The Cribb's Crib site (13WA105): the archaeology and ecology of an Oneota village in the central Des Moines River Valley

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The Cribb's Crib site (13WA105):
The archaeology and ecology of an Oneota
village in the central Des Moines River Valley

by

Steven LeRoy DeVore

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of the
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MASTER OF ARTS

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Signatures have been redacted for privacy

Iowa State University
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1984
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CHAPTER 1.

INTRODUCTION

General Background

During the 1960s, the United States Army Corps of Engineers constructed the Red Rock Reservoir as part of the general flood control program along the drainages of the upper Mississippi and Missouri Rivers. Designed to impound the waters of the Des Moines River during periods of high flood, the reservoir pool extends from a locality between Knoxville and Pella, in Marion County, north to the southeastern city limits of Des Moines in Polk County. In 1969, the dam was completed, and the impounded waters quickly formed a permanent lake in the conservation pool inundating 8,950 acres at an elevation between 725 and 730 feet above sea level. A full flood control pool was first obtained in the summer of 1973. Since the completion of the dam in 1969, the impounded flood waters have risen on several occasions to a maximum elevation of 780 feet above sea level inundating over 65,500 acres (Gradwohl 1973; Osborn 1982).

The National Park Service contracted the Iowa State University to conduct archaeological investigations at eleven specified sites in order to salvage information about the cultural resources in Red Rock Reservoir during the field seasons of 1964 through 1966. Results of those archaeological investigations were submitted to the National Park Service
a series of field reports and in a final contract completion report
(Gradwohl 1973). Throughout the salvage project it was apparent that
many other archaeological sites would be destroyed or adversely affected
by the construction and operation of the Red Rock Reservoir. Therefore,
beyond the work specifically designated by the contracts, Iowa State
University-National Park Service (ISU-NPS) archaeological crews engaged
in emergency work at several additional sites. During June and July of
1968, the archaeological crew conducted excavations and undertook
monitoring activities at the Cribb's Crib site (13WA105)\(^1\), the site
which is the focus of the present study.

Discovered by the ISU-NPS crew during the 1966 field season, the
Cribb's Crib site is located on a terrace immediately above the flood
control pool limits of the Red Rock Reservoir (Figure 1). By 1968, the
site was in the process of being destroyed by the construction of a
protective levee around the southeastern city limits of Carlisle. As
part of the 1968 field season, the ISU-NPS crews, under the direction of
Dr. David Gradwohl and assisted by John Cole, conducted emergency archaeo­
logical excavations at the Cribb's Crib site in an attempt to salvage
archaeological material before the destruction of the site occurred.

\(^1\)Following the procedure of the Smithsonian Trinomial System, the
Cribb's Crib site was designated 13WA105: 13 is the number for Iowa in an
alphabetically arranged list of states, WA indicates the site is located
within Warren County, and 105 designates the number of the site within
Warren County (Frankforter 1953:4).
Figure 1. Location of the Cribb's Crib site (13WA105) within the Red Rock Reservoir
[Adapted from the United States Army Corps of Engineers (1959)]
and the National Park Service to salvage portions of the site. In addition to the excavation of certain areas of the site, the ISU-NPS crew also monitored the bulldozing of the borrow area and the levee axis applying emergency procedures when needed (Cole and Gradwohl 1969:309-310).

Statement of Purpose

It is the intent of this study to describe in a systematic manner 1) the investigation and analysis of materials from the Cribb's Crib site, 2) the ecological setting of the site, and 3) the site's relationship to the Moingona Phase (Gradwohl 1967:211-212) and more generally to the occurrence of Oneota manifestations in the Prairie-Plains region. The primary focus of the present study concentrates on the description and the interpretation of the prehistoric Oneota manifestation at the Cribb's Crib site. Secondary foci include the relationship of the site to the regional Oneota manifestations in the Prairie-Plains, and the adaptation of the prehistoric occupants of the site to the local ecosystem. A major goal of the present study is the description of the exploitive potential of the ecological setting and the prehistoric subsistence-settlement patterns. The ultimate value of the study is its contribution to the documentation of the culture-history and the prehistoric adaptation within the central Des Moines River Valley. It may also provide a potential better understanding of the distribution of the Oneota complex which is largely attributed to the Chiwere Siouan speakers of the eastern Prairie-Plains during the late prehistoric and
protohistoric period (Griffin 1937; Keyes 1927; Mott 1938).

The author did not participate in the excavation, although he was able to visit the site in 1982. A general interest in the various cultural manifestations of the Prairie-Plains stems back to the author's initial participation in the excavations at 14J014 and 14J046 during the 1972 Kansas State Historical Society-ISU field school season, under the direction of John Reynolds, Assistant Kansas State Archaeologist. Since then, the author has participated in the archaeological investigations of priority 1 archaeological sites within the Saylorville Reservoir (1981), the archaeological investigation of Buxton, Iowa (1981), the archaeological investigations of the Ledges State Park (1982 and 1983), and the archaeological projects of the Midwest Archaeological Center—National Park Service (1983) in Missouri (OZAR), and Minnesota and Wisconsin (SACN).

A desire to produce a site report (Hester, Heizer, and Graham 1975:303), the basic means of presenting archaeological data has also led to the undertaking of the present study. The ability to analyze the excavated data and present a detailed scientific report contributes to the archaeologist's understanding the cultural history of a region and allows one to reconstruct past lifeways. These goals are among the major aims of archaeology. Before one can become proficient in the profession, basic skills must be acquired. These skills include the ability to analyze and interpret the data, and present a professionally adequate archaeological report. The author has undertaken the present study in order to acquire these necessary skills.
Methodology

The site was excavated under salvage conditions during the construction of the protective levee. Archaeological field procedures, as described by Hester, Heizer, and Graham (1975), were employed during the recovery of material from the Cribb's Crib site in 1968. These procedures included the initial surface collecting from the site, the setting up of a locational grid, the selective excavation of the cultural zone, and the documentation of the location of artifacts and features. The area designated for destruction was continuously monitored, and emergency procedures were applied as preventative precautions and "first aid" when necessary (Cole and Gradwohl 1969:309).

The analytical framework employed in organizing the data is essentially the same used in standard site reports and further outlined by Willey and Phillips (1958) and by Zeier (1982). For the purpose of describing the archaeological data, the categories used to divide the recovered material consist of portable objects and structural remains. These categories are subdivided into smaller classificatory units corresponding to natural, formal, and functional attributes. The method employed in the present study is aimed at simplifying the comparison of the archaeological data from the site to the archaeological data from other sites.

A major aim of archaeology, within the scope of anthropology, is the reconstruction of the lifeways of the people whose behavior is represented in the archaeological material (Binford 1972:78). Although the material culture is a part of the total cultural system, certain socio-
cultural activities can not be fully understood due to the very nature of the archaeological evidence. Only a portion of the total behavior of a group is represented in the archaeological record. Some aspects of behavior of the prehistoric occupants, however, can be inferred to varying degrees.

Drawing upon a general model (Hawkes 1954:161-162), the reconstruction of socio-cultural activities can be made from the archaeological evidence. The model is structured according to the degree in which activities can be reconstructed from the archaeological data. The technology can be determined with a high degree of validity; for example, the use of shell-tempered pottery, the use of chipped stone tools such as triangular projectile points, end scrapers, knives, and the use of ground stone tools. The economic base is second according to the degree to which reconstruction of activities is valid; for example hunting, fishing, and horticultural activities represented by the faunal, fish, and mussel shell remains, charred corn and cobs, and the large number of storage and/or refuse pits. Socio-political activities are difficult to reconstruct but the analysis of the settlement system may provide some insight. The magico-religious activities are extremely difficult to reconstruct with any degree of validity; however, a possible example is the use of shell as corn shellers in green corn ceremonialism referred to in ethnographic studies of historic tribes.

In summary, the primary aims of the present study are to relate the archaeological evidence from the Cribb's Crib site to the culture history of the region and to provide a better understanding of the
processes involved in the adaptation of the Oneota peoples to the environment. To accomplish the first aim, the relationship between the Cribb's Crib site and other Oneota manifestations is analyzed from the perspective of the Willey and Phillips paradigm for the integration of culture history. To accomplish the second aim, analysis of the ecosystem in which the Oneota inhabitants operated is examined primarily in terms of resource availability and site catchment theory (Jarman, Vita-Finzi, and Higgs 1972:61-66).

Plan of Presentation

The subsequent discussion is presented in the following manner. The ecological setting of the Cribb's Crib site is the focus of Chapter 2. The primary goal of this chapter is to present the potential resources available for exploitation by the Oneota inhabitants. This chapter also looks at some of the environmental factors which affect site formation. Chapter 3 presents a summary of the culture history of the central Des Moines River Valley in order to orientate the reader to the cultural historic setting of the Oneota inhabitants at the Cribb's Crib site. Chapter 4 presents the history of the investigation of the site, and a description of the excavation and stratigraphy of the site. Chapters 5 and 6, respectively, describe the excavated material and the result of the water flotation of material from the site. Chapter 7 summarizes the data and presents a reconstruction of the prehistoric life-style of the Oneota inhabitants at the Cribb's Crib site.
CHAPTER 2.

THE ECOLOGICAL SETTING

The Regional Environment Setting

The project area is located in the central portion of an archaeological region defined as the central Des Moines River Valley (Gradwohl 1974:90). To some degree, this region is a spatial unit based on the "vagaries of archaeological history" as presented by Willey and Phillips (1958:19). The regional boundary generally coincides with the Des Moines River watershed located within the confines of the Red Rock and Saylorville Reservoirs (Gradwohl 1974:90; Osborn 1982:5; Thies 1979:10; Timberlake 1981:5). The region extends approximately 76 miles northward from the Red Rock dam near Knoxville to the upper reaches of the Saylorville flood control pool near Fraser (Figure 2).

Although archaeological activity is influential in the definition, the central Des Moines River Valley also occupies an unique environmental niche within the parameters of a more generalized ecological setting. Situated near the western fringe of the Central Lowland Province (Fenneman 1938), the region lies within the western portion of the grassland biome described by Transeau (1935) as the Prairie Peninsula (Figure 3). Characterized by peculiarities in climate, ecological climax, fauna, flora, physiography, soil, and vegetation associations, the region is part of the Illinoian biotic province (Dice 1943:3, 21-
Figure 2. Area map of the central Des Moines River Valley archaeological region
Figure 3. The geographic extent of the Prairie Peninsula
The Des Moines River serves as the focal point for the environmental factors affecting the region.

**Physiography**

The Des Moines River is the longest river in the state. It has the largest watershed, most tributaries, and widest basin of any other river in Iowa (Peterson 1941:177). It flows from the highest to the lowest altitude of any other tributary of the Mississippi River in Iowa. The resulting gradual gradient and the meandering course of the Des Moines River separates the valley into two distinct subregions (Figure 4). The subregional distinctions are based on differences in the Pleistocene glaciations in the region (Lees 1916; Prior 1976; Ruhe 1969; Theis 1979).

The two subregions come in contact with one another at the confluence of the Des Moines River and one of its tributaries, the Raccoon River. The confluence of the two rivers is located within the city limits of Des Moines, the capital of Iowa. A young glacial plain exists to the north of the confluence. The plain was formed when an active ice lobe, the Des Moines Lobe, pushed into the state during the Wisconsin glaciation approximately 14,000 years years ago (Prior 1976:41; Ruhe 1969:61; Sage 1974:7). The landscape has had little modification since the departure of the ice sheet between 12,000 and 13,500 years ago. The glacial drift, deposited during the Cary advance, is relatively flat with minor irregularities; however, the topography can range from flat to strongly sloping. Drainage was often poor with numerous bogs,
Figure 4. Subregional boundaries within the archaeological region
[Adapted from Thies 1979:17]
marshes, and ponds forming in low lying areas before artificial drainage was introduced by Euro-American farmers. These wetlands provided excellent nesting areas for migratory waterfowl. Only along the major stream systems will one find large-scale erosional features (Lees 1916:435-436; Oschwald et al. 1965:28; Prior 1976:42-43; Ruhe 1969:54-60). Mollisols dominate the uplands and bottomlands while alfisols occupy the valley slopes and ridgetops on the young Cary drift. The Clarion-Nicollet-Webster soil association reflects a native vegetation cover consisting primarily of prairie grasses. Forested areas existed only within the narrow confines of major stream valleys.

To the south of the confluence of the two rivers, the Des Moines River flows out of its young narrow valley into a mature broad stream valley. Located in the Southern Iowa Drift Plain (Prior 1976), the river has discontinued down cutting into the landscape. Much of river's energy is spent meandering across the valley floor. The region consists of a mantle of Wisconsin age loess over Kansan glacial till overlying Nebraskan glacial till. The topography of this subregion in more undulating and dissected than the Cary drift to the north. Drainage is better developed with dendritic drainage systems being the most common. Features associated with the young Cary drift, i.e. bogs, marshes and swampy areas, are lacking in the Southern Iowa Drift Plain. Only remnants of the Kansan glacial moraine system remain in the southern subregion while to the north, the Wisconsin glacial morain system is a prominent feature of the landscape. These characteristics of the Southern Iowa Drift Plain also represent the greater maturity of
the southern subregion of the central Des Moines River Valley. Alfisols and mollisols comprise the majority of the soil groups common to this subregion. Alfisols occupy a larger portion of the valley floor, valley walls, and upland ridges along stream channels. Several soil associations occur in the Southern Iowa Drift Plain. The Shelby-Sharpsburg-Mackburg soil association represents the major association within the project area. Native prairie vegetation occupied the uplands and a portion of the valley floor. Mixed prairie and forest vegetation occupied a transitional zone between prairie and forest. Deciduous forest vegetation occurred along stream channels and on slopes and ridgetops. The Clinton-Keswick-Lindley soil association occurs along the Des Moines River. This soil association occupies moderate to steep sloping areas adjacent to the river valley. Upland ridges and slopes were covered with climax deciduous forest vegetation or mixed prairie and forest vegetation. Prairie vegetation was less common along the Des Moines River than throughout most of the region.

Beneath the Pleistocene glacial drifts and Wisconsin loess deposits are bedrock formations consisting of Mississippian limestones and Pennsylvanian limestones, sandstones, and shales (Gradwohl 1974:90; Lees 1916). These formations outcrop in several areas along the course of the Des Moines River. These outcrops along with the unconsolidated material in the glacial till provided both the prehistoric and historic inhabitants with important raw materials. Chert for stone tools, sandstone for grinding tools, clay for pottery, coal for heating, and various other types of rock for building materials and ground stone stools
are present throughout the region.

Climatic conditions

The climate of the region is mid-continental and is characterized by seasonal extremes, year to year variation, and frequent local, rapid changes (Bowles 1975:12; Reed 1941:871; Trewartha and Horn 1980:300). Warm to hot summers and cold winters characterizes the seasonal variation. At Des Moines, Iowa, the recorded temperatures range from a minimum of -30°F to a maximum of 110°F. Seasonal temperature averages range from 22.1°F in January to 76.3°F in July. The average annual precipitation for the region is 31 inches per year. The majority of the precipitation is concentrated in the summer months. The recorded average precipitation for Des Moines is 30.69 inches per year. The preceding factors along with other discussed by Trewartha and Horn (1980) contribute to an annual growing season of 175 days extending from mid-April to early October (climatic data from Reed, 1941).

Iowa, lying in the contact zone between the dry climate of the Great Plains and the humid climate of the eastern United States, is dominated by dry Pacific air masses. The condition creates a drier climate than would normally be expected for the region. The climate has been classified by Trewartha (1954:330) as subhumid. The subhumid climate characterizes a wedge-shaped geographic region corresponding roughly to Bryson's and Wendland's (1967:275) "corn belt-climate" and Transeau's (1935) Prairie Peninsula. Droughts are not an uncommon occurrence, especially during the summer months. Major droughts occur on a
synchronic basis within the grassland region (Borchert 1950:29).

The post-glacial climate sequence for the Prairie Peninsula, proposed by Bryson, Baerreis, and Wendland (1970:55), was a period of slowly rising temperatures peaking 7,000 to 5,000 years ago followed by a period of slowing declining temperatures until the present. The climatic sequence of the last 2,500 years was divided into seven episodes (Bryson and Wendland 1967:280). The Neo-Atlantic (900-1200 A.D.) and the Pacific I (1200-1450 A.D.) episodes marked the period which concerns the present study. The onset of the Neo-Atlantic episode was marked by an amelioration of climate. The period was ideally suited to maize agriculture (Baerreis and Bryson 1965:215). The Pacific I episode marked a decline in climatic conditions favorable for maize agriculture. An increase in aridity occurred which caused an expansion of the Prairie Peninsula towards the east (Bryson and Wendland 1967:294). Data for the reconstruction of post-glacial climates was based on pollen analysis with supporting radiocarbon dates. Caution should be emphasized when viewing the results of pollen analysis:

Pollen-zone boundaries cannot be used for precise time correlations, although they are invaluable for tracing progress of events from place to place—the essence of history. Excessive continental or global expansions of pollen zones caused difficulties not only because of time transgression but also because diagnostic pollen types change geographically as vegetation belts change. A better method of time correlation is radiocarbon dating (Wright 1974:12).
Flora

The unique climate and topological factors within the Prairie Peninsula created a preponderance of tall-grass prairie before the area was plowed under by the Euro-Americans. The central Des Moines region was a part of the tall-grass prairie. To the west, the drier short-grass prairie occupied much of the Great Plains region. Separating the two types of prairies, a transitional belt of mixed tall-grass and short-grass prairie extended from Saskatchewan to Texas (Borchert 1950:2; Carpenter 1940).

The regional vegetational pattern consisted of tall-grass prairie interfingered with riverine deciduous forest before the arrival of the Euro-Americans. Grasslands made up approximately 80 to 90% of the total land surface in Iowa (Conrad 1954; Shimek 1911). Prairie vegetation occupied the uplands and drier portions of the stream terraces and bottomlands. Prairie vegetation was dominated by big blue stem, little blue stem, and wild dennet grasses. Xeric areas were also inhabited by grama and fescue (Conrad 1954; Pammel, Weems, and Lamson-Scriber 1901:297).

Forest vegetation occupied the bottomlands near streams, side slopes and upland ridge tops. Forest vegetation formed a gradual transition from the willow and cottonwood associations along the streams to the oak and hickory associations along the upper slopes and ridgetops (Aikman and Gilly 1948; Conrad 1954). The willow and cottonwood associations occupied the wetter portions along the waterways. The elm association occupied the broader portions of the bottomlands especially in the more
mature stream valleys. The elms ascended from the floodplain to the toe and foot slopes until they intermingled with lindens and maples on the side slopes (Conrad 1954:11). Oak-hickory associations occupied a variety of ecological niches on the upper slopes and ridgetops (Conrad 1954:18-27). A variety of edible nuts were available from the woodlands including acorns, hickory nuts, and walnuts.

Although the wooded areas may have bordered directly with the prairie, often a transitional zone of mixed prairie, trees, and shrubbery served to separate the woodland and grassland communities (Aikman and Gilly 1948:72; Conrad 1954:42). The transitional zone contained several edible fruits and berries, including blackberry, elderberry, gooseberry, raspberry, wild grape, and wild plum. Other prominent border shrubs included smooth sumac and hazelnut. The prairie, forest, and bordering shrubbery provided both historic and prehistoric occupants of the region with a variety of edible, medicinal, and other usable plants (Densmore 1928; Gilmore 1977; Weiner 1972).

Fauna

The fauna of the region represents a mixture of prairie and forest wildlife. Several mammalian species have been available for human exploitation both aboriginally and historically. Extant mammalian fauna includes deer, opossum, porcupine, rabbit, raccoon, and squirrel in the forested and shrubbery areas. Muskrats populate the riverine areas. Other exploited mammalian fauna, exterminated by historic land use after the arrival of Euro-Americans, include bison, wapiti, and pronghorn on
the prairie; bear in the wooded areas; and beaver and otter in the riverine environments (Bowles 1975, 1981; Scott 1937). Other mammalian species present include mice, voles, moles, bats, gophers, ground squirrels, mink, weasels, rats, skunks, badgers, ermine, and fishers. Predators include mountain lions, bobcats, coyotes, wolves, and foxes.

Besides mammalian fauna, a wide variety of avifauna exists in the region both historically and aboriginally. Migratory waterfowl on lakes and rivers, wild turkey in the wooded areas, prairie chicken on the prairie, and eagles and hawks are examples of some of the important avifauna exploited by the human occupants of the region (Dinsmore 1981:28-27). In addition to the mammals and avifauna, a variety of freshwater fishes (Menzel 1981:17-23), amphibians and reptiles (Christiansen 1981:24-27), and molluscs (Gradwohl 1982b; Menzel 1982) have been exploited by prehistoric and historic inhabitants of the central Des Moines River Valley.

**Summary**

Biotic and physiographic conditions present in the Des Moines watershed have created an unique environmental setting. The conditions differentiate the central Des Moines River Valley region from similar environments of the Missouri and Mississippi Rivers. The geological activity in the region during the Pleistocene glaciations creates a division of the region into a northern younger subregion and a southern older subregion which separates the region from the rest of the state (Lees 1916; Oschwald et al. 1965:13; Prior 1976). Local botanical
studies (Aikman and Gilly 1948; Pammel, Weems, and Lamson-Scriber 1901) in the central Des Moines region describe unique biotic associations; however, they exhibit similarities to the more generalized schemes (Carpenter 1940; Dice 1943; Shimek 1911) of the North American heartland.

The Local Environmental Setting

The Cribb's Crib site is located in the northern portion of the southern subregion of the central Des Moines River Valley. The site is located 1/4 mile east of the Carlisle city limits in the extreme northeastern corner of Warren County. The legal provenience is the S1/2 of the SW1/4 of Section 2, Township 77 North, Range 23 West, Warren County, Iowa (Figure 5).

Physiography and geomorphology

The site is located on a stream terrace 18.22 feet above the left bank of the Middle River, a tributary of the Des Moines River. The Middle River is located 1/4 mile southeast of the site. The Des Moines River flows approximately two miles east of the site while the North River flows approximately 2/3 mile north of the site. The elevation of the terrace is between 774 feet and 782 feet above sea level. The bordering uplands rise 70 to 150 feet above the Middle River flood plain. The interfluve between the Middle and North Rivers gradually descends to the flood plain of the Des Moines River just north of the Cribb's Crib site. The ground rises gradually on either side of the
Figure 5. Topographic map of the locality surrounding the Cribb's Crib site. The circle indicates a two mile radius of the site. Adapted from United States Department of the Interior Geological Survey (1965; 1972a; 1972b; 1976).
river to the surrounding uplands. The northern slopes consists of gradual rising undulations which mix imperceptibly with the uplands; however, the southern slopes rise more steeply to the rolling uplands (Lees 1916; Tilton 1895:139). The river flows close to the steeper southern valley slopes.

Outcroppings of bedrock are often exposed in the bluffs along the southern slopes along the Middle River. Exposures also occur along the numerous ravines which dissect the uplands. Geological cross-sections of two exposed outcrops, one five miles east, and the other 1 3/4 miles south of the site, reveal the geology of the surrounding area (Tilton 1895:139-140; 1896:332-333). One mile east of Ford, a 20 foot thick mantle of loess and glacial drift cover alternating beds of shale, soft yellow sandstone, bituminous shale, dark clay-shale, white clay, heavily bedded soft sandstone, white clay, and sandy, clayey shale (Tilton 1895:139; 1896:332). This outcrop can be traced for two miles along the southern bluff of the Des Moines and Middle Rivers. Beyond the western margin of this outcrop, the exposures become less continuous. The second exposure, recorded by Tilton (1896:333), consists of alternating layers of clayey shale, coal, clay, sandstone, clayey shale, black clayey shale, coal, fine clay, banded shale, dark clayey shale, and clayey shale. Tilton's (1895; 1896) observations indicated a variety of clays, coal, sandstones, and shales are available to both the prehistoric and historic inhabitants of the area. Besides the mineral resources supplied by bedrock outcrops, the surficial deposits of glacial drift contain a variety of cherts and other glacially transported mater-
ial suitable for manufacturing stone tools. The weathered glacial drift also provides an excellent source of clay for pottery and/or brick and tile manufacturing.

Potential resource exploitation

The success of the inhabitants of a given area is determined by their ability to exploit the various natural resources in the biophysical environment. The method used by this study to analyze the exploitative potential of the Cribb's Crib site involves the application of site catchment analysis. Vita-Finzi and Higgs (1970:5) define site catchment analysis as: "the study of relationships between technology and those natural resources lying within the economic range of individual sites."

The term catchment is drawn from geomorphology. In geology, the term catchment refers to the watershed surrounding a stream from which the stream receives its water supply. Its application to archaeological sites denotes an area from which the inhabitants of a site procure their resources (Roper 1979:120). By delineating a territory or set of concentric territories surrounding the site, site catchment analysis provides for the analysis of the resource potential of the area.

Circular territories of fixed radii and/or time contours are the most widely used procedures to define the territory under investigation (Roper 1979:123; Vita-Finzi 1978:26). The present study utilizes a circular territory with a fixed radius of two miles to describe the exploitive potential of the catchment surrounding the Cribb's Crib site. Analysis of the territory relies on the interpretation of the
soil survey data (c.f. Bryant and Worster 1978; McCracken 1953) from which the native prehistoric vegetational pattern can be inferred.²

Four major soil associations comprise the immediate area surrounding the site. The Tama and the Downs-Fayette associations consist of nearly level to strongly sloping or steep, well-drained soils formed on the uplands or high stream benches in a parent material of loess (Bryant and Worster 1978:2-4). The Zook-Wabash-Nodaway and the Waukegan-Dickinson-Dorchester associations consist of nearly level, very poorly drained to moderately well drained soils formed on the bottom or benches along the major streams in a parent material of alluvium (Bryant and Worster 1978:9; McCracken 1953:11).

