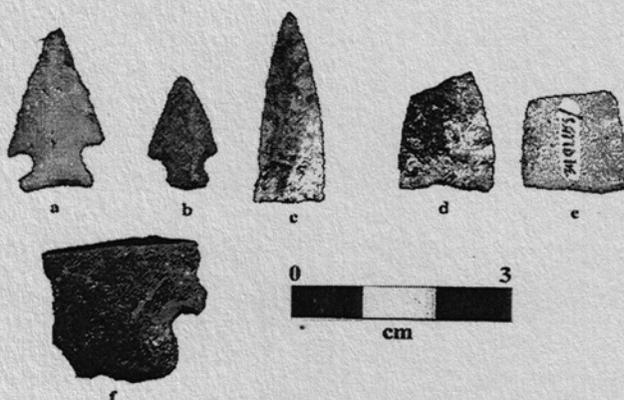


ARCHAEOLOGICAL INVESTIGATIONS OF THREE SITES IN BLAINE COUNTY, OKLAHOMA

Prehistoric Occupations in the Western Cross Timbers

34BL102, 34BL103 and 34BL104

by
Robert Bartlett
with contributions by
Valli Powell



**Excavations Conducted on SH51A
Project STP-6B(170-172)**

Oklahoma Department of Transportation
Environmental Studies Branch, Planning Division
200 NE 21st Street
Oklahoma City, Oklahoma

Reports in Highway Archaeology, Number 15
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Acknowledgments

The investigations reported herein are the result of the interest, support, and assistance of numerous individuals and agencies. If not for Mr. Jesse Ballenger's curiosity regarding gravel deposits exposed during construction of State Highway 51A, probably none of the sites described in this report would have been recorded and studied. Thanks to the Robison family, who permitted limited test excavations on their property adjacent to SH-51A, much more was learned about 34BL103 than would have been possible within the narrow and disturbed highway right-of-way. Personnel from ODOT's Enid Residency, particularly Mr. Wade Mason, Mr. Neil Rogers, and Mr. David Cross, were very helpful in coordinating construction activities to assist the archaeological excavations and suggesting appropriate methods to protect exposed portions of 34BL103 in the right-of-way once the investigations were completed. Assistance within the Department's central office was provided by Planning Division Engineer Mr. Terry McFall, Assistant Planning Division Engineer Mr. David Streb, and Environmental Studies Branch Manager Mr. Kyle McKinley. Mr. Robert Bartlett of the Oklahoma Highway Archaeological Survey Program directed all field and laboratory operations and is the principal author of this report, with contributions by Ms. Valli S. Powell. Mr. Bartlett was assisted in the field by Mr. Gary Edington, and field crew members included Mr. David Engle, Mr. Chris Cook, Mr. Bob Stokes, and Mr. Brian Gilley.

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I. Introduction

In June of 1997, an archaeological investigation of three sites located on SH 51A was conducted by the Oklahoma Archaeological Survey Program. The sites were uncovered during construction related to highway improvements as part of Project STP-6B(170-172). The project was initially surveyed in February of 1994 as part of Section 106 procedures. No evidence of the sites was observed at this time. The sites were discovered after Mr. Jesse Ballenger reported finding archaeological materials in a fresh road cut on the west side of SH51A to the Oklahoma Highway Archaeological Survey on May 23, 1997. The location, was visited by Highway Archaeologists Robert Bartlett and Lynita Langley-Ware and Oklahoma Department of Transportation (ODOT) Archaeologist John Hartley on

May 27, 1997. This visit resulted in the observation of a light scatter of lithic debitage and faunal materials in the area reported by Mr. Ballenger. In addition, two other areas containing prehistoric cultural materials were identified in close proximity to first site. The sites are designated 34BL102, 34BL103 and 34BL104. At this point construction activity in the areas was halted pending further investigation. All the sites had been disturbed by road cut operations and exhibited scatters of lithic artifacts on exposed surfaces. The scatters observed on 34BL102, west of SH 51A and 34BL104, north of the canyon were sparse. However, at 34BL103 east of SH 51A, a large amount of lithic material and some faunal material was observed along the exposed road cut. In addition there were indications of at least one buried soil observable in the road cut.

Figure 1. Location of archaeological sites uncovered during SH51A improvements.

Additional work including subsurface testing, was conducted on all sites from June 10-20, 1997 to determine if archaeological deposits eligible for the National Register of Historic Places (NRHP) were present on the sites. The testing revealed that 34BL102 and 34BL104 do not have deposits within the right-of-way (R/W) which would merit inclusion of either site in the NRHP. Testing on 34BL103 revealed the site to have two prehistoric components, including a buried soil containing prehistoric archaeological material. The site also contains a historic component. The prehistoric components include a Woodland and late prehistoric or early protohistoric occupation. Based on the findings of the investigation, it appears that 34BL103 retains archaeological deposits containing useful information

regarding prehistoric occupations in this portion of west-central Oklahoma and is potentially eligible for the NRHP under Criteria D.

Upon completion of this investigation, no further archaeological work was recommended on 34BL102 and 34BL104 and construction was allowed to continue in these areas as planned. However, since 34BL103 was found to contain potentially significant deposits, further recommendations were made regarding completion of construction in this area involving installation of a vegetative cover on the road cut. Rather than the planned tilling and sodding, it was proposed by the Enid Residency that the area be lightly top-dressed and mulch sodded. This method would minimize disturbance to the remaining deposits .

II. PROJECT BACKGROUND

Environmental Setting

Physiography

The sites occur along the narrow Cimarron Gypsum Hills geomorphic province (Curtis and Ham 1972). These hills trend from eastern Harper County southeast across Woodward, Major and Blaine Counties before ending in northern Canadian County. They form a physiographic boundary between the Central Redbed Plains of central Oklahoma and the Western Sandstone Hills in western Oklahoma (Curtis and Ham 1972).

The Cimarron Gypsum Hills rise as a steep escarpment formed by resistant layers of gypsum and dolomite within the Permian aged Blaine Formation (Fay 1962). Known as the Blaine escarpment, the abrupt line of hills, ridges and buttes rise anywhere from 30 to 75 m above the surrounding floodplain (Figure 2). The southeast trending escarpment is about 1670 feet amsl in the northern portion of Blaine County and about 1480 feet amsl in the southern portion of the county (Fay 1962:13). The escarpment generally faces the Cimarron River and several tributary streams head in the escarpment cutting deep canyons through the Blaine Formation and the underlying Dog Creek Shale Formation (Fay 1962).

In the study area, the Permian deposits are directly overlain with Quaternary sand and gravel deposits. Where these deposits meet the eroded Permian beds, unique hydrologic and vegetational conditions are created.

Hydrology

The study area occurs on a divide between two major river systems, the Cimarron and North Canadian Rivers. The sites are situated at the head of a canyon on a tributary of Salt Creek which flows into the Cimarron River about 35 km northeast of the site location (Figure 2). However, the North Canadian River occurs about 7 km west of the site area and its drainage begins about 1.5 km west of the site. In addition, the Canadian River lies about 35 km west of the site area.

All the rivers flow southeastward across the region. The Cimarron River occurs at an elevation about 150 m lower than that of the North Canadian and Canadian Rivers. This is due to the Cimarron river cutting down through less resistant rock while the North Canadian

and Canadian flow over more resistant rock in the region (Fay 1962:13). These factors have also resulted in the Cimarron carving a much wider valley through this region than either of the other two rivers. The ridges dividing the North Canadian watershed from the Cimarron to the east and the Canadian to the west are capped with Quaternary terrace deposits consisting of sand and gravel as well as scattered deposits of volcanic ash (Fay 1962:94). Along the divide between the North Canadian and Cimarron drainages the terrace deposits overlay the Permian aged Blaine Formation. The gravel and sand deposits serve as an aquifer and discharge water in springs located along the edge of the Blaine escarpment (Fay 1962:95). Water wells in these terrace deposits yield 25 to 150 gallons per minute (Morton 1980). The water is fresh where discharge is directly from the terrace aquifer. Just west of the sites, springs (which local landowners report has never been known to run dry) discharge from this aquifer into the canyon. Through this portion of Blaine County several springs discharge where the base of the terrace deposits meet the underlying Permian deposits as the canyons steadily erode westward into the escarpment. Water seeping through the Blaine Formation prior to discharge in springs contains a heavy load of salts. Several springs are reported in Salt Creek Canyon and those below 1300 amsl in elevation contain high levels of chloride (Ferring et al. 1976:84-85).

Salt Creek is a major tributary stream of the Cimarron River and carries water from several spring fed, lateral streams. The creek is appropriately named, as a salt flat (the Ferguson Salt Plain) occurs along the stream east of the site area (Morton 1980). The remains of small scale salt works dating to the early 20th century have been found on the salt flat (Ferring et al. 1976). The main southern branch of Salt Creek begins at the head of Ruby Mill Canyon near the site locations. The discharge from springs at the head of and along this canyon supply water to the stream flowing through the base of the canyon.

Other water resources in the vicinity include several small ephemeral lakes or ponds occurring on the same terrace deposits discussed above (Figure 2). These lakes are fed by run-off and possibly seepage from the aquifer. Some of the lakes hold water much of the year and attract waterfowl. In places, dunes occur around these lakes. Several of the lakes occur 2 to 4 km south of the site area (Fay 1962; Morton 1980).

Figure 2. Major geologic divisions and hydrologic features in the vicinity of the project area (adapted from Morton 1980).

Soils

The project area occurs in a region containing two distinct soil associations, the Shellbarger-Nobscot-Pratt association and the Vernon-Lucien association (Fisher 1968). The soils of the Shellbarger-Nobscot-Pratt association are generally deep, sandy soils formed on weathered sandy, upland terrace deposits of Pleistocene age. The Vernon-Lucien association consists of thin soils developed on weathered Permian red beds and sandstones.

All three sites discussed here occur on the sandy soils of the Shellebarger-Nobscot-Pratt association. Site 34BL103 occurs on soils mapped as Pratt which formed under a cover of tall grasses (Fisher 1968). The typical profile of this soil consists of an A1 horizon of up to 25 cm of gray brown to dark brown loamy fine sand and a 20 cm thick B2 horizon on dark brown to yellow brown fine sandy loam underlain by loamy fine sand or sand. Sites 34BL102 and 34BL104 occur on soils mapped as sandy broken land. The soil appears to be somewhat eroded Nobscot soil which formed under cover of mixed oak timber and some grasses (Fisher 1968). The soil typically displays an A horizon of up to 50 cm of gray brown to yellow brown fine sand over about 10 cm of B horizon composed of yellow-red sandy loam underlain by yellow red loamy sand.

Vegetation

The project area is situated within the Osage Savanna biotic district (Blair and Hubbell 1938; Duck and Fletcher 1943). The district is composed of a combination of mixed oak timber and open tall and mixed grass prairie and covers much of central Oklahoma (Figure 3). The area, referred to as the Cross Timbers, comprise an ecotone between the open grasslands of the Southern Plains and the forests of the Southeastern woodlands. The mixed oak forest occurs mostly on upland settings and consists of varying proportions of blackjack oak (*Quercus marilandica*) and post oak (*Q. stellata*) with an under story of dwarf sumac (*Rhus copallina*), coral berry (*Symphoricarpos orbiculatus*) and bluejoint grass (*Andropogon furcatus*) (Blair and Hubbell 1938:434). Although its distribution has been facilitated by modern disturbances, eastern red cedar (*Juniperis virginianus*) is abundant in some areas. This plant association is common in central

Oklahoma on high-terrace deposits dominated by sand such as the area investigated in this report (Rhodes 1980) and occurs on terrace deposits along the north side of the Cimarron, North Canadian and Canadian Rivers extending as "fingers" into areas of western Oklahoma (Duck and Fletcher 1943). These particular areas extend the Cross Timbers into areas dominated by prairie resources.

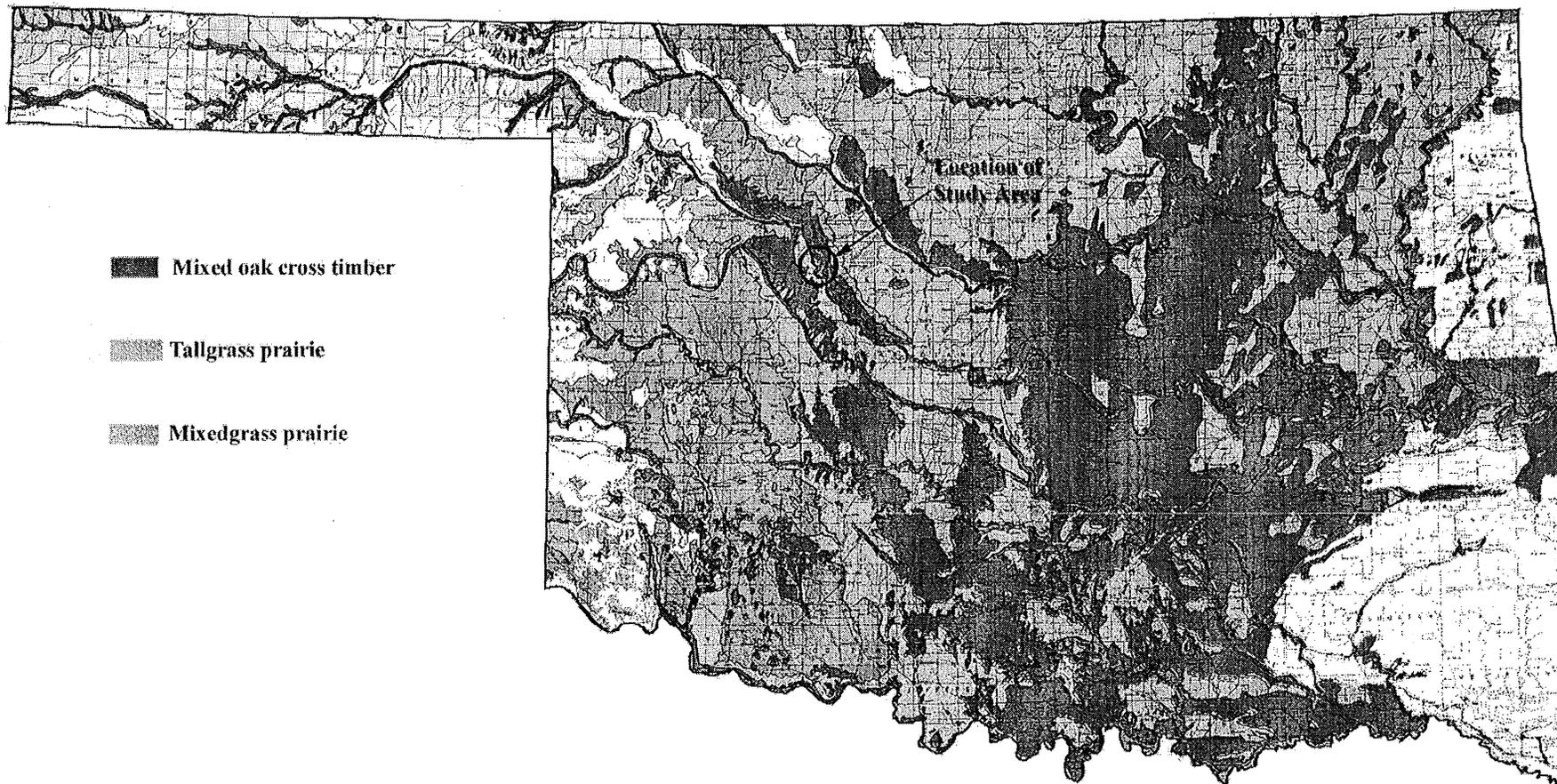
The prairie grasslands are dominated by associations of bluestem grass (*Andropogon* sp.), grama grasses (*Bouteloua* sp) and buffalo grass (*Buchloe* sp.). Other common plants include liatris (*Liatris punctata*), sunflowers (*Helianthus* sp.), aster (*Aster* sp.), yucca (*Yucca* sp.) and prickly pear cactus (*Opuntia* sp.).

Floodplain forest also occurs along the major streams in the area. The forest is composed of elm (*Ulmus* sp.), hackberry (*Celtis* sp.), cottonwood (*Populus deltoides*) and willow (*Salix* sp.) .

The distribution and occurrence of forest and grassland over the Osage Savanna is influenced by several factors including soils, exposures, slopes, geology and climatic conditions (Blair and Hubbell 1938; Rhodes 1980; Wyckoff 1984:3). In addition, the Osage Savanna is sensitive to climatic fluctuations and its makeup and areal extent have been variable through time (Wyckoff 1984:17-20). Thus, the Osage Savanna has offered a diverse and variable range of flora resources over central Oklahoma through time.

Faunal

The floral diversity of the Osage Savanna is known historically to have supported an equally diverse variety of fauna, many of which are no longer extant in the area (Blair and Hubbell 1938:448-450; Wyckoff 1984:13). Large mammals such as bison (*Bison bison*), whitetail deer (*Odocoileus virginianus*), antelope (*Antilocarpa americana*), black bear (*Ursus americanus*) and elk (*Cervus canadensis*) were historically known from the region. Medium size animals such as bobcat (*Lynx rufus*), coyote (*Canis latrans*), wolf (*Canis lupus*) and beaver (*Castor canadensis*) were also common as well as species of smaller animals such as rabbit (*Sylvilagus* sp.), squirrel (*Sciurus* sp.), raccoon (*Procyon lotor*), turkey (*Meleagris gallapavo*) and turtle (*Terrapene* sp.).



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Figure 3. Vegetation map of Oklahoma showing location of Project Area (Adapted from Duck and Fletcher 1943).

Cultural Background

Little is known of the prehistory of this particular region of what is now Oklahoma. Most of the following discussion is based on information drawn from other nearby areas where prehistoric cultures are better understood.

Pre-Clovis

Prehistoric occupations in North America are known to extend back to the Late Pleistocene between 11,000 and 12,000 years ago. During this time distinctive fluted bifaces known as Clovis points are the hallmarks of a wide spread cultural complex. Occupations prior to this time are a matter of debate among archaeologist. The recent acceptance of radiometric dates from the Monte Verde site in southern Chile confirming occupation of the site around 12,500 years ago (Meltzer et al. 1997) certainly raises the question of pre-Clovis occupations in North America.

