shape due to these characteristics. Three examples are made out of heat treated Florence-A chert (Figure 20). The view illustrated is from top to bottom: ventral, proximal, dorsal.

The presence of these flakes is direct evidence that projectile point retooling occurred at 34WN27 which further supports to the notion that bifacial tool reduction was a major activity carried out at the site.

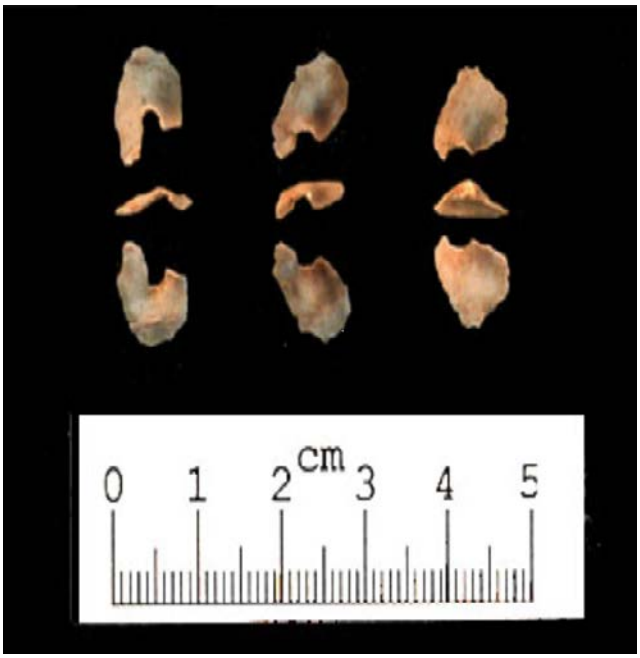


Figure 18. Examples of notching flakes recovered during excavations at 34WN27.

Debitage Analysis Summary

General characteristics of the debitage assemblage from 34WN27 are indicative of two kinds of raw material use. The majority of flake debris is indicative of being produced from already reduced pieces undergoing further modification at the site. This part of the assemblage is also predominately comprised of non-local raw material. Local chert gravels were utilized to a lesser extent and brought in "raw" and reduced at the site as indicated by the local gravel chert flakes with cortex cover.

Results of the MSRT analysis strongly suggest that bifacial reduction was the primary lithic technological activity carried out at the site. This is supported by the abundance of biface thinning flakes in the assemblage. Several notching flakes were also identified during analysis. Notching flakes are direct evidence that the final steps of projectile point manufacture occurred at the site.

Together, these lines of evidence indicate that 34WN27 was used as a retooling locality in addition to a habitation site where biface blanks were brought in and reduced further into formal tools. This evidence fits well with the pattern seen from other sites similar to 34WN27 in the area. Vehik and Pailes (1979) interpreted similar sites in the area as being indicative of short-term occupations related to hunting and perhaps exploitation of seasonally available plant resources. We can expect that part of the activities carried out at these special task camps would be the production and maintenance of hunting gear.

This interpretation also accords well with the fact that bifaces were one of the most abundant artifact classes recovered during excavation. The bifaces from the site are broken and likely represent manufacturing failures discarded at the site. A few are pieces of bifacial tools and were probably discarded and replaced with tools made at the site. A similar pattern is seen for

the points at the site. They are generally broken or fragmentary, and several show signs of heavy reworking before discard. The evidence indicates that projectile point slugs were discarded and replaced with newly manufactured points at 34WN27.

Summary of Investigations at 34WN27

The investigations of 34WN27 entailed multiple hand excavated test units and controlled machine trenching within the Area of Potential Effect (APE) for the bridge replacement project over Cotton Creek. The study documented a prehistoric burned rock midden on the site comprised of a dense layer of burned sandstone occurring from about 25-30 to 50 cm below the surface. The midden was thickest at its center and became thinner to the north, south and east. A radiocarbon date obtained from soil humates collected from soil just below the feature produced a date of 2590 +/- 40 B.P. While not directly dating the midden or cultural deposits on the site, the date provides a reasonable date to postulate that the rock midden formation began after this date. Based on the artifacts recovered from the deposits overlying the feature, as well as those recovered from the midden, it appears that a Late Archaic to Early Woodland occupation resulted in the midden feature. The nearby site 34WN104, located on Cotton Creek west of 34WN27, contains a sequence of dated hearth features spanning much of the Late Archaic period, including Feature 3, a rock oven that dates within 10 years of the soil date obtained from 34WN27.