The Tama association consists primarily of gently to moderately sloping soils occupying the convex ridgetops and strongly sloping soils occupying the steeper side slopes. Gentle to moderate sloping soils occupying high stream benches comprise the remainder of this association. These soils border the south side of the Des Moines River. The Tama association occupies the loess covered glacial till plain in southern Iowa. The major soils of the association have formed in loess parent material. Other soils have formed in alluvium, colluvium, residuum, glacial till, or weathered till (paleosol). The Tama

²Numerous objections to 'site catchment' have arisen but if one accounts for the limitations of site catchment analysis a basic understanding of the exploitive potential of the territory surrounding a site can be obtained (Roper 1979; Vita-Finzi 1978, Tiffany and Abbott 1982).
soils comprise approximately 80% of the association while Muscatine soils comprise 7% and the remaining 13% consists of Adair, Bauer, Colo, Ely, and Shelby soils. These soils have formed under a native vegetation of prairie grasses.

The Downs-Fayette association occupies similar landscape positions as the Tama association; however, the Downs-Fayette association occurs along the sides of the Middle and South Rivers at the points where these tributaries enter the Des Moines River flood plain (Bryant and Worster 1978:3). The major soils have formed in loess parent material, while the rest of the soils have formed in alluvium, colluvium, glacial till or paleosol. The Downs soils comprise 45% of the association. Fayette soils comprise 25%, and the remaining 30% consists of several other soils. Downs soils have formed under a native vegetation of mixed prairie grasses and forest. The Fayette soils have formed under a native deciduous forest. Outcrops of sandstone and shale occur where the major streams have downcut through the overlying loess and glacial till.

The Zook-Wabash-Nodaway association occupies the flood plains of the major streams. These soils have formed in alluvium. Zook soils comprise 33% of the association, Wabash soils comprise 10%, Nodaway soils comprise another 10%, and the remaining 47% of the association consists of soils of minor extent. The Zook soils formed under a native vegetation of mixed prairie grasses and sedges which could tolerate excessive wet conditions. Wabash soils have formed under prairie grasses. The Nodaway soils have formed under native deciduous forest
vegetation along the stream channels.

The final association found within the catchment is the Waukegan-Dickinson-Dorchester association. The soils in this association have formed in alluvium of the flood plains of the North and Des Moines Rivers or in glacial outwash found in the Des Moines River Valley. The Waukegan and Dickinson soils have formed under a native vegetation of prairie grasses while the Dorchester soils have formed under a native deciduous forest along the stream channel.

Analysis of the area within the circular site catchment boundary reveals a great diversity of ecotones present for exploitation by the inhabitants of the Cribb' Crib site (Figure 6). The Oneota inhabitants are not limited to the boundaries expressed in the present study. It is highly probable that they exploited a much wider area; however, the use of the fixed radius circle can express the resource potential available for human exploitation.

The circle contains 12.57 square miles or 8,042.48 acres. The catchment consists of seven different ecotones: tall prairie, prairie, wet prairie, mixed prairie and forest, wet mixed prairie and forest, forest, and aquatic (the waterways and lakes). The prairie area comprises 52.7% or 4,238.24 acres or the total area within the catchment boundaries. The prairie is subdivided into the tall grass prairie on the uplands (15.09% or 1,213.47 acres), prairie grasses (26.87% or 2,161.22 acres), and wet prairie found in areas of excessive wetness on the bottomlands (10.74% or 863.55 acres). The prairie areas are marked by an intermixture of moisture regimes ranging from aquic in depressions
Figure 6. Vegetational regimes of the locality around the Cribb's Crib site indicated by soil maps. [The circle indicates a two mile radius about the site. Based on soil information from Bryant and Worster (1978) and McCracken (1953)]
and low lying bottomlands to mesic or xeric conditions on the side slopes and uplands. A variety of plants are available for human exploitation from the different prairie ecotones. Conrad (1954) and Shimek (1911) provide detailed analysis of plant potential and the distribution of the prairie grasses.

Mixed areas of prairie and forest comprise the second category and consists of 25.26% or 2,031.74 acres of the total 'catchment' area. This transitional zone between the prairie grasses and trees consists of mesic to xeric mixed forest and prairie (17.97% or 1,445.28 acres) on the slopes to areas of mixed forest and prairie tolerant to excessive wetness (7.29% or 586.46 acres) along the stream channels. Conrad (1954) discusses the vegetation of the transitional zone in detail. Several varieties of edible berries can be found among the eric shrubs in this zone.

Forest areas comprise 18.12% or 1,457.11 acres. Aikman and Gilly (1948) and Conrad (1954) indicate the presence of four general species associations. The associations are the aquic willow-cottonwood association along the streams, the more mesic elm association of the bottomlands, the mesic maple-linden association of the side slopes, and the more xeric oak-hickory association of the upper slopes and uplands regions. Within the forested areas, a large exploitative potential exists (Aikman and Gilly 1948; Conrad 1954) and would have been readily available to the prehistoric inhabitants of the Cribb's Crib site.

Finally, the waterways and lakes consist of 3.92% of the total area or approximately 315 acres. The rivers comprise 2.16% or 173.46 acres
while oxbows comprise 1.76% or 141.93 acres. It should be noted the percentages and acreages of the waterways are subject to change as a result of the meandering of the Des Moines River and its tributaries; however, the variation would not drastically change the percentage of the areas occupied by the various forms of native vegetation. Aquatic plant species, such as cattail and arrowhead, are available from the marshes, lakes, and streams for local exploitation (Conrad 1954; Weiner 1972:194).

Although a small percentage of the total site catchment, the most notable features of the area are the Des Moines River and two of its tributarites, the Middle and North Rivers. The confluence of the Des Moines River with the North River is located within the 'catchment' while the confluence with the Middle River is located further east. Spring flooding results in the deposition of fertile silts and clays on the broad flood plains of these rivers. Fresh deposition would have created an ideal habitat for several varieties of edible wild plants as well as maintaining a fertile environment for the maize oriented agriculture of the inhabitants of the Cribb's Crib site.

Besides the plant resources available within the 'catchment' for human exploitation, numerous animal species also existed. A mixture of prairie and forest wildlife existed on the land, including mammals and birds (Bowles 1975, 1981; Dinsmore 1981; Scott 1937). The lakes and streams provided a variety of migratory waterfowl (Dinsmore 1981), fish, and molluscs (Gradwohl 1982b; Menzel 1981, 1982).
Summary

The area surrounding the Cribb's Crib site supported a wide variety of edible plants along with substantial numbers of wildlife. The bottomlands, uplands, and upland slopes not only supplied food resources but mineral and other natural resources for the manufacturing of tools, clothing, and shelters. The availability of these resources in the catchment area indicate the site was well situated for the acquisition of many potential resources by the inhabitants. Besides providing a variety of wild edible plants, the bottomland also provided the prehistoric agriculturalists inhabiting the site an ideal setting for their gardens (Osborn 1982:7).

The Environmental Impact on the Archaeological Remains

Environmental reconstruction is an important aspect of the archaeologist's understanding of past human activity at the site. The archaeologist strives to understand how people have adapted and used the environment. Manipulation or exploitation of the surroundings environment by the human occupants determines their chances of survival.

The archaeologist's reconstruction of past activities is dependent upon the preservation of the archaeological material (Hole and Heizer 1973:88). The preservation of the archaeological remains is affected by the environmental conditions. Since "archaeological remains are a distorted reflection of past behavioral system" (Schiffer 1976:12), it is important to understand how the environment has affected the preserva-
tion of the archaeological remains at the site.

Soil conditions at the site would not have been conducive for the preservation of organic remains. The Cribb's Crib site is located on a stream terrace above the Middle River. The soil is mapped as Alluvial land (Bryant and Worster 1978:16, and Sheet No. 5); however, at the time the mapping of the soil occurred, the soil had already been disturbed by the levee construction project in 1968. In an earlier soil survey (O'Neal and Devereux 1925:27, and soil map), the soil is mapped as Waukesha loam. It is described as a highly productive soil. The disturbed soil is probably Wiota silt loam (0-2% slope), a soil formed under prairie grasses (Bryant and Worster 1978:64). The Wiota soil is moderately acid. The high level of acidity greatly enhances the decomposition of the osteological material, including bone and shell artifacts (Biek 1963:181). Vegetal remains are easily destroyed unless they are carbonized (Hole and Heizer 1973:89).

The human inhabitants of the site introduced material onto the site which includes artifacts, raw materials for various purposes, and a wide range of foodstuffs. Material no longer required may have been discarded and trampled into the habitation floor or disposed by placement in recently emptied storage pits. Burrowing animals and earthworms may disturb the archaeological material by moving it vertically or horizontally about the site. Modern cultivation of the area can be assumed to have mixed artifacts throughout the plowzone. Surface runoff after storms probably moved material down the slope in the cultivated field. Much of the archaeological material recovered from the site have been
recovered from storage and/or refuse pits. These remains have stood a better probability of remaining in situ.
CHAPTER 3.

THE CULTURE-HISTORICAL SETTING

The Prehistoric and Protohistoric Occupation of the Region

Archaeological evidence from the central Des Moines River Valley indicates extensive utilization of the region by several distinctive cultural traditions following the retreat of the Wisconsin ice sheet 14,000 to 12,000 years ago. While gaps do exist in the archaeological record, it is apparent the region has been occupied by humans for several millennia. The major cultural affiliations for Iowa outlined by Keyes (1927; 1941; 1951), McKusick (1964), and Alex (1980) are employed for the present discussion. These cultural affiliations include the Paleo-Indian (Big Game Hunting) Tradition, the Archaic Tradition, the Woodland Tradition, the Great Oasis manifestation, the Oneota (Moingona Phase) manifestation, and Protohistoric and Historic Indian tribes. The principal concern of the present study is the Moingona Phase (Oneota); however, a summary of each cultural tradition will be presented as it applies to the region (Gradwohl 1974; Osborn and Gradwohl 1982) and to the more generalized temporal models of North American prehistory (Griffin 1967; Jennings 1974; Stoltman 1978; Willey 1966).

Paleo-Indian

Evidence for Paleo-Indian manifestations in the region consists of a
few surface finds without any contextually excavated data or supporting radiocarbon dates (Gradwohl 1974:93). At present, the evidence relies primarily on the occurrence of lanceolate projectile points from surface collections. The presence of these points suggests the region was occupied by 10,000 years ago subsequent to the retreat of the Wisconsin ice sheet. Typologically, the points resemble types defined in the literature as Agate Basin, Angostura, and Meserve (Gradwohl 1974:93).

It is postulated these early inhabitants were nomadic, game hunters; however, it is probable gathering wild food plants played an important role in their diets (Griffin 1967:176). Besides the lithic materials, speculation about the Paleo-Indian life styles have been inferred from the study of the behavior of Pleistocene herbivores.

**Archaic**

Succeeding the Paleo-Indian period, the Archaic Tradition occurred from ca. 10,000 to 3,000 years ago. Although the majority of the evidence for the Archaic manifestations in the region comes from surface collections of projectile points, some excavated data and radiocarbon dates (Osborn and Gradwohl 1982:279) indicate the occurrence of a pre-ceramic late Archaic occupation in the northern subregion. Typologically, the projectile points are medium-sized, side-notched, and often basally ground. Affiliations with the Logan Creek complex in western Iowa and eastern Nebraska, and the Keg Creek complex a western Iowa may be represented.

A diversified technology and subsistence base are representative of
the Archaic. Foraging is the center of the subsistence pattern (McKusick 1964:79). Improvements in technology and more efficient utilization of local food resources is believed to have resulted in a less nomadic way of life for the Archaic people.

**Woodland**

Woodland manifestations are abundant throughout the central Des Moines region (Figure 7). Several Woodland sites have been excavated, and surface finds abound in the region (Gradwohl 1974:93-95; Osborn and Gradwohl 1982:279-280; Thies 1979; Timberlake 1981). The transition from the Archaic to Woodland occurs between 3,000 and 2,500 years ago. Traditionally, the Woodland Tradition has been separated from the Archaic by the appearance of burial mounds, ceramics, and cultivated plants. In the central Des Moines region, Woodland sites are represented by mortuary sites with burial mounds, and semi-sedentary village and camp sites (Alex 1980:122-127; Gradwohl 1974:93-95; Osborn and Gradwohl 1982:279-280).

Three temporal periods are recognized for the Woodland Tradition: Early Woodland, Middle Woodland, and Late Woodland. The separation of these periods, in Iowa, is based upon the seriation of ceramic types (Logan 1976; McKusick 1964).

In the central Des Moines region, little evidence is available for an Early Woodland occupation (Gradwohl 1974:95). The majority of evidence points to a fairly extensive Middle Woodland occupation of the region (Gradwohl 1974:94-95; Osborn and Gradwohl 1982:279-280). Within
Figure 7. Distribution of Woodland sites in the central Des Moines River Valley [Adapted from Gradwohl (1974:91)]
the Middle Woodland period (ca. A.D. 300-A.D. 570), Hopewellian manifestations apparently parallel the developments of the western Hopewelian extension of the Kansas City locality (Gradwohl 1974:94). The northern subregion appears to contain more stronger defined Hopewelian influences than the southern subregion (Gradwohl 1974:95).

The subsistence activities appear to be a continuation of the diversified hunting and gathering patterns established in the preceding periods. Middle Woodland artifacts include thick, cord-roughened, grit-tempered pottery, corner-notched or contracting stemmed projectile points, three-quarter grooved axes, abraders, drills, and end scrapers. Village sites are located on river terraces while the burial mounds are located on the adjoining uplands.

One excavated site and several surface finds indicate a Late Woodland manifestation in the region. The Saylorvillage site (13PK165) provides evidence for horticultural activities. Seeds of at least two cultigens have been recovered from the site: corn (Zea mays), and squash, gourd, or pumpkin (Osborn, Gradwohl, and Thies 1978:88). Artifacts include single-cord impressed pottery, small notched and unnotched triangular projectile points, end scrapers, grooved axes, and grinding stones. No radiocarbon dates are presently available for the Late Woodland in the central Des Moines region; however, the Late Woodland may have extended into the early historical period in some areas (Anfinson 1979).
Great Oasis

The Great Oasis manifestation (Figure 8) in the central Des Moines River Valley is apparently confined to the northern subregion (Gradwohl 1974:97). Excavated and surface evidence indicates an extensive occupation of this subregion. Radiocarbon dates from excavated sites range from A.D. 975 to A.D. 1080 (Gradwohl 1974:97). The dates and material recovered from these sites are similar to other Great Oasis sites in northwestern Iowa, southwestern Minnesota, northeastern Nebraska, and southern South Dakota.

Known site distributions indicate Great Oasis people constructed their villages on terraces above major streams. Faunal and vegetal remains indicate they subsisted by hunting, gathering, and horticulture (Gradwohl 1974:97; Osborn and Gradwohl 1982:281). Pottery characteristically consists of fine sand and crusted granite tempering. Decorations include tool-impressed and finely incised parallel lines often with superimposed designs on the upper lip and rim surfaces (Gradwohl 1974:97). Non-ceramic artifacts included small plain or side-notched projectile points, end scrapers, ovate knives, pecked and polished celts, sandstone abraders, and grinding stones. Bone tools are also present.

It is hypothesized Great Oasis developed out of a Woodland base (Henning 1971:130). Great Oasis culture is one of several late prehistoric groups which occupied the Prairie-Plains. Others included Initial Middle Missouri, Late Woodland, Mill Creek, Nebraska Culture, Oneota, and St. Helena. According to Henning (1971:30), the occurrence of these
Figure 8. Distribution of Great Oasis in the central Des Moines River Valley [Adapted from Gradwohl (1974:98)]
groups greatly complicates our understanding of the cultural interrelationships during this period.

The distribution of Great Oasis sites in the central Des Moines River Valley further adds to these complexities. The known sites are primarily confined to the northern subregion (Gradwohl 1974:96-97). No Great Oasis pottery sherds have been located in the Red Rock Reservoir area in the southern subregion; however, some sherds have been collected along the lower Raccoon River drainage (Gradwohl 1974:97).

Oneota

The present study is concerned with the Oneota manifestation in the central Des Moines region (Figure 9). A large body of data indicates an extensive occupation of the southern subregion below the city of Des Moines. Four sites have been extensively excavated: Clarkson (13WA2), Cribb's Crib (13WA105), Howard Goodhue (13PK1), and Mohler Farm (13MA30). Two components have been tested, and several other components in the Red Rock Reservoir area have revealed surface material which is demonstratively Oneota. Due to formal variation, and spatial and temporal integrity different from other Oneota manifestations throughout the Prairie-Plains, the Oneota manifestation in the central Des Moines region has been designated as the Moingona Phase (Gradwohl 1967:211-212). The lack of historic trade goods and the clustering of the majority of the radiocarbon dates between A.D. 1020 and A.D. 1290 indicate the Moingona Phase represents a local manifestation of the prehistoric Oneota Tradition.
Figure 9. Distribution of Oneota sites in the central Des Moines River Valley [Adapted from Gradwohl (1974:91)]
The occurrence of the agricultural Oneota manifestation in the southern subregion of the central Des Moines River Valley counterbalances the occurrence of the agricultural Great Oasis manifestation in the northern subregion. A few isolated shell-tempered sherds have been found in the northern subregion; however, no large village sites have yet been located north of the confluence of the Des Moines and Raccoon Rivers. A small Oneota habitation site has recently been discovered at the north edge of the city of Des Moines. Other Oneota sites have been found throughout the Prairie-Plains including portions of Minnesota, South Dakota, Nebraska, Kansas, Missouri, Illinois, Wisconsin and Iowa (McKusick 1964:149).

Subsistence activities, similar to Great Oasis, combine intensive horticulture or corn agriculture, hunting, and gathering practices (Alex 1980:147; Gradwohl 1974:95; Osborn 1982:86). Identifiable cultigens include the maize-bean-squash triad common to the late prehistoric period (Thies 1979:37). Corn and beans have been positively identified while squash is only tentatively identified (Gradwohl 1974:95; Osborn 1982:73). The faunal inventory from the sites reveals a broad-based meat diet consisting of bison, deer, and wapiti (elk), along with several smaller mammals. Fish, freshwater mussels, turtles, and a variety of birds are also present in faunal inventory.

The most distinctive artifacts are shell-tempered ceramics. The ceramics of the Moingona Phase are globular shaped with trailed and punctated decorations confined to vessel rims and shoulders. Other artifacts are less distinctive and commonly occur in other contemporary
Prairie-Plains cultures. They include small plain triangular projectile points, end scrapers, ovate knives, sandstone abraders, and ground stone tools. Worked bone, including scapula hoes, antler rakes, fishhooks, awls, and projectile points also occur. Shell and copper artifacts have also been found.

Speculation concerning the connection between the prehistoric and protohistoric Oneota and historic Indian tribes, particularly the Oneota-Siouan connection, was first presented by Keyes (1927). Griffin (1937) furthered Keyes' hypothesis by presenting an Oneota-Chiwere Siouan association from archaeological and mythological evidence. In 1938, Mott presented her classic elucidation on the relationship between historic Indian tribes and archaeological Oneota manifestations in Iowa. More recently she expanded her argument by correlating ethnohistoric evidence pertaining to the historic locations of the Ioway tribal group to Orr focus sites of the Oneota manifestation in northeastern Iowa (M. Wedel 1976).

Protohistoric and historic tribal groups

By the mid-17th century, European explorers were pushing into the interior region of the North American continent. The French and English, later the Americans, were expanding their hold on the northern and eastern part of continent while the Spanish occupied the southern and western portion of the Plains.

The archeological evidence is insufficient to link historic Indian groups to the central Des Moines region during the protohistoric
period. Although the written records and journals of explorers, traders, and government officials provide the data for the ethnohistoric reconstruction of this period, the information is often scanty and sometimes of questionable nature. One should exhibit caution when viewing the accuracy of this material (Mott 1938:231).

The first recorded statement concerning the Indian tribes in Iowa was made by Nicolas Perrot, a French trader, during the mid-1650s (Mott 1938:231). Maps, published in 1673 and 1674 by Marquette and Joliet, place a group known as the Moingwena in the Des Moines River Valley. Mott (1938:233) states it is possible the maps are in error and the river may be the Iowa River to the northeast of the Des Moines River.

Seventeen different tribes occupied Iowa from the mid-17th century to the final cession of Indian land to the United States Government (Mott 1938:234). Some tribes resided in Iowa for a brief period while others maintained a more permanent residence. The two major groups occupying Iowa were the Ioway and the combined Sauk and Fox tribe.

The Ioway maintained the longest residence in the state. These people along with their Chiwere-speaking Sioux neighbors, the Oto, apparently wandered over the entire state prior to the 1760s (Mott 1938:249). Reports during the early 1800s place the Ioway along the Des Moines River (Mott 1938:254-258). They were forced from the Des Moines region before 1828 by the Sauk and Fox (Fulton 1882:119-120). In 1830, the Ioway ceded what was left of their holdings in Iowa to the United States (Mott 1938:258).

The Algonquin speaking Sauk and Fox were reported living on the Des
Moines River north of the Des Moines-Raccoon confluence prior to 1735 (Mott 1938:274). They found refuge in Iowa after being forced out of their traditional lands in Illinois in the early 1800s. In 1843, the Sauk and Fox were living in Warren County. They had villages along the Des Moines River between Red Rock and Fort Des Moines (Schultz and Berry 1953:21). The archaeological evidence has yet to verify the location of historic tribes in the central Des Moines River Valley region (Gradwohl 1974:98). The Sauk and Fox ceded their territory in Iowa, including Warren County, to the United States by 1845 (McKusick 1964:198; Schultz and Berry 1953:22; Union Historical Company 1879:258).

The Historic Occupation of the Region

Before the final removal of the Indians from the region in 1845, the Euro-American presence in the central Des Moines region consisted of fur traders and trappers (Union Historical Company 1879:281). In 1843, federal dragoons established Fort Des Moines near the confluence of the Des Moines and Raccoon Rivers. They were responsible for protecting the Sauk and Fox from attacks by the Sioux and to prevent white encroachment into Indian lands west of the 1843 treaty line at Red Rock (Gradwohl 1974:99).

White settlement was prohibited in the area surrounding the Cribb's Crib site prior to 1845 except by special permission from the post commandant at Fort Des Moines. In June 1843, John D. Parmalee obtained a permit to build a saw mill on the Middle River approximately 1 1/2 miles east of the present town of Carlisle. Parmalee and his wife,
Jane, became the first white settlers in Warren County (Schultz and Berry 1953:23; Union Historical Company 1879:281-284).

White settlement was officially allowed in 1845. The land rush occurred on October 11, 1845.

As the eleventh of October, 1845, drew near, the settlers, provided with sharpened stakes and lanterns or blazing torches, waited eagerly for the signal which opened the western part of the Sauk and Fox purchase to settlement. At midnight the firing of guns for miles along the line was followed by the sudden advance of the settlers in covered wagons and on horseback. Jerry Church, who located his claim near Carlisle, is said to have set fire to Indian shelters to provide light for staking his claim (Schultz and Berry 1953:23).

The community of Carlisle, near the Cribb's Crib site, was laid out in 1851 by Jeremiah 'Jerry' Church (Schultz and Berry 1953:72). The town was located on rolling land overlooking the plain between the North and Middle Rivers:

... the plain known to early settlers as "Buffalo Prairie"... a level span about two miles wide with the distant Des Moines River along the eastern horizon. This place has been a favorite spot since the days of the Indians and before the coming of the white man (Schultz and Berry 1953:72).

Flourishing industries included the Carlisle flouring mills and a pottery works. These were essential industries for the pioneers. The mill provided flour and corn meal and the kilns provided stoneware crocks, jars and jugs. The pottery industry was one of the earliest industries practiced in the region. Archaeological evidence (Figure 10) of the 19th century kilns has produced much information concerning the
Figure 10. Distribution of historic Euro-American sites in the central Des Moines River Valley [Adapted from Gradwohl (1974:98)]
early pottery industry and pioneer life style in the region (Gradwohl 1974:100; Reynolds 1970; Schroeder 1974; Schulte 1974).

Another major industry in Carlisle was the Carlisle Brick and Tile Company. It was established in 1908 by William McKissick (Schultz and Berry 1953:75). Like the earlier pottery works, clay was obtained locally for the company. The Carlisle Brick and Tile Company was reorganized in 1936. The present plant stands near the site of the original plant (Schultz and Berry 1953:75).
CHAPTER 4.

INVESTIGATION AND EXCAVATION OF THE SITE

Previous Investigations

Prior to the discovery of the Cribb's Crib site by the ISU-NPS crew in 1966, three archaeological surveys were conducted in the general vicinity in conjunction with the overall development of the Red Rock Reservoir. In 1948, the Smithsonian Institution River Basin Surveys sponsored the preliminary archaeological survey of the central Des Moines River Valley within the proposed Red Rock Reservoir project under the direction of Richard P. Wheeler (1949). Except for some surface finds, little archaeological information was known about the area within the boundary of the proposed reservoir. Collections of artifacts of local residents indicated generalized Woodland and Oneota manifestations in the project area (Wheeler 1949:5). Investigation of the Red Rock Reservoir area by Wheeler indicated the Des Moines River Valley had a relatively high archaeological potential which would be threatened by the Red Rock Reservoir project. Recommendations called for more intensive investigations of the entire area and testing known sites, including four Oneota occupation sites (Wheeler 1949:8). Wheeler also recommended the establishment of an excavation program for reconstruction of the cultural history of the region; however, due to the uncertainty of the project at the time of the report, no urgency was proposed for immediate work (Wheeler 1949:8).
An additional survey was conducted in the project area by University of Iowa personnel, under the direction of Dr. Marshall McKusick and Joe Ries, in 1961. The second survey was a continuation of Wheeler's preliminary investigation (McKusick and Ries 1962). The survey included locating additional sites and determining the potential significance of archaeological sites within the reservoir project. The major emphasis of the survey was to determine the nature of the sites located in the reservoir flood pool (McKusick and Ries 1962:3). In the summary of prehistoric cultures represented in the reservoir, McKusick and Ries (1962:13-15) mentioned: 1) the possibility of an Archaic occupation from the presence of certain projectile point forms; 2) an intense Woodland occupation characterized by a number of burial mounds and a variety of Woodland artifacts; and, 3) a single Oneota village site (13PK10) and the occurrence of shell-tempered ceramics at other sites. Although the University of Iowa team identified 13PK10 as a 'rich Oneota site' and shell-tempered ceramics from other sites, their comments regarding the Oneota manifestation in the reservoir boundary were

... beginning in Iowa by at least 1300 A.D., the Woodland cultures were supplemented by agricultural communities ... Oneota culture soon extended itself into the Des Moines Valley. It never intensively occupied the Red Rock Area and only a single village was located (McKusick and Ries 1962:14).