About 100 km north of the Blaine County sites, work at the Burnham site has resulted in intriguing finds concerning Pleistocene occupations on the Southern Plains (Wyckoff and Carter 1994; Wyckoff et al. 1990). Although final analysis and interpretation are not yet complete, the recovery of lithic artifacts in association with an extinct form of large horned bison within a deposit producing radiometric dates from 25,000-35,000 years ago is intriguing. Further evidence of possible Pre-Clovis peoples comes from the Cooperton site in southwest Oklahoma where evidence suggests human activity in association with a mammoth dated to about 16,000 BP (Anderson 1975).

Paleoindian

Hard evidence for people occupying the southern plains beginning about 11,500 years ago is apparent from several sites in the region. It is thought that highly mobile groups were engaged in hunting and gathering at this time throughout much of the Plains until about 9,000 years ago. This time frame witnessed the onset of the Holocene and the environmental changes and faunal extinctions associated with the melting of glaciers and increase in grasslands.

Paleoindian adaptations on the prairies of western Oklahoma are not well known. The Clovis and Folsom complexes are the two earliest Paleoindian groups identified by archaeologists. Based on the findings at sites such as Domebo, Waugh and Cooper, the hunting of large mammals, including late Pleistocene fauna, is one documented facet of their adaptation (Bement

1997; Hill and Hofman 1997; Leonhardy 1966a). Among the earliest radiometrically dated (11,000 BP) archaeological sites of this time in Oklahoma is the Domebo site in Caddo County about 110 km south of the project area where Clovis bifaces and flake tools were recovered in association with mammoth remains (Leonhardy 1966a). Although no Clovis sites are documented in Blaine County, two Clovis points are reported from the county (Hofman and Wyckoff 1991).

Folsom occupations in western Oklahoma are manifest at two bison kill sites in Harper county. The Waugh and Cooper sites attest to Folsom hunters trapping bison in gullies and dispatching them with darts or spears tipped with the distinctive fluted Folsom points (Bement 1997; Hill and Hofman 1997). Hofman (1993:74,87) documents six Folsom artifacts from near the Canadian River in the southwestern corner of Blaine County about 45 km south of the project location and four from a site in Kingfisher County about 55 km east of the project area.

Late Paleoindian manifestations in western Oklahoma are poorly understood. Several lanceolate styles of Paleoindian bifaces are common throughout the region, 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 site in southwest Oklahoma has produced Late Paleoindian style lanceolate bifaces similar to those from the Plainview site in association with at least two bison (Hofman and Todd 1997; Saunders and Penman 1979). It appears that hunting of large mammals remained an important aspect of adaptation throughout the Paleoindian period.

Archaic

Archaic adaptations in western Oklahoma span a vast time frame from about 9,000 to around 2,000 years ago and very little is known from most of the period. The lack of information has hampered definition of phases or complexes in this area of the southern Plains. However, the time frame is often discussed in terms of Early, Middle and Late Archaic. Paleoenvironmental evidence suggests a general decrease in moisture occurred over the southern Plains until about 4,000 BP when conditions similar to present began to dominate (Wyckoff 1984:19).

The Early Archaic period likely witnessed the continuation of hunting and gathering adaptations. The mixture and variability of traits observed on many

lanceolate bifaces from western and central Oklahoma may indicate a continuation of Late Paleoindian technologies into Early Archaic times. Early Archaic occupations are evident at the Gore Pit site in southwest Oklahoma (Hammatt 1976). Here, several burned rock features as well as a burial dated to 7,100 BP were found deeply buried in a terrace. Although not directly associated with any features, several corner-notched bifaces were also found. Other material from the site suggest a wide variety of resources including mussels, small mammals and plants were utilized by the site's occupants.

Middle Archaic cultures in the region are poorly known. Recent study and compilation of Calf Creek materials from several sites in Oklahoma indicate a Middle Archaic cultural horizon from the Ozark Plateau across the prairie Plains occurred around 6,000 to 5,000 BP (Wyckoff 1995). Preliminary studies suggest that a well developed lithic technology including the production of large, thin basally-notched bifaces is one trait of the horizon. Subsistence information is scanty but it appears that bison hunting was a part of an adaptive strategy during this time (Spivey et al. 1994).

Late Archaic sites are known in the region although, few have provided radiometric dates. The Summers site in southwest Oklahoma produced a date of about 2,770 BP (Leonhardy 1966b). Several stone tools were recovered from the site including corner-notched bifaces, knives, scrapers, pulping planes, Clear Fork gouges and grinding stones. Bison remains were also present at the site. The Certain site in western Oklahoma contains multiple bison bone beds possibly representing several kill episodes dating to around 1,400 BP (Buehler 1997). Corner-notched projectile points recovered from the bone beds compare well with those recovered from similar sites in the Texas Panhandle (ibid). Bison seem to have remained an important resource for some groups on the southern plains through the Late Archaic.

Plains Woodland

Like the Archaic period, evidence pertaining to Plains Woodland adaptations on the mixed grass prairie is scanty and defining of phases or complexes has yet to be accomplished. However, radiometric dates and associated assemblages available from sites in north central and northeast Oklahoma provide some information regarding Woodland adaptations in the tall grass prairie and Cross Timbers (Vehik 1984). Materials recovered from these sites indicate that the production and use of pottery as well as the bow and

arrow began during this time. Hunting of deer and small game played an important role in subsistence as well the gathering and processing of plants. Most Woodland assemblages date from 2000 to 1000 years ago.

Woodland sites on the plains of western Oklahoma are few and little substantial information is available. Sites relating to plains Woodland occupations are known on the Dempsey Divide in Roger Mills County (Thurmond 1991; Thurmond et al. 1998). The Beaver Dam site (34RM208) contains a Woodland component producing corner-notched arrow and dart points as well as some cordmarked pottery possibly dating to A. D. 430 to 630 (Thurmond 1991:120). The Swift Horse site, situated in a canyon setting near the Dempsey Divide also produced a Woodland assemblage. The site, radiometric dated to around A.D. 250 to 450, produced corner-notched dart points, an arrow point, cordmarked pottery and unifacial stone tools (Briscoe 1987). Faunal remains recovered from the site include bison, antelope and deer as well as smaller animals such as rabbit, turtle and bird. It has been postulated that the site may relate to the Lake Creek Focus in the Texas Panhandle (Hofman and Brooks 1989). Closer to the project area, diagnostic artifacts typical of Woodland occupations including corner-notched arrow points and stemmed bifaces have been recovered from sites near Salt Creek (Ferring et al. 1976:88-113).

Late Prehistoric

The emergence of Plains Village societies began about 1,200 to 1,100 years ago. Sites from this period often contain evidence of houses, storage pits and burials. Horticulture practices including growing corn, beans and other domesticates such as marshelder begin to assume a major role in subsistence. In central Oklahoma two major phases, the Paoli and Washita River phases have been identified (Drass 1997). In western Oklahoma, the Custer and Turkey phases are roughly contemporaneous with the Paoli and Washita River phases (Drass 1997). Due to the proximity of the Blaine County sites to Custer and Turkey phase sites, those two phases will be discussed in this section. In addition, the Zimms complex, another Late Prehistoric manifestation in western Oklahoma is discussed.

Custer Phase Custer phase sites are concentrated in an area southwest of Blaine County within the Washita River drainage basin. The Custer phase was initially defined as the Custer foci by Bell and Baerrieis (1951) and Brighton (1951) after analysis of several sites along the Washita River in Custer county. These early Plains

Village sites were subsumed under the Custer phase by Hofman (1978, 1984a) and defined as a cultural manifestation centered along the Washita River in western and central Oklahoma dating from AD 800 to 1150. The artifact and subsistence evidence suggest an *in situ* development of Custer phase from local Woodland adaptations (Hofman 1984a). The Custer Phase is further proposed as the precursor to the later Turkey Creek phase (Drass 1997).

Custer phase sites include small villages and special activity camps. Hearths and various pits are common, however, only one house (at the Mouse site 34CU25) has been excavated. This rectangular house contained a central hearth although no interior post was identified. Artifact assemblages include: fossiliferous shale, grit and caliche tempered cordmarked, smoothed over cordmarked, and a minor amount of smooth surface pottery, arrow points which are mostly triangular corner-notched and side-notched (some unnotched occur), small end and pointed scrapers, manos, metates and abraders. In addition, bison tibia digging stick tips, deer antler flakers, deer bone shaft wrenches, bone beads and mussel shell discs are often found on Custer phase sites. Subsistence includes hunting of deer, bison and small game, gathering of wild plants including cheno-ams, sunflower, walnut and various grasses and horticulture entailing corn and probably beans and squash (Drass and Moore 1987).

Radiometric dated sites representing Custer phase occupations are few and include the Lindville (34RN492), Mouse (34CU25) and Edwards II (34BK44) sites. Radiometric dates from these indicate occupations from about AD 900 to around AD 1265 (Drass and Swenson 1986).

Turkey Creek Phase Later radiometric dated Plains Village sites attributed to the Turkey Creek phase include Goodman I (34CU1), McLemore (34WA5), McLemore II (34WA44) and Heerwald (34CU27). Radiometric dates from these sites indicate occupation from around AD 1300-1450 (Drass 1997). Pit features as well as houses are common at these later sites. More abundant evidence of houses has been noted on these sites when compared to that of Custer phase sites. Houses are square to rectangular with two to four interior support posts, interior pits and central hearths. Chipped stone assemblages witness an increase in side-notched and unnotched arrow points, the latter being most common. Smooth or plain surface pottery is more frequent than cordmarked. An increase in the manufacture of bone tools associated with agriculture

occurs. Bison scapula hoes which are rarely found on Custer phase sites increase dramatically on later Plains Village sites. Faunal evidence suggests an increase in bison hunting over that of deer.

Zimms Complex The Zimms complex is defined after work at the Zimms site (34RM72). The remains of a house structure exhibiting architectural similarities to those of the Antelope Creek phase was excavated (Flynn 1984;1986). The material assemblage including shell and limestone tempered smooth and plain surfaced pottery closely resembles assemblages from Turkey Creek phase sites. Based on radiometric and archeomagnetic dates obtained from the Zimms structure, Flynn (1984:287) suggests an occupation of around A.D. 1370 to 1450. Salvage excavations at the nearby New Smith Site (34RM400) resulted in the recovery of three burials and the identification of 10 trash filled pits and 2 structures (Brooks *et al.* 1992). The structures appear to be of light construction (no central support posts and few outside posts) and they, as well as the pits are interpreted as relating to mortuary practices. However, the features could also be the result of seasonal occupation or activities. Radiometric dates from the New Smith site suggest occupation from around A.D. 1220 to 1330 (Brooks *et al.* 1992:72). The remains of a house structure similar to that at the Zimms site was excavated at the Hedding site (34WD2) in Woodward county (Shaeffer 1965). The site also contained the remains unusual, smaller structure. The material remains from the site suggest a Late Prehistoric affiliation. However, unlike the Zimms site materials which displays similarities to Turkey Creek phase materials, Hedding's display a wider diversity exhibiting similarities with both the Antelope Creek phase and Turkey Creek phase (Drass 1989). There also appears to be difference in subsistence practices between Zimms and Hedding. Clearly, more work is needed to better define and understand the Zimms complex.

Protohistoric

The protohistoric era in the region is poorly understood. However, sites have been investigated northeast and southwest of Blaine County. The Wheeler and Edwards complexes have been described based on differences in assemblages recovered from sites in western (Edwards) and central (Wheeler) Oklahoma. (Hofman 1989:95-98; 1984b). Differences in the material assemblages include: a predominance of Alibates silicified dolomite on Edwards complex sites and Florence A chert on Wheeler complex sites, higher percentages of both Southwest and Southeastern ceramics on Edwards sites

and more materials of European origin on Wheeler sites (Hofman 1984b:357). Wheeler complex sites including Little Deer (34CU10), Scott (34CN2) and Wilson Springs (34CD5) also produce large endscrapers made of Florence A chert. Sites of both complexes contain sandy paste pottery, abundant bison remains and midden features. Circular ditches, probably the remains of fortifications, occur on the major Edwards complex sites such as Duncan (34WA2) and Edwards I (34BK2) but have not been identified on Wheeler sites. Some of the differences in materials and features, particularly regarding European goods, may reflect that Wheeler is slightly later than Edwards. In fact, it is proposed that both complexes be subsumed under the Wheeler phase with sites of the Edwards and Wheeler complexes reflecting spatial and temporal differences of the same culture. (Baugh 1986; Drass and Baugh 1997).

Northeast of Blaine County, the Bryson-Paddock and Deer Creek sites along the Arkansas River in Kay County are thought to have been important trading centers dating circa AD 1700 (Bell 1984; Hartley and Miller 1977). Trade goods recovered from the site suggest early French contact (*ibid*). Bison remains are abundant at these sites. These two sites along with others in the Red River drainage in southern Oklahoma appear to represent Wichita occupations (Bell 1984).

Historic

Two of the earliest historical accounts of the region include that of Thomas James and Stephen Long, both of whom traveled across what is now Oklahoma in the early 1820's. James followed the Cimarron River from its confluence with the Arkansas northwest to what is now Woodward County, Oklahoma. He noted extensive salt deposits along the river as well as numerous gypsum buttes along the Blaine escarpment (Thomas 1976:70). Indigenous peoples which his expedition encountered through this area include the Osage and Comanche. James returned to the area again in February of 1823 initially following the course of the Canadian River and then that of the North Canadian

River. He describes a fertile country with lush grasses and large timber including walnut, ash, hackberry and oak (Thomas 1976:74).

In August of 1820, Major Stephen H. Long and his expedition entered western Oklahoma heading east along the Canadian River passing below the Antelope Hills. Although believing they were on the Red River, they followed the Canadian to its confluence with the Arkansas River. The expedition encountered bison near the Antelope Hills and noted an increase in the diversity of animals, including black bear, deer, turkey and elk as they made their way east (Smallwood 1976:57). The river was described as mostly dry throughout what is now western Oklahoma with only occasional pools of water forcing the party members to sink holes in the sand to obtain drinking water (*ibid*). Timber began to increase when they reached the areas near present day Blaine County (Smallwood 1976:55-56).

In the early 1900's, commercial exploitation of the salt flats and gypsum deposits along the Cimarron River began. The remains of two small salt evaporation plants (34BL39 & 34BL40) are located along Salt Creek just north of the project area. The plants operated around 1900 and produced salt by pumping water from shallow wells sunk on the salt plain into evaporation vats where the salt was harvested (Ferring et al. 1976:96-101).

South of the project area, remains of the town of Bickford (34BL58) are located near Roman Nose State Park. The town was established in 1904 by the Roman Nose Gypsum Company and was operated as a company mining town until 1924 when it was abandoned (Morris 1978:27). The town included a mill, railroad, stores and several residences. The Rubey Stucco-Plaster Company established one of the first (1901) gypsum quarrying and processing operations in the area. The mill, located in Ruby Mill canyon just east of the project area, employed 10-12 people and operated until 1910 (Fay 1962:115-116).

III. Site Investigations

Field Methodology

Archaeological investigations of sites 34BL102-104 occurred during June 10-20, 1997. The goal of the investigations was to determine if intact cultural deposits meriting inclusion in the NRHP were present in the R/W on the sites. All sites were subjected to a careful surface examination and collection of exposed artifacts as well as subsurface testing by hand excavated formal test units and shovel tests. Soil from all excavated units was screened through 1/4" mesh. With the exception of 34BL103, all investigations were conducted within the exposed right-of-way. The work on 34BL103 included subsurface investigation outside the R/W to gain an understanding of the nature of the site prior to disturbance by construction. The results of the study are discussed below. Sites 34BL102 and 34BL104 were found not to contain significant deposits in the project area and are discussed first. Site 34BL103 was found to have significant deposits and is discussed last.

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. Due to the recovery of only a few items from 34BL102 and 34BL104, both the surface and excavated materials are described together. The materials from 34BL103 are described by provenience.

Charcoal Recovery Small pieces of charcoal were recovered from soil matrix during excavations at 34BL103. All were collected and stored in aluminum foil. One small piece (.14gm) was selected for Accelerated Mass Spectrometer dating.

Lithic Analysis The lithic assemblage comprises the bulk of the material recovered. The assemblage is divided into tool and debitage categories and raw material types identified. Tool categories are based on morphology, inferred function, edge modification, flake scar patterns and degree of flaking. Debitage is classed into flake categories according to attributes exhibited by platforms and dorsal and ventral faces. Based on the amount of cortex present on the dorsal face, cortical flakes are classed as primary or secondary flakes. Non-cortical flakes are classed as tertiary or biface. Flakes removed from a biface are identified by platform attributes including lipping or a bifacial edge, acute angles and faceting. Dorsal flake scars are

numerous. All non-cortical flakes with flat, high angled platforms and few dorsal flake scars are classed as tertiary. In addition, broken flakes which cannot be attributed to removal from a biface are classed tertiary. Microdebitage from the macrobotanical flotation samples was also analyzed. The obsidian flake was also submitted from sourcing and hydration analysis.

Miscellaneous Cultural Materials Other cultural materials recovered and analyzed include a pottery sherd, a mano and metate and a bone tool, all from 34BL103. In addition, several pieces of stone relating to the prehistoric occupation were recovered from 34BL103. These are separated into two classes, fractured stone and a soft greenish gray mudstone, for analyses. Fractured stone includes quartzite, quartz and some sandstone, most of which evidence exposure to heat.

Faunal Remains The faunal remains recovered from 34BL102 and 34BL103 are for the most part fragmentary and cannot be identified. When possible, the analysis focused on identification of species and elements. Species identification was accomplished using comparative collections at the Oklahoma Archeological Survey. Although fragmentary, many of the pieces could be identified as deriving from large or small mammals.

Macrobotanical Analysis Soil samples collected for flotation were processed in 2 liter increments in the wet lab at the Oklahoma Archeological Survey. Both light and heavy fractions were processed by passing through nested geologic screens. Selected samples were then examined under a binocular microscope.

34BL102

Introduction

This site is situated on top of a high bluff west of the highway. The site occurs on a forested (mixed oak) area between two small branches of a canyon. Clearing of the right-of-way (R/W) and construction of a steep road cut in this area uncovered a light scatter of lithic artifacts and bison bone in a sandy soil. The steep cut revealed a thick gravel deposit at the base of the sandy deposit directly above Permian clay and shales. A large area of dark soil was exposed in the road cut beginning just above the gravel deposit and extending south of the gravel. In places the dark soil was exposed on the

disturbed surface. A large amount of water seeped from the soil as well as the gravel below throughout the investigation. The soil on the site area is mapped as Sandy Broken land (Fisher 1968:Sheet No. 23). This soil is described as shallow to deep loamy fine sand present along a narrow east facing strip of Permian clay and shales and covered in mixed blackjack oak timber and various grasses. The soil observed on the site is consistent with this description. Investigations at 34BL102 included a surface examination and collection of exposed cultural materials and the excavation of a subsurface test unit.