The cultural deposits overlying the burned rock feature contain artifacts typical of Late Archaic and Woodland occupations within the mixed context of the plow zone. While no typical Late Prehistoric artifacts were found during the investigation within the APE, the original site recorder, A. H. Rohn of Wichita State University, documented the presence of Fresno type arrow points and Cowley plain pottery on the site, indicating a Late Prehistoric component as well (the one grit tempered sherd recovered by this investigation likely predates the Late Prehistoric). Other than the burned rock feature, no other prehistoric features were found in the APE and the mixing of deposits overlying the rock midden limits the useful information that can be derived from the deposits. The areas north and south of the midden contained mixed deposits as well, however in less frequency than the deposits in the Central excavation block. While the area of the site investigated does not contain the deposits that merit NRHP eligibility, the investigation at 34WN27 does provide some further insight into prehistoric occupations in the area. The site documents a Late Archaic and/or Early Woodland occupation on Cotton Creek, which in combination with other known sites such as nearby 34WN104, suggests temporary, though possibly frequent, occupations during this time.

The burned rock midden on the site indicates specific activities were occurring at the site, activities common to many of the sites along Cotton Creek and Little Caney River which also contain large burned rock features. Archeological investigations at most of these sites have failed to encounter associated features or organic remains which may shed light on the activities generating the quantity of burned rock. The recovery of ground stone tools used for plant processing have been recovered from most of the middens and the well preserved rock oven feature at 34WN104 lends credence to the use of heated sandstone in food preparations. However, the lack of plant and faunal remains at the sites limits understanding of what foods might have been processed.

One activity documented at 34WN27, as well as many other sites in the area, is the apparent grinding of hematite as evidenced by grinding slabs exhibiting hematite residue and pieces of hematite exhibiting striations from grinding. The activities for which the ground hematite in the Little Caney River drainage was employed is speculative, but hematite is known to be used as paint pigment and in hide processing, and occurs in ritual contexts as well.

Stone tool production and refurbishment is another apparent activity occurring at 34WN27. Many of the hafted stone tools recovered by the investigation exhibit extensive reworking and appear to have been discarded at the end of their use life. The lithic analysis conducted by this study supports the production of bifacial stone tools at the site, however, based on the fact most of the lithic debitage is small and very few flakes exhibit cortex, the material from which they were produced appears to have been initially reduced to the form of bifaces prior to being brought to 34WN27. The lithic assemblage is dominated by Florence-A chert, sources of which are found some 70 km west of the site. Most is heat treated as well. Previous research has documented the same pattern of lithic use, particularly during the Archaic time period (Reid and Artz 1984:83). While some Woodland and Late Prehistoric sites in the area contain a similar pattern of lithic material use, others contain cherts derived from the Ozark Plateau comprising around 50 percent of the recovered lithic material (Reid and Artz 1984:83).

Previous researchers of archeological sites in the area comprising the Little Caney River and Cotton Creek drainage suggest that the prehistoric sites in the region represent seasonal occupations focused on specialized activities. It appears that the activities may have become more focused on hunting in the Late Prehistoric (Reid and Artz 1984). The lack of evidence for permanent structures and low occurrence of pottery on sites, especially those of Late Woodland and Late Prehistoric age, are factors indicating seasonal use rather than permanent occupations. The archeological evidence gleaned from 34WN27 does not contradict this hypothesis. However, archeological exploration of the area should continue. The location of the Little Caney River is roughly between lithic sources in the Flint Hills of the Southern Plains and the abundant chert formations of the Ozark Plateau, and chert from both locations occurs in the archeological record of the Little Caney River. The location is also roughly between the Arkansas River and the Neosho River along the boundary of the Osage Savanna and tallgrass prairie. Both rivers offer abundant, though different, flora and fauna resources. The sites along the Little Caney River may have been seasonally occupied by groups traversing the region or groups from Southern Plains and Eastern Woodlands using the same area.

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Appendix A: Methodology for Analyzing Lithic Debitage

Modified Flakes and Flake Tools

Stone tools and modified flakes were analyzed using standard techniques by recording metric attributes, raw material, and utilized edges. Artifacts were sorted by artifact class according to a generalized typology. Tools that exhibited formal shaping were included in appropriate categories (e.g., scraper, adze, etc.). Flakes that exhibited unifacially modified edges (to change the angle of or refurbish the edge) but no formal shaping were designated unifaces. Flakes that were modified from use but that do not exhibit formal shaping were designated modified flakes.