Besides the contradictory nature of Wheeler's reported evidence (Wheeler 1949:5-7), McKusick's and Ries's data failed to support the occurrence of an extensive Oneota occupation within the Red Rock vicinity. Subsequent investigation by ISU archaeological crews, supported Wheeler's
original evaluations by indicating an extensive Oneota occupation in this portion of the central Des Moines River Valley.

Between 1964 and 1966, the National Park Service negotiated two contracts with Iowa State University to conduct an archaeological investigation of the Red Rock Reservoir project area in order to salvage threatened archaeological resources (Gradwohl 1973). The contracts called for the exploration of eleven stipulated sites and allowed the ISU crews

... to locate, test, and excavate additional sites which appear to be productive of scientific information essential to the reconstruction of the archaeological cultural sequence in the reservoir area, those additional sites to be mutually agreed upon in writing between the Service and the Contractor (Gradwohl 1973:7).

It was under these auspices the Cribb's Crib site was first located and designated by an Iowa State University crew on June 26, 1966, during a reconnaissance of the vicinity surrounding Carlisle. The site was intensively surveyed and further delineated on June 28, 1966. A rich Oneota occupation of the area was indicated by the presence of a large number of shell-tempered ceramics, triangular projectile points, end scrapers, and other artifacts. Besides the substantial inventory of Oneota material collected, one grit-tempered sherd and several notched and/or stemmed points indicated a possible earlier Woodland occupation of the area. Historic Euro-American material, including china, glass, metal, and kiln-furniture, was also recovered during the initial survey of the site. An additional survey and testing of the site occurred in the spring of 1968 before the excavation of the site took place in the
summer of 1968 (Gradwohl 1982a).

Rationale

In 1966, the Army Corps of Engineers formulated a plan for the construction of a protective levee around the southeastern portion of Carlisle. The plans called for eight foot high levee to extend from the intersection of Highway 60 and the Rock Island Railroad north to the eastern end of Elm Street (Gradwohl 1982a). The construction of the levee would destroy a major portion of the site.

The Corps of Engineers opened and let the bid for the construction of the levee on May 7, 1968. The construction company of R. B. Burch, Inc., of Cedar Rapids, Iowa, received the bid and started construction by the end of the month. It was imperative for an emergency archaeological investigation to begin immediately in order to salvage as much of the site as possible in face of its impending destruction.

Through verbal agreement with the Corps of Engineers, the National Park Service, and permission from Burch construction company, a portion of the ISU archaeological crew for the 1968 field season was able to conduct emergency operations, and to salvage archaeological material and pertinent information about the Oneota occupation at the Cribb's Crib site during the site's destruction by the levee construction (Gradwohl 1982a).

Excavation Procedures

After arrangements were made to excavate the site, a grid was imposed over the site to facilitate the mapping and measurement of arti-
facts and features and to provide overall control of the excavation of the site. The control grid was oriented along north-south and east-west axes with the basic excavation unit being a 10x10 foot square. The datum was designated N1000/W1000 (Figure 11). Permanent metal stakes were set in the railroad levee to the south and west of the datum and in a fence 728 feet to the east of the datum.

Two major blocks of excavation units were established at the site. The first block, designated XU#1, was opened on June 3, 1968, in an area of rich surficial artifact concentration within the boundary of the proposed levee (Figure 13). The area was scraped to a depth of approximately one foot below the surface by Burch company's heavy machinery. Excavation squares were set up in the scraped area and excavation continued at XU#1 until June 25, 1968, when they were abandoned due to trenching and levee construction by the Burch company personnel in the immediate vicinity of the excavation block. Excavation primarily involved shovel skimming and dry screening using 1/2 inch steel mesh screens, although troweling was employed when cultural material was encountered. A total of 22 excavation squares was opened and excavated at XU#1 before its final abandonment. Five more excavation units were opened and excavated as an extension of XU#1 into the adjacent berm area. A total of five features was located and excavated in XU#1 with three more features found in the extension of XU#1 into the berm area.

The second block of excavation squares, designated XU#2, was opened on June 24, 1968, to the northeast of the most prominent feature on the
Figure 11. Topography and general location of excavation squares, features (represented by dots), and test pits at the Cribb's Crib site
Figure 12. General locations of areas A thru G.
Figure 13. Enlargement of area A, identifying excavation squares, test pits, and features.
landscape in the vicinity of the site, a corncrib (Figures 14-15). The surface of XU#2 had also been scraped to approximately one foot below the surface by the Burch company's heavy machinery. Work continued intermittently until the end of the field season at the site. A total of 11 excavation squares was opened and excavated at XU#2. Although no features were located within the excavation block, several features were discovered around XU#2 through monitoring the scraping activities of the heavy machinery during the process of levee construction (Figures 14-19). Monitoring the construction company's activities allowed the archaeological crew to map and excavate the features as they were being uncovered. A total of 163 features was designated at the site during the summer's field work. Eight features were discovered through actual excavation operations while the remaining 155 features, the majority of which were truncated during scraping operations, were discovered during the monitoring of the activities of the Burch company's heavy machinery.

A third area was designated XU#3 as a result of monitoring activities by the Iowa State University crew of the Burch company equipment in the eastern portion of the site. Although no excavation squares were opened in the area, Features 6 through 9 were investigated when they were uncovered by quarrying activities of Burch company equipment in the borrow area. The features were designated, mapped, and hurriedly excavated under the shadow of Burch company heavy machinery.

Monitoring the activities of the Burch company machinery during scraping and quarrying activities allowed the Iowa State University crew to locate subsurface features which normally would have remained undis-
Figure 14. Enlargement of area B, identifying excavation squares and features.
Figure 15. Enlargement of area C, identifying excavation squares and features
Figure 17. Enlargement of area E, identifying test pits and features
Figure 18. Enlargement of area F, identifying test pits and features.
Figure 19. Enlargement of area G, identifying test pits and features.
covered by standard excavation procedures. Several concentrations of features, including hearths, refuse, and storage pits, were mapped and excavated after being uncovered by borrowing operations of the Burch construction company earlier in the day. Although the construction of the levee destroyed a portion of the Cribb's Crib site, the emergency excavations, conducted by the ISU crew salvaged important information about the Oneota occupation of the site in the form of artifacts, eco-facts, and features. During the final days of the 1968 field season at the site, several 5x5 foot square test pits were excavated in or near the berm area. The final testing of the berm area marked the completion of a very successful but often chaotic field season at the Cribb's Crib site. The excavations officially stopped at 7:00 p.m., July 19, 1968, following the completion of the levee by the Burch construction company.

Site Stratigraphy

Due to the emergency nature of the excavations at the Cribb's Crib site, no opportunity existed to ascertain the stratigraphy of the site prior to the construction activities; however, during the course of the excavations, three major zones were defined: 1) the plowzone, 2) the cultural zone, and 3) a zone of sterile clay. In most instances, the plowzone and a portion of the subplowzone were removed by heavy machinery before the excavations started thus leaving only a partial profile for observation. At least one of the 5x5 foot square test pits, Test Pit C, was excavated in situ from the surface to sterile clay below the Oneota cultural zone (Figure 20). The cultural zone extended from a
Figure 20. Vertical profile showing the general stratigraphy at the Cribb’s Crib site
depth of 1.0 to 2.4 feet below the surface. The cultural matrix was comprised of a brownish loam to a mixed clay loam. Below the cultural zone, a layer of yellowish clay existed. The clay was sterile of cultural material with the exception of storage pits which had been dug into the clay by the prehistoric occupants of the site. The outlines of the storage pits were distinguishable from the yellowish clay matrix by a darker humic fill. Some of the storage pits extended into the clay to a total depth of ca. 3.0 feet below the surface. As the features were defined, each was dug as a single stratigraphic unit, whether it was uncovered during the excavation of the site or during the construction company's activities.
CHAPTER 5.

ANALYSIS OF THE EXCAVATED DATA

The artifact assemblage from the Cribb's Crib site includes ceramic artifacts, lithic artifacts, bone and shell artifacts, and miscellaneous materials. Besides the artifacts, ecofacts are also present in the materials recovered during the archaeological investigation of the Cribb's Crib site. These ecofacts include, vertebrate and invertebrate faunal remains, and floral remains. Besides the portable artifacts, a total of 163 features is identified in the field during the 1968 season. These features often occur in groups or clusters within the boundaries of the village site.

The subsequent discussion of the analysis of the excavated data is presented in the following manner. Ceramic artifacts are first discussed. This discussion is subdivided into Oneota and Woodland ceramics. Chipped stone artifacts are discussed second. The chipped stone artifacts are subdivided into chipped stone tools and lithic debitage. Third, a discussion of ground stone artifacts includes flint-knapping tools, woodworking tools, food processing implements, and miscellaneous stone tools. The fourth section is discussion of bone and shell artifacts. The final section on the artifact descriptions covers miscellaneous artifactual material, including daub, hematite, limonite, and angular rock. It should be noted the following presentation mainly
involves a descriptive discussion of the artifacts, ecofacts, and features.

Following the discussion of the artifacts, a summary of the 163 features is presented. Following this section, the faunal and floral ecofacts recovered from the Cribb's Crib site are discussed. The next section deals with the historic artifacts collected from the site. The final section in this chapter involves a discussion of the radiocarbon dates for the Moingona Phase along with the date from Feature 150 at the Cribb' Crib site.

Ceramic Artifacts

Oneota ceramics

Fragmented shell-tempered ceramics comprise the greatest number of artifacts recovered from the Cribb's Crib site. The majority of the fragments apparently represent the remnants of domestic cooking and/or storage vessels. Other ceramic forms were also present in addition to the fragmentary vessels. Besides the shell-tempered ceramic sherds, three grit-tempered sherds were also recovered from 13WA105. Two sherds, including an undecorated rim sherd, were found in association with other Oneota artifacts, and will be discussed as part of the Oneota occupation of 13WA105. A grit-tempered Woodland body sherd, recovered from the eastern portion of the site, will be discussed at the end of this section on ceramic artifacts.

The ceramic inventory of the Cribb's Crib site includes 10,306 Oneota pottery sherds, four miscellaneous Oneota ceramic objects, and
one Woodland body sherd. Table 1 lists the general distribution of the ceramic artifacts from 13WA105. The discussion of clay daub is covered in a subsequent section of miscellaneous materials.


Criteria for the analysis of the general attributes of the Moingona Phase ceramic assemblage at the Cribb's Crib site closely follows those reported for Oneota sites throughout the Prairie-Plains region. Included in the list of general attributes for Oneota ceramics are shell-tempered globular jars with tool or finger impressed lip decorations and smoothed exterior vessel surfaces with trailed and/or punctated decorated shoulders. Bowls often occur in the various Oneota ceramic assemblages. On rare occasions, even bottles have been noted among the Oneota ceramics.

Oneota has traditionally been recognized as a 'pottery culture' (Hall 1962:108; Henning 1970:13; M. Wedel 1959:111). Although described as a 'pottery culture', Oneota ceramics are not easily categorized according to the ware-type concept (Lehmer 1954:41). Henning best described the problem of Oneota ceramic classification:
Table 1. Distribution of ceramic artifacts, Cribb's Cribb site [Unless otherwise indicated, all ceramic artifacts are shell-tempered]

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation</th>
<th></th>
<th>Test</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>Squares</td>
<td>Features</td>
<td>Pits</td>
<td>Totals</td>
</tr>
<tr>
<td>Bowl rims, plain</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Bowl rims, decorated</td>
<td>1</td>
<td>7</td>
<td>6</td>
<td>-</td>
<td>14</td>
</tr>
<tr>
<td>Jar rims, plain</td>
<td>25</td>
<td>139</td>
<td>54</td>
<td>12</td>
<td>230</td>
</tr>
<tr>
<td>Jar rims, decorated</td>
<td>41</td>
<td>219</td>
<td>104</td>
<td>29</td>
<td>393</td>
</tr>
<tr>
<td>S-shaped rims</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Grit-tempered rim</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Necks</td>
<td>46</td>
<td>176</td>
<td>85</td>
<td>11</td>
<td>318</td>
</tr>
<tr>
<td>Decorated body sherds</td>
<td>170</td>
<td>788</td>
<td>447</td>
<td>109</td>
<td>1,514</td>
</tr>
<tr>
<td>Undecorated body sherds</td>
<td>666</td>
<td>3,932</td>
<td>2,772</td>
<td>388</td>
<td>7,758</td>
</tr>
<tr>
<td>Grit-tempered body sherd</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unattached handles</td>
<td>8</td>
<td>44</td>
<td>8</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>Effigy figurine</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bottle neck</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Clay disc</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Spoon or scoop</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Oneota Totals</td>
<td>959</td>
<td>5,316</td>
<td>3,484</td>
<td>551</td>
<td>10,310</td>
</tr>
<tr>
<td>Grit-tempered body sherd</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Woodland Totals</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Totals</td>
<td>960</td>
<td>5,316</td>
<td>3,484</td>
<td>551</td>
<td>10,311</td>
</tr>
</tbody>
</table>
It is difficult to place Oneota ceramics into meaningful grouping according to features of form, even within single components; there is generally a great range in rim profile, angles, height, lip thickness, etc., with gradations from one form to another . . . One can not sit at his laboratory table and sort Oneota from one or a series of sites into neat, homogenous piles, each pile representing a consistent 'type' . . . Oneota pottery is heterogeneous by nature; but it is instantly recognizable to those with a minimum of experience in handling it . . . Yet, some of the named types are recognizable and seem to have spatial-temporal significance (1970:13).

It is apparent Moingona Phase ceramics do not fit the traditional usage of 'type' categories utilized to describe many prehistoric archaeological manifestations on the Prairie-Plains (Gradwohl 1973:22). The description of the Cribb's Crib site ceramics follows the general stylistic guidelines presented by Gradwohl (1973), Henning (1970), Osborn (1982), and M. Wedel (1959). Accordingly,

. . . additional emphasis is placed on the description of "design components" and their combinations around the shoulders of the vessels. While this is certainly a subjective selection on the part of the analyst, it perhaps can be justified on the basis that virtually all Oneota pottery--at least that observed in the central Des Moines River Valley--is decorated, if not on the shoulder of the vessel then on the lip or rim interior. This apparent ubiquity of decoration is in marked contrast to many ceramic complexes in which "plain" wares predominate (Gradwohl 1973:22).

Decoration occurs almost universally on the vessel shoulders as combinations of trailed lines and/or punctates. The remainder of the exterior portion of the vessel is seldom decorated. Gradwohl further commented:

. . . many details involved in manufacture and decoration of Oneota pottery are almost diametrically opposed to
those exhibited by various Woodland complexes as well as Mill Creek, Great Oasis, Nebraska Phase and other Prairie-Plains archaeological manifestations (1973:21).

**Vessel form** The ceramic inventory from the Cribb's Crib site contained no complete vessels; however, several fragments from a medium-sized globular jar (specimen #4283) enabled laboratory personnel to reconstruct the vessel's form (Figure 21). A few other rim and shoulder fragments were sufficiently large to allow measurable estimates for projected dimensions (Table 2).

The majority of the vessels represented at the Cribb's Crib site appears to be the common globular jar or olla. Limited evidence indicates the presence of bowls. Bowls have been found at other Moingona Phase sites (Gradwohl 1973:24; Osborn 1982:19, 39). One ceramic fragment may represent a bottle neck. The occurrence of bottles has been noted at other Oneota sites (Bluhm and Liss 1983:107, 112; Straffin 1971:24). These may represent trade items from other Upper Mississippian cultures.

Moingona Phase jars generally appear symmetrically round. They lack the ellipsoidal characteristics common to Orr Focus ceramics (Osborn 1982:19; M. Wedel 1959:84, 113). The greatest circumferential dimension occurs at the shoulder of the Cribb's Crib Oneota vessels. Figure 22 illustrates the vessel terminology used in the analysis of the Cribb's Crib ceramics.

The shoulder form varies from vessel to vessel; however, two general forms persist. They range from gently rounded to slightly flattened. The rims generally range from straight to slightly flared. Two exceptions are
Figure 21. Reconstruction medium sized jar, 4283, from the Cribb's Crib site [Detail of loop handle shown to left of jar and detail of strap handle shown to right of jar. Actual size]
Table 2. Projected horizontal dimensions of selected vessel fragments, Cribb's Crib site

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Provenience</th>
<th>Relative Vessel Size</th>
<th>Extrapolated Orifice Diameter</th>
<th>Extrapolated Shoulder Diameter</th>
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<td>N900/W1901</td>
<td>Miniature</td>
<td>62 mm.</td>
<td>76 mm.</td>
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<tr>
<td>2364</td>
<td>N930/W1080</td>
<td>&quot;Pinch pot&quot;</td>
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<td>3786</td>
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<td>Medium</td>
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<tr>
<td>4283</td>
<td>Feature 34</td>
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<td>140 mm.</td>
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<tr>
<td>4386</td>
<td>Feature 40</td>
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<td>Feature 110</td>
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<td></td>
<td>0.0'-.75 below orifice</td>
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<td></td>
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<td>4966</td>
<td>Feature 153</td>
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<td>428 mm.</td>
</tr>
<tr>
<td></td>
<td>0.5' below orifice</td>
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</tr>
</tbody>
</table>
distinctly S-shaped. The rims join the body of the vessels at a vertical or slightly everted angle. The interior neck juncture ranges from a gently curved to a shapely angular edge. Handles occasionally occur on the vessels. They span the exterior angle between the rim and upper shoulder. The handle attachments occur at the lip or slightly below it on the rim exterior to a point slightly below the neck juncture on the upper shoulder of the vessel. Moingona Phase handles apparently occur in diametrically-opposed pairs (Gradwohl 1973:57; Osborn 1982:19). Only the reconstructed vessel (specimen #4283) is complete enough to verify this assumption.

Rim height is apparently a function of vessel size, i.e. there is a tendency for larger vessels to have higher rims than smaller vessels (Gradwohl 1973:37; Osborn 1982:19). One-hundred eighty-two rims of the 626 rims, recovered from the Cribb's Crib site, are complete enough for height measurements. The measurement is taken from the lip edge to the rim/shoulder junction on the rim interior. These heights range from 5.7 mm. for a miniature jar to 62 mm. for the larger jars. The mean rim height is 33 mm. Although the rim height distribution tends to follow the standard bell curve, a slight clustering of rim heights occurs between 40-45 mm. Eighteen percent (33 specimens) of the rim heights fall within this range. The range of rim heights of the Cribb's Crib vessels is not inconsistent with those described at other Oneota sites throughout the Prairie-Plains (Table 3).

Medial rim thickness ranges from 3.3 mm. to 13 mm. on 492 measured rims. The mean medial rim thickness is 8 mm. The measurement is taken
<table>
<thead>
<tr>
<th>Site Description</th>
<th>Range</th>
<th>Mean</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cribb's Crib (Moingona Phase)</td>
<td>5.7-62 mm.</td>
<td>33 mm.</td>
<td>Osborn 1982:19</td>
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<tr>
<td>Clarkson (Moingona Phase)</td>
<td>7.5-59 mm.</td>
<td>32 mm.</td>
<td>Osborn 1982:19</td>
</tr>
<tr>
<td>Goodhue (Moingona Phase)</td>
<td>4-68 mm.</td>
<td>not available</td>
<td>Gradwohl 1973:37</td>
</tr>
<tr>
<td>Preston (central Des Moines River Valley)</td>
<td>28.57 mm.</td>
<td>not available</td>
<td>Henning 1961:31</td>
</tr>
<tr>
<td>Blue Earth/Correctionville Phase</td>
<td>15-40 mm.</td>
<td>25.5 mm.</td>
<td>Anfinson 1979:40</td>
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<tr>
<td>Sheffield (Blue Earth Phase)</td>
<td>13-61 mm.</td>
<td>not available</td>
<td>Gibbon 1973:11</td>
</tr>
<tr>
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<td>15-40 mm.</td>
<td>25.5 mm.</td>
<td>Henning 1961:11</td>
</tr>
<tr>
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<td>17-30 mm.</td>
<td>28.2 mm.</td>
<td>Henning 1961:17</td>
</tr>
<tr>
<td>Dixon (Correctionville Focus)</td>
<td>8-31 mm.</td>
<td>20.4 mm.</td>
<td>Harvey 1979:94</td>
</tr>
<tr>
<td>Fisher (Fisher Focus)</td>
<td>40 mm.</td>
<td>not available</td>
<td>Griffin 1943:277</td>
</tr>
<tr>
<td>Bornick (Grand River Phase)</td>
<td>8-51 mm.</td>
<td>24 mm.</td>
<td>Gibbon 1971:109</td>
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<tr>
<td>Walker-Hooper (Grand River Phase)</td>
<td>6-63 mm.</td>
<td>not available</td>
<td>Gibbon 1972:197, 220-222</td>
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<tr>
<td>Blood Run (Orr Focus)</td>
<td>19-59 mm.</td>
<td>36.9 mm.</td>
<td>Harvey 1979:172</td>
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<tr>
<td>Flatiron Terrace (Orr Focus)</td>
<td>23-70 mm.</td>
<td>50.2 mm.</td>
<td>Henning 1961:23</td>
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<tr>
<td>Lane Enclosure (Orr Focus)</td>
<td>12-16 mm.</td>
<td>not available</td>
<td>M. Wedel 1959:85</td>
</tr>
<tr>
<td>Midway (Orr Phase)</td>
<td>15-52 mm.</td>
<td>36 mm.</td>
<td>Gibbon 1970:91</td>
</tr>
<tr>
<td>Armstrong (Silvernale Phase)</td>
<td>15-70 mm.</td>
<td>not available</td>
<td>Hurley 1978:47-57</td>
</tr>
<tr>
<td>Dowell</td>
<td>24-52 mm.</td>
<td>38.7 mm.</td>
<td>Henning 1970:131</td>
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<tr>
<td>Guthery</td>
<td>12-58 mm.</td>
<td>35.3 mm.</td>
<td>Henning 1970:63</td>
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<tr>
<td>Leary</td>
<td>19-76 mm.</td>
<td>(exterior rim height)</td>
<td>Hill and Wedel 1936:33</td>
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<tr>
<td>Schmeisser (Burlington Focus)</td>
<td>15.6-50.1 mm.</td>
<td>33.4 mm.</td>
<td>Tiffany 1979:93-94</td>
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<tr>
<td>Utz</td>
<td>19-52 mm.</td>
<td>29.98 mm.</td>
<td>Henning 1970:107</td>
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midway between the lip edge and the neck junction. Rim cross sections are either of even thickness from neck to lip or thinning from neck to lip. A few of the rims are thickest near the middle of the rim and thin towards both the lip and the neck junction. These rims appear to have been slabs added to the vessel body to form the rim. One rim has a cut lip surface.

The neck (rim/shoulder junction) is generally the thickest part of the vessel. This is apparently to support the weight of the rim. The neck thickness ranges from 4 mm. on the miniature vessels to 16 mm. on the larger jars. Neck thickness also appears to be a function of vessel size and rim height. In the sample of sherds with measurable interior neck junctions, 71% have a slightly curved neck juncture. The curved interior junction angle is variable and ranges from $87^\circ$ to $152^\circ$ with a mean of $136^\circ$. The sherds with angular interior necks have angles which range from $81^\circ$ to $137^\circ$ with a mean of $102^\circ$. There is a tendency for larger rims to have more angular neck junctions.

Oneota vessels characteristically have relatively thin vessel walls. Among the body sherds recovered from the Cribb's Crib site, the vessel wall thickness ranges from 2 mm. to 12 mm. Eighty percent of the measurable body sherds have thicknesses which are less than 5 mm. Approximately 6% of the body sherds have a thickness greater than 5.5 mm. The shoulder is the thickest portion of the vessel body.

A few sherds exhibit possible food encrustations or other residue on the vessel surface. A total of 246 sherds apparently has surface residue. In several cases, the residue is present only on the exterior surface. This may represent smudging which has occurred during repeated
heating of the vessel over an open flame during the cooking process.

Vessel composition Clay for pottery manufacture is a readily available raw material in the vicinity of the Crib's Crib site. Three sources are mentioned by Tilton in his geological survey of Warren County:

The clay that can be used is derived from three sources: first, the loess; second, the alluvial deposits along the rivers; and third, the coal measures shales (1896:356).

Another excellent clay source for pottery manufacture is the Yarmouth-Sangamon paleosol which formed in the Kansan glacial till. This 'gumbotil' would provide a thick, clayey ceramic raw material. Exposures of the paleosol (gumbotil) often occur on the hill slopes (Ruhe 1969:87). Any one of these sources would provide the Oneota inhabitants with suitable raw materials for ceramic production. Historically, the prime clay source was the loess just beneath the 'soil', the second most utilized clay source was the alluvial deposits along the Middle River and lower courses of the North and South Rivers, and finally, the shales of the coal measures provided less satisfactory clay sources due to their variable composition (Tilton 1896:356-357).