Test Unit

Surface indications observed over the site suggested a lack of integrity to the cultural deposits on the site. Although the evidence suggested the dark soil was the result of hydrological factors, a test unit (1 x .5 m) was excavated to evaluate any possible cultural origins of the soil.

The test unit was excavated in 10 cm levels to 55 cm below the surface. The upper two levels were mixed and disturbed by the road cut activity and a total of three flakes were recovered from these two levels. Below Level 3 the soil evidenced less disturbance. No artifacts were recovered below the disturbed soil and it is apparent that the dark color of the sandy soil is attributable to gleying processes associated with seepage of the aquifer through the soil in this area.

Materials Recovered

The following section describes the materials recovered from the surface collection and test unit. A total of 12 lithic items and 14 pieces of bison bone were recovered from the surface and 3 flakes, 1 fractured cobble and 1 small rib bone fragment were recovered from the upper disturbed levels of the test unit (Table 1).

Table 1. Items recovered from 34BL102

Provenience	Lithic Artifacts		Faunal Remains		Total
	Debitage	Tools	Bison	Unidentified	
Surface	10	2	8	6	26
Test Unit A					
Level 1	1	—	—	1	2
Level 2	2	—	—	—	2
Level 3	—	—	—	—	0
Level 4	—	—	—	—	0
Level 5	—	—	—	—	0
Level 6	—	—	—	—	0
Total	13	2	8	7	30

Lithic Artifacts

Of the 15 total lithic artifacts recovered, 2 may be classed as unifacial tools. The remaining 13 are debitage.

Unifaces N=2

One of the unifaces is made on a flake of Florence A chert (43.5 mm x 28.5 mm x 6.2 mm) which retains some nodular cortex along one edge. One lateral edge of the flake has been modified by the removal of a series of flakes from the dorsal face. Utilization of this edge is indicated by light step fracturing as well as some polish and edge rounding extending onto the ventral surface. The second unifacial tool is made on a flake of gray quartzite retaining some gravel cortex. The flake (59.5 mm x 17.4 mm x 11.8 mm) is modified along one edge by the removal of a series of flakes to form a steeply angled edge. Utilization is evidenced by small step fractures and slight edge rounding. These manifestations are present along the opposite unmodified edge as well. Due to the nature of the material, polish was difficult to detect.

Debitage N=13

A total of 13 pieces of debitage was recovered, all but 3 of which were collected from the surface. Among the items are 4 flakes of Florence A chert, 2 of which have been removed from bifaces. All 4 display evidence of

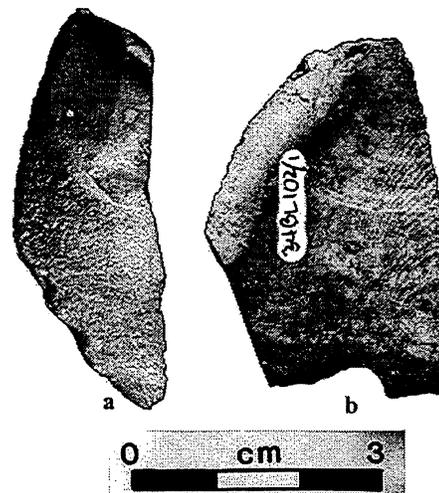


Figure 4. Unifaces recovered from 34BL102. a) gray quartzite; b) Florence A chert .

heat-treatment. A total of 2 flakes of Alibates silicified dolomite, both of which are broken and retain no cortex, was recovered. In addition, 2 flakes of Ogallala quartzite, 1 of which is derived from a biface, and 3 flakes of unidentified quartzite of which one was removed from a biface are present in the sample. The remaining 2 items include a flake of petrified wood and 1 of Day Creek dolomite.

Faunal Remains

A total of 15 pieces of faunal bone was recovered of which 8 are identifiable as bison. Most of the remainder are identifiable as large mammal(s) only.

Bison bison N=8

Identifiable bison remains include 5 teeth, 2 phalanges, and a fragment of metapodial. Among the teeth are 2 maxillary first molars and 1 fourth premolar. A mandibular third molar is also present. The fifth tooth is only represented by fragments, but appears to be a mandibular second or third molar.

Unidentified Large Mammal N=6

A total of 3 long bone fragments of a large mammal was recovered. Although positive identification cannot be made, they are likely bison. Also from the surface, 3 fragments of burned bone was recovered. Although small, the thickness of the cortical bone suggests they derive from a medium to large sized mammal.

Unidentified Small Mammal N=1

A rib from an unidentified small mammal was recovered from Level 1 of Test Unit A. The bone appears to be of relatively recent origin.

Site Summary

Site 34BL102 apparently retains little if any integrity of cultural deposits within the area investigated. Although disturbed by construction, the deposits seem limited to the upper portion of the soil as no evidence was found indicating subsurface deposits or features within the project area. The dark soil observed in the cut was investigated and found not to be cultural in origin. The dark color is the result of seepage from the local aquifer. No diagnostic artifacts were recovered which would allow temporal or cultural assignment of the site. Based on the few bison bones recovered as well as the 2 unifaces, it is possible that bison processing was an activity occurring on the site. However, no evidence of cultural processing was observed on the bones and they may be naturally occurring. The presence of the seep may have attracted bison which in turn died naturally. It should be recognized that the investigated portion of

the site rests on an east facing slope of the canyon edge. Areas outside the R/W west and up slope from the project area may retain deeper soils conducive to preservation of archaeological deposits.

34BL104

Introduction

Site 34BL104 occurs on the north side of the canyon on soils mapped as Sandy Broken Land (Fisher 1968:Sheet No.23). The site's setting is characterized by a generally east facing slope which becomes steep toward the southeast. Very few artifacts were initially observed on the surface with only one collected, and only one prehistoric artifact was recovered during subsurface investigations. Surface inspection revealed the area along the east R/W to be less disturbed and retained more soil. Therefore all subsurface investigations were conducted in the east R/W.

Subsurface Investigation

Subsurface investigations at 34BL104 consisted of a 1 x 1 m unit and seven screened shovel tests excavated along the east R/W. The 1 x 1 unit was placed in the southern portion of the east R/W and the shovel tests were placed at 15 m intervals on a line extending north of the unit.

Test Unit The 1 x 1 unit was excavated to 30 cm below the surface. All material was screened through 1/4" mesh and no artifacts were recovered. The soil throughout the unit was a dark brown loamy sand.

Shovel Tests The seven screened shovel tests were excavated to varying depths, most ending when subsoils were reached at 35 to 85 cm below the surface. Shovel Test 4 was only excavated to 25 cm after it became apparent the soil in this area was heavily mixed due to highway construction disturbance. A large quartzite flake was recovered from deepest shovel test (Shovel Test 1). The only other artifact recovered from the shovel tests was a piece of rusted metal from Shovel Test #4.

Artifact Descriptions

Uniface N=1

A unifacial tool manufactured on a flake of heat-treated Florence-A chert was collected from the site's surface along the west R/W. The flake, missing its platform, exhibits a hinge type fracture on the proximal end. Both lateral and distal edges of the flake have been modified. The lateral edges exhibit secondary flaking

on the dorsal face, some of which appear to manufacture a hafting element on the proximal end. The dorsal face retains dark discoloration resulting from heat-treatment and the extent of the secondary flaking is readily evident as it removed much of the discolored surface.

The tool measures 42.3 mm in length and is 11 mm in maximum thickness. The width varies from 23.5 mm in the haft area to 39.1 mm in maximum width which occurs toward the distal end. The distal end exhibits heavy rounding and polish which extends onto the ventral face. The lateral edges also exhibit some rounding and polish, although not as pronounced.

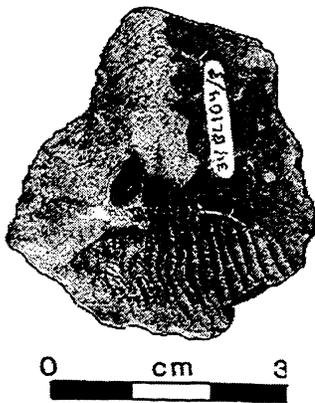


Figure 5. Uniface recovered from 34BL104.

Flake N=1

A large (67.0 mm x 55.5mm) flake of unidentified quartzite was recovered from Shovel Test #1. The flake is a secondary decortication flake with evidence of two previous flake removals on the dorsal face.

Unidentified Metal N=1

A fragment of rusted metal was recovered from Shovel Test #7. The item displays a portion of a crimped lip and appears to be a part of the top and side of a tin can.

Site Summary

The investigation of 34BL104 involved a surface survey and subsurface investigation including excavation of a 1 x 1 m test unit and seven shovel tests. No evidence of intact subsurface deposits was encountered and very little material was observed on the surface. Based on these findings it appears that no archaeological deposits eligible for inclusion in the NRHP are within the project R/W. Although areas

outside the R/W were not investigated, potential for substantial deposits outside the R/W appear minimal based on the setting and the information gleaned by this investigation.

34BL103

Introduction

Site 34BL103 is located on the south side of Ruby Mill Canyon. Initial investigation revealed a moderate scatter of flakes on the east road cut. No material was observed in the west road cut through this area. In addition to flakes, a pottery sherd, some deer bone and a few endscrapers were collected from the cut. Evidence of a possible buried soil was also observed on the slope surface, however, due to construction disturbance, the presence of a buried soil could only be confirmed by subsurface investigation.

Prehistoric materials were observed to extend south from the south wall of Ruby Mill Canyon for about 140 m. An area of historic occupation occurs about 350 to 400 m further south. This historic component consists of the remains of a stone foundation and dugout or cellar. In addition, a depression and an old drive entry are present just north of these features. A few artifacts associated with this occupation including metal items, whiteware, and miscellaneous glass bottle/jar fragments were observed around and north of the historic features.

Investigation

The investigation of 34BL103 consisted of an intensive collection of artifacts from the exposed road cut and hand excavation of 4 1x1 m test units and 3 shovel tests.

Surface Investigation and Collection

An intensive surface collection was conducted on the east road cut. Although disturbed by construction, the collected items provide valuable information about the site. In addition to the recovery of diagnostic artifacts, some evidence of spatial patterning was gleaned by the collecting. The surface collection was made in three basic units. An initial general surface collection was done when the site was first identified. Later, the area was collected in two units designated the North and South areas. This was done since most evidence of a buried soil was observed in the northern area of the exposure. A corner-notched arrow point as well as most biface fragments were recovered from the lower portions of the road cut in the North collection area. Most of the endscrapers were found in the South collection area.

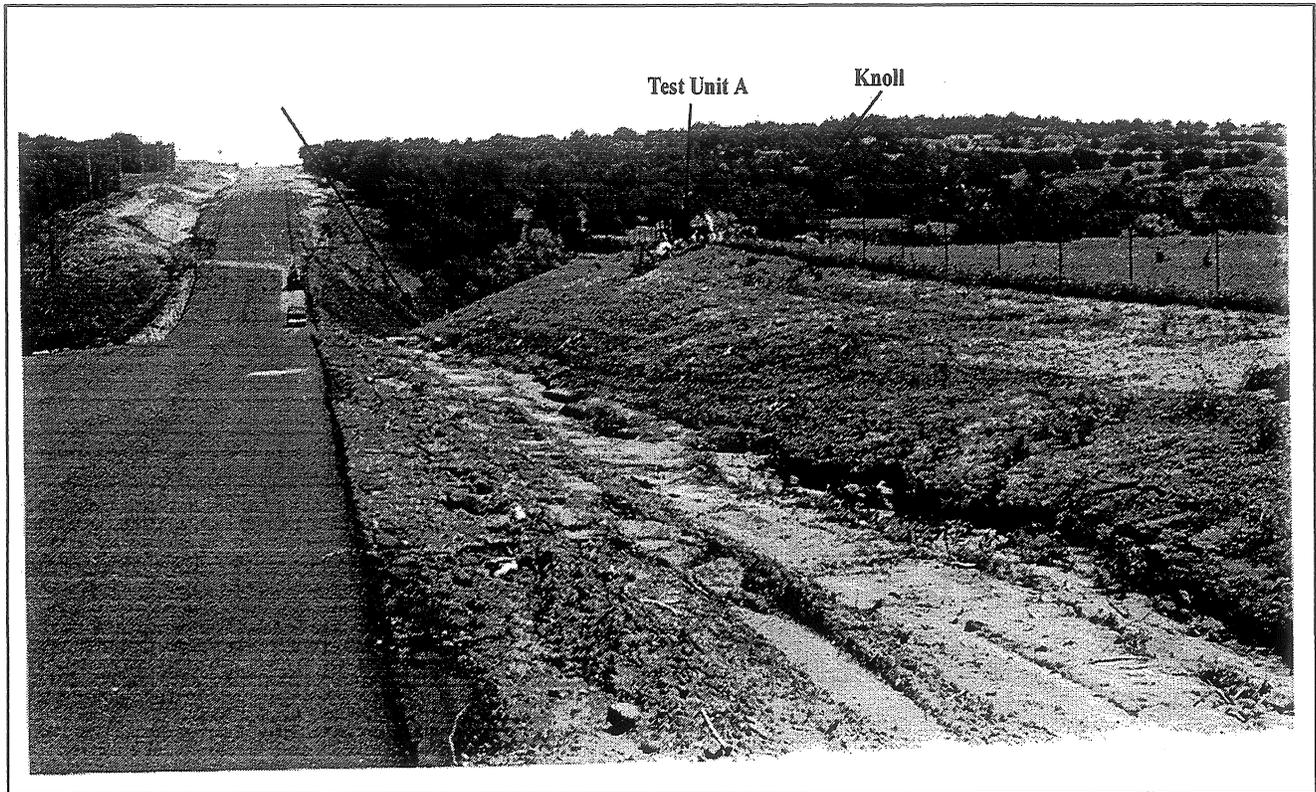


Figure 6. Photograph of 34BL103 looking north.

Subsurface Investigations

Shovel Tests

To better determine the extent of the site east from the R/W, three 30 x 30 cm shovel tests were excavated on a line east from Station 757 at 5, 10 and 20 m (Figure 7). This east/west line is approximately halfway between Test Units C & D. Shovel Test 5E was excavated to a depth of 80 cm. No prehistoric artifacts were recovered, however, some glass fragments were found in the upper 50 cm of brown loamy sand. From 50 to 59 cm, a soil change was noted with a darker brown loamy sand continuing to 80 cm where excavation ceased. Shovel Test 10 E, also excavated to 80 cm, resulted in recovery of a fragment of aqua glass bottle fragment as well as small fragments of rusted metal in the upper 10 cm. Soil was consistent with a brown loamy sand throughout the unit. Shovel Test 20E was excavated to 60 cm with the upper 20 cm producing a fragment of stoneware and “purplized” glass as well as a flake. A modified flake was recovered between 40 and 50 cm. No soil change occurred in the unit.

1 x 1m Test Units

Subsurface investigation of 34BL103 involved hand excavation of four 1 x 1 m test units referred to as Test Units A, C, D & E (Figure 7). Test Unit B was laid out just north of the knoll where it was thought that the buried soil might merge with the upper soil, however, time constraints did not allow its excavation. All units were excavated in 10 cm levels. Test Units C & D were placed outside the project area east of the R/W to investigate the nature of the cultural deposit prior to construction. Test Units A and E were excavated on the east road cut to determine the nature of the deposits within the R/W.

Test Units A and C were excavated on a small knoll at the south edge of the site. A very dark soil was observable at the surface in the exposed road cut in this area. Test Units D and E were excavated north of the knoll in areas thought to hold the best potential for investigation of the buried soil observed in the road cut.

Soil Profiles and Stratigraphy

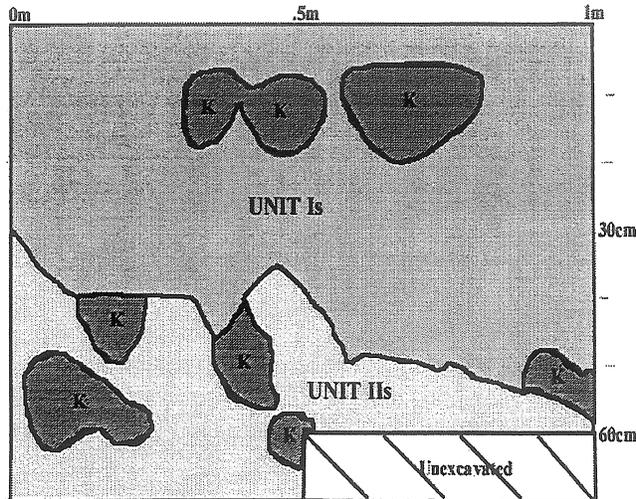
The following soil profiles are described in soil units. Each unit is identified by differences in soil color and texture. Soil units observed in the south Test Units (A and C) are designated with “s” while those in the north Test Units (D and E) are designated with an “n”. Since there are differences in the soils in these areas, they should be considered separately until further investigation establishes correlations between the two.

Test Unit A (Figure 8) Test unit A was excavated on the road cut with the unit’s east wall near the R/W edge and the original pre-construction surface. Because they were on the slope of a 4 to 1 road cut, the upper two levels and a portion of Level 3 did not cover the entire 1 x 1 unit. It is estimated that Level 1 resulted in excavation of about .03 cubic meters of soil, Level 2, .06 cubic meters and excavation of full 1 x 1 m levels (.10 cubic meters) began about halfway through Level 3. The entire unit was excavated to 60 cm and the S ½ was further dug to 70 cm. The test unit revealed dark brown loamy sand with charcoal staining and

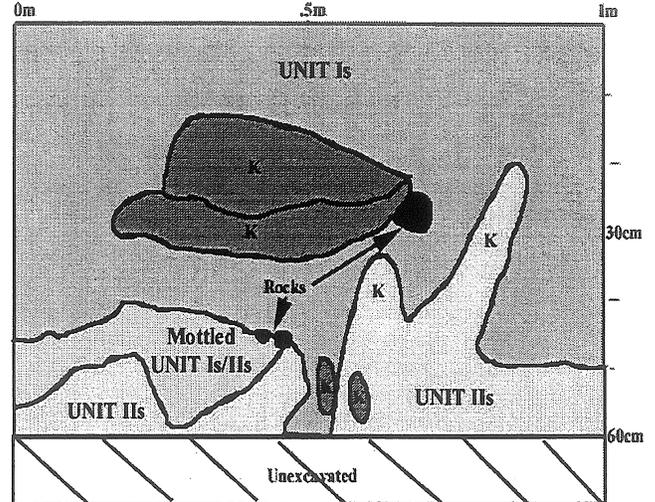
prehistoric cultural material from the surface to 40-58 cm below the surface (BLS), terminating with a rather clear boundary (Unit Is). Due to the 4 to 1 slope of the road cut, only about 6 cm of this Unit remains along the west edge of the unit. Below Unit Is there is a light reddish brown sand (Unit IIs) with very little cultural material. Several Krotovina were evident throughout the unit.