Maximum dimension measurements (length, width, thickness) were taken on each artifact. Measurements were not taken on broken artifacts as appropriate. For example, a tool with a lateral break that removed the distal end would not have a maximum length dimension recorded, but maximum width and thickness would be recorded.

Utilized edges were recorded using a standardized circular template divided into eight sections (Figure A-1). Tools were oriented with the proximal (i.e., platform bearing) end toward the top if discernible. If it was not possible to discern which end was proximal, the tools were oriented by aligning the longest axis of the tool with middle axis of the template (from 12:00 to 6:00). This method provides a standardized, objective way to describe the utilized edges of tools that is straightforward and easily replicable.

Bifaces and Bifacial Tools

Bifacially flaked implements were recorded using a simple typology and attribute recording system. The typology is a straightforward classificatory system used to distinguish between classes of finsihed bifacial tools and unfinised biface blanks (cf.Andrefsky 1998). Unfinished bifaces are designated simply “biface” or “biface fragment” if the specimen was a small broken portion of a biface. Formal bifacial tools at the site were assigned to a general category, such as “drill/perforator”, and then typological placement was conducted when feasible. A suite of metric attributes were also recorded on projectile points. Figure 21 illustrates these measurements. Some measurements could not be taken on all specimens depending on the condition of the point (for example, base width on points where the haft element was missing). In addition to these variables nominal attributes were also recorded including raw material, evidence for thermal alteration, and any evidence of reworking. Metric observations recorded on other bifaces included standard maximum dimension variables (length, width, thickness).

Debitage

A suite of variables were utilized to analyze the debitage assemblage from 34WN27 (Table A-1). These variables were used in mass, attribute and technological analyses to discern the lithic reduction activities carried out at the site.

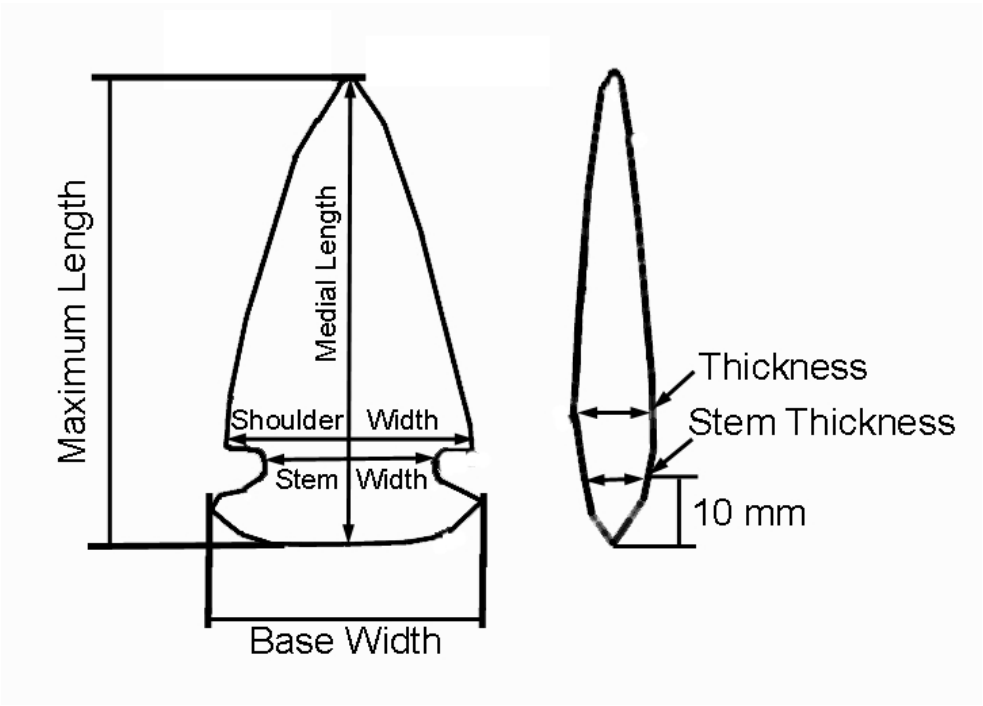

Figure A-1. Measurements recorded on projectile points.