The paste texture of the Oneota ceramics from the Cribbs Crib site ranges from fine to medium. Crushed shell is the main tempering agent; however, two sherds contain grit-tempering. The shell inclusions range from minute to large flakes up to 10 mm. in breadth; however, most shell inclusions are seldom over 3 mm. in breadth. Most sherds have moderate (5-25%) to abundant (>25%) amounts of shell temper. The core is lami-
nated and ranges from crumbly to fairly compact in consistency. Several factors may be involved in the variability of core consistency, including chemical reactions in the soils, firing techniques, clay composition, and amount of tempering agent in the paste (Henning 1961:10).

Several sherds (approximately 30% of the ceramic inventory) contain spherical iron oxide particles. These particles have been referred to as hematite inclusions in the literature. The particles range from minute to 4.5 mm. in diameter. Although it is possible these particles were intentionally added to the paste during the preparation of the clay, the author believes the iron oxide inclusions represent naturally occurring concretions in the original clay deposits. Upon close examination of several particles, a cross-sectional view shows the concentric spherical construction of the particles. This would seem to indicate the particles were natural iron oxide concretions versus crushed hematite additions. The presence of an iron oxide tubule (pipestem) in a bulked sample of daub tends to support this hypothesis. The presence of numerous iron oxide concretions is mentioned in the soil surrounding the site in an earlier soil survey (O'Neal and Devereux 1925:27) of Warren County. The formation of the iron oxide concretions could occur in any of the forementioned clay sources except for the coal measure shales (Fenwick and Knapp 1982:72,153-156; Limbrey 1975:28,58).

The hardness of the ceramic sherds ranges between 2 (gypsum) and 4 (flourite) on the Moh's scale. The hardness of 98% of the ceramic
inventory ranges between 2 (gypsum) and 3 (calcite).

The majority of the sherds range in color from dark (10YR3/1) or medium (10YR7/2) gray to a very pale brown (10YR6/3); however, a light yellowish brown/tan (10YR6/4) or a brownish yellow/buff (10YR6/6) color commonly occurs. Five specimens, including one nearly complete 'pinch pot' bowl, are reddish yellow/orange (7.5YR6/8). In order to describe the colors more accurately, soil color charts produced by the Munsell Color Company (1975) have been used. The color name is given along with its symbol designating its hue, value, and brightness.

The use of shell-temper may have created a revolution in ceramics. It apparently produced a superior vessel compared to grit or sand tempered ceramics of other cultural groups of the region. Two major benefits of the shell temper are presented by Morse and Morse:

The major benefit derived from the adoption of shell temper was increased vessel strength. A lighter paste allowed the manufacture of a globular or spherical shape and this shape is inherently stronger.

Another benefit of shell temper and the globular shape is a probable increased efficiency in cooking. More even heating would certainly result. Cooking jars invariably included both powdered shell and 2-4 mm. size shell particles in their paste, the latter presumably allowing an even more porosity that might relate to more efficient or more uniform heat transfer (1983:208, 210).

In addition to more efficient cooking, the calcium carbonate may have also aided in the digestion of the corn. Perhaps the calcium carbonate was released and allowed to diffuse through the vessel wall into the cooking corn. The preparation of corn in hot lime water is known to release the vitamin niacin. This would prevent the occurrence of
pellagra which results from a steady corn diet (Morse and Morse 1983:218).

**Vessel manufacture** The exact method of manufacture is not known. It is possible the pottery was mass molded then thinned and shaped by the paddle and anvil method. One reconstructed portion of a vessel body (specimen #4697N) tends to support this hypothesis. Several indentations appear to represent fingertip impressions. The end of the hand apparently was used as the anvil. Some sherds are cord roughened which indicates the limited usage of a cord-wrapped paddle. Many of these sherds shows signs of attempted smoothing over the cord roughened surface. The vessels may have also been constructed by pinching or drawing.

The exterior surface of the majority of sherds have been smoothed-over leaving a plain, dull surface. Some of the cord roughened sherds exhibit signs of attempted smoothing over the roughened surface. While smoothing is the common exterior surface treatment, some sherds exhibit signs of brushing and/or scraping, especially along the neck and on the vessel interior. The brushed surfaces appear to be made by wiping the surface with a bunch of grass during vessel construction.

The range of vessel colors has been mentioned in the preceding section. Inferences about the firing atmosphere can be drawn from the colors of the sherds (Rye 1981:114-118; Shepard 1954:104-107). The majority of the sherds appear partially to incompletely oxidized. Rim sherds have more oxidized colors compared to the body sherds. This may
indicate the vessels were inverted for firing. Some smudging has also occurred on the body surfaces.

Although the exact cause for the variations in the oxidation levels within the firing atmosphere may not be determined without experimentation, the following may represent possible explanations: 1) the temperature of the firing atmosphere may vary during the firing process; 2) the amount of time the vessels are fired may vary from firing to firing; 3) the amount of organic material present in the clay (or different clay sources) may affect the time required to fully oxidize the pottery; and 4) the type of firing atmosphere present at the vessel surface may depend upon the relative vessel position.

The introduction of shell tempering allowed prehistoric potters to produce stronger, finer ceramics than were previously produced; however, before shell could replace grit as a tempering agent, the disastrous effects created by calcium carbonate at the temperatures between 650° and 890°C had to be overcome (Shepard 1954:30). The decomposition of calcium carbonate to calcium oxide at these temperatures results in the hydration of calcium oxide with any available water to form calcium hydroxide. Since this compound has a higher volume than calcium carbonate, the resulting effect is the occurrence of 'lime' spalling within the temperature range (600°-900°C) of the primitive, non-kiln firing techniques (Stimmell 1978:267; Stimmell, Heimann, and Hancock 1982:219).

Recent X-ray diffraction analysis studies (Porter 1964: Stimmell, Heimann, and Hancock 1982) indicate salt was intentionally added to the paste before firing. Salt acts as a catalyst during the calcination
process and reduces the onset of sintering (Stimmell, Heimann, and Hancock 1982:226). The use of salt solved the problem of 'lime' spalling. It also created a need for salt in areas where it does not occur naturally. No attempt was made to verify the possibility of salt usage in the Cribb's Crib ceramics due to the necessity of special equipment not available in the archaeological laboratory.

**Vessel rim decoration** Of a total of 628 intact jar rims from the Cribb's Crib site, 232 specimens exhibit no decoration. The majority of the 396 decorated rims (Figures 23-25) exhibit decoration in one of three areas on the rim surface: 1) the lip surface (lip top); 2) the lip interior; or 3) the interior rim. Seven specimens have exterior rim decorations, including one S-shaped rim. It is difficult to determine if the plain rim sherds are representative of the entire vessel or just an undecorated section of an otherwise decorated rim. Several decorated rim sherds exhibit alternating decorated and undecorated areas.

Lip profiles tend to be rounded or flattened. A total of 438 rim sherds exhibits a rounded surface profile. A flattened lip surface occurs on 175 rim sherds. The remaining rim sherds are slightly thickened on the exterior lip edge.

A total of 102 decorated rims, recovered from the Cribb's Crib site, has decorated lip tops. Four major decorative categories occur on the lip top: 17.7% of the decorated lip surfaces have narrow-tool impressions, 66.7% have finger or broad-tool impressions, 10.8% have fingertip punctates, and 4.6% have miscellaneous punctates.
Figure 23. Decorated jar rim sherds and cross-sections from the Cribb's Crib site [A - rim with exterior tool impressed lip: 3493; B - rim with tool impressed lip top (ticked rim): 3736; C - exterior decorated S-shaped rim: 3638; and D - rim sherd and handle with tool impressed lip top: 1614. Actual size]
Figure 24. Rim and shoulder section, 4383, and cross-section of a small sized jar from the Cribb's Crib site [The rim lip top is decorated with tool impressions. Actual size]
Figure 25. Rim and shoulder segment, 4466, and cross-section of a large jar from the Cribb's Crib site [Top view is of rim interior, showing nested chevrons. Bottom view is of the vessel exterior with exterior rim decoration]
The narrow-tool impressions are formed by placing a tool on the vessel lip while the clay is still malleable and pressing the tool down at an angle to the lip surface. The narrow-tool impressions are elliptic shaped. The impression width is usually between 2-5 mm. Thirteen of the 18 specimens have impressions perpendicular to the lip edges. The other five specimens have oblique impressions.

Finger or broad-tool impressions are wider than the narrow-tool impressions. The width of these impressions range between 7-14 mm. While the narrow-tool impressions tend to be shallow (less than 3 mm. deep), these impressions may reach a depth of 6-7 mm. On 50 rim sherds, the impressions are perpendicular to the lip edge, while nine rim sherds have oblique impressions. A total of nine rims has impressions with depths greater than 4 mm. These deeper impressions give the rim a "ticked" appearance.

Eleven rim sherds have lip decorations which were produced by pushing the fingertip into the malleable lip surface. The punctates are ovoid shaped with the fingernail impression visible in the depression. Smaller rims may only exhibit the fingernail impression. Ten rims have the punctates aligned perpendicular to the lip edge while the remaining rim exhibits oblique punctates.

Five rims exhibit miscellaneous punctates on the lip surface. These punctates apparently are produced by a solid object with a blunt end. The diameter of the punctates varies with size of the tool used to make them. The diameters generally range between 2-5 mm.

Four major interior lip decorative techniques exist: 4.5% of the
219 interior lip decorated rims have short narrow tool-impressions, 80.5% have finger or broad-tool impressions, 7.3% have fingernail punctates, and 7.7% have circular punctations made by a blunt ended tool. Eight rim sherds have narrow-tool impressions oriented vertically across the interior lip surface. Two rims have oblique tool-impressions across the interior lip surface. The finger or broad-tool impressions are also oriented in either a vertical pattern (148 specimens) or an oblique pattern (18 specimens) of elliptical impressions across the interior lip surface. One specimen has circular impressions as opposed to the general elliptical shape. Several rim sherds have the upper lip slightly flared outward, resulting from the pressure utilized for the application of the impression into the still malleable vessel surface.

Two rim sherds exhibit fingernail punctations oriented in an oblique pattern across the interior lip surface. Fourteen rim sherds exhibit vertical fingernail punctations across the interior lip surface. Seventeen rim sherds have a series of circular punctations, made by a blunt tool, across the interior lip surface. None of the rims with decorated lips have the lip top decorations occurring in combination with interior lip decorations; however, they may occur either adjacent to one another or separated by an undecorated area.

The interior rim decoration on Moingona Phase ceramics occurs as trailed lines. Since the rims tend to be slightly everted, the interior rim is exposed to view and appears to be the logical area for decoration. It should be noted Oneota vessels, in general, and Moingona Phase vessels, in particular, seem to be decorated on vessel surfaces which
are readily visible. This aesthetic quality is quite different from
Mill Creek, Great Oasis, or Woodland ceramics where decorations may
occur on the underneath exterior portions of the everted or flared rims
and/or over the entire surface of the vessel body.

The presence of the interior rim decorations is consistent with
other Moingona Phase sites (Gradwohl 1973:45-57, 1974:95; Osborn
1982:31). Two categories of interior rim decorative elements exist for
the ceramics recovered from the Cribb’s Crib site. One category is the
occurrence of nested chevrons (Figure 25). These trailed chevrons occur
in nested groups of three to six chevrons per set. In all cases, the
chevrons begin with the widest parts at the lip edge and the points at
or near the rim/shoulder juncture. The trailed lines range in thickness
from 2-5 mm. A total of 33 rim sherds exhibit interior rim decorations
composed of nested chevrons.

The second category of interior rim decorations consists of a set of
oblique parallel trailed lines extending from the lip to the neck. It
is quite possible this is not a discrete category. The rim sherds are
often broken at a point where it is impossible to determine if these
lines represent a distinct motif or if they are part of a nested group
of chevrons (Osborn 1982:31). A total of 63 rim sherds exhibits this
category of interior rim decoration.

The interior lip decorations and the interior rim decorations often
occur together. Twenty rims exhibit combinations of these two forms of
rim decorations. Two rim sherds have the interior rim decoration occur-
ring next to the interior lip decoration. The lip top decorations do
not occur in combination with the interior rim decorations.

As a general rule, Moingona Phase rims are decorated on the lip and/or interior rim surface. Since rules are created to cover the majority of cases encountered, they often contain a few exceptions. The same is the case for decorated rims of the Moingona Phase ceramics. The analysis of the Cribb's Crib ceramics have revealed seven rims with external rim decorations. Six rims have vertical tool-impression along the exterior lip surface. The other rim is an S-shaped rim (specimen #3638). The exterior lip surface is decorated with vertical tool-impressions. The design element of the exterior rim surface consists of a repetitive series of three oblique trailed lines. These lines extend from the bottom of the tool-impressions to the neck of the vessel. The width of these trailed lines is 4 mm.

Handles are present on 33 rim sherds, including the reconstructed vessel with three attached handles. Eight additional rim sherds have areas where handles were previously attached. There were a total of eleven strap, two buttress, two triangular loop, and twenty loop handles attached to the rim sherds. A thorough discussion of handles occurs in a subsequent section.

**Vessel shoulder decoration** Of the 9,273 body sherds recovered from the Cribb's Crib site, 1,515 sherds are decorated, including one grit-tempered body sherd. The body decoration on Moingona Phase ceramics is limited to shoulder region of the vessel. An additional 198 shoulders attached to necks (111) or rims (87) are also decorated.
Nearly 16.7% of the total ceramic inventory from the Cribb's Crib site bear some type of shoulder decoration. Of the decorated sherds, a total of 44 body sherds are cord roughened, including the one grit-tempered body sherd.

The decorative effects on the rest of the decorated sherds have been created by trailed (occasionally incised) lines and/or short tool-impressions or punctates (Figures 26-29). Trailing is apparently the principal technique for design application. The punctates usually outline the trailed lines. The tool used to create the trailed lines appears to be either a flat or blunt, round object. Some decorations indicate a narrow pointed object may also have been used to create incised lines. This is often the case on the smaller vessels where decorated area is restricted because of vessel size. The decorative components are applied to the jar while the vessel surface is still malleable. This creates reasonably clear impressions. The range in thickness of the trailed lines on the majority of the decorated sherds is between 2.5-4.5 mm. with a mean thickness of 3 mm.

The trailed and/or punctated decorations on the vessel shoulders comprise a series of distinctive motifs used in combination or repetition. They form a cincture around the entire vessel shoulder (Gradwohl 1973:21-60).

As a general rule, these design components are delineated from one another by sets of oblique or vertical lines (the number varies) which extend from the neck juncture to the should periphery. It appears that a limited number of design components was considered to be "right" or "acceptable" within these potters' cultural views,
Figure 26. Decorated shoulders of large jars from the Cribb's Crib site [A:4966; and B:5305]
Figure 27. Decorated shoulders of jars from the Cribb's Crib site [A:3877; B:4599N; and C:4599L]
Figure 28. Rim and shoulder segment, 3876A, and cross-section of a large jar from the Cribb's Crib site.
Figure 29. Rim and decorated shoulder fragments with cross-sections from the Cribb's Crib site [A - "pinch pot":1054; B - C - minatures:1894, 4255; and D - small jar:3645. Actual size]
thus allowing the archaeological analyst to classify these design units and to record them as a decorative series (Osborn 1982:33).

The notation used in this analysis of the Cribb's Crib ceramics consists of an adaptation of Gradwohl's system used to describe the ceramics from the Howard Goodhue site (1973:26). Figure 30 depicts a graphic representation of the design motifs or components on the jars from 13WA105. Table 4 presents a list of design components observed on individual vessel shoulders recovered from the Cribb's Crib site. A comma is used to separate design components while a '+' indicates components occur in the same design space. The symbol 'H' designates the presence of a handle. Symbols enclosed by parentheses indicate the design components are incomplete.

In addition to the series of recognizable design components, a total of 541 smaller sherds contain single recognizable design elements. Table 5 contains a frequency listing of individually recognizable design elements.

The majority of the decorated body sherds, recovered from the Cribb's Crib site, unfortunately are not large enough to be categorized according to the design elements previously described. The following broad categories are used to describe the remaining decorated sherds: sherds with parallel trailed lines (902 specimens); sherds with parallel lines perpendicular to trailing (26 specimens); sherds with parallel trailed lines and circular trailed lines (8 specimens); sherds with trailed lines edged by punctations (99 specimens); sherds with puncta-
Figure 30. Design motifs found on ceramic vessels from the Cribb's Crib site [Also included are design motifs from other Moingona Phase sites. Adapted from Gradwohl (1973:26)]
Table 4. Series of design components observed on individual vessel shoulders, Cribb's Crib site

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Provenience</th>
<th>Design Components</th>
</tr>
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<tbody>
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<td>Surface</td>
<td>(1B), 1</td>
</tr>
<tr>
<td>1026</td>
<td>N900/W1080</td>
<td>(1C) + 2A</td>
</tr>
<tr>
<td>1040A</td>
<td>N900/W1090</td>
<td>1 + (2H)</td>
</tr>
<tr>
<td>1091</td>
<td>N900/W1090</td>
<td>2C, 1, (1F)</td>
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<td>1336</td>
<td>N910/W1080</td>
<td>1B, 1</td>
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<td>1369</td>
<td>N910/W1080</td>
<td>(3E) + 5A</td>
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<td>1511</td>
<td>N910/W1090</td>
<td>3, 1A</td>
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<td>N910/W1090</td>
<td>4B + 2I</td>
</tr>
<tr>
<td>1650</td>
<td>N910/W1090</td>
<td>(3E) + 5D</td>
</tr>
<tr>
<td>1654</td>
<td>N910/W1090</td>
<td>2A, (1A)</td>
</tr>
<tr>
<td>1849</td>
<td>N910/W1100</td>
<td>(1C), 1, 2A</td>
</tr>
<tr>
<td>1853</td>
<td>N910/W1100</td>
<td>1A, 2A</td>
</tr>
<tr>
<td>1960</td>
<td>N910/W1110</td>
<td>3E + 5D</td>
</tr>
<tr>
<td>2130</td>
<td>N920/W1090</td>
<td>1A, 2A</td>
</tr>
<tr>
<td>2303</td>
<td>N920/W1100</td>
<td>1, 2C</td>
</tr>
<tr>
<td>2596</td>
<td>N930/W1100</td>
<td>2, 2G, 7 (incised)</td>
</tr>
<tr>
<td>2797</td>
<td>N660/W930</td>
<td>1A, 2A</td>
</tr>
<tr>
<td>3041</td>
<td>N660/W940</td>
<td>(2) + 1I, 2H</td>
</tr>
<tr>
<td>3072</td>
<td>N660/W940</td>
<td>2, 1A + (3E)</td>
</tr>
<tr>
<td>3611</td>
<td>Feature 1</td>
<td>2, 1I with perforation</td>
</tr>
<tr>
<td>3660</td>
<td>Feature 1</td>
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</tr>
<tr>
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<td>Feature 2</td>
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</tr>
<tr>
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<td>Feature 2</td>
<td>4B + 5A</td>
</tr>
<tr>
<td>3876</td>
<td>Feature 8</td>
<td>4F, 1A, 3 + 5D, 1A, 2E, 4F</td>
</tr>
<tr>
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<td>Feature 8</td>
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<tr>
<td>4044</td>
<td>Feature 23</td>
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<tr>
<td>4045</td>
<td>Feature 23</td>
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</tr>
<tr>
<td>4255</td>
<td>Feature 34</td>
<td>1A, 2</td>
</tr>
<tr>
<td>4283</td>
<td>Feature 34</td>
<td>1A, 4 + H, 1A (3 repetitions)</td>
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<tr>
<td>4295</td>
<td>Feature 34</td>
<td>(2A), 1, 2A</td>
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<td>Feature 40</td>
<td>4D, 1B</td>
</tr>
<tr>
<td>4466</td>
<td>Feature 86</td>
<td>4F, 1A, 3 + 5D, 1A</td>
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<td>4599L</td>
<td>Feature 120</td>
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<tr>
<td>4599N</td>
<td>Feature 120</td>
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<tr>
<td>4752</td>
<td>Feature 132</td>
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</tr>
<tr>
<td>4948</td>
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<td>(3B) + 5A</td>
</tr>
<tr>
<td>4966</td>
<td>Feature 153</td>
<td>(1A), 1E + 3B, 1C</td>
</tr>
<tr>
<td>5033</td>
<td>Test Pit C</td>
<td>(1H) + 7A</td>
</tr>
<tr>
<td>5272</td>
<td>Test Pit C East</td>
<td>2H + (H)</td>
</tr>
<tr>
<td>5281</td>
<td>Test Pit C East</td>
<td>1D, (1C)</td>
</tr>
<tr>
<td>5305</td>
<td>Test Pit C East</td>
<td>1G, 4D, (1G)</td>
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Table 5. Single design elements observed on individual sherds, Cribb's Crib site

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<tr>
<th>Category 1:</th>
<th>Total</th>
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<tbody>
<tr>
<td>Design element</td>
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</tr>
<tr>
<td>without handles</td>
<td>19</td>
</tr>
<tr>
<td>with handles</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Category 2:</th>
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<tbody>
<tr>
<td>Design element</td>
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<tr>
<td>without handles</td>
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<td>with handles</td>
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<table>
<thead>
<tr>
<th>Category 3:</th>
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<tbody>
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<td>Design element</td>
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<td>with handles</td>
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<table>
<thead>
<tr>
<th>Category 4:</th>
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<tr>
<td>Design element</td>
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<td>without handles</td>
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<table>
<thead>
<tr>
<th>Category 5:</th>
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<td>Design element</td>
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<table>
<thead>
<tr>
<th>Category 6:</th>
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</thead>
<tbody>
<tr>
<td>Design element</td>
</tr>
<tr>
<td>without handles</td>
</tr>
</tbody>
</table>

Grand Total 541
tions (15 specimens); sherds with fine incised, linear lines (10 specimens); sherds with fingernail punctations (1 specimen); and sherds with perforations (1 specimen). Handles are attached to eleven specimens. A total of 175 sherds has been intentionally smoothed after the design motifs were applied to the vessel surface.

The occurrence of many of these motifs has been reported throughout the Prairie-Plains for Oneota ceramics. There are of course many variations on the generalized design components. The variation and frequency of design elements have served as diagnostic indicators for the various Oneota phases (M. Wedel 1959:112). One variation is the differentiation of the use of punctates for either space fillers or borders for the trailed lines.

Orr Focus ceramics characteristically have design spaces filled with punctates (Harvey 1979:160; M. Wedel 1959:117), while Correctionville ceramics (Harvey 1979:160), and those from the Leary site (Hill and W. Wedel 1936:37), the Guthrey site (Henning 1970:69-72, 137) and the Goodhue site (Gradwohl 1973:27) tend to have punctates used as a border in conjunction with trailed lines (Osborn 1982:33).

Moingona Phase ceramics have punctations used as bordering elements for the basic trailed line motifs (Gradwohl 1973:27; Osborn 1982:31-37). The decorated sherds from the Cribb’s Crib site are consistent with this observation.

Undecorated body sherds A total of 7,758 undecorated body sherds was recovered from the Cribb's Crib site. These sherds were apparently from the undecorated portion of Oneota vessels. In most cases, this
area was located on the lower half of the vessels beneath the shoulder. The surface of these sherds exhibited various forms of smoothing, including brushing and scraping. Some sherds have a series of parallel striations which may indicate the surface was brushed with grass. Other sherds exhibit drag marks which are similar to those produced by using a shell scraper (Rye 1981:86).

Approximately 44% of the body sherd inventory range in thickness from 2.5–4.5 mm. Although this percentage may not seem substantial, it should be noted this represents 73% of the measurable body sherds. The sherds vary little from the general discussion on color and paste composition.

Handles There is a total of 93 occurrences of handles at the Cribb's Crib site (Table 6). Thirty-three rim sherds have attached handles; including the reconstructed vessel which has three handles present. The remaining 60 handles occur as either whole unattached handles or isolated fragments. An additional 26 rim and/or shoulder fragments have attachment areas which indicate the former existence of handles.

The method of attachment is apparently one of two methods: 1) the handles were riveted to the vessel, or 2) they were attached by pressing the handle onto the vessel surface. Thirteen handles are riveted to the vessel wall. Joukowsky (1980:355) describes this method as scoring and slip. A hole was pierced into the vessel wall while the vessel was still leather-hard. A slip was probably added to act as an adhesive agent. The handle was then inserted. Two sherds have been scored
Table 6. Distribution of handle forms, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation Surface</th>
<th>Squares</th>
<th>Features</th>
<th>Test Pits</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buttress</td>
<td>1</td>
<td>10</td>
<td>4</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Loop, undecorated</td>
<td>3</td>
<td>21</td>
<td>8</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>Loop, decorated</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Lug</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Strap, undecorated</td>
<td>2</td>
<td>12</td>
<td>6</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Strap, decorated</td>
<td>1</td>
<td>8</td>
<td>4</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>59</strong></td>
<td><strong>26</strong></td>
<td><strong>2</strong></td>
<td><strong>95</strong></td>
</tr>
</tbody>
</table>
(perforated), while two unattached handles have the tenons present for
insertion. The remaining handles appear to have been pressed against
the vessel with the aid of a possible adhesive "slip". Joukowsky
(1980:355) describes this method as slip.

The one end of the handle was attached to the rim exterior at the
lip or slightly below it. The other end was attached to the shoulder of
the vessel below the rim/shoulder juncture.

Four basic handle forms exist among the Cribb's Crib material: 1)
buttress or carinate handles, 2) loop handles, 3) strap handles, and 4)
lugs. The buttress (carinate) handles are deeper than broad with a
rectangular cross-section. Loop handles are often round or ovoid in
cross-section, although a few triangular cross-sections were noted in the
sample. Strap handles are broader than deep. With the exception of the
possible lug handles, the handles allowed space between the vessel and
handle surface for the passage of thongs or other supportive material
from which the vessels could be suspended.

A total of 15 buttress (carinated) handles or handle fragments is
present in this handle category. These handles are decorated along the
entire length of the handle with a series of horizontal tool-impress-
sions. The length of these handles ranges from 35-64 mm. The mean
length is 45 mm. The width of these handles ranges between 8.5-14.5
mm. The mean width is 10.7 mm. The thickness of these handles ranges
between 22-55.5 mm. The mean thickness is 35 mm.