Test Unit C (Figure 8) Test Unit C was excavated outside the R/W with the southeast corner about 1 m east and 2 m south of Test Unit A. In this unit the charcoal stained, dark brown loamy sand containing cultural material extends from the surface to a depth of 45 to 50 cm ending with a clear boundary (Soil Unit Is). Below this occurs the same light reddish brown sand observed below the cultural zone in Test Unit A (Soil Unit IIs). An area of mottling of Soil Units Is and IIs was observed in the south half the profile. Like Test Unit A, several Krotovina were observed throughout the unit.

Figure 7. Plan map of 34BL103 showing locations of Test Units.



Test Unit A East Wall



Test Unit C West Wall

Figure 8. Soil profiles of Test Units A and C, 34BL103. K=Krotovina

Test Unit D (Figure 9) Test Unit D was excavated adjacent to the R/W about 53 m north of Test Unit C. The upper 10-15 cm is light brown loamy fine sand (Soil Unit In) comprised of relatively recent wash likely occurring over the last 75-100 years. Historic materials were recovered within this unit. Below this is 5 to 10 cm of a mottled darker brown loamy fine sand (Soil Unit IIn) resulting from a mixing of the upper zone (Soil Unit In) with a darker brown loamy fine sand below (Soil Unit IIIIn). Soil Unit IIIIn consists of dark brown loamy fine sand beginning at 20 to 25 cm and extending to a depth of 75-85 cm. This soil unit roughly corresponds to Soil Unit Is in Test Units A and C. Soil Unit IIIIn also contains prehistoric cultural material, most occurring below 50 cm. After 75-85 cm the dark brown loamy sand transitions into a lighter brown somewhat coarser loamy sand extending to a depth of 110 to 118 cm (Soil Unit IVn). This soil unit contains cultural material at about the same density as the soil unit above it. Between 110 and 120 cm occurs a clear to gradual boundary into a light reddish brown medium sand with some loam (Soil Unit Vn). Excavation within Soil Unit Vn was carried to 140 cm in the east ½ and 150 cm in the west ½ where excavation ceased. Artifact density drops abruptly in Soil Unit Vn. Probes with a hand corer from the base of the unit indicate this zone continues to a depth of 255 cm where a darker red sand with some clay occurs. This darker red sand and clay is likely derived from the underlying Permian deposits. It was hoped the buried soil would be encountered in this unit, however, no

evidence of its presence was found.

Test Unit E (Figure 9) Test Unit E was excavated on the road cut within the project R/W and the southeast corner was approximately 15.25 m south and 2.5 m west of Test Unit D. Being on the 4 to 1 slope and 2 m west of the pre-construction surface, it is estimated that from east to west across the unit, approximately 40 to 65 cm of soil had been removed by construction. Thus the upper two soil units (Soil Units In and IIn) identified in Test Unit D are missing and a portion of Unit IIIIn truncated. This is important to bear in mind when comparing the profile of Test Unit E to that of Test Unit D. The dark brown loamy fine sand containing prehistoric artifacts (Soil Unit IIIIn) occurs from the surface of Test Unit E to a depth of about 30-35 cm. Soil Unit IVn consists of 15 to 20 cm of lighter brown loamy sand mottled with lighter material derived from the underlying unit (Soil Unit Vn), however, a clear boundary exists between Soil Unit IVn and Soil Unit Vn. Soil Unit Vn is comprised of about 65 cm of light brown fine sand.

Artifacts were recovered throughout Soil Unit Vn, although in very low numbers. A lens of coarse sand was encountered in the southern portion of Test Unit E at 110 cm. The 5 cm thick lens emerges from the south wall and lenses out 20 cm north of the wall at a depth of about 116 cm. At this depth, throughout the remainder of the test unit, occurs a thin veneer of coarse sand containing a few small pebbles as well a couple of

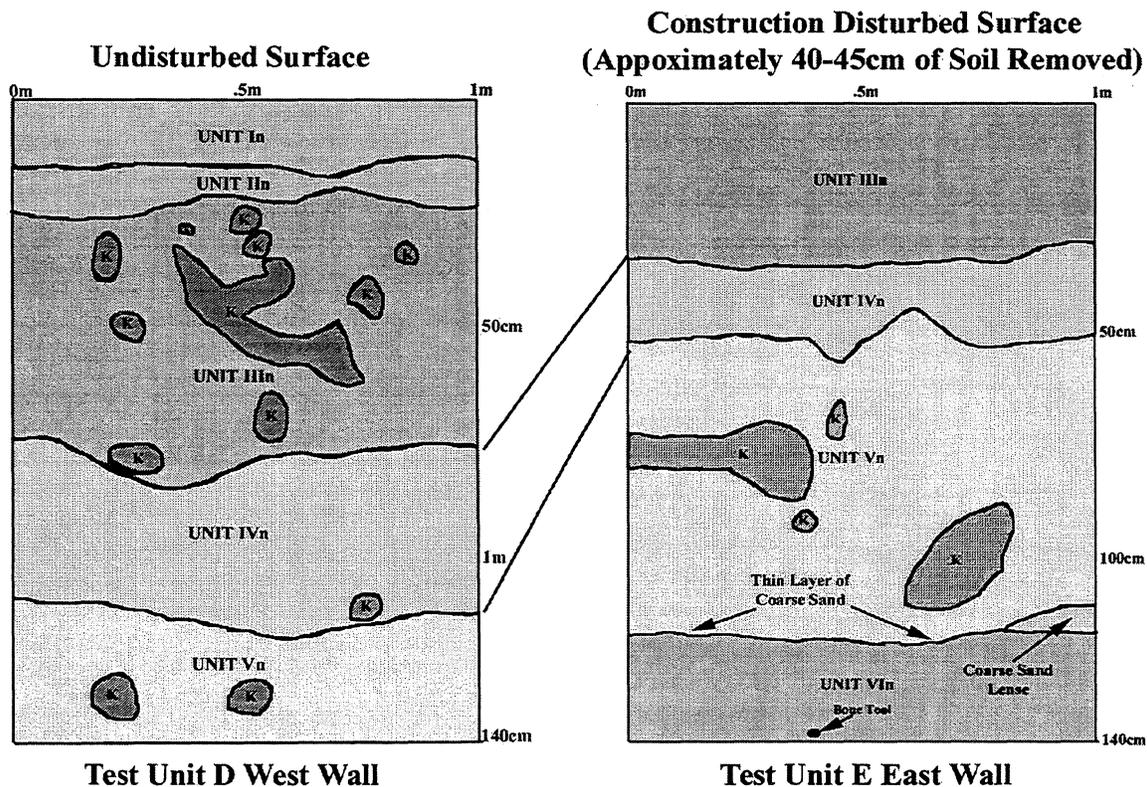


Figure 9. Soil profiles of Test Units D and E, 34BL103. Note that Test Unit E was located on the road cut and approximately 40 cm of soil including Units Ia, IIa and a portion of IIIa had been removed by construction prior to excavation.

flakes. This sandy veneer occurs on top of a distinct dark brown loamy sand (Soil Unit Va) which begins about 116-122 cm below the construction surface. This dark loamy sand appears to correspond to the buried soil horizon observed in the road cut. Hand excavation ceased at 140 cm, but coring with a hand soil probe indicates that Soil Unit Va extends to a depth of 155 cm where it overlays material derived from Permian deposits. The recovery of flakes as well as a modified deer ulna from the two levels excavated within Soil Unit Va provides evidence of a cultural occupation associated with this buried soil. Considering the approximately 40-45 cm of material removed from the area prior to excavation of Test Unit E, the buried soil (Soil Unit Va) occurs about 155 cm below the undisturbed surface in this portion of the site.

Radiocarbon Date

An AMS radiometric date was obtained from a small (.14 gm) piece of charcoal recovered from Level 4 of Test Unit C. A resulting date of 1460 +/- 60

radiocarbon years before present was derived from the sample (Beta-108582). A calibrated calendar date of AD 619, with a one sigma range of AD 552 - 654 and two sigma range of AD 450 - 673 was calculated for the sample (Stuiver and Pearson 1993).

Discussion

The excavations reveal differences in the soils north to south across the site. The south test units revealed a dark upper soil (Soil Unit Ia) containing prehistoric cultural material occurs on the knoll at the south edge of the site. This area marks the southern extent of the prehistoric occupation. The soil is a dark brown fine loamy sand, similar in texture to the A horizon of Pratt loamy sand mapped on the site area (Fisher 1968: Sheet No. 23) except that it is darker in color and includes charcoal flecks. This darker color may be the result of organics incorporated into the soil by the prehistoric occupation. No B horizon was evident, probably due to the heavy influx of organics. Soil Unit IIa is the C horizon.

The soil over the northern area of the site displays more complexity than that of the southern area. In the undisturbed portion of the site, Test Unit D reveals about 20 to 25 cm of relatively recent wash (Soil Units In and IIIn) overlying a thick soil (Soil Unit IIIIn). Soil Unit IIIIn, present in both north test units, is interpreted as the A horizon of Pratt soil. Soil Unit IVIn is distinguishable as the B horizon. Both soil units contain prehistoric materials. These soil units represent the surface prior to historic occupation and likely correspond with Soil Unit Is. The buried soil (Soil Unit VIn) encountered in Test Unit E occurs below the C horizon (Soil Unit Vn) identified in both the north test units. The buried soil begins about 155 cm below the undisturbed portion of the site surface. Although not confirmed by subsurface investigation, observations on the exposed road cut suggest that the buried soil rises to the south and merges with the upper soil (Soil Unit Is) on the northern edge of the south knoll. The fact that this soil could not be detected by hand coring from the base of Test Unit D may indicate that portions of the soil eroded away prior to becoming buried. The coarse sand lens and veneer encountered just above Unit V in Test Unit E evidence erosional processes prior to burial.

The recovery of flakes and a bone tool within the buried soil provides evidence of an associated cultural occupation. Due to the apparent merging of the buried soil with the upper soil on the knoll, cultural materials associated with both soils may be mixed or compressed in this area. Thus, the radiometric date of 1460 BP obtained from Level 4 of Test Unit C on the south knoll may relate to the cultural occupation evidenced in the buried soil of the northern site area.

Recovered Artifacts

A total of 1,268 prehistoric artifacts was recovered from the surface collections, shovel tests and 1 x 1 test units during the investigation of 34BL103 (Table 2). The items include chipped stone tools and debitage, a mano, a metate, a bone tool, and a pottery sherd as well as other stone such as fractured quartzite cobbles and mudstone relating to the prehistoric occupation of the site. A few historic materials, thought to relate to the occupation evident south of the prehistoric occupation were recovered and are discussed separately.

The artifact descriptions are presented by provenience. The surface collected items are designated by three proveniences including a general surface and North and South collection areas and are described first followed

by descriptions of materials recovered from excavated contexts. The faunal and macrobotanical materials recovered are presented in separate sections following the artifact descriptions.

Surface Collection

As mentioned previously, these items were collected on the exposed road cut along the east R/W. During the initial discovery of the site, a small general surface collection was made to provide a sample of materials on the site. During the investigation, a corner-notched arrow point, and several biface fragments were found toward the north end of the road cut slope. Subsequently, the slope was divided into North and South surface collection units to ascertain any spatial differences among the materials.

General Surface Collection

Lithic Artifacts A total of 42 items including 2 bifaces, 4 endscrapers, 35 pieces of debitage and 1 core were collected from the general surface of the road cut.

Bifaces N=2

Miscellaneous Bifaces (N=2) Two small bifaces, both of Ogallala quartzite were collected. One is unbroken, measures 41.5 x 27.5 mm and is 7.9 mm thick. It is roughly sub-triangular and completely bifaced. One face exhibits a thick platform along one edge and none of the edges display evidence of use. This item is likely an abandoned preform.

The second biface is of heat-treated material and exhibits a transverse bending fracture. The artifact measures 29.5 x 23.1 mm and is 7.8 mm thick. A platform set up for a flake removal is present on the end of the artifact. An attempt to remove this flake may have resulted in the bend fracture. Although probably broken while attempting to manufacture a tool, one edge of the biface displays slight rounding and polish indicating use.

Unifacial Endscrapers (N=4) Figure 10a-d

The 4 unifacial endscrapers in the general surface collection are all manufactured on flakes with the distal end modified by secondary flaking to form a working edge. Three are made on flakes of Alibates silicified dolomite, 2 (Figure 10b,c) are made on cortical flakes with no lateral edge modification. The cortex on one is typical of gravel sources while the other is more similar to that from the geologic source. The third (Figure 10d) is made on a flake struck from a biface. All evidence use by rounding and polish on the distal edges and some "nibbling" is present on the one made on the

Table 2. Provenience of prehistoric items recovered from 34BL103.

Provenience	Chipped Stone Tools*						Debitage*						Misc. Mod. Stone*				Other stone*			PS	Bone*			Total		
	AP	BF	ES	WG	OT	total	P	S	T	BF	S/B	BP	total	MN	MT	HMS	CR	FR	MS		total	IFN	UFN		BT	
Surface																										
General	-	2	4	-	-	6	2	9	16	6	2	-	35	-	-	-	1	-	-	-	-	-	-	-	-	-
South Area	2	3	3	-	4	12	31	36	126	33	55	7	288	-	-	1	3	32	-	32	-	14	89	-	-	-
North Area	1	7	-	1	2	11	14	21	51	20	11	1	118	1	1	-	2	38	-	38	1	1	46	-	-	-
subtotal	3	12	7	1	6	29	47	66	193	59	68	8	441	1	1	1	6	70	-	70	1	15	135	-	-	-
Test Units																										
A L1*	-	-	-	-	-	-	3	2	5	3	6	-	19	-	-	-	-	-	-	-	-	1	1	-	-	21
L2*	-	-	-	1	-	1	6	2	5	1	2	-	16	-	-	-	-	4	-	4	-	-	5	-	-	26
L3*	-	-	-	-	2	2	3	1	8	1	1	1	15	-	-	-	-	3	4	7	-	1	6	-	-	31
L4	1	-	-	-	-	1	-	1	12	3	15	1	32	-	-	-	-	3	9	12	-	-	12	-	-	57
L5	-	1	-	-	-	1	2	4	12	5	7	-	30	-	-	-	-	3	-	3	-	-	9	-	-	43
L6	-	-	-	1	-	1	1	7	4	2	7	-	21	-	-	-	-	2	3	5	-	-	2	-	-	29
L7*	-	-	-	-	-	-	2	-	-	-	2	-	4	-	-	-	-	-	5	5	-	-	2	-	-	11
total	1	1	-	2	2	6	17	17	46	15	40	2	137	-	-	-	-	15	21	36	-	2	37	-	-	218
C L1	-	-	-	-	-	-	-	2	4	2	-	-	8	-	-	-	-	-	3	3	-	-	-	-	-	11
L2	-	-	-	-	-	-	3	3	12	-	11	1	30	-	-	-	-	-	-	-	-	-	6	-	-	36
L3	-	1	-	-	-	1	1	2	16	4	14	1	38	-	-	-	1	-	62	62	-	-	7	-	-	109
L4	1	-	-	-	1	2	2	4	10	1	5	1	23	-	-	-	-	-	45	45	-	-	-	-	-	70
L5	-	-	-	-	-	-	-	3	4	5	5	1	18	-	-	-	-	-	4	4	-	-	2	-	-	24
L6	-	-	-	-	-	-	-	2	6	-	5	-	13	-	-	-	-	-	2	2	-	-	-	-	-	15
L7*	-	-	-	-	-	-	-	-	3	2	3	-	8	-	-	-	-	-	-	-	-	-	-	-	-	8
total	1	1	-	-	1	3	6	16	55	14	43	4	138	-	-	-	1	-	116	116	-	-	15	-	-	273
D L1	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	2	1	3	-	-	-	-	-	5
L2	-	-	-	-	-	-	-	-	1	1	1	-	3	-	-	-	-	-	1	1	-	-	-	-	-	4
L3	-	-	-	-	-	-	-	-	5	1	-	-	6	-	-	-	-	-	-	-	-	-	2	-	-	8
L4	-	-	-	-	-	-	-	2	2	4	-	-	8	-	-	-	-	6	-	6	-	-	-	-	-	14
L5	-	-	-	-	-	-	-	2	1	1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	4
L6	-	-	-	-	-	-	-	1	11	3	2	-	17	-	-	-	-	-	-	-	-	-	-	-	-	17
L7	-	-	-	-	-	-	1	1	4	4	3	-	13	-	-	-	-	2	-	2	-	-	9	-	-	25
L8	-	1	-	-	-	1	-	1	2	1	-	-	4	-	-	-	-	-	-	-	-	-	1	-	-	5
L9	-	-	-	-	1	1	-	2	8	4	1	-	15	-	-	-	-	4	-	4	-	-	-	-	-	20
L10	-	-	-	-	-	-	1	1	2	1	2	-	7	-	-	-	-	-	-	-	-	-	-	-	-	7
L11	-	-	-	-	-	-	-	2	4	3	1	-	10	-	-	-	-	-	-	-	-	-	2	-	-	12
L12	-	-	-	-	-	-	-	1	-	1	-	-	2	-	-	-	-	1	-	1	-	-	-	-	-	3
L13	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	2	-	2	-	-	-	-	-	3
L14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	-	-	-	-	-	4
L15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
total	-	1	-	-	1	2	2	16	40	24	10	-	92	-	-	-	-	21	2	23	-	-	14	-	-	131
E L1*	-	-	-	-	-	-	1	-	1	-	2	-	4	-	-	-	-	11	-	11	-	-	1	-	-	16
L2*	-	-	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	13	-	13	-	-	-	-	-	15
L3*	-	-	-	-	-	-	4	1	1	1	5	-	12	-	-	-	-	13	-	13	-	-	4	-	-	29
L4	-	-	-	-	-	-	-	3	3	1	4	-	11	-	-	-	-	1	-	1	-	-	-	-	-	12
L5	-	-	-	-	1	1	2	1	2	-	-	-	5	-	-	-	-	1	-	1	-	1	1	-	-	9
L6	-	-	-	-	-	-	1	-	3	1	-	-	5	-	-	-	-	-	1	1	-	1	2	-	-	9
L7	-	-	-	-	-	-	-	1	2	1	1	-	5	-	-	-	1	5	1	6	-	-	20	-	-	32
L8	-	-	-	-	-	-	-	-	3	-	2	-	5	-	-	-	-	2	5	7	-	-	1	-	-	13
L9	-	-	-	-	-	-	-	-	2	1	1	-	4	-	-	-	-	2	-	2	-	1	1	-	-	8
L10*	-	-	-	-	-	-	1	-	4	3	2	-	10	-	-	-	-	2	6	8	-	-	1	-	-	19
L11*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	6	10	-	-	1	-	-	11
L12	-	-	-	-	-	-	1	1	4	-	2	-	8	-	-	-	-	7	1	8	-	-	3	-	-	19
L13	-	-	-	-	-	-	1	-	1	-	-	-	2	-	-	-	-	5	-	5	-	-	2	1	-	10
total	-	-	-	-	1	1	11	7	28	8	19	-	73	-	-	-	1	66	20	86	-	3	37	1	-	202
subtotal	2	3	-	2	5	12	36	56	169	61	112	6	440	-	-	-	2	102	159	261	-	5	103	1	-	824
Shovel Tests																										
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
2	-	-	-	-	1	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
subtotal	-	-	-	-	1	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Total	5	15	7	3	12	42	83	122	3623	120	183	14	882	1	1	1	8	172	159	331	1	20	238	1	-	1526

*Chipped Stone Tool Types: AP= arrow point (incl. preform); BF=bifaces; ES=endscraper; WG= wedge; OT=other (incl. unifacially and bifacially edge modified items).