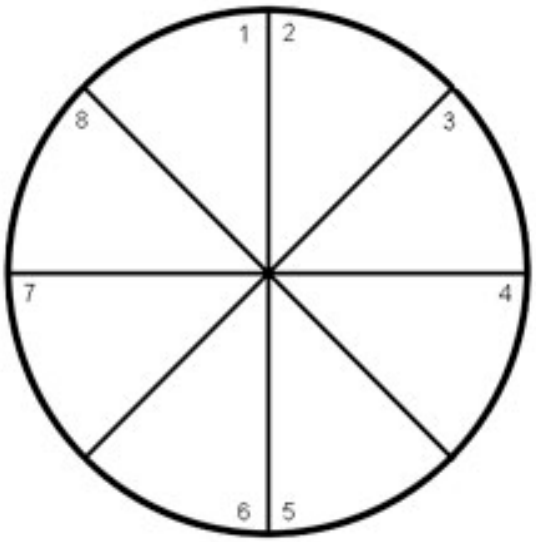

Figure A-2. **Template used for analyzing utilized edges of modified flakes and flake tools. Numbers in each section refer to the corresponding section of the tool where edge modification occurred.**

Variable	Description
Size Class	1 0.5 through 1.0 2 1.0 through 1.75 3 1.75 through 2.5 4 2.5 through 4.0 5 4.0 through 5.5 6 greater than 5.5
Element	CO=complete PR=proximal DS=distal ME=medial DB=angular/blocky debris
Platform	PL=plain CR=cortical FC=faceted CS=crushed EC=edge collapse
Initiation	HZ=hertzian BN=bending WG=wedge
Termination	FT=feather ST=step HG=hinge OS=overshot UN=indeterminate

Variable	Description
Dorsal Cortex coverage	0 <50% >50% 100%
Dorsal flake scar orientation	1-8 (number[s] of section based on circular template, Figure A-2)
Morphology	General: expanding, parallel, convergent, irregular Longitudinal cross-section: flat, curved, convex
Raw Material	FA = Florence-A WR= Wreford FO=Foraker OG=Oolagah KE=Keokuk TA=Tahlequah SL=siltstone QT=quartzite UN=source indeterminate

Table A-1. Variables Utilized in Mass Analysis.

Appendix B: Provenience of Excavated Artifacts from 34WN27

Test Unit	Level	Debitage	Core	Uniface	Modified flake	Biface	Drill/ Perforator	Point	Ground stone	Fauna	Charcoal – Carbonized Plants	Ochre	Historic
N24E0	1	1	-	-	-	-	-	-	-	-	-	-	-
	2	3	-	-	-	-	-	-	-	-	-	-	-
	3	3	-	-	-	-	-	-	-	-	-	-	-
N22E0	1	-	-	-	-	-	-	-	-	-	-	-	1
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	1	-	-	-	-	-	-	-	-	-	-	-
N20E0	1	2	-	-	-	-	-	-	-	-	-	-	5
	2	4	-	-	-	-	-	-	-	-	-	-	2
	3	7	-	-	-	1	-	-	-	-	-	-	-
	4	9	-	-	-	1	1	-	-	-	+ *	-	-
	5	3	-	-	-	-	1	-	-	-	-	-	-
N18E0	1	1	-	-	-	-	-	-	-	-	-	-	-
	2	1	-	-	-	-	-	-	-	-	-	-	1
	3	1	-	-	-	-	-	-	-	-	-	-	1
	4	1	-	-	-	-	-	-	-	-	-	-	-
N16E0	1	4	-	-	-	-	-	-	-	-	-	-	-
	2	4	-	-	-	-	-	-	-	-	-	-	1
	3	9	-	-	-	-	-	-	-	-	-	-	1
N14E0	1	2	-	-	-	-	-	-	-	-	-	-	-
	2	1	-	-	-	-	-	-	-	-	-	-	-
	3	15	-	-	-	-	-	-	-	-	-	-	-
N14E2	1	3	-	-	-	-	-	-	-	-	-	-	1
	2	14	-	-	-	-	-	-	-	-	-	-	1
	3	8	-	-	-	-	-	-	-	-	-	-	-
	4	3	-	-	-	-	-	-	-	-	-	-	-
N14E4	1	3	-	-	-	-	-	-	-	-	-	-	-
	2	10	-	-	-	-	-	-	-	-	-	-	-
	3	13	-	-	-	-	-	-	-	-	-	-	-
N12E0	1	7	-	-	-	-	-	-	-	-	-	-	-
	2	2	-	-	-	-	-	-	-	-	-	-	-
	3	5	-	-	-	-	-	-	-	-	-	-	-
	4	6	-	-	-	-	-	-	-	-	-	-	-
N11E2	1	10	-	-	-	-	-	-	-	-	-	-	-
	2	19	-	-	-	-	-	-	-	-	-	-	-