Loop handles are the most numerous type of vessel handle recovered
from the Cribb's Crib site. A total of 44 loop handles is present in
the sample. Two loop handles occur as a diametrically-opposed pair associated with a strap handle on the single reconstructed vessel.

The majority of the loop handles has an ovoid or circular cross-section, while three loop handles have a triangular cross-section. The length of these handles ranges between 21-49.5 mm. The mean length of the loop handles is 33.5 mm. The width of these handles ranges between 6-22 mm. The mean width is 12.9 mm. The thickness of these handles ranges between 5-19 mm. The mean thickness is 11 mm.

One triangular loop handle is decorated with a series of horizontal tool-impressions along the length of the handle. Two other loop handles also have horizontal tool-impressions. Three loop handles are decorated with a series of vertical trailed lineds. One loop handle has a single trailed groove down its midrib. A total of four loop handles exhibits punctations. Two handles have three vertical rows of punctates along the length of the handle. One handle has three vertical rows of punctates which extend only midway down the handle. The remaining handle has a single vertical row of punctates along its entire length down the center line.

Two sherds have thickened areas which may be possible lug handles. Both lugs are undecorated. One lug measures 22 x 10 x 4 mm. and is slightly curved. The other one is too fragmentary for valid measurements.

A total of 34 strap handles is among the handles recovered from the Cribb's Crib site. The length of these handles ranges between 13-63 mm. The mean length is 41 mm. The width of the strap handles ranges
between 9-55 mm. The mean width is 36.5 mm. The thickness of the strap handles ranges between 4-14.5 mm. The mean thickness is 10.4 mm.

Thirteen strap handles are decorated. The most common form of decoration on the strap handles is a series of vertical trailed lines. The number of lines ranges from five to eight depending upon the width of the strap. Eight strap handles have the vertical trailed lines extending along the entire length of the handle. Three strap handles have the vertical trailed lines extending only half-way down the handle length. One strap handle has the trailed lines arranged horizontally across the entire length of the handle. The remaining handle has a single row of circular punctates across the top of the handle. Beneath the punctates, a series of horizontal trailed lines occurs above a series of vertical trailed lines.

The probable method of suspension is by passing leather thongs or fiber cordage through the handles. As noted by Osborn, the handles also appear to be incorporated into the overall vessel decoration:

Apparently, handles are intentionally incorporated into the decorated motifs which occur on the vessel shoulders. Oblique parallel lines are oftentimes found to "emanate" from the bases of the handles, and the symmetrical placement of handles may have served to guide the arrangement of motifs (1982:38).

**Bowl fragments** Although the occurrence of bowls is rare, they have been identified at Moingona Phase sites (Gradwohl 1973:59; Osborn 1982:39). It is possible the occurrence of bowls is higher than noted. It is extremely difficult to differentiate bowl fragments from jar
fragments especially when the sherds are small.

A total of 29 recognizable bowl rims and/or fragmentary bowls is among the ceramics recovered from the Cribb's Crib site (Figure 31). Three specimens represent miniature bowls or "pinch pots." One specimen (#4467) may represent the rim of an effigy bowl. The lip surface of this rim exhibits a broken surface. This surface may have originally been part of an effigy-like projection. Extrapolated orifice diameters of measurable bowl sherds range between 46-270 mm.

The lip profile of the bowls range between rounded and square with the rounded lips being the most common. The rims are generally straight although some are slightly flared. One specimen is a braced rim. Rim thickness ranges between 1.5-4 mm. The mean rim thickness is 3 mm. Body thickness generally ranges between 2.5-6.5 mm. One "pinch pot" has a body thickness of 9 mm. The mean bowl body thickness is 5 mm.

A total of 14 bowl rims exhibits decorated surfaces. The braced rim (specimen #625) has a series of punctates along the thickest portion of the rim. Eight rims exhibit decorations on the lip top. Four rims exhibit oblique tool-impressions across the lip surface. One specimen has miscellaneous punctates on the lip surface while another one has fingernail punctates arranged perpendicular to the lip edge. Two rims have perpendicular tool-impressions across the lip surface. These two rims along with two other rims have a series of parallel, horizontal trailed lines on the exterior rim surface. Three bowl rims have short vertical tool impressions on the interior lip surface.

Miniature vessels and "pinch pots" A total of 56 specimens repre-
Figure 31. Decorated bowl rims from the Cribb's Crib site [A - braced rim (625) and cross-section; B - exterior trailed and tool-impressed bowl rim (1124/1769); and C - interior lip decorated "pinched" bowl (4041) with exterior (left) and interior (right). Actual size]
sent portions of very small vessels. Some appear crudely made including one nearly complete "pinched" bowl. Others are carefully manufactured. It is possible these sherds were used to test the quality of the clay or were children's toys (Osborn 1982:39). They may also represent novice attempts at pottery manufacture.

Five specimens represent "pinch pots." They appear to have been manufactured from a ball of clay pinched into shape. These specimens are all decorated with tool-impressions on either the lip surface (1) or the interior lip edge (4).

Of the 51 miniature vessel fragments, 27 exhibit decorations. Nine rims have tool-impressed lip tops. The remaining 18 rim sherds have tool-impressed interior lip edges. Ten specimens exhibit decorated shoulders. Eight are decorated with trailed or incised lines, while two sherds are decorated with trailed or incised lines with punctations. Due to the small size of these sherds the exact design elements are difficult to determine.

**Cord-roughened ceramics** Forty-four body sherds, 43 shell-tempered sherds and one grit-tempered sherd, have cord roughened exteriors. The cord impressions on the exterior surface of the sherds range from 1.1 to 3.1 mm. These impressions are made by a stranded cord, either S or Z twisted, used in a series of elaborations created by adding more cords to the core (Hurley 1979). These impressions appear to have been applied to the surface of the vessel by a cord-wrapped paddle. One sherd has parallel trailed lines over the cord roughening. Twenty-nine sherds exhibit smoothing after the surface of
the vessel had been cord-roughened. Six shell-tempered sherds are part of the surface collection. Thirty-three shell-tempered sherds come from the excavation units, eight shell-tempered sherds come from features, and one grit-tempered sherd comes from the test pits. Cord roughening has been noted at other Moingona Phase sites (Gradwohl 1973:95; Osborn 1982:39).

Grit-tempered ceramics A total of two grit-tempered sherds, including one rim sherd, is among the ceramics recovered from the excavated portion of the Cribb's Crib site. With the exception of the tempering agent, the surface treatment and vessel composition are not inconsistent with the rest of the Moingona Phase ceramics at the Cribb's Crib site. Grit-tempered sherds have been noted at other Moingona Phase sites (Gradwohl 1973:47).

The grit temper ranges in size from minute to 4 mm. The rim sherd (specimen #2381) and one body sherd have been smoothed. The lip profile of the undecorated rim sherd is rounded.

These sherds may represent part of the Oneota ceramic industry. They might also represent items picked up by the inhabitants of the site, or they may have been part of trade vessels from people of the Late Woodland or the Central Plains traditions. Plain, grit-tempered vessels have been associated with Oneota material from several sites (Gibbon 1972:226; Hall 1962:70; Mason 1966:159-164).

Miscellaneous ceramic artifacts Four ceramic artifacts are discussed separately from the rest of the Oneota ceramics (Figure 32). These are shell-tempered specimens which do not represent the general
Miscellaneous ceramic artifacts from the Cribb's Crib site [A - side and front view of effigy figurine (154); B - possible bottle neck (2460A) and cross-section; C - ceramic disc (2680) and cross-section; and D - top and side view of ceramic spoon or scoop (5188). Actual size]
jar or bowl forms previously discussed.

One specimen (#1547) is the head of a small effigy figurine. It may represent the head of a bird. The specimen measures 12 x 18 mm. with a basal dimension of 16 x 18 mm. It is from an excavation square at a depth of 1.7-1.8 feet.

One specimen (#2460A) may represent a portion of a bottle neck. It appears cylindrically shaped with an interior diameter of 28 mm. and an exterior diameter of 38 mm. It is 5 mm. thick. It comes from an excavation square at a depth of 1.8 feet.

One specimen #2680 may be a portion of a fired clay disc. It is possible this specimen represents a gaming piece utilized in a dice game similar to one commonly played by several historic American Indian groups. The diameter of the fragment is 36 mm. It is 16 mm. wide. The exterior edge is 4.5 mm. thick, while the broken interior edge is 7 mm. thick. It is from an excavation square at a depth of 1.0-1.5 feet.

The final specimen (#5188) appears to be a portion of ceramic spoon or scoop. The surface of the specimen is smoothed. The rim thickness ranges from 6 to 10 mm. nearest the handle.

**Woodland ceramics**

One Woodland body sherd was collected from the surface at the eastern end of the site. The physical characteristics were quite different from the Oneota ceramics. The exterior surface was cord-roughened. The surface texture was much coarser than the Oneota ceramics. The grit-temper ranged in size from fine sand to 2 mm. The
The majority of the lithic artifacts recovered from the Cribb's Crib site consists of chipped stone tools, cores, anddebitage. A total of 6,860 specimens comprises the chipped stone artifacts recovered from the Cribb's Crib site (Table 7). The source materials of the majority of these artifacts are heterogeneous cherts. Other source materials include basalt, dolomite, limestone, quartz, quartzite, and Tongue River Silica. These materials are readily available in the surficial glacial till and in the river gravels; however, the large proportion of relatively homogeneous Mississippian formation cherts may indicate this material was obtained from a centralized quarry area (Gradwohl 1973:66; Osborn 1982:39). Mississippian formations of the Osage Series, containing cherty carbonate rocks, outcrop along the Des Moines and South Skunk Rivers in Marion County (Anderson 1983:137-167; Miller 1901:143-144; Parker 1973). The closest outcrops of this chert are located along Thunder Creek, a tributary of the South Skunk River, in the northeastern part of the county (Miller 1901:143-144). The chert is also present near Pella, Iowa, at a depth of 26 feet; however, Miller (1901:143) makes no mention of any outcrops in this vicinity. Except for these possible references, little information is available concerning the possible prehistoric quarry sites in the vicinity of the Cribb's Crib site. The author feels this is an important topic for future
Table 7. Distribution of chipped stone tools, cores, and debitage, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation Surface</th>
<th>Excavation Squares</th>
<th>Excavation Features</th>
<th>Excavation Pits</th>
<th>Test Totals</th>
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</thead>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Chipped Stone Tools</td>
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<td>23</td>
<td>1</td>
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<td>4</td>
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<td>17</td>
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<td>4</td>
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<td>20</td>
</tr>
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<td>Drills</td>
<td>9</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Gravers/perforators</td>
<td>29</td>
<td>10</td>
<td>8</td>
<td>-</td>
<td>47</td>
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<td>5</td>
<td>2</td>
<td>-</td>
<td>8</td>
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<td>1</td>
<td>-</td>
<td>2</td>
</tr>
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<td>Thin biface</td>
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<td>18</td>
<td>12</td>
<td>3</td>
<td>71</td>
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<td>Thick bifaces</td>
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<td>33</td>
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<td>Quarry preforms</td>
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<td>Utilized flakes</td>
<td>91</td>
<td>49</td>
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<td>9</td>
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<td>Cores</td>
<td>14</td>
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<td>Lithic debitage</td>
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<td>Waste flakes</td>
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<td>66</td>
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<tr>
<td>Shatter</td>
<td>239</td>
<td>237</td>
<td>154</td>
<td>16</td>
<td>646</td>
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<tr>
<td>Total</td>
<td>3,660</td>
<td>1,776</td>
<td>1,284</td>
<td>140</td>
<td>6,860</td>
</tr>
</tbody>
</table>
research in the southern subregion of the central Des Moines River Valley.

The remaining cherts are mainly comprised of various gray, often fossiliferous, cherts and butterscotch-colored cherts. These cherts are also variable in quality. These cherts along with the other non-cherty materials were probably gleaned from the glacial till or river cobbles. The most variation in source materials occurs in the debitage categories.

Approximately 5% of the chert inventory has been subjected to heat treatment. Presumably, this is an attempt to increase the working quality of poorer grade material (c.f. Collins and Fenwick 1974; Mandeville 1973; Mandeville and Flenniken 1974).

A total of 191 chipped stone tools, and 13 cores exhibit some unmodified cortex of the original source material. Another 1,001 pieces of lithic debitage are either primary or secondary decortication flakes (c.f. Binford and Quimby 1963:287-289; Gradwohl and Osborn 1972:34). This amounts to 18% of the total chipped stone industry at the Cribb's Crib site. This percentage seems to indicate a portion of the chipped stone material was initially worked at the site.

**Projectile points** A total of 144 projectile points or point fragments is among the artifact inventory for the Cribb's Crib site (Table 8). The most common form is the small plain triangular point (Figure 33). This point type is typical for the Late Prehistoric groups in the Prairie-Plains region.

Thirty-three complete points and 111 point fragments are among the
Table 8. Distribution of projectile points and point fragments, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation</th>
<th>Test</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>Squares</td>
<td>Features</td>
</tr>
<tr>
<td>Small triangular points</td>
<td>21</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Complete</td>
<td>42</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Bases</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Midsections</td>
<td>17</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Tips</td>
<td>5</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Longitudinal</td>
<td>8</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>97</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>
Figure 33. Examples and cross-sections of projectile points from the Cribb's Crib site [A–J – small plain triangular points: 724, 739A, 1007, 1283, 2138, 2139, 3896, 4235, and 5363; J – side-notched points: 116; and K – corner-notched point: 5362. Actual size]
chipped stone artifacts recovered from the Cribb's Crib site. Ninety-seven of these specimens are part of the surface collection while the remaining 47 specimens were found in the cultural zone. It is quite possible these samples do not truly represent the total possible variation since the site was known to private collectors, who systematically select projectile points and other chipped stone and ground stone tools over other categories of prehistoric and historic debris.

Of the 144 specimens recovered from the site, 135 specimens are the small plain triangular points. A sample size of 29 points is complete enough for measurements. The length of the points ranges between 16.4-28.7 mm. with a mean length of 20.48 mm. The thickness of these points ranges between 2.2-6.5 mm. with a mean thickness of 3.37 mm. Besides the 29 complete points, another 24 point fragments possessed complete bases. A total of 53 specimens comprise the sample for width measurements. The basal width of the points ranges between 10.9-26.2 mm. with a mean width of 15.04.

All the small triangular points have been manufactured from flakes. Most of the projectile points and point fragments are bifacially worked by the pressure flaking technique around the flake margins. One specimen (#4602) is alternately beveled along the sides of the point.

A total of 61 base fragments, 7 midsections, 27 tips, and 11 longitudinally fractured points comprises the remainder of the small triangular projectile point category. Three basal fragments have been re-sharpened along the fractured edge. The majority of the complete points
and base fragments exhibit thinning flakes along the basal edge. Presumably, this thinning facilitates the hafting of the point to the shaft. Several broken tips exhibit impact fracture scars at the distal end. The large quantity of broken points compared to the complete specimens may indicate the practice of returning to the site with the broken point still hafted to the shaft. The fragment could be removed, reworked, and/or discarded depending upon its condition. A new point could then be hafted to the shaft. Another possibility is the removal of the fragment from the carcass after returning to the site.

A total of nine projectile points and point fragments represents exceptions to the general small triangular point form:

1. A side-notched projectile point with a slightly concave base manufactured of fine-grain gray fossiliferous chert; 40 x 17 x 6 mm.; the base of the point has been thinned, presumably for hafting. Specimen #116.

2. A side-notched point fragment with a slightly convex base manufactured of Mississippian white chert; 8 mm. thick; the base apparently have been ground. Specimen #117.

3. A triangular projectile point manufactured of fine-grain carmel colored chert; 31 x 9 x 7 mm.; the lateral edges have been alternately beveled. Specimen #457.

4. A ovate projectile point manufactured of fine-grain carmel colored chert, which has undergone heat treatment; 27 x 20 x 6 mm. Specimen #707.

5. A side-notched point fragment manufactured of gray chert; 3 mm. thick; the body of point was apparently resharpened after the fracture occurred. Specimen #739G.
(6) The contracting base of a stemmed projectile point manufactured of Mississippian white chert with crystal inclusions; 7 mm. thick; the base appears to have been ground. Specimen #762G.

(7) The contracting base of a stemmed projectile point manufactured of Mississippian chalcedonic chert, which appears to have undergone heat treatment; 6 mm. thick; the base exhibits thinning flakes along the edge. Specimen #762D.

(8) The contracting, slightly convex base of a stemmed projectile point manufactured of fine-grain gray fossiliferous chert; 5 mm. thick; from a depth of .6-1.1 feet within excavation square N910/W1070. Specimen #1310.

(9) A corner-notched projectile point, with a slightly convex base, manufactured of fine-grain gray fossiliferous chert; 44 x 24 x 6 mm. the base, manufactured of fine-grain gray fossiliferous chert; 44 x 24 x 6 mm.; the base appears to have been ground. Specimen #5362.

These points may represent either an earlier Woodland occupation or a portion of the Oneota projectile point assemblage.

End scrapers One of the more consistently reported chipped stone artifact categories in the archaeological literature of the Plains and Prairie-Plains is the snub-nose end scraper (Figure 34). The abundance of these end scrapers in the artifact inventory reflects the importance of hide preparation among the prehistoric and protohistoric groups of the region. Besides their primary usage in hide and skin preparation, they may also have served as processing tools for wood, bone, and other pliable materials (Bell 1980:15).
Figure 34. Examples and cross-sections of end scrapers from the Cribb's Crib site [A-B rounded keel:943, 4950; C-D - flaked keel:2358, 4167; and E-F - flat:3135, 5294. Actual size]
Few ethnographic records relate the method of utilization and manufacture of these end scrapers (Lowe 1954:58; W. Wedel 1970:41). The chert end scrapers of the prehistoric period were replaced by the more efficient metal blades acquired from the Euro-Americans during the early historic fur-trading era. Although ethnographic information is scanty, the excavation of numerous archaeological sites and the analysis of the stone and the bone or antler artifacts have made reconstructions possible (W. Wedel 1970). Metcalf (1970:52) also mentions the occurrence of wooden scraper handles.

A total of 62 complete and 91 fragmentary specimens is part of the end scraper category recovered from the Cribb's Crib site (Table 9). The end scrapers are plano-convex flake tools with a steeply retouched working edge. The lateral and basal edges may also exhibit retouched working surfaces. The ventral surface may exhibit ripple marks which formed during the removal of the flake from the core. The bulb of percussion is also present on several specimens. Eleven specimens also exhibit bifacially worked edges away from the working edge. Most of these cases represents the thinning or removal of the bulb of percussion. Presumably, this is to facilitate the hafting of the end scraper to antler bone, or wooden handles. Several specimens apparently have been ground or smoothed along the lateral edges, presumably to facilitate the hafting of the scraper to the handle. Modification of the dorsal surface may represent the preparation of the core surface.

Descriptive classification of the end scrapers is based on the type of flake scars present on the dorsal surface. The three categories,
Table 9. Distribution of end scrapers, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation</th>
<th>Test</th>
<th>Totals</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>Features</td>
<td>Pits</td>
</tr>
<tr>
<td>Rounded keel</td>
<td>19</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Longitudinal flaked keel</td>
<td>14</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Flat keel</td>
<td>42</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>75</td>
<td>43</td>
<td>31</td>
</tr>
</tbody>
</table>
present among the end scraper inventory, represent the type and degree of modification of the dorsal surface. The distinctions between categories are based upon a flat dorsal surface versus a "keeled" or ridged dorsal surface. The "keeled" surface is also subdivided between a rounded surface versus one which has one or more longitudinal flakes removed by subsequent modification of the dorsal surface.

Approximately 19.7% of the end scrapers retain cortical material. The cortical material varies in the amount present on the dorsal surface. It is possible the cortex was regarded as a positive feature used to minimize unnecessary movement of the end scraper once inserted into the handle (Osborn 1982:43).

A total of 44 specimens has a rounded dorsal "keeled" surface. Another 38 specimens have a dorsal "keeled" ridge formed by the removal of one or more longitudinal flakes. On the remaining 71 specimens, the dorsal surface is flat with a negative dorsal flake scar or several low longitudinal flake scars. Osborn (1982:43) describes the differences between the "keeled" and the flat end scraper are based on their relative location on the core surface. The "keeled" scrapers are flakes struck from the longitudinal ridges, while the flat scrapers are flakes struck from areas between the longitudinal core ridges.

Sixty-two complete specimens represent the sample size used for length, working edge width, working edge thickness, and working edge angle measurements. Seventeen specimens are rounded "keeled" end scrapers, 21 specimens are "keeled" end scrapers with longitudinal flake scars, and 24 specimens are flat end scrapers. The width of the working
edge ranges between 11.5-24 mm. with a mean width of 19.24 mm. for the rounded "keeled" end scrapers. The width of the working edge of the longitudinally "keeled" scrapers ranges between 14-28 mm. with a mean width of 22.48 mm. The width of flat end scrapers ranges between 16-26 mm. with a mean width of 20.83 mm.

Analysis of the working edge thickness of the end scrapers reveals a range of thickness between 4-12.5 mm. for the rounded "keeled" scrapers with a mean thickness of 9.23 mm. The range of thicknesses for the longitudinally "keeled" scrapers is between 4.5-12 mm. with a mean thickness 8.05 mm. The working edge thickness for the flat end scrapers ranges between 4-10.5 mm. with a mean thickness of 6.21 mm.

The analysis of the working edge angle of the end scrapers, taken at the medial point of the working edge, reveals a range, for the rounded "keeled" scrapers, between 57°-90° with a mean angle of 71.76°. The angle for the longitudinally "keeled" scrapers is between 43°- 89° with a mean angle of 70.6°. The angle for the flat scrapers ranges between 55°-80° with a mean of 67.46°.

Using working edge width, thickness, and angle as criteria, there is little variation among the three end scraper categories, except maybe for thickness which is to be suspected. The variation in thickness appears reasonable especially when the source area on the core is considered. Overall, there is no apparent significant variation between the three categories of end scrapers at the Cribb's Crib site.

The length of the end scrapers is not considered a valid aspect for the analysis of these end scrapers. The continual usage of the end
scraper results in the rapid wear of the working edge. This edge needs constant retouching to maintain a sharp working edge (W. Wedel 1970:40). In a description on aboriginal skindressing, Mason mentions an account of the constant resharping of the scraper edge:

Lieutenant Stoney, speaking of his experience at Kotzebue Sound, says that the leather-worker is incessantly touching up his scraper edge with the chipper, and that he wears it out to a mere stub. This constant sharpening also accounts for the fact that few specimens show signs of great wear. It is important to repeat this, that the constant use of the edging tool rapidly wears down the scraper blade and keeps the edge sharp. This accounts for the great difference in the length of the blades in our cabinets and for the fact that they show so little sign of use (1891:586).

Although there is a lack of knowledge concerning the specific stage of usage, parameters may be established which will allow inferences concerning the size of the end scrapers before finally being discarded (Osborn 1982:42). A total of 62 specimens from the Cribb's Crib site is available for valid measurements. The length of these end scrapers ranges between 20-70 mm. with a mean length of 32.7 mm. The distributional pattern of the lengths of these end scrapers is that 10% of the total occurs between 20-24.5 mm., 34% occurs between 24.5-29.5 mm., 25% occurs between 29.5-34.5 mm., 18% occurs between 34.5-39.5 mm., and the remaining 13% occurs between 39.5-70 mm. The longest specimen (#2796) measures 70 x 22.5 x 11.5 mm. with a working edge angle of 90°.

One end scraper (#5294), manufactured from Lake Superior agate, is apparently a combination tool. The distal end has been modified by the removal of a flake to form a burin. The majority of the end scraper
fragments apparently represent the fracturing of the end scraper during use.

**Side scrapers** Flakes exhibiting one or more steeply unifacial retouched edges are classified as side scrapers. The side scrapers are assumed to have functioned in scraping activities. The retouched areas occur along portions of the flake but seldom along the entire edge. Most specimens are fragments with only a single, limited working edge. The majority of the side scrapers appear to have been manufactured similarly to the end scrapers. The major difference between end scrapers and side scrapers is the location of the working edge. End scrapers have the working edge at the end of the flake while side scrapers have the working edge(s) located on the lateral portion(s) of the flake. Other side scrapers are manufactured on irregular shaped flakes which may have resulted from core reduction.

A total of 141 specimens is among the chipped stone artifacts recovered from the Cribb's Crib site (Figure 35). The side scrapers range in length between 20-70 mm. Forty-five percent of the side scrapers range in length between 20-30 mm., 33% range between 30-40 mm., 16% range between 40-50 mm., and 6% range between 50-80 mm. The angle of the working edge ranges between 44° and 89° with a mean angle of 59.72°. One tear-drop shaped (#791) measures 79 x 31 x 15 mm. Another specimen (#459) is a combination tool with a graver tip.

**Spokeshaves** A total of 20 specimens of the chipped stone artifacts, recovered from the Cribb's Crib site, is identified as spokeshaves (Figure 36). These tools, manufactured from random flakes, are
Figure 35. Examples and cross-sections of side scrapers [A - 792, B - 2108, C - 2226, and D - 2415. Actual size]
Figure 36. Examples of chipped stone tools from the Cribb's Crib site [A-C - drills: 448, 525, 5090; D-E - wedges: 495, 3684; and F-H - spokeshaves: 4065, 3052, 783. Actual size]
characterized by one or more semi-circular concavities located along one or more sides of the flake. The concavity is unifacially worked on all the specimens. The concavities are not consistent in breadth; however, the depth of the concavities are more consistent. The breadth of the spokeshave concavities ranges between 9-46 mm. with a mean breadth of 22.14 mm. The depth of the spokeshave concavities ranges between 1.4-4.1 mm. with a mean depth of 2.5 mm.