*Debitage Types: P=primary flake; S=secondary flake; T=tertiary flake; BF=biface flake; SH/BD=shatter and blocky debris; BP=bipolar debitage.

*Misc. Modified Stone: MN=mano; MT=metate; HMS=hammerstone; CR=core.

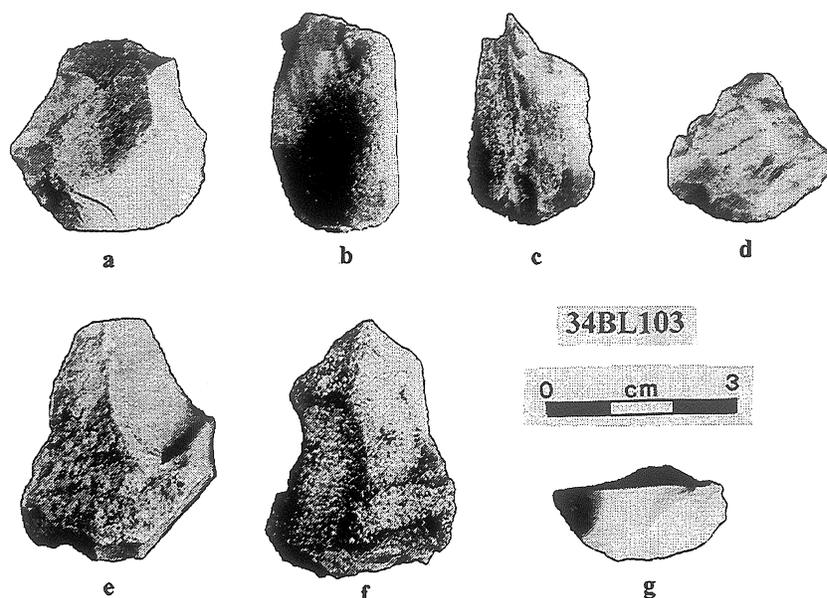


Figure 10. Unifacial endscrapers recovered from 34BL103. Top row from general surface, bottom row South collection area.

biface flake. However, all display little evidence of resharpening. The endscraper of Florence A chert is made on a tertiary flake struck from a core (Figure 10a). The platform evidences extensive preparation by flaking and grinding. Unlike the others in the sample, this endscraper evidences multiple resharpenings. The material has not been heat-treated. It should be noted that although these items are included in the general surface collection, at least two were found in what would become the South collection area.

Table 3. Metric attributes of endscrapers from R/W Surface, 34BL103.

Figure	Lithic Material	L	W	T	Distal Edge Angle
10a	Florence A chert	29.5	31.5	10.7	70°
10b	Alibates	36.0	20.5	8.2	65°
10c	Alibates	30.2	20.2	7.5	58°
10d	Alibates	23.2	27.0	5.0	64-70°
10e	Ogallala Quartzite	37.7	32.2	13.0	70°
10f	Unidentified Quartzite	41.3	30.0	10.9	62°
10g*	Day Creek chert	14.3	28.3	9.8	70-73°

L=length; W=width; T=thickness; *=only distal end recovered

Debitage N=35

This sample is dominated by Alibates agatized dolomite and unidentified chert and quartzite (see Appendix 1). The cortex present on some flakes suggest the items derive from gravel deposits. Florence A and Neva chert derived from sources 150 km northwest of the site were also collected. Most of the flakes in the general surface sample are tertiary (Table 2).

Core (N=1)

This core of Ogallala quartzite is made on a large (52.8mm x 38.8 mm) primary flake 20.5 mm in maximum thickness. A series of flakes have been removed from the flake's dorsal face.

North Surface Collection Area

Lithic Artifacts A total of 169 items were collected from the North surface collection area. Among the items are a corner-notched arrow point, a stemmed corner-notched biface fragment, 6 miscellaneous biface fragments, 2 edge modified flakes, a probable wedge, 118 pieces ofdebitage, a mano, a metate and several pieces of fractured stone (Table 2).

Arrow Point (N=1) Figure 11a

This complete corner-notched arrow point manufactured of Alibates agatized dolomite measures

24.7 mm in total length and 12.3 mm in maximum width. It is 4.0 mm in maximum thickness. The stem is 6.0 mm in width and the slightly concave base is 9.3 mm in width. The point compares well with Scallorn arrow points (Bell 1960:84, Suhm and Jelks (1962:285).

Corner-Notched Stemmed Biface (N=1) Figure 11f
This corner-notched biface fragment consists of the stem and a portion of the blade. The artifact is made of an unidentified purplish quartzite. The stem measure 9.8 mm in length and is 15.0 mm in maximum width. The blade exhibits lateral and transverse fractures and is 6.6 mm in thickness.

Miscellaneous Biface Fragments (N=6)
The 6 items in this category include four of Ogallala quartzite. Two are fragments of thick roughly shaped bifaces of indeterminate shape. Both exhibit transverse fractures and are about 9 mm thick. The remaining 2 are fragments of finished items. Both exhibit hinge type fractures and appear to be derived from blades. The maximum thicknesses are 4.8 mm and 6.0 mm. The remaining 2 biface fragments are small and include an 8.9 mm thick item made on a cortical flake of Alibates agatized dolomite. The last artifact is a lateral edge fragment of a finely flaked biface. The small fragment is 4.7 mm thick and is made of an

unidentified thermally altered chert.

Wedge (N=1)
This item measuring 14.7 x 16.2 mm and 3.0 mm in thickness is made of unidentified chert. The attributes on the artifact including opposing flake scars and battering on one edge suggest it was used as a wedge (Keely 1980:41).

Other Modified Stone Tools

Edge Modified Flakes (N=2)
Both of these items are flakes exhibiting edges modified by secondary flaking. One is made on a broken flake (15.2 mm x 13.3 mm) of Tecovas Jasper. The 3.5 mm thick flake exhibits modification on it's lateral edges. The modification is on opposing faces.

The second item is made on a quartzite flake fashioned into a triangular shape by unifacial flaking of the dorsal face along three edges. The tool measures 25.5 mm in length, 12.7 mm in width and is 3.4 mm in maximum thickness.

Debitage (N=118)
The 118 pieces of lithic debitage from the North collection area include 106 flakes, 1 piece of bipolar debitage and 11 pieces of shatter and blocky debris. The majority of the items (80%) are Ogallala quartzite,

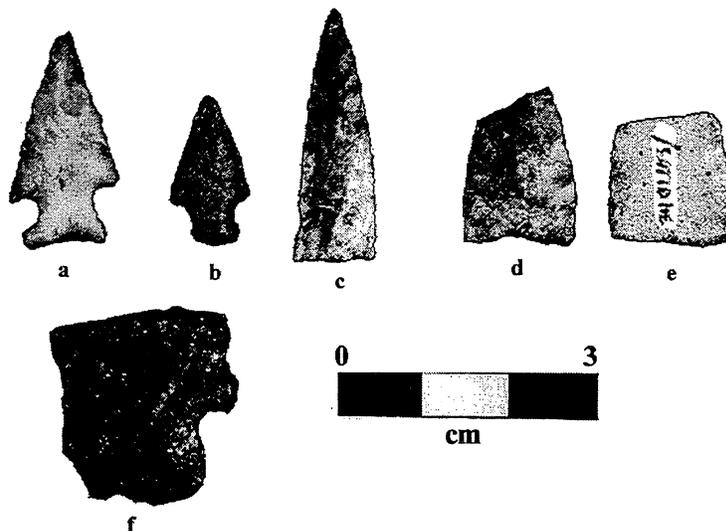


Figure 11. a) arrow point from North area; b) arrow point from South area; c) arrow point preform from South area; d) arrow point from Test Unit A; e) arrow point from Test Unit C; f) corner-notched biface from North area.

Alibates agatized dolomite and unidentified chert. Cortex on the primary and secondary flakes of these materials suggest their acquisition from gravel sources. Florence A and Neva chert derived from geologic sources about 175 km northwest of 34BL103 comprise 6.5% of this sample. The cortex present on the flake of Neva chert is typical of its geologic source. Two flakes are from more distant sources including obsidian from southern Idaho and Niobrara jasper from western Kansas (Banks 1990:96).

Ogallala quartzite comprises a fair percentage (42.9%) of the 35 (33% of flake sample) primary and secondary flakes. Of the total 106 flakes, 48.1% are tertiary with Ogallala quartzite, Alibates and unidentified chert the most frequent materials represented. A total of 18.7% of the flakes are identifiable as being derived from bifaces. The dominant materials in the biface flake category are Ogallala quartzite, Alibates agatized dolomite and unidentified chert with Alibates and unidentified chert accounting for 50% of the category.

Cores (N=2)

Both of the cores from the North area are of quartzite. One item is a core fragment of Ogallala quartzite measuring 43.8 mm x 36.8 mm x 23 mm. The fragment exhibits some cortex and 4 flake scars. The other core is of unidentified quartzite measuring 35 mm x 30.9 mm x 18.6 mm. Gravel cortex is present on two sides, one of which served as a platform for the removal of at least 3 flakes.

Groundstone

A mano and five fragments of a metate were recovered in the north area. All were found in close proximity to each other near the top of the slope.

Mano (N=1) Figure 12

The roughly ovate, unifacial mano made of relatively soft Permian sandstone measures 151mm x 127mm and is about 459 mm in maximum thickness. Aside from the smoothing evident on one face, the stone has not been modified. A deposit of calcium carbonate is present on the working face.

Metate Fragments (N=5) Figure 13

The five metate fragments are Permian sandstone and appear to be from one metate. All exhibit a smooth slightly dipping surface on one face. Four of the fragments can be refit into two pieces. One of these pieces measuring 117mm x 108 mm appears to be a

portion of an end of the metate. The working surface is about 48 mm thick. The other refit piece (about 150mm x 84 mm) is a portion of one side with a working surface about 52 mm thick. The remaining fragment (120mm x 130mm) also appears to be an end. Only a small portion of the working surface is present on this item and measures 62.5 mm in thickness. Like the mano, the working surface of each fragment displays a calcium carbonate deposit. The consistency of the deposit as well as the morphological traits observable on the fragments suggest they are part of the same metate.

Other Stone

Fractured Rock (N=38)

A total of 38 pieces of fractured rock weighing 792.7g were collected. Most are fractured quartzite and quartz cobbles, however, some sandstone is present. These items do not appear to be the result of stone tool production. Many exhibit evidence of fracture due to exposure to intense heat.

South Collection Area

A total of 337 lithic artifacts were collected from the South collection area. Among the items are 1 pottery sherd, 1 corner-notched arrow point, 1 arrow point preform, 3 biface fragments, 1 bifacially edge modified item, 3 endscrapers, 2 modified flakes and 288 pieces of lithic debitage.

Lithic Artifacts

Corner-notched arrow point (N=1) Figure 11b

This small corner-notched arrow point made of Ogallala quartzite measures 17.3 mm in total length, 9.4 mm in maximum width and is 3.5 mm in maximum thickness. The 5.4 mm long stem is 4.7 mm wide with a base 5.5 mm in width. Although morphologically similar, this arrow point is smaller than those initially described for the Scallorn type (Suhm and Jelks 1962:285).

Arrow point preform (N=1) Figure 11c

This small triangular biface made of Alibates agatized dolomite measures 29.2 mm in length, 9.8 mm in width and 3.8 mm in thickness. Flake scars originating from the base indicate an attempt at basal thinning. In addition, near the base there is evidence of an apparent attempt at notching which was abandoned after loss of the platform. This notching attempt as well as the length to width ratio and thickness of the biface suggest the item is a preform for a corner-notched arrow point.

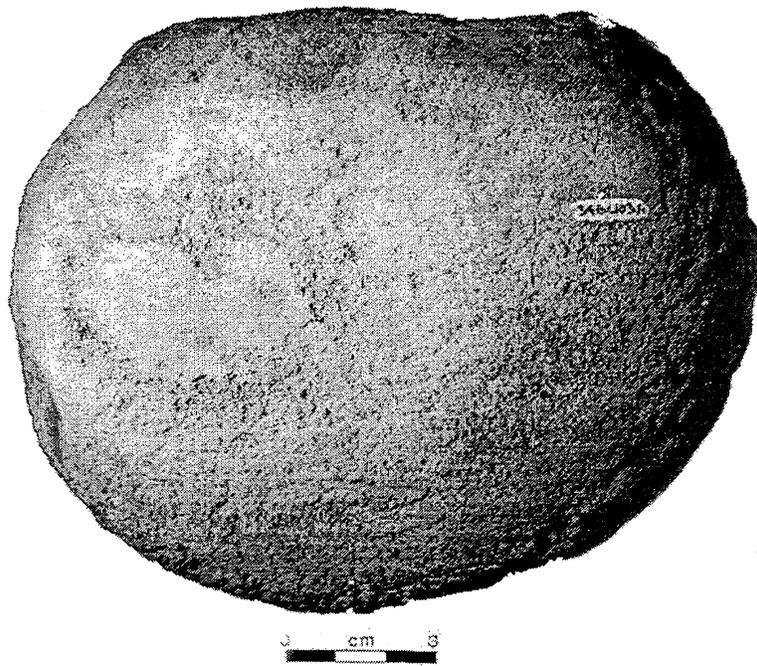


Figure 12. Mano from North collection area.

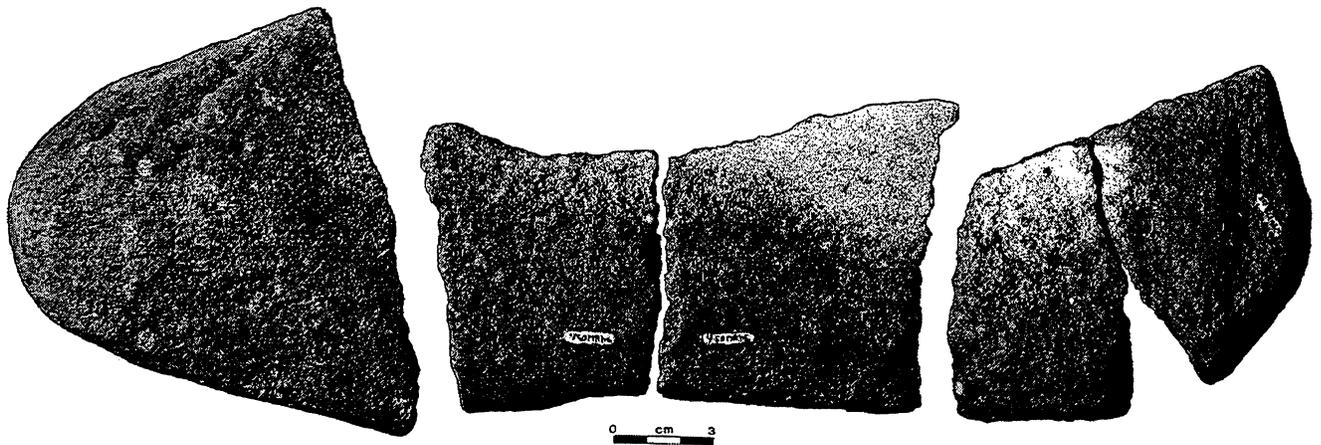


Figure 13. Metate fragments from North collection area.

Miscellaneous Biface Fragments (N=3)

Of the three biface fragments from the South area, one is a small 17.5 mm x 11.4 mm, 4.0 mm thick artifact consisting of two lateral edges forming a converging point. The remaining two are thicker items exhibiting no particularly formal shape. One is made of heat-treated Florence-A chert measuring 21.0 mm x 21.8 mm in maximum dimensions and is 6.9 mm in maximum thickness. A hinge fracture is present on one end of the biface. The other, made of a material closely resembling Tecovas jasper, is 22.5 mm x 20.8 mm and is 8.2 mm thick. The artifact exhibits a transverse fracture and heavy battering around the remaining edges as well as a vitreous sheen typical of heat-treatment.

Unifacial Endscrapers (N=3) Table 3, Figure 10 e-g.