Test Unit	Level	Debitage	Core	Uniface	Modified flake	Biface	Drill/ Perforator	Point	Ground stone	Fauna	Charcoal – Carbonized Plants	Ochre	Historic
	3	15	-	-	-	-	-	-	-	-	-	-	-
N7E0	1	37	-	-	-	1	-	-	-	-	-	-	-
	2	67	-	-	-	-	-	-	-	-	-	-	-
	3	55	-	-	-	1	1	-	-	-	-	-	-
	4	76	-	-	1	3	-	-	-	-	-	-	-
	5	33	-	-	-	-	-	-	-	-	-	-	-
N0E0	1	47	-	-	-	-	-	1	-	-	-	-	1
	2	95	-	-	-	3	-	-	-	-	-	-	-
	3	119	-	-	-	-	-	-	-	-	-	-	-
	4	65	-	-	-	-	-	1	-	-	-	-	-
	5	40	-	-	-	-	-	-	1	-	-	-	-
	6	51	-	-	-	1	-	-	-	-	-	-	-
N0E1	1	40	-	-	-	-	-	1	-	-	-	-	1
	2	141	-	-	-	-	-	-	-	-	-	-	3
	3	143	-	-	3	2	-	1	-	-	-	-	-
	4	92	-	-	1	3	-	-	-	-	-	-	-
	5	36	-	-	-	1	-	-	-	-	-	-	-
	6	16	-	-	-	1	-	-	-	-	-	-	-
N0E2	1	71	-	-	1	1	-	1	-	-	-	-	-
	2	119	-	-	-	-	-	-	-	-	-	-	-
	3	110	-	-	-	-	-	1	-	-	-	-	-
	4	48	-	-	-	-	-	-	-	-	-	-	-
	5	39	-	-	-	1	-	-	-	-	-	-	-
	6	61	-	-	-	-	-	-	-	-	-	-	-
	7	11	1	-	-	-	-	-	-	-	-	-	-
N0E3	1	74	-	-	-	-	-	-	-	-	-	-	-
	2	125	-	-	-	1	1	1	-	-	-	-	-
	3	78	-	-	-	-	-	-	-	-	-	-	-
N1E0	1	66	-	-	-	1	-	1	-	-	-	-	-
	2	124	-	-	-	1	-	1	-	-	-	-	2
	3	171	-	-	-	1	-	2	-	-	-	-	-
	4	53	-	-	-	1	-	2	-	-	-	-	-
	5	28	-	-	-	1	-	1	-	-	-	-	-
	6	21	-	-	-	-	-	-	-	-	-	-	-
S1E1	1	22	-	-	1	1	-	-	-	-	-	-	-
	2	58	-	-	-	1	-	-	-	-	-	-	-

Test Unit	Level	Debitage	Core	Uniface	Modified flake	Biface	Drill/ Perforator	Point	Ground stone	Fauna	Charcoal – Carbonized Plants	Ochre	Historic
	3	63	1	1	-	-	-	-	-	-	-	-	-
	4	28	-	-	1	-	-	-	-	-	-	-	-
S1E2	1	28	-	-	-	-	-	-	-	-	-	-	-
	2	37	-	-	-	-	-	-	-	-	-	-	-
	3	41	-	-	-	-	-	-	-	-	-	-	-
	4	27	-	-	-	1	-	-	-	-	-	-	-
	5	17	-	-	-	-	-	-	3	-	-	-	1
	6	11	-	-	-	-	1	-	-	-	-	-	1
S4E0	1	32	-	-	1	-	-	-	-	-	-	-	-
	2	126	-	-	-	-	-	-	1	2	6	-	1
	3	51	-	-	-	-	-	-	-	-	1	-	-
	4	40	-	1	-	-	-	-	-	-	-	-	-
	5	7	-	-	1	-	-	-	-	-	-	-	-
S12E0	1	15	-	-	-	-	-	-	-	-	-	-	-
	2	14	-	-	-	-	-	-	-	-	-	-	-
	3	5	-	-	-	-	-	-	-	-	-	-	-
	4	1	-	-	-	-	-	-	-	-	-	-	-
S16W1	1	45	-	-	-	1	-	1	-	-	-	-	-
	2	37	-	-	-	-	-	1	-	-	-	-	1
	3	18	1	-	-	-	-	-	-	-	-	-	1
	4	6	-	-	-	-	-	-	-	-	-	-	-
	5	3	-	-	-	-	-	-	-	-	-	-	-
	6	1	-	-	-	-	-	-	-	-	-	-	-
	7	2	-	-	-	-	-	-	-	-	-	-	-

* + indicates presence data, exact count not applicable.