Flenniken (1976:31-32) describes one possible use of the spokeshave as an arrow-shaft scraper. The variety of uses for smoothing wood and bone tools is not limited to this single example. A total of 55% of the spokeshaves exhibit wear and/or polish along the edge of the concavity, indicating extensive usage.

**Drills** A total of 12 specimens is classified as drills (Figure 36). Three complete specimens are characterized by a slender bifacially worked shank which bears evidence of rotary motion. The shape of the shank ranges between diamond shaped (5), ovate (5), and trapizoidal (1). One drill fragment consists of the basal portion from which the shape of the shank was difficult to discern. One complete specimen (#5090) is a T-shaped drill measuring 20 mm. in length, with a basal width of 15 mm. This specimen may represent secondary usage of a projectile point. The majority of the drills exhibits basal thinning which may indicate that they were mounted to a shaft. Traditionally, drills have been described as tools used for drilling or perforating various types of materials, including wood, bone, stone, and shell.

**Gravers/Perforators** - A total of 47 specimens represents gravers
and/or perforators. These specimens may have also functioned as drills but they lack evidence of rotary motion. The two categories used in this discussion closely correspond to the graver categories established by Henning (1970:47) for Oneota sites in the vicinity of the Chariton River along the lower Missouri River Valley.

**Category 1**

A total of seven specimens represents this category recovered from the Cribb's Crib site (Figure 37). These gravers/perforators are manufactured on thick random flakes. The working apex is triangular in cross-section. Retouch occurs along the lateral edges of the dorsal side. The ventral side does not exhibit any retouch. In the cases where the longitudinal ridge is present on the dorsal side, the lateral flake scars extend to the longitudinal ridge. These specimens generally appear plano-convex in cross-section. One specimen (#2553) may have also functioned as a scraper. It measures 53 x 18 x 6 mm.

**Category 2**

A total of 40 specimens represents this category recovered from the Cribb's Crib site (Figure 37). These gravers are

... manufactured on random flakes upon which a tip has been fashioned through either unifacial pressure flaking, the striking of burin blows or a combination of the two techniques to produce a sharp cutting edge (Henning 1970:47).

This category strongly resembles Osborn's graver/perforator category for the Clarkson site (13WA2):
Figure 37. Examples of perforators and gravers from the Cribb's Crib site [A-C - Category 1, perforators: 783, 2553, 3217; D-G - Category 2, gravers: 1286, 1788, 1789, 4926. Actual size]
One salient characteristic of these tools is the occurrence of a ridge between two flake scars as the midrib down the length of the perforating shank, often accentuated by short pressure flakes taken off either side (1982:46).

Sixty-four percent of the specimens also exhibit impact fracture scars along the graver tip.

Knives Although the knife has traditionally been defined as a cutting tool, it is used in this discussion as a description of form rather than function. Although low power magnification was used, the functional aspect of this category is difficult to determine.

Four knife types are identified among the chipped stone tools from the Cribb's Crib site. A total of eight specimens is identified as knives (Figure 38). The limited number may be due to the selective collection of knives, like projectile points and other worked tools, by private collectors. Another reason is the selective process used by the author. Only complete specimens and/or fragments exhibiting bifacial retouch with lenticular cross-sections are described as knives rather than bifaces. Other bifacially worked fragments and unifacially worked flakes have also probably functioned as knives. Their identification is best determined by the microscopic examination of edge wear patterns.

Category 1 Parallel-side knives (3). These are fragments from elliptically shaped bifaces. The three specimens range in thickness between 7-9 mm. with a mean thickness of 8.33 mm. They exhibit a thin lenticular cross-section. One specimen (#2801) tapers to a point while the other two specimens represent midsections. These specimens
Figure 38. Examples of knives from the Cribb's Crib site [A - category 1, parallel sided knives: 2802; B - category 3, diamond shaped knives: 3776; C - category 2, triangular knives: 2154; and D - category 4, flake knives: 4503]
may also converge slightly to a straight base. The tip of specimen #2801 also appears alternately-beveled. These fragments are similar to Henning's Category II knives (1970:44) and Osborn's Category I knives (1982:44).

**Category 2** Triangular knife (1). This knife specimen (#2154) measures 90 x 32 x 8 mm. It has a thin lenticular cross-section. It is bifacially retouched along the edges by pressure flaking. A large number of step fractures are common on the long side.

**Category 3** Diamond-shaped or "Harakey" knives (2). This knife category is "characterized by four edges with two acute and two obtuse angles. Adjoining edges are characteristically beveled in opposite directions" (Hill and Wedel 1936:51). One specimen (#3776), like the Type 1 knives from the Leary site (Hill and Wedel 1936), distinctly exhibits the four alternately beveled edges. It measures 43 x 27 x 6 mm. The other specimen (#2053) lacks the alternately beveled edges; however, if divided longitudinally, the adjacent sides are beveled on the same side.

**Category 4** Flake knives (2). Two specimens represent flakes with bifacially retouched lateral edges. The striking platform and bulb of percussion are still present on both specimens. The opposite edge on both specimens exhibits a hinge fracture. One specimen (#4503) exhibits a triangular shape and measures 71 x 38 x 8 mm. The bulb of percussion has been thinned by the removal of several flakes, presumably, to aid hafting. The other specimen (#3470) is ellipsoid. Thinning flakes along the striking platform are not present on this
specimen. Both specimens may represent M. Wedel's (1959:51) scraper-knife category. They may have functioned as knives and/or scrapers.

**Chisels/wedges**  Two specimens, recovered from the Cribb's Crib site, may represent chisel or wedge implements (Figure 36). They may have functioned as wedge or slotting tools for antler, bone, and/or wood. These specimens appear similar to Flenniken's (1981:48-56) *pieces esquillees* category.

Both specimens are rectangular shaped with battered working edges. The bases of both specimens exhibit snapped, squared surfaces. The working edge width for each specimen is 15 mm. and 25 mm. with thicknesses of 9 mm. and 8 mm., respectively. Both specimens have bifacial retouch along the lateral edges. The broken edge may have served as a striking platform for a hammerstone, bone, or wood baton.

**Thin and thick bifaces**  Bifacially worked objects, not previously described, are classified as bifaces. They exhibit at least one bifacially modified edge. Due to their fragmentary nature, shape, or size, they do not exhibit formal characteristics of the established chipped stone tool categories. The separation between the two types is arbitrarily based on the relative total size of the worked piece (Gradwohl and Osborn 1972:31). The general separation is arbitrarily based on a thickness between 8-10 mm.

The thin bifaces probably functioned as cutting tools, and might be considered "knives" in a more general sense. The thick bifaces might also have served as cutting tools, or possibly choppers. Some objects classified as thick bifaces might actually be preforms or small cores (Gradwohl and
Thin bifaces A total of 71 specimens represents the thin biface category recovered from the Cribb's Crib site. Four specimens are ovoid shaped. The rest are fragmentary portions of unidentified tools or bifacially worked random flakes. Ten specimens are triangular tip fragments possibly from knives or large projectile points. The thickness of the thin bifaces is the only measurable aspect with any validity; however, these values are not consistent. The thickness of these bifaces range between 3-9.3 mm.

Thick bifaces A total of 33 specimens represents the thick biface category recovered from the Cribb's Crib site. The thickness is also not consistent among these specimens. The thickness of the thick bifaces ranges between 9-27.6 mm.

Two specimens appear to be chopping tools. The ovoid specimen (#466), from the surface, is manufactured from pink quartzite. It measures 80 x 62 x 15 mm. The base is heavily ground while the edges are intensively battered. The other specimen (#4485), from the fill in Feature 98, is a modified river cobble. It is manufactured from a fine-grain, butterscotch colored, tabular chert. Bifacial retouch occurs along only one edge. It measures 65 x 48 x 29 mm.

Four specimens may represent preforms, or cores; however, it is also possible these specimens may represent chipped stone hoes. One specimen (#384N) is from the surface while the other three specimens (#1438, 2355, and 2465A) are from the cultural zone. Three specimens
(#384N, 2355, and 2465A) are manufactured from quartzite, and the other one (#1438) is manufactured from Mississippian chalcedonic chert. Each specimen exhibits several step fracture scars along its edges.

**Large quarry flakes**  A total of 12 large flakes is part of a cache of flakes and preforms recovered from a single feature (Feature 75) at the Cribb's Crib site (Figure 39). The majority of these flakes have been modified to various degrees but due to the homogeneity of the source material and their single location, they shall be discussed under one heading. Some quarry flakes and quarry preforms exhibit glossy surfaces; however, this appears to be a characteristic of the type of chert and not a result of heat treatment. The specimens are all manufactured from a fine-grain bluish-gray/white Mississippian chert. They are not consistent in length or width; however, ranges have been computed. The length of these flakes ranges between 73-125 mm. The width of these flakes ranges between 51-102 mm. The thickness ranges between 11-19 mm. Although the bulb of percussion is still present on each specimen, some reduction has occurred on five specimens. Fifty percent of these specimens exhibit a plano-convex surface.

Some utilization apparently occurred before these flakes were buried in the cache pit. Seven specimens exhibit the steep unifacial retouch characteristic of scraping tools. Two of these specimens are combination tools. One specimen (#4455) has a graver tip opposite the scraper edge. One specimen (#4456) has a spokeshave surface opposite the scraper edge. Another specimen (#4452) has two spokeshave surfaces.

**Quarry preforms**  A total of 25 specimens represents preforms
Figure 39. Examples of large quarry flakes from Feature 75
[A - end scraper:4450; B - spokeshave:4452; and
C-D - side scrapers:4454 and 4456]
recovered from the same feature (Feature 75) as the large quarry flakes previously mentioned. These preforms (Figure 40) are also manufactured from the same lithic source material as the large flakes; however, two specimens exhibit more of a cream or butterscotch color than the others. It is probable they are all from the same quarry site. Cortex is present on two specimens. Eleven specimens are lanceolate shaped while 13 specimens are ovoid. All the specimens exhibit a continuous sinuous edge resulting from direct percussion. The lengths of the preforms range between 99-166 mm. with a mean length of 128.8 mm. The width for the preforms ranges between 50-84 mm. with a mean width of 63.18 mm. The thickness ranges between 12-18.5 mm. for the preforms with a mean thickness of 15.10 mm.

**Retouched flakes** A total of 500 specimens represents this category of chipped stone artifacts recovered from the Cribb's Crib site. These random flakes do not fit the description of any previously described chipped stone category. They may be fragments of a tool whose form is no longer identifiable, or they may represent random flakes which were modified to suit a specific need of their maker. Gradwohl and Osborn defined retouched flakes as:

Retouched flakes exhibit edges or surfaces which appear to have been intentionally pressure flaked. The individual flake scars vary in angles and in their lengths away from the edge of the artifact. The retouching is usually, but not always, continuous along a large proportion of the tool edge (1972:32).

One hundred sixty-two specimens are modified flakes which are
Figure 40. Examples of quarry preforms from Feature 75 [A-D: 4430, 4431, 4440, and 4438]
consistently steeply, unifacially retouched along a portion of the flake edge. These specimens may represent scraping or planing tools described in the literature as retouched flake/scrapers. Experimentation and microscopic examination of the edge use wear may elucidate their actual usage.

Four ovoid specimens may represent preforms. They exhibit some retouch along marginal edges. Their uniform shape and size may further indicate they represent an unfinished step in tool manufacturing. Their lengths range between 45-49 mm. Their widths range between 33-47 mm. Their thicknesses range between 6-9 mm.

The majority of the retouched flakes are modified random flakes. Ten specimens are modified blades while another 31 specimens are apparently modified shatter. The majority (88%) of the specimens are under 40 mm. in diameter. Only 18% of these modified flakes retain any dolitic cortex, the remaining 82% are manufactured from blank flakes.

Utilized flakes A total of 172 specimens from the Cribb's Crib site is classified as utilized flakes. With the assistance of a binocular microscope (10x and 20x), identification and analysis of these flakes are made possible. Gradwohl and Osborn describes utilized flakes as exhibiting

... restricted, non-continuous small marginal flake scars. The flake scars are typically aligned at uniformly steep angles and restricted to the immediate margin of the tool. Those artifacts appear to represent unmodified flakes picked up "ad hoc" for a temporary task in scraping and or cutting tasks and then discarded (1972:33).
The majority of these flakes represents utilized random flakes, 10 specimens are utilized blades, and 13 specimens appear to be utilized shatter. Nineteen percent of the flakes occurs on primary or secondary decortification flakes. Eleven percent of the sample has apparently undergone heat treatment. Eighty-five percent of the utilized flakes is under 40 mm. in diameter. Only two specimens exceed 60 mm., and they both have a diameter under 70 mm.

Cores and debitage

Core and core fragments A total of 26 cores and 16 core fragments is among the chipped stone artifacts recovered during the archaeological investigation of the Cribb's Crib site (Table 10). These cores represent nuclei from which flakes or blades have been removed. The nuclei often exhibit deep negative bulbs of percussion and sinuous edge where flakes have been systematically detached. Three types of cores are represented in the cores from the Cribb's Crib site: 1) regular; 2) irregular; 3) bi-polar cores. Core fragments are portions of cores too small to identify as one of the three types but exhibit striking platforms and/or sinuous edges.

Seven specimens represent regular cores. The systematic removal of large precussion flakes, either detached by alternating blows to the core surface or by consecutive blows to the core, has produced a sinuous edge. These cores tend to be polyhedral shaped.

Nine specimens are apparently irregular cores. Either the core has had only a few flakes detached or the detached flakes have been randomly
Table 10. Distribution of cores, Cribb's Crib site

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<thead>
<tr>
<th>Category</th>
<th>Provenience</th>
<th>Surface</th>
<th>Excavation Squares</th>
<th>Features</th>
<th>Test Pits</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular core</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Irregular cores</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>-</td>
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<td>9</td>
</tr>
<tr>
<td>Bipolar cores</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>2</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Core fragments</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>20</strong></td>
<td><strong>7</strong></td>
<td><strong>1</strong></td>
<td></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>
removed from the nucleus surface. No systematic flake removal pattern is evident on the nucleus surface.

Ten nuclei exhibit the bi-polar core reduction technique. This technique involves resting the core nucleus on an anvil, and then striking the core with a percussor to create flakes. The edge of the core opposite the striking platform often shows signs of crushing. A large percentage of step fracture scars are observed along the basal zone of the core. The larger flake scars originate at the striking platform opposite the basal surface of the core.

A total of 16 specimens is classified as core fragments due to their small size. Striking platforms and/or sinuous edges are present on these fragments. Some amount of cortex is present on a few of the cores and core fragments. Five specimens have apparently undergone heat treatment.

Waste flakes A total of 4,832 specimens of chipped stone debris represents the waste flake category recovered from the Cribb's Crib site. A total of 797 flakes, nearly 17%, represents primary or secondary decortication flakes (c.f. Gradwohl and Osborn 1972:34). This percentage would seem to indicate a portion of the lithic material has been initially worked at the site. Approximately, 14% (669) of these flakes are less than 10 mm. in diameter. The small size of these flakes would indicate they were detached by precision pressure flaking during the trimming and sharpening process. Eighty-three percent (3,988 specimens) of the waste flake inventory have diameters between 10-40 mm. The remaining 175 specimens have diameters between 40-80 mm. Only two of
these flakes have diameters in excess of 70 mm. Less than 5% of the waste flakes exhibits signs of heat treatment. This agrees with the small percentage of heat treated specimens present among the chipped stone tools.

**Shatter** A total of 646 specimens is cubical or irregular shaped pieces of lithic debitage. It is possible the cleavage of this material followed old fracture planes (Binford and Quimby 1963:278-279). These specimens may have been created during the testing of lithic material to determine its feasibility of source material for tool production. Thirty-two percent of the shatter retains some cortical material. As indicated by waste flakes, the shatter also indicates the initial working of some lithic material at the site. The range in size for the shatter pieces is between 5-70 mm. The majority of the shatter (570 specimens) ranges between 10-40 mm. in size.

**Ground Stone Artifacts**

Sandstone and limestone outcrops, occurring in the vicinity of the Cribb's Crib site, provided the prehistoric occupants with raw materials for the manufacture of ground stone tools. Igneous and metamorphic rocks, gleaned from the glacial till, also provided source materials for the ground stone tools. A total of 158 specimens represents the ground stone category recovered from the Cribb's Crib site (Table 11).

Stone pipes are absent from the artifact inventory recovered from the Cribb's Crib site. They have been recovered from other Moingona Phase Oneota sites in the central Des Moines River Valley (Gradwohl
Table 11. Distribution of ground stone artifacts, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation Surface</th>
<th>Features</th>
<th>Test Pits</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>158</td>
</tr>
<tr>
<td>Sandstone abraders</td>
<td>11</td>
<td>65</td>
<td>29</td>
<td>5</td>
</tr>
<tr>
<td>3/4-grooved ax</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Celts</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Pestle</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Hammerstones</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Anvil stones</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Anvil or grinding stones</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Mullers</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Grinding slabs</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Pecked and smoothed stones</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Smoothed sandstone</td>
<td>-</td>
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<td>1</td>
<td>-</td>
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<tr>
<td>Smoothed and grooved siltstone</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>77</td>
<td>46</td>
<td>5</td>
</tr>
</tbody>
</table>
1973:72). Catlinite is also absent from the Cribb's Crib site. Although other Oneota sites often have catlinite objects, there is an apparent paucity of catlinite items from Moingona Phase sites (Osborn 1982:48). This appears to be related to general lack of widespread usage of catlinite prior to the 13th century A.D. (Osborn 1982:48).

**Flint-knapping tools**

**Grooved abraders** A total of 110 grooved sandstone abraders was recovered from the Cribb's Crib site (Figure 41). The entire inventory of these abraders was manufactured from medium to coarse grained Red Rock sandstone which outcrops in the vicinity. Outcrops of this type of sandstone are confined to a small area along the central Des Moines River Valley and to the northeast along the South Skunk River (Miller 1901:153-161).

Forty-five specimens contain a single groove, while the remaining 65 specimens exhibit two or more grooves. The single grooved specimens may be grouped according to their groove shape: 1) those with U-shaped grooves; 2) those with V-shaped grooves; 3) those with grooves which exhibit one straight wall and one curved wall (combination type); and 4) those with grooves which are indeterminate. The multiple grooved abraders are more difficult to categorize since a combination of the four groove types may be present on a single specimen.

Eleven single grooved abraders contain U-shaped grooves, 22 specimens exhibit V-shaped grooves, 7 specimens exhibit a combination groove, and 5 specimens contain the indeterminate groove category. Among the
Figure 41. Examples and cross-sections of grooved sandstone abraders from the Cribb's Crib site [A-B - shaft abraders:2232, 2930, showing U-shaped grooves; C-D - flint-knapping and/or tool abrading tools: 3296-3377, showing V-shaped or combination type grooves]
multiple grooved abraders, 9 specimens contain a combination of U-shaped and V-shaped grooves, 2 specimens contain a combination of two or more U-shaped grooves, 15 specimens contain a combination of two or more V-shaped grooves, and the remaining 39 specimens contain combinations of groove types not previously mentioned.

Twenty-seven specimens are either rectangular, trapezoidal, or "boat" shaped. Seven of these specimens exhibit characteristics of the traditionally described shaft abraders or shaft smoothers (Flenniken 1976:16-20). Shaft abraders have a long temporal and large spacial distribution throughout the Plains and its periphery during the prehistoric period (W. Wedel 1961:73, 106, 140, 188, 213, 256). The remaining specimens do not contain the characteristic U-shaped groove of the classic description of the shaft abraders.

The bulk of the abraders is described as pointed tool abraders or flint-knapping abraders (Flenniken 1976:40-69). The majority of the abraders occur on irregular-shaped pieces of sandstone. Two specimens have hematite stains on their surface.

**Hammerstones** Seven specimens exhibit pecked areas characteristic of hammerstones. Three specimens are spherical-shaped nodules of Mississippian chert or quartz. Two specimens are irregular-shaped chert river cobbles. One specimen is a spherical-shaped fine-grained granite rock, and one other specimen is a spherical-shaped diorite cobble. These hammerstones range in diameter between 50-120 mm. Besides their use in chipped stone manufacturing, they may have also been utilized to rough out ground stone implements.
Anvil stones Two cobbles exhibit varying degrees of concentrated pitting or pecking on the flat portions of the stone. One discoidal specimen exhibits two such areas (Figure 43). It is probable these stones were used in the bi-polar core reduction process; however, they could be used in several tasks (Brennan 1975:136).

Anvil or grinding stones Ten specimens show varying degrees of concentrated pitting and/or wear. These specimens may represent combination tools which have been used either for grinding or as an anvil stone (Figure 43). It is possible some of the discoidal shaped stones may represent chunky stones. It is difficult to determine their exact usage (Link 1979:140). Three specimens are stained with hematite on the grinding surface. A variety of source materials, including granite, limestone, and diorite, is utilized to produce these ground stone implements.

Food processing implements

Pestle One specimen (#4071) appears to be a ground stone pestle (Figure 42). It is a phallic-shaped implement manufactured from compact gray/green diorite. It measures 215 x 32 x 22 mm. Both ends exhibit pitted surfaces. No mortars are among the artifacts recovered from the Cribb's Crib site. It is possible the mortars have been manufactured from wood and not preserved.

Mullers Four specimens represent handstones used with the grinding slabs for the grinding or processing of corn (maize) and/or other foodstuffs. All the specimens have a flat to slightly convex
Figure 42. Examples of ground stone tools from the Cribb's Crib site [A - 3/4 grooved ax; B - side and top view of a ground stone celt; C - pestle; and D - smoothed and grooved siltstone]
Figure 43. Examples of miscellaneous ground stone implements
[A - Muller:8901; B - top and bottom view of an anvil or grinding stone:4423; and C - top and bottom view of an anvil stone:887B; B and C may also represent chunky stones]
grinding surface (Figure 43). These specimens are manufactured from either igneous or metamorphic rocks. A large, complete rectangular specimen (#885), manufactured from fine grain pink granite, measures 160 x 123 x 57 mm. It has a slightly convex grinding surface. The remaining specimens are discoidal or loaf shaped.

**Grinding slabs** Eight specimens represent grinding slabs (Figure 44) used to process corn and/or other food. The grinding slabs are similar to the metates of the Southwest except the grinding area is a circular concavity instead of the rectangular groove common to the metates. The circular concavity exhibits a smoothly ground surface which ranges from 105 mm. to 170 mm. in diameter. The mean diameter is 137.5 mm. The depth of the concavity ranges from 9 mm. to 16 mm. with a mean depth of 11.33 mm.

Four grinding slabs are manufactured from large cobbles of coarse-grained granite. One of these granite slabs is from the surface while the other three were recovered from Feature 40. A single medium-grained Red Rock sandstone cobble is also utilized as a grinding slab. The remaining slabs are manufactured from green/gray diorite.

**Wood-working tools**

**3/4-grooved ax** One specimen among the artifacts recovered from the site surface is a small 3/4-grooved ax (Figure 42). The ax is manufactured from compact gray/green diorite. The ax measures 61 x 37 x 20 mm. The groove is 10 mm. wide x 16 mm. thick with a depth of 3 mm. A highly polished area exists from the bit edge to 30 mm. behind the bit.
Figure 44. Examples and cross-sections of grinding slabs from the Cribb's Crib site [A - 4378; and B - 3999]
edge. The ax is atypical of Oneota material and may represent an earlier Woodland occupation of the site.

Celts Eight ground stone celts are included in the ground stone inventory from the Cribb's Crib site (Figure 42). Five specimens are part of the artifacts collected during the surface reconnaissance of the area. Seven specimens are manufactured from compact gray/green diorite. One specimen (#2493) is manufactured medium-grain sandstone.

One complete specimen (#4395) is crudely manufactured. Both faces are roughly pecked. The blade is extensively battered, presumably, from usage. Six specimens consist of the blade portion of the celt, including the sandstone celt fragment. The amount of polish present on the celt surface varies from specimen to specimen. Two of the diorite celt fragments may have also served as anvil stones after they broke. They both exhibit an area of localized pitting or picking behind the blade. The remaining specimen (#37) is a highly polished, butt portion of a diorite celt. It also contains a centralized area of pitting or pecking on its sides. It may also have served as an anvil stone after it fractured. It is also possible these celt fragments served as anvil stones before they were broken.

Miscellaneous ground stone

Pecked and ground stone Four specimens, recovered from the Cribb's Crib site, exhibit pecked or ground surfaces. They may be portions of ground stone tools or in the formative process of becoming a specific ground stone tool. One specimen exhibits hematite stains on the grounded surface.
Smoothed sandstone  Two sandstone specimens exhibit flat surfaces. The surface may have been formed by grinding or abrading other materials.

Smoothed and grooved siltstone  One specimen (#1959) of gray siltstone is apparently worked (Figure 42). It exhibits several grounded or scratched surfaces. There are also several grooved areas. It may represent a preform for a celt or pipe. Its softness may indicate it was used as a source for gray pigment.

Bone and Shell Artifacts

Worked bone, antler, and teeth

A total of 50 vertebrate faunal specimens shows signs of intentional modification (Table 12). A total of 13 categories illustrates the variation of worked vertebrate faunal remains. The majority of the worked bone is either deer, bison, or wapiti (elk). Black bear, beaver, turtle, and avifauna are also represented in the worked bone inventory.