Three endscrapers represented by two complete and one bit end were found in the South collection area. Both of the complete items are made on secondary cortical flakes of quartzite, one unidentified (Figure 10f) and one Ogallala (Figure 10e). Both have lateral edge modification as well as secondary flaking to produce the bit edge. Both exhibit little evidence of resharpening. The fragmentary endscraper is made of Day Creek chert and is represented by the distal or bit end (Figure 10g). No cortex is visible on the fragment. The artifact also displays little evidence of resharpening.

Edge Modified Artifacts (N=4)

The items in this category include 3 unifacially modified flakes and a small cobble of Ogallala quartzite with a bifacially modified edge. This latter, roughly circular item, measures 48.6 mm x 53.5 mm and is 23.5 mm in maximum thickness. The bifacially modified edge exhibits evidence of use by rounding and some polish. The unifacially modified flakes include two tertiary flakes of Alibates agatized dolomite. Both exhibit one edge with secondary flaking. The third is a small secondary flake of unidentified chert measuring 19.8 mm x 16.3 mm and is 6.6 mm in maximum thickness. The flake has been extensively modified including a notch 8.5 mm across and 1.6 mm deep.

Debitage (N=288)

A total of 226 flakes, 55 pieces of shatter and blocky debris and 7 pieces of bipolar debitage were recovered from South collection area (Table 2). Ogallala quartzite, Alibates and unidentified chert comprise the bulk (77.3%) of the flakes. A small but significant

percentage (7.7%) of the flakes are of materials (Florence A, Florence B and Neva chert) from the Flint Hills region about 180 km northeast of 34BL103.

Primary and secondary cortical flakes, dominated by Ogallala quartzite (47.8%), Alibates and unidentified chert (35.9%), comprise 28.7% of the flake sample. All the cortex on these materials indicates acquisition from gravel sources. Tertiary flakes account for 54.1% of the flakes with Alibates and unidentified chert making up 54% of the category. Biface flakes, dominated by Alibates and unidentified chert (60.6%) comprise 14.1% of the flakes. Shatter and blocky debris make up 19.1% of the total sample of lithic debitage from the south area. Seven pieces (2.4%) of the total debitage sample evidence bipolar battering.

Cores (N=3)

Two of the cores from the South collection area are made on cobbles of Ogallala quartzite. One cobble measures 52.5 mm x 46 mm x 18.7 mm and exhibits three flake scars in one area. The other cobble measures 101 mm x 82.5 mm x 49 mm. On one edge a flake was removed to create a platform from which at least 4 flakes were subsequently struck. The remaining core is represented by a fragment which is 27.4 mm x 25 mm x 13 mm in size. The item is Alibates agatized dolomite and retains some gravel cortex. The blocky artifact exhibits multiple flake scars.

Hammerstone (N=1)

This artifact is a roundish cobble of Ogallala quartzite measuring 52.5 mm x 67 mm x 64.3 mm. One end of the cobble exhibits heavy battering around most of its circumference. The opposite end also exhibits battering on its apex.

Other Stone

Fractured Rock (N=32)

A total of 32 pieces of fractured rock weighing 2.47 kg was collected. Most are fractured quartzite and quartz cobbles, however, some sandstone is present. These items do not appear to be the result of stone tool production. Many exhibit evidence of fracture due to exposure to intense heat.

Pottery Sherd (N=1)

One small pottery sherd (32.0 mm x 20.5 mm) measuring 9 mm thick was recovered. The bone tempered sherd retains a portion of a light brown outer surface. The core is dark gray and the inner surface is dark brown.

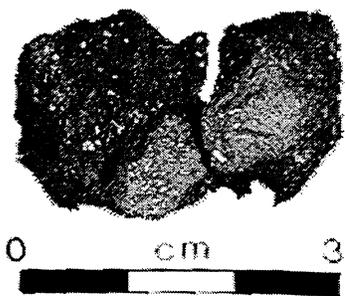


Figure 14. Pottery sherd recovered from 34BL103.

Subsurface Materials

The subsurface investigation of 34BL103 consisted of four 1 x 1 m units and three 30 x 30 cm shovel tests. All were excavated in 10 cm levels and screened with 1/4" mesh hardware cloth. Test Units A and C were located on the slight knoll in the southern area of the site and Test Units D and E were excavated in the northern area. Units C and D were located outside the disturbed R/W while A and E were located near the top of the road cut within the R/W. The three shovel test were excavated outside the R/W. The southern test units (A & C) produced the only excavated diagnostic lithic artifacts. In addition, they produced greater quantities overall and per level than the northern units (D & E).

Test Unit A

As mentioned in the soils section, this unit was excavated on the slope of the road cut. Thus, the first three levels are not full levels. Test Unit A was fully excavated to 60 cm (6 Levels) and the north half to 70 cm. A total of 143 lithic artifacts were recovered from Test Unit A including 6 chipped stone tools and 137 pieces of debitage (Table 2).

Chipped Stone Tools

Arrow Point (N=1) Figure 10e

This triangular arrow point recovered from Level 4 is made of Ogallala quartzite, possibly heat-treated. The tip is missing from the point which measures 18.4 mm in length, 12.9 mm in maximum width and is 3.5 mm thick. The point was manufactured from a flake which has a portion of the ventral surface still visible. The arrow point compares well with the Fresno type common during the Late Prehistoric and early Protohistoric (Bell 1960:44).

Biface Fragment (N=1)

A biface fragment of non heat-treated Florence A chert was recovered from Level 5. The 32.2 mm x 24 mm, 6.2 mm thick artifact exhibits several breaks and retains only one edge of the original biface. Heavy polish and rounding is apparent on this edge.

Wedges (N=2)

These 2 items evidence heavy battering and step fracturing on opposing edges typically produced when used as a wedge (Keely 1980:41). One is completely bifaced and made of Alibates agatized dolomite. The artifact measures 16 mm x 15.7 mm and is 6 mm in maximum thickness. The battering evidence on all edges indicate the item was used as a wedge along more than one axis. The second wedge is a primary flake of unidentified chert measuring 20.6 mm x 17 mm and is 6 mm thick. Although all edges of the flake evidence modification, most is confined along two opposing edges suggesting one primary use axis.

Miscellaneous Modified Items (N=2)

One cortical flake of Ogallala quartzite with one bifacially modified edge was found in Level 3. The 13.2 mm thick artifact measures 31.5 mm x 20 mm in maximum dimensions. Also found in Level 3 was a tertiary flake of unidentified chert with unifacial flaking along one edge. This artifact measures 21.7 mm x 14.5 mm and is 7.2 mm thick.

Debitage N=137

A total of 95 flakes, 40 pieces of shatter and 2 pieces of bipolar debitage were recovered from all levels of Test Unit A. Levels 4 and 5 produced the highest number of these items. However, the unit was excavated on a 4 to 1 slope and thus, the upper three levels were not full 1 x 1 m levels. Based on the number of items recovered from these partial levels, the concentrations of material in the unit's upper 30 cm is equal to or greater than that of Levels 4 and 5. The quantity of material begins to drop in Level 6 and, although only half of Level 7 was excavated, a significant percentage drop occurs in Level 7. Both of these levels are in the light reddish brown sand (Soil Unit IIs).

Tertiary flakes comprise 48.4 % of the flakes from this unit and 35.8% are primary and secondary decortication flakes. A total of 15.8 % of the flakes are identifiable as derived from bifaces. Considering that the first three levels are partial (due to the unit being on the slope), no particular trend in flake concentration per level is apparent. However, 50% of the primary and secondary cortical flakes were recovered from the first three levels

indicating a possible concentration of these flake types in the upper 20 to 30 cm of deposit in this area.

The flake sample is comprised of several lithic material. Most (65.3%) are Ogallala quartzite and unidentified chert. Alibates agatized dolomite and unidentified quartzite make up the bulk of the remainder (27.4%). A small portion (2.1%) is Florence A and Florence B chert. All the primary and secondary flakes exhibit cortex indicating acquisition from gravel sources. Most (73.5%) are Ogallala quartzite and unidentified chert. These same materials also account for 60.9% of the tertiary flakes. Both pieces of bipolar debitage are Alibates. Ogallala quartzite and unidentified chert are the most prevalent material in the shatter and blocky debris.

Other Stone

Among the 36 items in this category are fractured rocks including quartzite and quartz cobbles and some sandstone. These items do not appear to have been fractured by stone tool production, rather most exhibit fracturing and coloration typical of exposure to intense heat. Also found were pieces of a greenish gray mudstone. This soft stone derives from Permian deposits and can be observed in nearby exposures. Its occurrence among cultural items in the fine sandy loam above the Permian deposits suggest the presence of this material is due to human activity rather than natural processes.

Fractured Rock N=15

These 15 items weighing a total of 289.7g, consist of fractured quartzite and quartz cobbles derived from gravel. Its distribution by level is fairly even (Table 2).

Mudstone N=21

A total of 21 pieces of mudstone weighing 250.5g were recovered from Test Unit A. A particularly high concentration was found in Level 3 (Table 2).

Test Unit C

As previously mentioned, Test Unit C was excavated outside of the R/W in a portion of the site not disturbed by construction. Thus, the unit provides a basis from which to judge not only the potential of the site itself, but to gauge the amount of disturbance to the deposits remaining in the R/W.

The unit produced a total of 258 items in 7 fully excavated levels. These include 3 chipped stone tools, 138 pieces of debitage and 1 core. A concentration of mudstone was encountered between 28 and 35 cm

(Figure 15). Although no obvious pits, concentration of charcoal or other materials were directly associated with rocks, their occurrence within Soil Unit Is appears to be attributable to cultural activity. The mudstone is readily available in Permian deposits exposed in the canyon wall below the site, and does not naturally occur in this upper soil. In addition, their vertical distribution within the test unit does not appear to be random.

Chipped Stone Tools (N=3)

Arrow Point (N=1) Figure 10e

One triangular arrow point recovered from Level 4 is made of Ogallala quartzite. The tip is missing from the point which measures 15.3 mm in length, 14.3 mm in maximum width and is 2.5 mm thick. The point was manufactured from a flake and most of the ventral surface is still visible. The arrow point compares well with the Fresno type common during the Late Prehistoric and early Protohistoric (Bell 1960:44).

Biface Fragment (N=1)

A biface fragment of unidentified red quartzite was found in Level 3. It exhibits two laterally converging edges and transverse fractures on both ends. The biface measures 16.2 mm x 13.3 mm and is 4 mm thick.

Miscellaneous Modified Items (N=1)

A unifacially modified flake of Alibates was recovered from Level 4. The unifacial modification completely covers the dorsal face. The 4.3 mm thick artifact measures 22.5 mm x 14.3 mm. One end exhibits a break while the other end displays a heavy polish and rounding.

Debitage N=138

A total of 91 flakes, 43 pieces of shatter and 4 pieces of bipolar debitage was recovered from all levels of Test Unit C (Table 2). Levels 2, 3 and 4 produced the highest number and concentration of items accounting for 65.9% of the total debitage and 67.7% of the flakes. The quantity of material begins to drop in Levels 5-7. These levels occur in the light reddish brown sand (Soil Unit IIs) below the dark loamy sand (Soil Unit Is).

Tertiary flakes comprise 60.4 % of the 91 flakes from this unit. A total of 69% occur in Levels 2, 3 and 4. Most (68.2%) of the primary and secondary cortical flakes also derive from the these levels. These latter flake types comprise 35.2% of Test Unit C's flakes. Bifaces flakes make up 15.4% of the 91 flakes.

The flake sample is comprised of several lithic materials. Most are (68.1%) Ogallala quartzite and

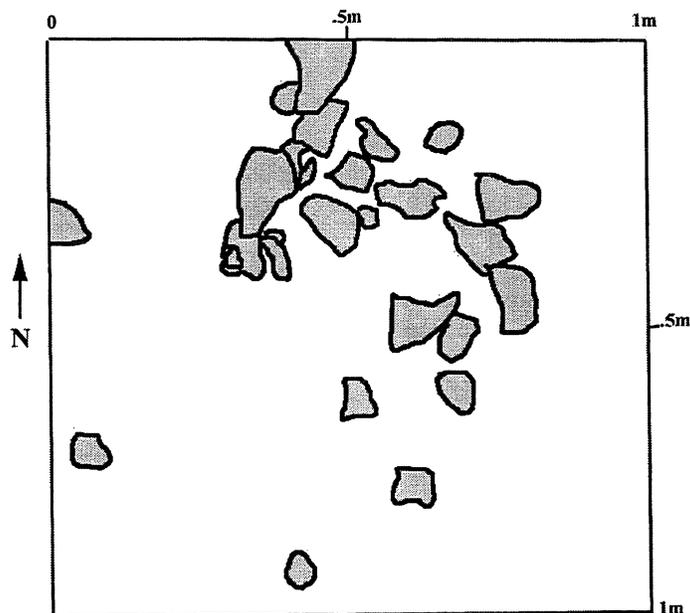


Figure 15. Plan view of mudstone concentration at 28-35cm, Test Unit C, 34BL103.

unidentified chert Alibates agatized dolomite and unidentified quartzite make up the bulk of the remainder (28.5%). A small portion (2.2%) is Florence A and Neva chert. All the primary and secondary flakes except the Neva chert flake which exhibits a rough cortex typical of that found at its geologic source, exhibit cortex indicating acquisition from gravel sources. Most (77.2%) of the primary and secondary flakes are Ogallala quartzite and unidentified chert. These same materials also account for 69.1% of the tertiary flakes with Alibates comprising 18.2%. Alibates and unidentified chert each comprise 50% of the bipolar debitage. The shatter and blocky debris is dominated by Ogallala quartzite and unidentified chert.

Core N=1

A core of unidentified quartzite was recovered from Level 3. The multidirectional core's dimensions are 47.6 mm x 49.2 mm x 30.7 mm. The core exhibits three platforms.

Other Stone

Aside from the debitage, no fractured quartzite or quartz was recovered from Test Unit C. However, a large amount of greenish gray mudstone derived from

Permian deposits was found. Most was recovered from Levels 3 and 4. A particularly high concentration, including larger stones was found near the base of Level 3 (Figure 15). Although no pits, stains or charcoal concentrations were associated with this cluster of stone, the occurrence of this Permian derived material within the cultural deposit can only be the result of human activity. There is no evidence of these stones being exposed to heat.

Mudstone N=116

A total of 116 pieces of mudstone weighing 5.455kg was recovered from Test Unit C. Most (n=107; 5.347kg) was found in Levels 3 and 4. In fact, the mudstone from these 2 levels comprise 67.3% of the total mudstone recovered during the investigation.

Test Unit D

Like Test Unit C, this unit was also excavated outside the R/W. Test Unit D and Test Unit E, both in the northern site area, were excavated deeper than units A and C in an effort to reach and investigate the buried soil observed on the road cut. A total of 117 artifacts was recovered from the 15 excavated levels (150 cm). Among the items are 2 chipped stone tools and 92 pieces of debitage.

Chipped Stone Tools (N=2)

Biface Fragment (N=1)

The convergent tip of a finely flaked biface made from unidentified chert was recovered from Level 8. The artifact measures 18.3 mm x 29 mm and is 4.5 mm thick. A snap break is present at one end.

Miscellaneous Modified Item (N=1)

A cortical flake of Alibates exhibiting minimal unifacial modification and slight use wear was recovered from Level 9. The artifact is 38.1 mm x 18.5 mm and is 7.8 mm in maximum thickness.

Debitage (N=92)

A total of 82 flakes and 10 pieces of shatter and blocky debris was recovered from Test Unit D (Table 2). Levels 6-9 (from 50 to 90 cm BLS) produced 53.3% of the totaldebitage recovered from the 15 levels with Levels 6 and 7 alone accounting for 32.6%. These levels occur in the lower half and just below the upper dark loamy sand (Soil Unit III_n) which grades into a lighter brown somewhat coarser loamy sand around the base of Level 8 and ending at 110 to 115 cm (Soil Unit IV_n). Beginning in Level 12 (110-120 cm), the artifact density drops significantly and no lithic artifacts were found below Level 13 (130 cm).

Tertiary flakes comprise 48.8 % of the 82 flakes from this unit. Although only two primary flakes were found in the unit, cortical flakes (primary and secondary) comprise 22% of the total flakes. Flakes derived from bifaces make up 29.3% of the flakes and shatter and blocky debris account for only 10.9% of thedebitage sample.

The flake sample from Test Unit D is comprised of the fewest lithic material types of any of the test units. Most of the flakes are unidentified chert and Alibates (71.9%) with Ogallala quartzite making up the bulk of the remainder (19.5%). All of the primary and secondary flakes exhibit cortex indicating acquisition from gravel sources. Most (66.7%) are Ogallala quartzite and unidentified chert. The shatter and blocky debris is comprised of Ogallala quartzite (50%) and unidentified chert (50%).

Other Stone

A majority of the 23 items in this category are fractured rocks including quartzite and quartz cobbles and some sandstone. These items do not appear to have been fractured by stone tool production, rather most exhibit fracturing and coloration typical of exposure to intense heat. Pieces of greenish gray mudstone were also

found.

Fractured Rock N=21

These 21 items weighing a total of 427.7g, consist of fractured quartzite and quartz cobbles derived from gravel as well as 2 pieces of sandstone. Level 4 produced the greatest number per level (6), however, these 6 items only weigh a total of 8.8 g. The 4 (75.1g) from Level 14 are the only artifacts recovered from that level.

Mudstone N=2

A total of 2 pieces of mudstone weighing 128g were recovered from Test Unit A. Both are from the upper two levels (Table 2).

Test Unit E

Test Unit E was excavated in the R/W about 15.25 m north of Test Unit D. Because the unit is on the slope of the road cut, the first three levels are not full 1 x 1 m levels. Situated on the 4 to 1 slope about 1.5 m west of the pre-construction disturbed surface, it is estimated that about 45 cm of soil had previously been removed from the area encompassing the east wall of unit. Therefore, Level 1 of Test Unit E is roughly stratigraphically equivalent to Level 5 of Test Unit D. A total of 74 chipped stone artifacts, including a unifacially edge modified tool, a core and 73 pieces ofdebitage were recovered. In addition, a bone tool was found in Level 13.

Chipped Stone Tools (N=1)

A primary flake of Alibates exhibiting unifacial modification along both lateral edges was recovered in Level 5. The 7.8 mm thick artifact measures 38.1 mm x 18.5 mm and, in addition to the secondary flaking, exhibits areas of small step fractures and nibbling as well rounding and polish along its lateral edges.

Debitage (N=73)

A total of 54 flakes and 19 pieces of shatter and blocky debris was recovered from Test Unit E. (Table 2). Levels 3 and 4 (from 20 to 40 cm BLS) exhibit the greatest concentration of materials and account for 32.4 % of the lithic artifacts from the 13 Level Unit (140 cm BLS). These two levels roughly correspond to Levels 7 and 8 in Test Unit D. The quantity of recovereddebitage begins to drop in Levels 9 and none was recovered from Level 11. An increase indebitage begins in Level 12 where the top of the paleosol (Soil Unit VI_n) was encountered.

Tertiary flakes comprise 51.8 % of the 54 flakes from

this unit and are fairly evenly distributed throughout the levels. Primary and secondary cortical flakes make up 33.3% of the total flakes with 61.1% coming from Levels 3-5. Flakes derived from bifaces make up 14.8% of the flakes and shatter and blocky debris account for 26% of the debitage sample.

Most of the flakes are Ogallala quartzite, unidentified chert and Alibates (70.3%). Most (72.2%) the primary and secondary flakes are Ogallala quartzite, unidentified chert and Alibates and exhibit cortex indicating acquisition from gravel sources. The shatter and blocky debris is comprised mostly of Ogallala quartzite and Alibates (68.4%).

Other Stone

A majority (76.7%) of the 86 items in this category are fractured rocks including quartzite and quartz cobbles and sandstone. Most exhibit fracturing and coloration typical of exposure to intense heat and do not appear to have been fractured by stone tool production. The remaining 20 (23.3%) of the items are mudstone.

Fractured Rock N=66

These 66 items weighing a total of 966 g, consist of 35 pieces of sandstone and 31 pieces of fractured quartzite and quartz cobbles derived from gravel. More than half (56%) of the fractured rock derives from the first three levels (Table 2).

Mudstone N=20

A total of 20 pieces of mudstone weighing 246.4g was recovered from Test Unit E. All derives from Level 6 or below with most (60%) coming from Levels 11 and 12 (Table).

Bone Tool (N=1) Figure 16

A modified left deer ulna was recovered from Level 13 within Soil Unit VI. The tool measures 10.8cm in length and exhibits modification forming a convergent tip on the distal end. In addition, a portion of the olecranon has been removed and smoothed. Deterioration at the distal end inhibits examination of the working tip of the tool, however, similar tools have been found which exhibit use-wear resulting from pressure flaking.

Discussion

Analysis of the surface material from the North and South collection areas suggests some differences in the distribution of materials. Among the stone tools recovered from the surface collection areas, a higher number of bifaces were found in the North collection area and most endscrapers were found in the South collection area. In addition, a much higher frequency of debitage was found in the South area. Further important information gleaned from the surface collection was the recovery of diagnostic artifacts. The two corner-notched arrow points, arrow point preform and corner-notched biface indicate a Plains Woodland component is present on the site.

The mano and metate from the North area provides evidence of plant processing activity on the site and the one pottery sherd attests to presence of ceramics on the site.

Considering the total number of artifacts recovered from the four 1x1 test units, Test Units A and C, excavated in the south portion of the site produced a higher frequency of materials than the units in the north portion of the site (Test Units D and E).

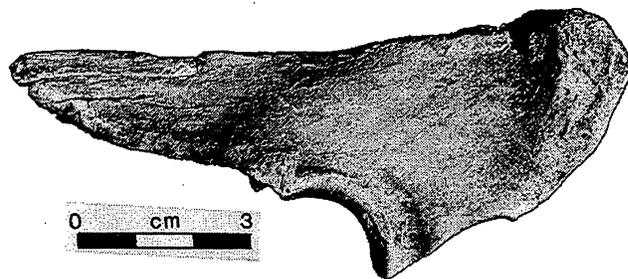


Figure 16. Modified deer ulna from Test Unit E, 34BL103.

The number items collected from the North and South surface collection units reflect a similar pattern. In addition, the majority of stone tools recovered from excavated contexts are from the south units. Among these items are two triangular arrow points typical of Fresno types common to Late Prehistoric and early Protohistoric components.

Among the other stone recovered, the vast majority of mudstone from the site was found in the south units with Test Unit C producing the most. This type of stone originates in Permian deposits which are stratigraphically well below the cultural deposit. Thus, the mudstone could only be present as the result of cultural activity. The mudstone concentration near the base of Level 3, Test Unit C may indicate some integrity of the cultural deposit.

The cultural material of both units is concentrated in the upper 50 cm of deposit. In comparing the two units, there appears to be little disturbance of the deposit below the surface of the road cut. Aside from the concentration of mudstone in Unit C, the virtual absence of fractured quartz and quartzite stone is interesting.

Analysis of the artifacts excavated from the south units (mostly lithic debitage) does not indicate significant differences in the materials between the upper and lower levels. However, the recovery of unnotched arrow points and the radiometric date of 1460 +/- 60 radiocarbon years BP derived from charcoal in Level 4, Test Unit C indicate both a Late Prehistoric component as well as a Plains Woodland component are present in the south area of the site. Considering that one triangular (Fresno) arrow point was found in the same level producing the 1460 +/- 60 BP date, it could be suggested that point is associated with the Plains Woodland component. However, the stratigraphic separation of materials observed in Test Unit E in the north area of the site as well as analysis of the obsidian flake discussed later suggest a Late Prehistoric occupation of the site. Therefore, it is likely that the Fresno point relates to this later occupation and the co-occurrence of Late Prehistoric artifacts and charcoal producing a Plains Woodland date may indicate mixing or compression of materials from both occupations in this area of the site.

Although there is cultural material present through most of the levels in Test Units D and E, it is not present in the quantity of that in Units A and C. Only three stone tools were recovered from both units, none of which are

diagnostic.

There is a concentration of lithic materials in Levels 6-9 of Unit D (53.3%), the corresponding levels of Test Unit E (Levels 2-5) account for 41.1 % of the total lithic assemblage from the Unit. When considering that Levels 2-3 are not complete 1 x 1 levels, it appears that Levels 2-5 of Test Unit E and Levels 5-9 of Test Unit D contain corresponding frequencies of cultural material. The cultural items in both units are most frequent within corresponding areas of Soil Units III_n and IV_n and likely represent a cultural occupation.

The recovery of cultural material including 10 pieces of debitage and a modified deer ulna from Levels 12 and 13 which were excavated within soil Unit VI_n provides evidence of a cultural occupation associated with the buried soil.

Although the analysis of the lithic debitage could not distinguish lithic material or flake types between either component, it is evident that both components relied heavily upon local gravel deposits as sources of lithic material for the production of stone tools.

Additional Analyses

The following section contains analysis of other materials recovered from 34BL103 including faunal and macro botanical remains, microdebitage and an analysis of the obsidian flake recovered from the site.

Faunal Remains

by

Robert Bartlett and Valli Powell

The investigation of 34BL103 produced 258 faunal remains. Most are small fragments and the majority show evidence of weathering. Of the 258, a total of 19 elements were identified. Of the remaining number, 167 are unidentifiable and based on attributes such as overall size or thickness of the cortical bone, 75 could be attributed to either small, or medium/large mammals. Small mammals would include animals such as rodents, squirrel and raccoon, medium being animals of the size of dogs or beaver, and large being animals such as deer or bison.

Most of the identifiable remains were found in the South collection area. Although not abundant, all 1 x 1 m test units produced faunal remains. Test Units A and E contained higher numbers than Test Units C and D.

Identified Elements N=19

A total of 19 elements representing 4 mammal, 1 amphibian and 2 avian species was identified in the assemblage. All identified elements are represented only by fragments.

White-tailed Deer (*Odocoileus virginianus*) N=12

Of the 12 identified remains of white-tailed deer, 11 were found in the South collection area and 1, a molar, is from Test Unit E, Level 6. None of the elements are complete and all are represented by only small portions of the element. Identifiable elements include a pelvis, a humerus, two metatarsals, a left and right astragalus, a right tibia, three right and one left femurs and two molars.

Bison (*Bison bison*) N=2

A portion of a right humerus identifiable as bison was recovered from the South collection area. A 2nd phalange was recovered from Test Unit A, Level 4.

Canis (*Canis sp*) N=1

A portion of the left mandible of either domestic dog or coyote was found in the South collection area.

Squirrel (*Sciurus sp*) N=1

A portion of the left mandible of a squirrel was found in the North collection area.

Unidentified Waterfowl N=1

A scapula of an unidentified species of duck was recovered from Test Unit A, Level 1.

Unidentified Bird N=1

A portion of a femur of a unidentifiable species of bird was found in Test Unit E, Level 9.

Frog (*Rana sp*) N=1

A partial tibio-fibula of a frog was found in Test Unit E, Level 5.

Unidentified Mammal Bone N=75

Based on attributes such as the overall size of the fragment and thickness of the cortical bone, 74 bone fragments could be attributed to either small or medium/large mammals. Most fall into the medium/large category.

Small Mammal N=5

Among these items are 2 long bone fragments from Test Unit E, Levels 11 and 12. In addition, tooth fragments

were recovered from Test Unit E, Level 9 and Test Unit A, Level 6. One small bone fragment from a small mammal was found the South collection area.

Medium/Large Mammal N=70

The majority (N=55) of these items derive from the South collection area, and the North (N=11) collection area. At least 19 of the fragments appear to be from large mammals, the remainder being attributable to at least medium sized animals. In addition, 1 fragment in this category is from Test Unit D, Level 8, 2 from Test Unit E, Level 12 and 1 from Test Unit E, Level 13.

Unidentified Bone N=167

The majority of bone (69%) recovered during the investigation is unidentifiable. This is due to the fragmentary nature of the remains as well as the eroded condition of many of the pieces. A total of 69 of the items in this category are from the surface collection areas. Test Unit A produced the most (N=36) of all the test units with the highest concentrations in Levels 3 and 4. A total of 49 (29.3%) of the items in this category have been burned.

Discussion

Overall, most of the recovered bone is in poor condition. All are fragments and many exhibit evidence of weathering which inhibits identification. About 23% (N=60) of the sample evidences burning, none of which are identified as to species. Of the 19 bones which could be identified as to species, most are from the South collection area. Among these remains are white-tailed deer, bison and either dog or coyote. The South collection also produced the highest number of medium to large mammal remains as well as most of the unidentifiable bone. Other identified species include squirrel, duck, frog and unidentified bird. Of the remains which could be identified as either small or medium to large animals, only five appear to be from small animals. Although not identifiable as to species, most of the bone identified as medium to large mammal are most likely deer or bison.

Test Unit A produced more bone than Test Unit C with most coming from Levels 3-5. In the northern portion of the site, Test Unit E produced significantly more bone than Test Unit D, most of which was found in Levels 3-7. Although only about 12% of the total sample is from Test Unit E, five pieces of bone were recovered in levels excavated in Soil Unit VI in attesting to the presence of bone in the paleosol.

Table 4. Faunal remains recovered from 34BL103

Provenience	Identified Elements	Mammal		Unidentifiable	Total
		Small	Medium/Large		
North Area	Squirrel (<i>Sciurus sp.</i>); 1 mandible (left)	—	11	35	47
South Area	White-tailed Deer (<i>Odoicoileus virginianus</i>); 1 pelvis; 2 metatarsal; 2 astragalus (1 left, 1 right); 1 molar (P3); 1 tibia (right); 4 femur (1 left, 3 right) Bison (<i>Bison bison</i>); 1 humerus (right) Canis (<i>Canis sp.</i>); 1 mandible (left)	1	55	34	103
Total	14	1	66	69	150
Test Unit A					
Level 1	Duck (unidentified sp.); 1 scapula	—	—	1	2
Level 2		—	—	5	5
Level 3	Bison (<i>Bison bison</i>); 1 2 nd phalange	—	—	6	7
Level 4		—	—	12	12
Level 5		—	—	9	9
Level 6		1	—	1	2
Level 7		—	—	2	2
Total	2	1	—	36	39
Test Unit C					
Level 2		—	—	6	6
Level 3		—	—	7	7
Level 5		—	—	2	2
Total		—	—	15	15
Test Unit D					
Level 3		—	—	2	2
Level 7		—	—	9	9
Level 8		—	1	—	1
Level 11		—	—	2	2
Total		—	1	13	14
Test Unit E					
Level 1		—	—	1	1
Level 3		—	—	4	4
Level 5	Frog (<i>Rana sp.</i>); 1 tibio fibula (left)	—	—	1	2
Level 6	White-tailed Deer (<i>Odoicoileus virginianus</i>); 1 molar	—	—	2	3
Level 7		—	—	20	20
Level 8		—	—	1	1
Level 9	Bird (unidentified sp.); 1 femur	1	—	—	2
Level 10		—	—	1	1
Level 11		1	—	—	1
Level 12		1	2	—	3
Level 13		—	1	1	2
Total	3	3	3	31	40
Total	19	5	70	164	258

Macrobotanical Remains

by Valli Powell

Soil samples of 2.0-2.5 liters each were collected from the four 1 x 1 m test units. Samples were collected from levels that, based on the number of recovered artifacts and presence of charcoal, held the most potential for the presence of plant remains. In Test Unit A, soil for flotation was taken at Levels 3 and 5; soil was collected from three different levels in Test Unit C (Levels 4, 5, and 6), from three levels in Test Unit D

(Levels 4, 7, and 8), and from two different levels in Test Unit E (Levels 3 and 4).

Residue from flotation processing of these yielded sets of both light fraction and heavy fraction materials for each of the 33 total samples. Eight sets of processed residue were selected for analysis and sorted through graduated geologic screens of 2.0 mm, 1.0 mm, 0.5 mm, 0.25 mm, and <0.25 mm sizes for examination under a binocular microscope. Thus, ten different units consisting of five sizes each of heavy and light residue

Table 5. Seed types per test unit and level from fully sorted soil samples.

Seed Type	Test Unit A		Test Unit C			Test Unit D	Test Unit E		Total
	L. 3	L. 5	L. 4	L. 5	L. 6	L. 7	L. 3	L. 4	
Cheno-Am, charred	58	37	24	28	17	3	1	8	176
Carpetweed		1	2	6	7; 1,c		2		19
Flatsedge			3; 1,c		2				6
Dropseed	1,c								1
Goosegrass	1		1						2
Maygrass	1,c								1
Portulaca		1							1
Oxalis		1	1						2
Loco		1							1
Viola			1						1
Mustard			1	2		1			4
Pepperweed				1					1
Doveweed					1	2			3
Unid.grass seedhead			1	1					2
Rockgrass					1				1
Sheep sorrel					1				1
Unidentified	1		2	2					5
Total	62	41	37	40	30	6	3	8	227

Abbreviations: c=charred; L=level; unid.=unidentified.

were produced for each of the eight fully sorted samples. These full sorts came from Test Units A, Levels 3 and 5, Test Unit C, Levels 4, 5, and 6, Test Unit D, Level 7, and Test Unit E, Levels 3 and 4.

Table 5 displays the seeds from each of the fully sorted samples. Contamination of the floatation samples was from small rootlets and plant stem pieces and comprised approximately 50-85% of the light fractions of residue and about 50% of the heavy fractions of residue. As can be seen from Table 5, most seeds, retrieved from soil samples came from Test Units A and C.

A total of 227 seeds were found in the eight fully sorted samples. Table 5 presents a breakdown of the various types of seeds identified in each test unit and level. All of the 176 chenopodium-amaranth seeds were charred while only four of the other seed types were burned (1=carpetweed [*Mollugo*]; 1=dropseed [*Panicum*]; 1=flatsedge [*Cyperus*]; 1=Maygrass [*Poaceae*]). All of the chenopodium-amaranth type seeds came from Levels 3 through 7. Some were found in all four test units; however, most of the chenopodium-amaranths (93.18%) came from Test Units A and C. Only 12 of the chenopodium-amaranth seeds were associated with the samples from Test Units D and E. There were only five unidentified seeds present in the eight soil samples.

In addition to the seeds recovered by flotation, a fragment of charred nut hull was recovered during excavation from Level 5 of Test Unit C. The fragment measures 6.5 mm x 6 mm and is 1.7 mm thick. One side displays a raised texture typical of walnuts.

Microdebitage Analysis by

Valli Powell and Robert Bartlett

Microdebitage, defined here as small flakes of 2 mm or less in size, results from the production of chipped stone tools, as well as their use and maintenance. The recovery of microdebitage from soil samples by water screening through fine mesh or as heavy fraction during flotation has been demonstrated to be an indicator of primary deposits of cultural material (Fladmark 1982). These small flakes are highly susceptible to displacement by deflationary processes such as wind and water. Thus, their absence among deposits containing debitage of larger sizes may indicate secondarily deposited material (*ibid*). Alternatively, the recovery of small flakes from soil matrix may indicate activity areas or deposits little affected by deflationary processes. Microdebitage in the heavy fraction of the flotation samples sorted during the macrobotanical analysis, were counted and identified by material type as either chert or quartzite (Table 6).

An obvious difference in the occurrence of microdebitage between the north and south test units is apparent. All but one of the 68 pieces of microdebitage came from south test units (Test Units A and C, Levels 3 through 6) while only one microflake was found in the heavy fraction among the samples analyzed from the north test units (Test Unit E, Level 3). Forty pieces of lithic microdebitage were identified as quartzite, 27 as chert, and one was unidentifiable.

Table 6. Lithic types recovered from soil samples.

Material Type	Test Unit A		Test Unit C			Test Unit D	Test Unit E		Total
	L. 3	L. 5	L. 4	L. 5	L. 6	L. 7	L. 3	L. 4	
Chert	3	14	5	4	1				27
Quartzite	7	6	17	7	3				40
Unidentified							1		1
Total	10	20	22	11	4		1		68

Abbreviations: L=level.

Obsidian Analysis

The flake of obsidian found on the surface of the road cut was submitted for sourcing and hydration analysis. The 1.8 gm flake measures 21.5 mm in length, 22.6 mm in width and is 4.0 mm in maximum thickness (Figure 17). The 87 degree platform displays preparation in the way of flaking. No lip is evident and the flake was apparently struck from a core with at least two platforms. The dorsal face exhibits small flake scars originating from the same direction as the platform, as well as a scar originating perpendicular to this axis. A small portion of the dorsal face does not display compression rings indicating flake removal and may represent an unmodified surface of the core.