Scapula hoes  Two specimens represent bison scapula hoes (Figure 45). Due to preservation of bone, only a portion of each of the scapulae is still intact. The scapular spine is missing from both specimens. Apparently, the spine is removed to facilitate the attachment of the scapula to the hoe handle (Wilson 1917:105). The glenoid fossa of one specimen (#4612) has been ground away leaving only a portion of glenoid fossa present on the scapula. The glenoid fossa on the other specimen (#4550) has been considerably ground along its edges. These modifications may have also facilitated the handle attach-
Table 12. Distribution of worked vertebrate faunal remains, Cribb's Crib site

<table>
<thead>
<tr>
<th>Category</th>
<th>Surface</th>
<th>Squares</th>
<th>Features</th>
<th>Pits</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scapula hoes</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Deer-jaw sickles</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Scapula skin-dressing/fiber-pressing tool</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Hide grainers</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Thong-strecher</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Flesher</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Split beaver incisor</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Fishhook</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Antler flint-knapping tools</td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>Turtle carapace</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Deer phalanx</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bear incisor</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
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</tr>
<tr>
<td>Bead</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Cut and/or chipped bone</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1</td>
<td>16</td>
<td>34</td>
<td>-</td>
<td>50</td>
</tr>
</tbody>
</table>
Figure 45. Examples of bison scapula tools from the Cribb's Crib site [A-B - bison scapula hoes: 4550, 4612A; and C - bison scapula skin-dressing/fiber-processing tool: 5351]
Scapula skin-dressing/fiber-processing tool. One bison scapula specimen (#5451) may represent either a skin-dressing or fiber-processing tool (Bell 1971:125-127; Hofman 1980:135-142). The glenoid fossa has been removed along with the scapular spine (Figure 45). Although the presence of a polished surface has been obliterated due to the application of polyvinyl acetate to stabilize the bone, wear striations are noted along the borders of the scapula. The interior portion of the scapula has been removed to form a V-shaped notch.

Hide grainers. Two specimens represent hide grainers recovered from the Cribb's Crib site. The specimens are portions of bison humerus heads. One specimen (#3473) has been trimmed so a large flat area of the cancellous portion of the bone is exposed (Figure 46). The surface of the cancellous region has apparently been smoothed. The other specimen (#4103) is a fragmentary portion of bone with a smoothed surface along one edge. Apparently, these specimens have been used as rasping tools to smooth the hides and/or to remove fatty tissue and hair from the hide (Bell 1980:65).

Thong-stretcher. A bison metacarpal (Specimen #3126) exhibits wear marks on the shaft (Figure 46). These striations occur around the circumference of the shaft. Semenov (1970:190) indicates hide thongs were stretched and softened by pulling the hide across the bone in his reconstruction of this process.

Flesher. One specimen (#3113) exhibits a cut and beveled edge (Figure 46). It is manufactured from a bison calcaneum. A high degree
Figure 46. Examples of hide-processing bone tools from the Cribb's Crib site [A - thong-stretcher:3126; B - hide grainer: 3473; and C - flesher:3113]
of polish is exhibited along the beveled edge of bone. The exposed cancellous tissue exhibits smoothing along its surface. This artifact may represent a flesher used to remove tissue from the hides.

**Split beaver incisor** One specimen (#1831) is a cut and longitudinally split beaver incisor (Figure 47). It exhibits a polished surface at both ends and on the split surface, indicating considerable wear. Gibbon (1972:176) describes this category as a wood-working chisel. He further indicates the probability that the tool was mounted on a handle.

**Fishhook** One worked specimen (#3560) represents either a finished fishhook or a roughed-out blank for a fishhook (Figure 47). The J-shaped piece of bone has a groove cut across the upper portion of the shank. Several other cut notches occur on the upper shank of the hook. A notch is also present in the valley of the J.

**Deer-jaw sickles** Two specimens may represent sickles or shellers (Brown 1964:382; Gradwohl 1982b:144). Both specimens are missing the anterior end of the mandible, while one specimen (#4909) also lacks the ascending ramus. Analysis of this specimen is further limited by its poor preservation. Specimen #4400 (Figure 47) has been coated with polyvinyl acetate (PVA). This application of PVA makes the possible presence of polish problematic.

**Antler flint-knapping tools** Two specimens represent antler batons. One specimen (#3943) is the base of a wapiti (elk) antler (Figure 47), and the other specimen (#4068) is the base of a white-tailed deer antler. Both specimens have had a portion of the base modi-
Figure 47. Examples of worked faunal artifacts from the Cribb's Crib site [A - deer-jaw sickle/sheller:4400; B - wapiti antler baton:3743; C - fishhook:3560; and D - split beaver inciser:1831]
fied by either cutting or grinding activities in preparation of their use as a baton. Apparently, this provides a better striking surface. They also exhibit signs of battering along these edges.

Twenty-six wapiti (elk) antler fragments are from two adjoining features (Feature 12 and 12A). The fragments exhibit cut or scribe marks. One fragment is a portion of an antler tine which is highly polished. It may represent a flaker or a scraper handle. The remainder of the fragments is portions of the main branches from which the tines (flakers) and bases (batons) were detached. Some of these fragments may be fragments of discarded flint-knapping batons, billets, or flakers.

**Worked turtle carapace** One specimen (#1826) is a notched carapace section from a soft-shelled turtle (Figure 48). The carapace is notched along the anterior and posterior edges of the carapace section. These edges exhibit smoothed and highly polished surfaces, presumably, from usage. It is possible this specimen represents a burnishing or scraping tool for either hides or pottery.

**Worked deer phalanx** One specimen (#1610) is a cut and notched white-tailed deer phalanx (Figure 48). It may be a pendant or "tinkler."

**Worked bear incisor** One specimen (#1885) is a notched black bear incisor (Figure 48). The notched areas may have facilitated the attachment of the incisor to a cord to serve as a pendant or other decorative item.

**Tubular beads** Two specimens represent tubular beads manufactured from bird long bones (Figure 48). Both specimens are
Figure 48. Examples of worked decorative faunal artifacts from the Cribb's Crib site [A-B:2314, 1717; C - bead:3697; D - worked deer phalanx:1614; E - worked bear incisor:1885; and F - worked turtle carapace:1826]
polished. Both specimens have one broken end. One specimen (#2314) is cut and highly polished on the other end. It has also been ground smooth on this end. The other specimen (#1717) is only cut through half way. The scribe marks are present on both specimens.

**Bead** A single black colored, cylindrical bead is among the artifacts recovered from the Cribb’s Crib site (Figure 48). The bead is manufactured from either bison horn or the hoof of an artiodactyl. The bead is smoothed and polished. It is 5.5 mm. long. The exterior diameter is 6 mm. while the interior orifice diameter is 2.7 mm.

**Cut and/or chipped bone** Five specimens exhibit varying degrees of either cutting, chipping, grinding, or smoothing. It is extremely difficult to determine the usage of these pieces due to their limited size. It is possible some of these pieces may have been intended for gaming pieces.

**Worked shell**

Several pieces of worked mussel (freshwater clam) shell were distributed throughout the cultural zone; however, no worked shell was recovered from the fill matrix of the excavated features (Table 13). Six categories of worked shell were established during the analysis of the shell. A total of 27 worked pieces of shell was recovered from the site (Figure 49). Classification and analysis of the worked shell assemblage is presented below.

**Corn scrapers or shellers** Eleven shell specimens are modified in a manner indicative of corn shellers used to process green corn.
<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation Surface</th>
<th>Excavation Squares</th>
<th>Excavation Features</th>
<th>Test Pits</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn scrapers/shellers</td>
<td>1</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>Spoons or scoops</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Notched shell</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Serrated shell</td>
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<td>Incised shell</td>
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<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous cut fragments</td>
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<td>6</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>27</td>
</tr>
</tbody>
</table>
Figure 49. Examples of worked shell artifacts from the Cribb's Crib site [A - incised shell: 1294; B - notched shell: 907; and C - serrated shell: 16121. Actual size]
(Gradwohl 1982b:151). It is possible the specimens were also used as scrapers. Several pottery sherds exhibit scraping marks on their interior. The use of pottery shell scrapers is also documented in the literature concerning the experimental reconstruction of prehistoric pottery (J. White 1976; Rye 1981:86).

The exterior surface of the shell exhibits smoothing across the valve from the umbo to the posterior edge. Localized flaking occurs along the ventral and posterior margins of the valves. Some of the artifacts also exhibit grinding along the posterior edge of the valve.

**Spoons or scoops** Four shells are classified as spoons or scoops. They are modified but lack the characteristics common to the corn shellers/scrapers. One shell (specimen #2241L) may be a small bowl-like container due to its larger size.

**Notched shell** One triangular-shaped specimen (#907) has been intentionally notched along one side (Figure 49). The exterior is also smoothed. The object may have been used as a fishing lure or pendant.

**Shell with serrated edges** Three specimens have serrated (Figure 49) edges which resulted from intentional cutting and/or grinding operations along the edge of the shell. One specimen (#2992) exhibits flaking along both the anterior and posterior edges leaving a 27 mm. long serrated edge from the cardinal teeth to the ventral edge. The valve is also perforated beneath the cardinal teeth. The exterior is smoothed from usage. Another specimen (#1051A) may be a partially completed zoomorphic effigy cut-out.

**Incised shell** Two specimens exhibit incised lines. One valve
(specimen #1294) is incised on its interior forming a lattice-like design (Figure 49). They may represent a ceremonial or decorative function not presently understood.

**Miscellaneous cut fragments** Six specimens appear intentionally cut. Two of these specimens are triangularly shaped. Their function is not discernible from their size or shape.

**Miscellaneous Artifactual Materials**

The miscellaneous materials include materials manufactured or altered by the prehistoric inhabitants of the Cribb's Crib site (Table 14). Some of the materials represents structural remains, i.e. daub and hardened clay pit lining material. This category also includes a description of pigment source materials, as well as unworked worked materials which may represent manuports.

**Daub** A total of 323 hardened clay fragments is recovered from the Cribb's Crib site. These "plaster" fragments have been interpreted as daub or "wattling" clay. This material, along with the numerous features, may indicate the presence of structures; however, no postmolds were discovered during the excavation of the site. The movement of heavy machinery across the site may have obscured their presence, or they may have been destroyed by plowing.

Over 13% of the daub pieces have stick or grass impressions. A stick impression in one specimen measures 5.2 mm. in diameter. The majority of the impressions is much smaller usually measuring less than 1 mm. wide. Eighteen percent of the daub specimens appears to have been
Table 14. Distribution of miscellaneous artifactual materials, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>Features</td>
</tr>
<tr>
<td>Daub</td>
<td>27</td>
<td>86</td>
</tr>
<tr>
<td>Clay pit lining</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pigment source material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hematite</td>
<td>21</td>
<td>47</td>
</tr>
<tr>
<td>limonite</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>siltstone</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous stone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angular rock</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Coal/shale</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Pumice</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Sandstone</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Unworked rock</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Burned limestone</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>146</td>
</tr>
</tbody>
</table>
subjected to intense heat. It may be that these pieces were once part of a burned structure or they may be part of a clay lined hearth. Most of the specimens are small to medium in size with a diameter less than 30.5 mm. Several specimens have a smooth surface. It is possible these specimens served in a non-plaster function, i.e. a burnishing or smoothing piece for the ceramic vessels.

Although evidence for Moingona Phase structures is limited (Gradwohl 1973:17), the presence of daub may indicate their former existence. Gradwohl (1973:17, 120) reports the presence of a mortuary enclosure at the Howard Goodhue site. No structures have been identified at the Clarkson site (Osborn 1982) nor have any been identified at the Cribb's Crib site. Possible structural floors have been mentioned at the Christenson site, an Oneota occupation site in the downstream corridor of the Saylorville Reservoir (Benn and Bettis 1981:21; Benn and Harris 1982:38). Their presence has not been substantiated to date.

No single type of house structure is associated with the Oneota cultural tradition. In a synthesis of Oneota structures, McKusick (1971) mentions several types of structures which have been identified at Oneota archaeological sites. Small rectangular house structures (Hall 1962) to large longhouses (McKusick 1973) have been reported in the literature. Oval structures have also been noted (Bluhm and Liss 1983:99-102; Bluhm and Fenner 1983:141-143; Gibbon 1972:156-159).

Clay pit lining A total of 180 specimens has been recovered from four separate features (F1, F111, F130, F150). These specimens are hardened pieces of clay. They may represent part of a clay lined stor-
age pit wall. These pieces were recovered from the heavy fraction units during the flotation process.

**Pigment source materials** Hematite and limonite have often been sources of pigments among the aboriginal inhabitants of North America. Several sites in the central Des Moines River Valley have yielded pieces of worked hematite and limonite (Gradwohl 1973; 1974:94; Osborn 1982:55-56). Hematite and limonite are found in small quantities in the coal measures of Warren County (Tilton 1896:354). Tilton (1896:339) also describes an exposure of hematite in an outcropping along the North River. Stream gravels and the glacial till may have also provided the prehistoric inhabitants of the Cribb's Crib site with these pigment sources.

A total of 105 specimens of hematite is among the material recovered from the Cribb's Crib site. Twenty-four specimens exhibit signs of intentional scratching, chipping, grinding, and/or polishing (Figure 50). One specimen (#4011A) is a small worked, cubic piece of hematite. It measures 24 x 20 x 18 mm. It has also been scratched and polished.

A total of 19 specimens of limonite is also among the materials recovered from the Cribb's Crib site. Only one surface specimen exhibits signs of intentional alteration.

Another possible source of pigment is gray siltstone. This material is available in the stream gravels and the glacial till. The gray siltstone ("soapstone") is also present in the shales of the Saint Louis formation which outcrops in the vicinity of Pella, Iowa (Miller
Figure 50. Examples of worked hematite from the Cribb's Crib site [A - scratched and polished hematite cube: 4011A; B-F - scratched and/or smoothed hematite: 2790, 3126, 2556, 3326, and 4957. Actual size]
One specimen, mentioned in the section on ground stone, may have been intended as a source of gray pigment. Twenty-nine other specimens of siltstone are part of inventory of materials recovered from the Cribb's Crib site. Five of these specimens exhibit signs of intentional grinding or chipping.

Miscellaneous unworked stone A total of four angular pieces of granite (3) and shale (1) is recovered from the cultural zone at the Cribb's Crib site. They may represent fire-cracked rock. Angular rock is noted in the descriptions of Features 19, 20, and 135.

Twenty-five specimens of low-grade coal or carbonaceous shale were recovered from the site. Eleven specimens were located in the cultural horizon while 14 specimens were collected from the surface.

Four pieces of unworked sandstone were recovered from the Cribb's Crib site. One was from the surface while three were collected from the cultural horizon (1) or from feature fill (2). Although they do not appear worked, it is possible they may have served an abrading or grinding function.

Two pieces of burned limestone were collected from the surface along with a piece of pumice. One water rolled piece of tabular chert was collected from the surface. Four pieces of igneous or metamorphic rocks or pebbles were also recovered from the site. Due to their location, shape, or surface condition, it was difficult to formulate any significant relationship between these objects and the Oneota occupants at the Cribb's Crib site. With the exception of the burned limestone, these specimens may represent natural occurring materials either in the
sediments or eroded from the glacial till; however, it is possible they may represent manuports.

Features

A total of 163 features was designated in the field at the Cribb's Crib site. Information concerning these features is tabulated in Appendix A. The term "feature" is used to denote:

... those materials and visible items in or about archaeological sites that are either atypical of the general run of the deposit or not frequently encountered on the surface or in the vicinity of an aboriginal habitation. Generally speaking, features are things that are not brought back to the laboratory or museum. Thus ash lenses, house floors, caches and unworked stones, earth ovens, storage pits, and the like are generally called features (Hester, Heizer, and Graham 1975:131).

Generally, these were discrete areas of soil discoloration and/or concentrations of artifacts, ash, burned earth, and/or charcoal.

Of the 163 features designated in the field, three were determined to be rodent krotovinas (F4, F27, and F32). Of the remaining 160 features, 87 excavated features contained artifactual material, 45 excavated features contained no artifactual material, and 28 features were essentially destroyed before they could be excavated. Of the 87 features which contained artifactual material, 76 features were identified as storage pits which were latter converted in to refuse pits once their initial usage had been terminated. Nine features were identified as hearths during the excavations at the Cribb's Crib site. One feature contained a hearth which was intrusive into a storage/refuse
pit. Feature 75 was a flint-knapper's cache. It contained several quarry preforms and large flakes.

Only eight features were designated within the excavation squares at the Cribb's Crib site. The remaining 155 features, including three intersecting pits, were located during monitoring activities. These activities involved checking the borrow area during the removal of the soil for the levee fill. Although many features were cross-sectioned and excavated, several features were destroyed by construction activities before they could be excavated. Several features contained no artifactual materials. Few fill samples were collected, since the flotation process had not yet been incorporated into the standard archaeological procedures (Struever 1968). This is regrettable since, in all probability, much valuable information concerning the prehistoric economy and subsistence system was lost.

Three basic feature shapes are represented at the Cribb's Crib site: 1) basin (16); 2) straight-walled (14), and 3) belled or undercut pits (16). The limited number of identified shapes is due to emergency conditions present at the site. Often time was not allowed to record specific information concerning the shape and dimension of the features before being destroyed on a subsequent pass of the Burch company's heavy machinery. It is possible, however, to make a few general comments concerning the features' shapes. The basin-shaped pits are generally shallower pits than the other two types. The bell-shaped (undercut) pits are constricted at the neck, and then expand to the base below the constricted neck with the maximum expansion occurring at the base.
The majority of the features is interpreted as storage pits which served as trash repositories once their primary function was finished. Little specific information is available concerning the majority of the features. The emergency conditions, under which the site was excavated, did not allow time to thoroughly examine every feature. Much information was probably destroyed by the standard excavation techniques of cross-sectioning and coring the features (Syms 1974:314).

There are apparently three or four localized areas containing a concentrated number of features. These areas may indicate the presence of structures; however, no postmolds were identified. It is possible some of the basin-shaped pits represent holes for the structural timbers. Wilson (1917:95-97) indicates the cache pits were located either inside the lodges of the Hidatsa or along the exterior wall of the lodge. Will and Hyde (1917:135) describe an account of the Pawnee practice to locate their storage pits inside their lodges.

**Faunal Remains**

**Vertebrate fauna**

A total of 1,990 fragments of worked and unworked bone, antler, teeth, horn or hoof, and scales was recovered from the Cribb's Crib site (Table 15). This sample included 1,935 unworked fragments and 50 worked specimens. Preliminary analysis of the faunal remains indicated a total of 1,852 mammalian osteological remains, 50 reptilian osteological remains, 67 fish osteological remains and 21 avifaunal (bird) osteological remains. The bulk of the bone was in various states of
Table 15. Distribution of faunal remains, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>Features</td>
</tr>
<tr>
<td>Mammalian Bone</td>
<td>122</td>
<td>616</td>
</tr>
<tr>
<td>Burned bone</td>
<td>17</td>
<td>245</td>
</tr>
<tr>
<td>Reptilian Bone</td>
<td>-</td>
<td>43</td>
</tr>
<tr>
<td>Burned bone</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Fish Bone</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Burned bone</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Avifauna Bone</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Burned bone</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>139</td>
<td>927</td>
</tr>
</tbody>
</table>
preservation, and the majority is highly fragmented. Although all these might have been associated with the Oneota occupation of the site, it is possible the rodent and snake osteological remains may represent intrusive elements.

The majority of the analysis was conducted by the author. Some of the bison remains were verified by Dr. Holmes A. Semken, Geology Department, University of Iowa, Iowa City, Iowa. The fish remains were identified by Lynn Alex, Archaeological Research Center, Ft. Mead, South Dakota. The author relied on the following taxonomic manuals for identification of the faunal material: mammal (Brown and Gustafson 1979; Gilbert 1980; Lawrence 1974; Olsen 1964, 1974); reptile (Olsen 1968); avifauna (Gilbert, Martin, and Savage 1981; Olsen 1979); and general (von der Driesch 1976). Besides these taxonomic keys, the author also utilized the limited osteological comparative collection of the Iowa State Archaeological Laboratory for positive identification of the faunal material.

Mammalian remains A total of 1,852 fragments of bone, antler, horn or hoof, and teeth is among the mammalian remains recovered from the Cribb's Crib site. Four hundred seventy-three specimens are charred or calcined. The bulk of the unburned bone is in various states of preservation. Seven bone fragments and teeth are human. The human specimens will be discussed in a subsequent section following the vertebrate fauna discussion.

A total of 446 bone, antler and teeth specimens is positively identified as to species. Thirteen species are present in this sample,
including badger, beaver, bison, black bear, dog or canid, ground squirrel, Plains pocket gopher, porcupine, raccoon, squirrel, wapiti (elk), and white-tailed deer. A fragment of raccoon maxilla is part of the surface collection. It is possible it is a modern specimen and not part of the Oneota occupation. All the mammalian species represent prairie, riverine, or woodland species which would have been locally available at the time the site was occupied by the Oneota inhabitants.

Table 16 summarizes the pertinent data concerning the identified mammalian species with the exception of the human osteological remains. Appendix B lists the bison remains identified by Dr. Semken. The minimum number of individuals represented by the sample are extremely conservative. Although the figures are undoubtedly biased by the author's limited experience, they may provide a rough comparison to the actual subsistence pattern of the Oneota inhabitants of the site. Estimated dressed weights for each species are from Dallman (1983:31), Guilday, Parmalee, and Tanner (1962:61), and T. White (1953a:397-398).

Much of the osteological material is too fragmentary to allow positive identification. The fragmentary nature of the long bones may have resulted during the extraction of marrow or in preparation for the extraction of bone grease (Leechman 1951:355-356). Several specimens exhibit butchering marks. The butcher marks occur more frequently on the osteological remains of the larger mammals than on the smaller species. A disproportionate number of bison scapulae may indicate the removal of specific sections at the kill site for transfer back to the village. The number and variation in the type of deer osteological
Table 16. List of identified mammals represented in the faunal inventory, Cribb's Crib site

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Pieces</th>
<th>Minimum Individuals Represented</th>
<th>Individual Weight</th>
<th>Percent of Total</th>
<th>Estimated Pounds Represented</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Taxidea taxus</em></td>
<td>Badger</td>
<td>1</td>
<td>1</td>
<td>12.5</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td><em>Castor canadensis</em></td>
<td>Beaver</td>
<td>3</td>
<td>3</td>
<td>38.5</td>
<td>4</td>
<td>115.5</td>
</tr>
<tr>
<td><em>Bison bison</em></td>
<td>Bison</td>
<td>131</td>
<td>6</td>
<td>650</td>
<td>8</td>
<td>3900</td>
</tr>
<tr>
<td><em>Ursus americanus</em></td>
<td>Black bear</td>
<td>1</td>
<td>1</td>
<td>210</td>
<td>1</td>
<td>210</td>
</tr>
<tr>
<td><em>Canis (sp.)</em></td>
<td>Dog/canid</td>
<td>8</td>
<td>5</td>
<td>17.5</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td><em>Cervus claphus</em></td>
<td>Wapiti (elk)</td>
<td>120</td>
<td>6</td>
<td>350</td>
<td>8</td>
<td>2100</td>
</tr>
<tr>
<td><em>Spermophilus (sp.)</em></td>
<td>Ground squirrel</td>
<td>14</td>
<td>4</td>
<td>.5</td>
<td>5</td>
<td>2.0</td>
</tr>
<tr>
<td><em>Geomys bursarius</em></td>
<td>Plains pocket gopher</td>
<td>36</td>
<td>13</td>
<td>.7</td>
<td>17</td>
<td>9.1</td>
</tr>
<tr>
<td><em>Erethizon dorsatum</em></td>
<td>Porcupine</td>
<td>4</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td><em>Procyon lotor</em></td>
<td>Raccoon</td>
<td>1</td>
<td>1</td>
<td>17.5</td>
<td>1</td>
<td>17.5</td>
</tr>
<tr>
<td><em>Scirus (sp.)</em></td>
<td>Squirrel</td>
<td>1</td>
<td>1</td>
<td>1.75</td>
<td>1</td>
<td>1.75</td>
</tr>
<tr>
<td><em>Odocoileus virginianus</em></td>
<td>White-tailed deer</td>
<td>125</td>
<td>33</td>
<td>100</td>
<td>44</td>
<td>3300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>446</td>
<td>76</td>
<td></td>
<td>100%</td>
<td>9775.85</td>
</tr>
</tbody>
</table>
remains may indicate the carcass was dismembered at the village rather than at the location where they were killed. Dallman (1983) and T. White (1952; 1953b; 1954; 1955) describe butchering techniques for various species.

Three groups of burrowing animals are included in the Cribb's Crib mammalian population. These may represent food sources utilized by the Oneota occupants of the site. It is also highly probable the majority of these remains are intrusive, especially those of the ground squirrels and the Plains pocket gophers (Semken 1959:111).

Besides utilization of food sources, several species may have also been collected for their fur (beaver), hides (bison, deer, and wapiti), quills (porcupine), teeth (black bear) or antler (wapiti and deer). The hides of the artiodactyls were probably used for clothing and/or shelter coverings. The quills and teeth may have provided decorative raw materials. Other osteological material provided raw materials for the manufacture of tools.

Avifaunal remains A total of 21 specimens is identified as bird osteological remains. Only one specimen is charred or calcined. Three species are tentatively identified among these remains. They include a turkey vulture, a little blue heron, and wild turkey. Although the birds may have been used for food, their feathers and bones may have provided the raw materials for personal adornment. Two bone fragments are apparently modified to form pipe (tubular) beads.

Reptilian remains A total of 50 specimens represents reptilian osteological remains. Only one specimen is charred or calcined. The
The majority of the specimens represents vertebrae from several different species of snakes. Although they may have served as a food source or as some decorative function, it is also possible the snakes represent intrusions into the Oneota cultural horizon. The other identified reptilian remains are sections of the carapace of the soft-shell turtle. One specimen has been intentionally modified.