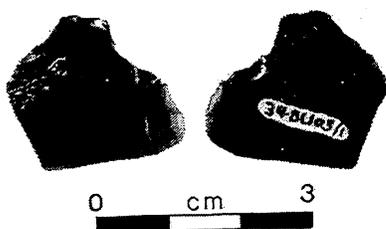


Figure 17. Obsidian flake recovered from 34BL103.

Source Analysis

The flake was submitted to the Archaeological X-Ray Fluorescence Spectrometry Laboratory, Phoebe Hearst Museum of Anthropology, Berkeley, California for source identification (Sample 2103-1). The results of Energy Dispersive X-Ray Fluorescence (EDXRF) analysis indicate the flake is derived from material obtained at the Malad, Idaho source in Oneida County, Idaho (Shackley 1999).

Table 7. EDXRF concentrations for the obsidian flake from 34BL103. All measurement in parts per million.

Element	Ti	Mn	Fe	Rb	Sr	Y	Zr	Nb
ppm	696.8	188.3	9560.2	125.4	74.2	33.4	89.2	14.4

Hydration Analysis

The flake was submitted for hydration analysis in hopes of determining which component on the site produced the flake. Obsidian hydration rates vary according to the source of the material and are also affected by other variables including local temperature. Therefore, determining calendar dates based on obsidian hydration, particularly on a site far from the geologic

source, can be questioned simply on evidence of environmental fluctuations through time. However, methods are constantly being improved and while acknowledging problems in using hydration to provide an absolute date, it is possible in the case of the 34BL103 flake, that a determination may be made as to which of the two components on the site likely produced the flake.

Analysis by the Obsidian Hydration Laboratory, Sonoma State University obtained a hydration band measurement of 2.5 +/-0.2 microns on the ventral surface and 3.4 +/-0.2 microns on the dorsal surface. The dorsal measurement is from a portion of the flake with a scar from a previous flake removal. The .9 micron difference in the hydration band measurements between the two faces indicate the events producing the dorsal face scar and removal of the flake itself occurred at different times. Calculations based on a comparison of laboratory produced hydration rates between the Napa Glass Mountain source in California and the Malad source in Idaho, and the effective hydration temperature (EHT) determined for Blaine County, Oklahoma, indicate the ventral surface of the flake was produced around 722 (A.D.1277) years ago (Origer 1999). This is assuming the flake was detached on the site. Considering the +/-0.2 micron measurement range, the ventral surface hydration band could indicate a date ranging from 847 to 583 (A.D. 1152-1416). Based on an assumption that the dorsal flake scar was produced at 34BL103, it was created about 1335 (A.D. 664) years ago [+/- 0.2 microns: 1427-1127 years ago, A.D. 572-872] (Origer 1999). However, if the dorsal flake scar was produced at the Malad, Idaho source, it could date (based on the difference in EHT) much earlier.

Based on the above analysis the flake can be attributed to the Late Prehistoric component. Obsidian artifacts from the Malad, Idaho source have been found on other Late Prehistoric sites in northwest Oklahoma including two from the Zimms site (34RM72) and one from the Omev site (34WO43) (Baugh and Nelson 1987).

Historic Items

A total of 36 historic items were recovered during the investigation (Table 8). All the items are fragments and include ceramics, glass and metal.

Table 8. Historic items recovered during the 34BL103 investigations.

Provenience	Ceramics			Glass			Metal		Total
	Whiteware	Transferware	Stoneware	Jar/Bottle	Decorative	Lamp	Nail	Unidentified	
Surface	3	1	—	1	—	—	—	1	6
Shovel Tests									
5E	—	—	—	2	—	3	—	—	5
10E	—	—	—	1	—	—	—	3	4
20E	—	—	1	—	1	—	—	2	4
Test Unit D									
Level 1	—	—	—	4	—	—	—	3	7
Level 2	—	—	—	2	—	—	1	5	8
Level 3	—	—	—	2	—	—	—	—	2
Total	3	1	1	12	1	3	1	14	36

Ceramics

Whiteware N=3

A total of three fragments of whiteware were collected from the surface of the road cut. All are rim portions and include fragments of a cup and two plates. The plate fragments include one with molded relief design. No makers marks or other distinctive attributes are present on the items.

Transferware N=1

One fragment of a blue transferware plate was collected from the surface of the road cut. The sherd includes a portion of the foot. The design displays thin lines, however, due to the small size of the sherd the design elements cannot be distinguished.

Stoneware N=1

A portion of the base (comprised of 2 refit sherds) of a Bristol glazed crock was recovered in Shovel Test 20E. The base is flat with a foot around the outer edge.

Glass

Jar/Bottle Fragments N=12

A total of 12 fragments identifiable only as jar or bottle glass was recovered during the investigations. Most derived from the upper levels of Test Unit D (Table 8). With the exception of a fragment of a milk glass canning jar lid liner, all the items are too small to identify as far as container type or use. There are 3 pieces of aquamarine glass, 3 pieces of solarized glass and 5 pieces of clear glass.

Decorative Glass Fragment N=1

A small piece of clear glass displaying a molded cross-hatched design was recovered from Shovel Test 20E.

Lamp Chimney N=3

A total of three pieces of thin (.5-.8mm), clear glass

appear to be glass from a lamp chimney. All were recovered from Shovel Test 5E.

Metal

Nail N=1

A heavily oxidized fragment of a small nail was found in Level 2 of Test Unit D. The item is 26 mm long and retains a portion of the head. Due to heavy oxidation, a determination as to if the item is a round wire or cut nail cannot be made.

Unidentified N=14

A total of 14 pieces of oxidized unidentifiable metal fragments were recovered. All are too small to render any further description. Most are from the upper 2 levels of Test Unit D.

Site Summary

Based on the recovery of diagnostic artifacts from 34BL103 and evidence gleaned from the soil profiles, there appear to be two stratigraphically separated prehistoric components, a Plains Woodland and a Late Prehistoric are present on the site. However, there are differences in the stratigraphic relationship of the components in the northern and southern areas of the site.

The Fresno points recovered from the south test units evidence a Late Prehistoric component on the site. Analysis of the obsidian flake indicates this item also relates to this component and suggests an occupation around 725 years ago (A.D. 1272). Since no side-notched arrow points, which are usually more prevalent during this time were recovered, the occupation may be slightly later than this date. The corner-notched arrow points and corner-notched biface recovered are typical

of Plains Woodland assemblages and the radiometric date of 1460 +/- 60 radiocarbon years BP obtained from charcoal recovered from Level 4 of Test Unit C falls well within the range of Woodland assemblages dated elsewhere in Oklahoma (Vehik 1984:180-181). Although the diagnostic Woodland artifacts from 34BL103 were not found in an excavated context, and the only diagnostic artifact from Test Unit C (a Fresno point) appears to relate to the later occupation, the date may be representative of the Plains Woodland occupation. This may be explained by the interpretation that the Plains Woodland occupation is likely associated with the artifact bearing buried soil (Soil Unit VIIn) in Test Unit E on the site. Inspections on the road cut suggest the buried soil merges with the upper soil on the knoll where Test Unit C was excavated. Further, since there seems to be some spatial integrity to the items collected from the surface of the road cut, the corner-notched arrow point as well as the corner-notched arrow point preform recovered near the knoll suggest the possibility of Plains Woodland artifacts in this area. Thus, the two components may be mixed or compressed on the knoll.

Aside from the Fresno points, analysis of the cultural materials recovered from the south excavation units was unable to distinguish artifacts from either the Late Prehistoric or the Plains Woodland occupation. Further investigation could likely answer this question. Microdebitage analysis and the variety of stone tools found both in Test Units A and C and the south collection area suggest the southern area of the site contains primary deposits possibly reflecting several activities. The concentration of mudstone in Level 3, Test Unit C suggests the possibility of intact features in this area of the site. Therefore, if the two components are mixed or compressed, hampering the association of artifacts to either occupation, features attributable to either component may be present.

The north area of the site presents a somewhat different scenario than the south area. The upper soil contains a concentration of cultural material within the base of Soil Unit IIIIn (50-70 cm BLS). However, no diagnostic artifacts were recovered and very few stone tools were found. In addition, the three soil samples

from the north test units examined for microdebitage produced only one microflake. Thus, the possibility that the cultural material may be a secondary deposit must be considered (Schiffer 1987). While it is likely the concentration of cultural material in Soil Unit IIIIn is indicative of the Late Prehistoric cultural occupation, the possibility that some, or many of the items have been deposited within the upper soil by downslope erosion from the south area of the site must be considered. If this is the case, these items may a mixture of both occupations.

Although the buried soil was only minimally investigated, prehistoric cultural materials were found in association with the soil. It is very likely that the corner-notched arrow point and biface found in the North collection area derive from this soil. Although there is evidence of erosional processes occurring with this soil prior to burial, including the lack of its presence in Test Unit D and the presence of coarse sand over the top of the soil in Test Unit E, there is certainly the possibility of intact cultural deposits relating to a Plains Woodland occupation within this soil.

In summary, the investigation of 34BL103 produced evidence that site is eligible for inclusion in the NRHP under Criteria D as it may provide information on Plains Woodland and Late Prehistoric occupations in an area of Oklahoma for which very little is know about either adaptation. The evidence suggests that the two prehistoric components may be stratigraphically separated including cultural materials associated with a buried soil. The recovery of charred seeds, faunal material and a bone tool indicate the preservation of organic material on the site. In addition, the radiometric date obtained by the investigation is consistent with the corner-notched artifacts recovered and the possibility of obtaining more dates in direct association with artifacts is certainly a possibility. These dates could be very informative as very few dates are available from Plains Woodland sites in Oklahoma. Most importantly, the site presents an opportunity to study the use of a diverse environmental setting by two different cultural adaptations.

IV Management Recommendations

The investigations of 34BL102 resulted in the determination that cultural deposits within the project R/W are not intact nor substantial and do not merit inclusion in the NRHP. It should be noted that areas west of the R/W were not investigated and the nature of the deposits in this area remains unknown. The local topography and soils on the site suggest a potential for cultural deposits in this area. Any future disturbance outside the R/W in this area should be preceded by subsurface archaeological investigations.

The investigations of 34BL104 indicate the site contains a sparse, widely dispersed scatter of prehistoric materials. No evidence of intact deposits was found in the R/W and the site does not appear to merit inclusion in the NRHP. Although areas outside the R/W were not investigated, based on the findings of the investigation as well as the nature of the local topography there would appear to be little potential for

significant cultural deposits outside the R/W.

Although there are questions regarding stratigraphy and site formation processes, based on the findings of this investigation, it appears that site 34BL103 contains cultural deposits which could provide important information regarding prehistoric occupations on the southern Plains. Therefore, the site is considered eligible for inclusion in the NRHP under Criteria D. It is also determined that although the deposits were affected by construction, the disturbance is minimal and the deposits remaining in the R/W are intact. It is recommended that any further disturbance within the R/W be preceded by an archaeological investigation. It is also recommended that the installation and maintenance of a vegetative cover on the road cut be conducted in a manner minimizing erosion and other factors that may result in the disturbance of the prehistoric cultural deposits.

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Appendix

Lithic material types of debitage recovered during the investigation of 34BL103. Definition of material types are presented below the tables.

Debitage recovered from surface of road cut, 34BL103.

Provenience	Lithic Material*	Debitage Type*						Total
		P	S	T	BF	SH/BD	BP	
General	OGQ	—	2	—	—	—	—	2
	ALB	—	2	6	1	2	—	11
	UC	—	2	4	2	—	—	8
	UNQZTE	1	1	4	1	—	—	7
	FLA	—	1	1	1	—	—	3
	NV	—	—	—	1	—	—	1
	PW	1	1	—	—	—	—	2
	QZTCRY	---	---	1	---	---	---	1
subtotal		2	9	16	6	2	---	35
South Area	OGQ	16	16	26	5	15	—	78
	ALB	4	8	34	9	15	5	75
	UC	7	5	34	11	12	2	71
	UBQZTE	1	3	12	5	10	—	31
	FLA	—	—	14	1	1	—	16
	FLB	—	—	1	—	—	—	1
	NV	—	—	—	1	—	—	1
	PW	2	1	—	1	—	—	4
	QTZ	—	2	2	---	2	—	6
	QZTCRY	—	—	3	---	—	—	3
	DC	1	1	---	---	---	---	2
subtotal		31	36	126	33	55	7	288
North Area	OGQ	5	10	13	5	—	—	33
	ALB	2	2	13	5	3	1	26
	UC	3	2	11	5	5	—	26
	UNQZTE	3	4	1	2	1	—	11
	FLA	—	—	4	2	—	—	6
	NV	—	1	—	—	—	—	1
	QZTCRY	—	—	5	—	1	—	6
	PW	—	1	2	—	1	—	4
	DC	1	1	1	—	—	—	3
	OBS	—	—	1	—	—	—	1
	NB	---	---	---	1	---	---	1
subtotal		14	21	51	20	11	1	118
Total		47	66	193	59	68	8	441

*Debitage Types: P=primary flake; S=secondary flake; T=tertiary flake; BF=biface flake; SH/BD=shatter and blocky debris; BP=bipolar debitage

Debitage material types recovered from Test Units, 34BL103.

Provenience	Lithic Material*	Debitage Type*						Total
		P	S	T	BF	SH/BD	BP	
Test Unit A	OGQ	6	10	17	5	22	—	60
	ALB	4	2	5	3	2	2	18
	UC	6	3	11	4	6	—	30
	UNQZTE	1	2	8	1	5	—	17
	FLA	—	—	—	1	—	—	1
	FLB	—	—	—	1	—	—	1
	DC	—	—	1	—	1	—	2
	QZTCRY	—	—	3	—	1	—	4
	QZT	—	—	1	—	3	—	4
subtotal		17	17	46	15	40	2	137
Test Unit C	OGQ	2	9	17	5	21	—	54
	ALB	2	3	10	3	2	2	22
	UC	2	3	21	3	12	2	43
	UNQZTE	—	—	6	2	7	—	15
	FLA	—	—	—	1	—	—	1
	NV	—	1	—	—	—	—	1
	QTZ	—	—	—	—	1	—	1
	QZTCRY	—	—	1	—	—	—	1
	subtotal		6	16	55	14	43	4
Test Unit D	OGQ	—	4	9	3	5	—	21
	ALB	—	2	10	6	—	—	18
	UC	—	8	18	15	5	—	46
	UNQZTE	—	1	1	—	—	—	2
	QZTCRY	—	—	2	—	—	—	2
	PW	—	1	—	—	—	—	1
	QZ	2	—	—	—	—	—	2
subtotal		2	16	40	24	10	—	92
Test Unit E	OGQ	2	4	7	2	9	—	24
	ALB	3	—	8	2	4	—	17
	UC	2	2	4	2	1	—	11
	UNQZTE	2	—	3	2	2	—	9
	FLA	—	—	2	—	—	—	2
	QTZ	2	—	—	—	1	—	3
	QZTCRY	—	1	2	—	1	—	4
	PW	—	—	2	—	1	—	3
subtotal		11	7	28	8	19	—	73
Total		36	56	169	61	112	6	440

*Debitage Types: P=primary flake; S=secondary flake; T=tertiary flake; BF=biface flake; SH/BD:=shatter and blocky debris; BP=bipolar debitage

***Lithic Material Types**

OGQ *Ogallala Quartzite* Includes fine and coarse grained quartzite from deposits containing gravel derived from the Ogallala Formation. The quartzite is gray to slightly reddish in color and exhibits a well polished cortex. Gravel deposits containing this material are present in western and central Oklahoma (Banks 1990:114). The material is common in gravel deposits in the vicinity of 34BL103.

ALB *Alibates Agatized Dolomite* Silicified dolomite derived from the Alibates Formation in the Texas Panhandle (Banks 1990:91-92). Bedrock sources were heavily exploited in prehistoric times. Knappable cobbles are present in terrace deposits along the Canadian River through Oklahoma (Wyckoff 1993). Terrace gravel deposits containing Alibates occur 25-30 km west of the site.

UC *Unidentified Chert* Includes a variety of unidentifiable chert. Cortex present on some flakes suggest some of the items are derived from small cobbles or pebbles obtained from local gravel sources.

UNQZTE *Unidentified Quartzite* This category includes coarse grained quartzite of various colors. The materials are likely from local gravel deposits.

FLA *Florence A Chert* Bedrock sources (Florence Formation) of this material are along the western edge of the Flint Hills 175 km northeast of 34BL103. Many sources are documented in Kay County, Oklahoma (Banks 1990:96-91). This material is often heat-treated to enhance knappability.

NV *Neva Chert* This material occurs in Neva limestone within the Grenola Formation (Banks 1990:98). Samples of this material housed at the Oklahoma Archeological Survey collected in Pawnee County near the Arkansas River compare very well with the material from 34BL103. Cortex on one flake in the sample is typical of the geologic source 200 km east of 34BL103.

QTZ *Quartz* Quartz cobbles are found in terrace gravel deposits derived from the Ogallala Formation. The material is common in local gravel deposits

QZTCRY *Quartz Crystal* This material is clear to somewhat opaque quartz most likely from quartz crystal. None of this material from 34BL103 exhibits facets displayed by unmodified crystals. One item does exhibit stream rolled cortex. Thus the material may be from local gravel deposits, however this remains undocumented. Stream rolled quartz crystal is documented in streams in the Wichita Mountain region of southwest Oklahoma 135 km from 34BL103 (Ferring 1978:377).

OBS *Obsidian* This category includes a fairly dark obsidian. Sources are not known in the area. The closest known source is northern New Mexico. The 34BL103 flake is from the Malad, Idaho source about 1400 km northwest of the site.

PW *Petrified Wood* This silicified material is difficult to knap due to its structure. Pieces of petrified wood are common in gravel deposits derived from the Ogallala Formation (see OGQ discussion above).

DC *Day Creek Chert* The closest geologic sources of this material occur about 75 km northwest of 34BL103 in Harper and Woodward counties of Oklahoma within the Cloud Chief Formation (Banks 1990:92). However, the material has been observed by the author in terrace gravel deposits along the Cimarron River very near 34BL103. A primary flake of this material exhibiting gravel cortex suggest these gravel deposits are the likely source of this material found on 34BL103.

NB *Niobrara Jasper* This material is tan jasper displaying dark bands. The material is derived from the Smokey Hill Member of the Niobrara Formation in Central Kansas (Banks 1990:96). The material is variable in flaking quality but was extensively utilized during prehistoric times. The closest sources to 34BL103 are about 300km north of the site.

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