**Fish remains** A total of 67 specimens of fish osteological remains is among the faunal material recovered from the Cribb's Crib site. Only one specimen is charred or calcined. The fish remains have been analyzed by Lynn Alex. Appendix C contains a complete listing of these results. Two families are positively identified; catfish (Ictaluridae) and suckers (Catostomidae). The catfish family includes channel catfish (*Ictalurus punctatus*) and black/brown/yellow bullheads (*Ictalurus melas/nebulosus/natilis*). With the exception of the bullheads, the identified families prefer moderate gradient, permanent streams (*Pflieger 1975:178, 212*). The black bullheads prefer muddy oxbows and backwaters of large streams, or permanent pools in intermittent streams (*Pflieger 1975:209*). The brown and yellow bullheads prefer clear, quiet back waters and overflow pools with large amount of submerged vegetation (*Pflieger 1975:210-211*).

**Summary** The proportions of usable meat at the Cribb's Crib site closely resembled those at the Clarkson site (*Osborn 1982:70-72*), a Moingona Phase site located a couple miles east of the Cribb's Crib site. The artiodactyl meat was apparently the major meat source. White-tailed deer was the predominant species in the faunal inventory.
Besides meat, the artiodactyl's provided hides for clothing and shelter coverings and bone for tools. Other species present in the faunal inventory also provided meat, as well as fur, bone, feathers, and teeth for clothing, tools, and decoration. The Oneota occupants apparently utilized a broad-spectrum hunting subsistence base by exploitation of fauna from the surrounding prairie, riverine, and woodland environments. The hunting subsistence pattern of the Oneota inhabitants at the Cribb's Crib site closely parallels that used at other Oneota sites in Iowa (Harvey 1979; Jenkins and Semken 1972).

**Human remains**

A total of seven human skeletal fragments was recovered from the site. The material consisted of a very worn molar from the mature adult, four deciduous molars, a portion of a parietal, and a mandible fragment with a worn permanent molar still in place. The molar and mandible fragment were from adjacent excavation squares. They may have been from the same individual. Both belong to a mature adult. The adult parietal and the deciduous teeth were recovered from feature fills.

No burials were discovered during the excavation activities at the site. Although the deposition of the human remains may have represented secondary interment, it would seem more probable they were carried back to the site from a burial location, not yet discovered, by either the human or the canid inhabitants of the site. The deciduous teeth lacked roots and may have been discarded when they fell out of the juvenile's
mouth. The adult molars were highly ground indicating the presence of a large amount of abrasive material in the diet. This material was probably added during the grinding of food, such as corn. No pathologies were present on any of the human remains.

**Invertebrate fauna**

*Freshwater mussels*  In addition to the vertebrate osteological material, a large quantity of mussel shell was also recovered from the Cribb's Crib site. A total of 2,384 complete valves and/or fragmentary pieces of freshwater mussel shell was recovered during the emergency excavations at 13WA105. A total of 298 pieces of shell (13%) was collected from the surface. A total of 1,590 pieces of shell (67%) was recovered from the excavation squares and test pits. Another 496 pieces of shell (20%) was located and recovered from the features at the site. The general distribution of shell is described in Table 17. The worked shell artifacts were described in a preceding section; however, the following discussion also pertains to those specimens.

The sample was very fragmentary due to natural processes and past cultural activities. As a result, only a total of 298 whole valve sections was recovered from the excavations and features. The author was able to identify 137 valve sections with the following taxonomic keys: Buchanan (1980), Eddy and Hodson (1982), and Parmalee (1967). The number of identified specimens was further reduced to a minimum number of 84 individuals based on the number of right or left valve sections (Table 18).
Table 17. Distribution of shell, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Surface</th>
<th>Excavation Squares</th>
<th>Features</th>
<th>Test Pits</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mussel</td>
<td>298</td>
<td>1,519</td>
<td>496</td>
<td>71</td>
<td>2,384</td>
</tr>
<tr>
<td>Gastropod</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic</td>
<td></td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Land</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>299</td>
<td>1,528</td>
<td>496</td>
<td>71</td>
<td>2,394</td>
</tr>
</tbody>
</table>
Table 18. Distribution of identified freshwater mussels, Cribb's Crib site

<table>
<thead>
<tr>
<th>Species</th>
<th>Surface</th>
<th>Excavation Squares</th>
<th>Features</th>
<th>Test Pits</th>
<th>Total</th>
<th>Minimum No. of Individuals</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actinonaias ligamentina (mucket)</td>
<td>-</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Amblema plicata (three ridge)</td>
<td>-</td>
<td>21</td>
<td>1</td>
<td>-</td>
<td>22</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Fusconaia flava (pig-toe)</td>
<td>-</td>
<td>15</td>
<td>1</td>
<td>-</td>
<td>16</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Lampsilis radiata (fat mucket)</td>
<td>-</td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>11</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Lampsilis teres (yellow sand-shell)</td>
<td>-</td>
<td>9</td>
<td>1</td>
<td>-</td>
<td>10</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Lampsilis ventrosa (pocket book)</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Ligumia recta (black sand-shell)</td>
<td>-</td>
<td>26</td>
<td>3</td>
<td>1</td>
<td>30</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>Pleurobema coccineum (round pig-toe)</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Quadrula 'sp.'</td>
<td>-</td>
<td>18</td>
<td>5</td>
<td>1</td>
<td>24</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Quadrula nodulata (warty-back)</td>
<td>-</td>
<td>6</td>
<td>1</td>
<td>-</td>
<td>7</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Trigonia verrucosa (buckhorn)</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>116</td>
<td>17</td>
<td>3</td>
<td>137</td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>
The small number of identifiable specimens illustrates the variety of species and the variation in size of species utilized at the Cribb's Crib site. The significance of the freshwater mussels was probably greater in the diet of the prehistoric inhabitants than indicated by the identifiable specimens. Mussels may represent an important supplementary food resource to the subsistence of the prehistoric inhabitants (Parmalee and Klippel 1974). Biases in the sample are due to the large quantity of fragmentary shell resulting from both pre- and post-depositional breakage and weathering of the shell. The limited expertise of the author to differentiate between mature adults of smaller species and immature specimens of larger species is also included in the sample biases. A total of 161 smaller mussel valves is unidentified.

Although positive correlation is not present, the significance of the freshwater mussels as a possible food source is demonstrated by their distribution throughout the site and general association with other faunal remains. Parmalee and Klippel (1974:421) describe the principal means of cooking mussels was by steaming. Steaming mussel shells by the prehistoric inhabitants of the site may represent the method of cooking since only 4% of the total mussel shell inventory consisted of burned shell.

The significance of fresh water mussels to the prehistoric inhabitants is also enhanced when the material cultural context is considered for shell utilization. A major use of shell is temper for the pottery. Other uses may include corn shellers, scrapers, fishing lures, spoons, scoops, and ceremonial and/or decorative applications. These
uses along with the obvious utilization as a food resource contribute to the abundance of shell recovered from the site.

**Gastropods**  A total of ten specimens of snails was recovered from the site. One specimen was an unidentified land snail obtained during the surface reconnaissance of the area. The remaining nine specimens were aquatic species (Table 19). Their size and limited distribution preludes their use as a food resource. Although none of the shells appear to have been intentionally perforated, they may have been meant for decorative functions.

**Floral Remains**

The survival of vegetal material at an archaeological site depends upon its compositional features and the micro-environmental composition of the soil where it is deposited (Dimbleby 1977:19; 1978). The soils, surrounding the Cribb's Crib site, vary from neutral to moderately acid. The acid condition is extremely detrimental for preservation unless the vegetal material has been charred or carbonized. Even this condition does not guarantee preservation. There are also adverse side-effects. Charring has an adverse effect on the morphological structure of the vegetal remains. Bark, tissue structure, seed coatings and color, along with other identifying characteristics, are altered or destroyed during the charring process. The charred and/or carbonized vegetal remains are still important to the reconstruction of ecological and subsistence patterns concerning the prehistoric inhabitants of the site (Dimbleby 1978:17-24). A number of vegetal remains from several
Table 19. Distribution of identified gastropods, Cribb's Crib site

<table>
<thead>
<tr>
<th>Provenience Category</th>
<th>Excavation Squares</th>
<th>Excavation Features</th>
<th>Test Pits</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND SNAIL</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>PLEUOCERIDAE</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td><em>Goniobasis livescons</em></td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td><em>Pleuocera acuta</em></td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>PLANORBIDAE</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><em>Helisoma (sp.)</em></td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><em>Helisoma anceps</em></td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>LYMNACIDAE</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>VIRIPARIDAE</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><em>Campeloma (sp.)</em></td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1</td>
<td>9</td>
<td>-</td>
<td>10</td>
</tr>
</tbody>
</table>
feature fills has been recovered by water flotation, and will be discussed in detail in Chapter 6. Classification and analysis of the floral remains from the Cribb's Crib site are presented below. Appendix D contains a detailed listing of the identified vegetal remains recovered from the Cribb's Crib site, excluding wood charcoal.

Seeds

The variation in species types of seeds is extremely limited. Only one cultigen is among the recovered vegetal remains. Several kernels, cob fragments, and stalk segments of corn (*Zea mays*) or maize represent the agricultural produce recovered from the Cribb's Crib site. Three excavation squares and thirteen features contained varying amounts of corn. The corn is a flint variety, commonly known as Eastern Eight Row. A more detailed discussion is found in Chapter 6.

One feature (Feature 141) also contained two charred goosefoot seeds (*Chenopodium 'sp.'*) and two charred pigweed seeds (*Amaranthus 'sp.'*). These two species of wild plants have been utilized by prehistoric and historic inhabitants of the region for food. The gathering aspect of the Oneota occupation is limited to these specimens and to a charred walnut hull recovered from another feature. Two seeds (one *Polygonum*, smartweed and one *Lepidium campestre*, field peppergrass), area identified as modern intrusions into the cultural zone.

Grass

A total of 16 features (F12, F12A, F13, F28, F31, F34, F38, F68, F119, F122, F124, F140, F150, and F155) was apparently grass-lined
storage pits. Half of these features contained a thin film of carbonaceous material between the pit fill and the pit walls, while the other half used as a storage pit lining, grass was used as a brushing material to smooth the vessel walls during the ceramic manufacturing process. Grasses would have been readily available from the tall-grass prairies surrounding the Cribb's Crib site.

Wood

Wood charcoal was recovered from throughout the cultural horizon and from numerous features (Table 20). Identification of the wood charcoal, recovered the Cribb's Crib site, was made by John Broihahn, a fellow graduate student in Anthropology. Identified species included American and red elm, basswood, black and white ash, black walnut, cottonwood, hackberry, hickory, red and white oak, soft maple, and willow.

These hardwood species occur in four major forest associations of the surrounding region (Aikman and Gilly 1948; Conrad 1954). The willow-cottonwood association occurs along the wetter portions of the waterways. The elm association occurs on the drier portions of the bottomlands. On the toe and foot slopes, the elms intermingle with the linden-maple association on the side slopes. The oak-hickory association occupy the upper slopes and ridgetops in the region. A detailed listing of identified wood species is presented in Appendix E.

Trees provided construction material for structures. They also supplied wood for heating and cooking. Nuts have been used as food both
Table 20. Distribution of identified wood species, Cribb's Crib site

<table>
<thead>
<tr>
<th>Wood Species</th>
<th>Cultural Zone</th>
<th>Features</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Elm (Ulmus americana)</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Basswood (Tilia americana)</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Black ash (fraxinus nigra)</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Black walnut (Juglans nigra)</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cottonwood (Populus deltoides)</td>
<td>-</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Elm (Ulmus)</td>
<td>1</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Hackberry (Celtis occidentalis)</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Hickory (Carya 'sp.')</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Red Elm (Ulmus rubra)</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Red Elm (Ulmus rubra) or Hackberry (Celtis occidentalis)</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Red Oak (Quercus rubra)</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Soft Maple (Acer 'sp.')</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>White ash (Fraxinus americana)</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>White oak (Quercus alba)</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Willow (Salix 'sp.')</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td><strong>40</strong></td>
<td><strong>57</strong></td>
</tr>
</tbody>
</table>
prehistorically and historically. The trees may have also supplied bark and leaves for storage pit linings.

Historic Artifacts

A variety of historic artifacts was recovered from the Cribb's Crib site (Table 21). The majority was recovered from the surface. The rest of the historic artifacts were located either in the plowzone or in disturbed areas consisting of rodent krotovinas. The small size of the fragments and their location in highly disturbed areas beneath the plowzone indicate their intrusive nature.

The appearance of most historic material in the field probably resulted from the mixing of the debris with manure spread as fertilizer (Timberlake 1981:252). Other historic artifacts consisted of material used on late 19th and 20th century farmsteads. The largest category of historic artifacts was the ceramics. Three pieces of pottery kiln furniture were recovered from the surface. This material was probably discarded from the pottery works located in Carlisle.

Ceramics

A total of 72 specimens comprises the ceramic sample. The majority of the sample is recovered from the surface or plowzone. Of the artifacts located beneath the plowzone, all are recovered from disturbed areas within rodent krotovinas. Classification and analysis of the historic ceramic assemblage are presented below.
Table 21. Distribution of historic artifacts, Cribb's Crib site

<table>
<thead>
<tr>
<th>Historic Artifacts</th>
<th>Excavation</th>
<th>Test</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface</td>
<td>Squares</td>
<td>Features</td>
<td>Pits</td>
</tr>
<tr>
<td>Ceramics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porcelain</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ironstone</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stoneware</td>
<td>29</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Construction material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tile block</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Drain tile</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kiln furniture</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Household glass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Container glass</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Milk glass</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Window glass</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Metal</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Construction material</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortar</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>105</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
Ceramics

White paste porcelain:

White glaze: 4 sherds, including 1 with a single linear design and 1 small doll cup fragment.

Unglazed: 1 sherd.

Ironstone:

Plate fragments: 10, including 3 with transfer designs.
Cup fragments: 4.
Saucer fragments: 3.
Pitcher fragments: 1.
Miscellaneous fragments: 9 including 1 with 2 sponge decoration.

Stoneware:

Covered container: 2, including 1 exterior salt glazed sherd and 1 Albany slip sherd.
Butter churn: 1 salt glazed sherd.
Crock fragments: 4 salt glazed sherds.
   Jug fragments: 1 Albany slip sherd.
   Jar fragments: 1 Albany slip sherd.
   Milk bowl: 5 Albany slip sherds.
Miscellaneous fragments: 18.

Construction material: 5 tile block fragments, including 1 with painted exterior surface.
   3 drain tile fragments.
Kiln furniture: 1 setting tile.
1 cross-wedge support.
1 salt glazed brick.

Household glass
A total of 24 specimens comprises the household glass sample. All the specimens are recovered from the surface. Classification and analysis of the historic household glass assemblage are presented below.

Container glass
Bottle glass: 7, including 5 clear, 1 green and 1 brown colored fragments.
Mason jar: 1 clear fragment.
Bowls: 2 molded decorated fragments.
Melted glass lumps: 2.

Milk glass
Mason jar lid liners: 10, including 1 with a portion of zinc seal still attached.

Window glass
Clear window pane fragments: 2

Metal
A total of 14 specimens comprises the historic metal sample. The majority are recovered from the surface. The rest are recovered beneath the plowzone in areas heavily disturbed by rodent krotovinas. Classification and analysis of the historic metal assemblage is presented below.
Metal hardware

Canning equipment: 2 zinc jar lid fragments.
2 zinc seals.

Hunting equipment: 1 .44 or .45 caliber lead mini-ball.

Harness equipment: 1 snap.

Pocket knife: 1.

Tools: 1 open-end wrench (1/2"-5/8").

Nails: 1 cut nail (9d).
2 wire nails (6d).

Wire: 1 16-gauge smooth wire.

Miscellaneous metal: 2 pieces.

Construction material

A total of 1 specimen comprises the construction material sample not already mentioned in the analysis of the ceramic category. The single specimen is recovered from the surface. Classification and analysis of the assemblage are presented below.

Construction material

Mortar: 1 specimen.

Radiocarbon Dates

Charcoal samples collected from Moingona Phase sites have yielded several conflicting radiocarbon dates. Charcoal samples from the 1965 field season at the Howard Goodhue site, collected from Feature 3 using standard field procedures, were submitted to the radiocarbon laboratory at Gakushuin University, Japan, and to the Smithsonian Institute in
Washington, D.C. The Gakushuin assay (GAK-879) reported the data to be "modern, less than 500." The Smithsonian assay (SI-357) reported the dates as "B.P. 300 ± 200—that is, A.D. 1650 ± 200 (Gradwohl 1973:126). The problem was further complicated when charcoal samples from the Mohler Farm site were submitted to the two institutions. Charcoal from Feature 23, a storage pit, analyzed by the Gakushuin lab "assayed at A.D. 690 ± 80 (GAK0698) A.D. 1500 ± 200 (SI-358)." An additional sample (posthole in Feature 11) assayd as "modern" (Gradwohl 1973:27). This last sample probably represented a modern intrusion since it was not positively associated with the Oneota material (Gradwohl 1974:96). Osborn further commented:

Although the more recent of these dates, is highly plausible considering what is known of the occupation of Oneota sites on the historic horizon in northeastern Iowa (Mott 1938:302) . . . the total absence of trade goods in the Moingona Phase sites begs for earlier dates of occupation. Also, the long time span reflected by dates from charcoal within the same storage pits is curious (1982:74).

Several more assays of charcoal from the Howard Goodhue site, the Mohler Farm site and other Moingona Phase sites were run by the Center for Climatic Research at the University of Wisconsin-Madison (Table 22). The clustering of dates from the 11th through 13th centuries offered a more feasible temporal setting for the Moingona Phase (Osborn 1982:76).

In 1982, a charcoal sample from Feature 150, at the Cribb's Crib site, was submitted to the Beta Analytic, Inc., radiocarbon laboratory . . .
Table 22. Radiocarbon dates from the Center for Climatic Research for Moingona Phase sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Provenience</th>
<th>Sample No.</th>
<th>Radiocarbon Date</th>
<th>Date A.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mohler</td>
<td>Feature 5</td>
<td>WIS-734</td>
<td>930+50</td>
<td>1020</td>
</tr>
<tr>
<td>Mohler</td>
<td>Feature 23</td>
<td>WIS-763</td>
<td>750+45</td>
<td>1210</td>
</tr>
<tr>
<td>Howard</td>
<td>Feature 33</td>
<td>WIS-733</td>
<td>760+60</td>
<td>1190</td>
</tr>
<tr>
<td>Goodhue</td>
<td>Feature 2</td>
<td>WIS-738</td>
<td>650+55</td>
<td>1300</td>
</tr>
<tr>
<td>Clarkson</td>
<td>Feature 2</td>
<td>WIS-756</td>
<td>660+60</td>
<td>1290</td>
</tr>
<tr>
<td>Clarkson</td>
<td>Feature 9</td>
<td>WIS-731</td>
<td>705+50</td>
<td>1245</td>
</tr>
<tr>
<td>Clarkson</td>
<td>Feature 9</td>
<td>WIS-732</td>
<td>765+55</td>
<td>1185</td>
</tr>
</tbody>
</table>
at Coral Gables, Florida. The sample consisted of 11 grams of wood charcoal tentatively identified as either cottonwood or poplar. The sample (Beta-5939) assayed at $730 \pm 60$ radiocarbon years. The resulting date A.D. was 1220. This date is consistent with the clustering of Moingona Phase shown in Table 22.

To further confuse the issue, two radiocarbon dates from the Christenson site, an Oneota occupation site in the downstream corridor of the Saylorville Reservoir have yielded a difference of 500 years. The material was analyzed by the Beta Analytic, Inc. One sample (Beta-5231), from a depth of 100 cm. below the surface, assayed at $700 \pm 140$ years before (A.D. 1250). The other sample (Beta-4925), from a depth of 54-57 cm., assayed at $235 \pm 95$ years before (A.D. 1715) (Benn and Bettis 1981:10; Benn and Harris 1982:20). While the one sample appears consistent with other radiocarbon dates for the Moingona Phase, the second one is apparently much latter and may represent a second occupation of the site.

If the 11th through 13th century dates are assumed to be the representative temporal span of the Moingona Phase, this would place the Cribb's Crib site roughly contemporaneous with several other Oneota phases. Dobbs (1983:96) has evaluated the possibility of a development sequence existing for several Oneota phases. The results indicate the Moingona Phase, in the central Des Moines River Valley, is roughly contemporaneous with Lake Koshkonong, Siverale, Cambria, Lake Winnebago, Blue Earth, Grand River and earlier Orr Phase sites (Table 23). Dobbs (1983:101-105) presents listings of radiocarbon dates used
Table 23. Some Oneota sites roughly contemporaneous with the Cribb's Crib site

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Location</th>
<th>Range of Dates A.D.</th>
<th>Clustering of Dates A.D.</th>
<th>Cultural Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryan</td>
<td>Southern Minnesota</td>
<td>1135+150 to 1450+120</td>
<td></td>
<td>Blue Earth Phase</td>
</tr>
<tr>
<td>Sheffield</td>
<td>Wisconsin</td>
<td>1300+180</td>
<td></td>
<td>Blue Earth Phase</td>
</tr>
<tr>
<td>Dixon</td>
<td>Northeastern Iowa</td>
<td>930+ 80 to 1670+70</td>
<td>1315</td>
<td>Correctionville-Blue Earth Phase</td>
</tr>
<tr>
<td>Bornick</td>
<td>Wisconsin</td>
<td>1290+50</td>
<td></td>
<td>Grand River Phase</td>
</tr>
<tr>
<td>Walker-Hooper</td>
<td>Wisconsin</td>
<td>1200+55 to 1240+45</td>
<td>1230</td>
<td>Grand River Phase</td>
</tr>
<tr>
<td>Carcajou Point</td>
<td>Wisconsin</td>
<td>890+ 80 to modern</td>
<td></td>
<td>Lake Koshkonong Phase</td>
</tr>
<tr>
<td>Lasleys Point</td>
<td>Wisconsin</td>
<td>1020+ 80 to 1420+70</td>
<td>1260</td>
<td>Lake Winnебago Phase</td>
</tr>
<tr>
<td>Clarkson</td>
<td>Iowa</td>
<td>1185+55 to 1300+55</td>
<td>1255</td>
<td>Moingona Phase</td>
</tr>
<tr>
<td>Howard Goodhue</td>
<td>Iowa</td>
<td>1190+50 to modern</td>
<td></td>
<td>Moingona Phase</td>
</tr>
<tr>
<td>Mohler Farm</td>
<td>Iowa</td>
<td>690+90 to modern</td>
<td></td>
<td>Moingona Phase</td>
</tr>
<tr>
<td>Grant</td>
<td>northeastern Iowa</td>
<td>980+95 to 1090+190</td>
<td></td>
<td>Orr Phase</td>
</tr>
<tr>
<td>Kingston</td>
<td>southeastern Iowa</td>
<td>1230+105 to 1380+105</td>
<td>1320</td>
<td>Orr Phase</td>
</tr>
<tr>
<td>Lane Enclosure</td>
<td>northeastern Iowa</td>
<td>1410+105 to 1640+170</td>
<td></td>
<td>Orr Phase</td>
</tr>
<tr>
<td>Armstrong</td>
<td>Wisconsin</td>
<td>1010+105 to 1190+110</td>
<td></td>
<td>Silvernale Phase</td>
</tr>
<tr>
<td>Guthrey</td>
<td>northern Missouri</td>
<td>1200+ 80 to 1430+75</td>
<td>1345</td>
<td></td>
</tr>
<tr>
<td>Leary</td>
<td>eastern Nebraska</td>
<td>1205+ 70 to 1360+70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
in his study of Oneota origins and subsequent development. Hurley (1978:86-87) has a compilation of Oneota radiocarbon dates for Iowa, Minnesota, and Wisconsin. Tiffany (1981:63-66) has also compiled a list of radiocarbon dates for Iowa.

By the 11th to 13th centuries A.D., the Oneota Cultural Tradition represents several spatially separated groups which were culturally related. This appears consistent with Henning's earlier appraisal of the temporal and geographical continuity of the various Oneota groups

... I consider "group continuity" as implying a close evolutionary relationship between phases or subphases within a defined geographical unit. One or more group continuities might constitute portions of a local or regional sequence; there may be no diachronic cultural relationships between those groups' continuities. The group continuity bears traditional elements; the local or regional sequence does not necessarily do so (1970:10).
CHAPTER 6.

ANALYSIS OF THE FLOTATION DATA

During the 1968 field season, a total of 21 fill samples was collected from the Cribb's Crib site. The majority of these samples was collected because they contained large quantities of charred corn and cobs, or carbonized grass used as pit lining material. The author utilized water flotation techniques to recover any small-scale archaeological remains present in the fill samples (Struver 1968:353; Thies 1979:148).

A flotation station was constructed to accommodate the sample size. The station consisted of a large dish pan and a set of Newark standard testing sieves. A fine mesh window screen was placed inside the pan to collect the heavy fraction units. The light fraction units were allowed to overflow the pan where they were collected in the Newark standard testing sieves. Two sieves were used to sort the light fraction units. A #10 (2 mm.) sieve was stacked upon a #60 (250 μm.) sieve.

Analysis revealed both heavy fraction and light fraction units generally contained varying amounts of charred vegetal remains and burned bone. The author analyzed the heavy fractions. The light fraction units were analyzed by Dr. Leonard W. Blake, Department of Anthropology, Washington University, St. Louis, Missouri.
Heavy Fraction Units

Few pebbles were found in the sample, due to the alluvial nature of the soils covering the site. A total of 7 samples, from the 13 samples containing heavy fraction units, contained fire hardened or dried clay fragments. These fragments apparently were portions of the storage pit wall. Artifacts, present in these 13 samples, comprised a small percentage of heavy fraction units. The artifact inventory consisted of 3 small decorated body sherds, 47 undecorated body sherds and/or ceramic spalls, 1 retouched flake, and 71 very small (micro) flakes resulting from pressure flaking techniques. Four other samples contained minute bone, burned bone, and shell fragments. Two samples also contained fish scales. Table 24 contains a list of the heavy fraction unit material recovered from the Cribb's Crib site.

Light Fraction Units

A total of 22 float samples was submitted to Dr. Blake for analysis. Twelve samples contained vegetal material held in a 2 mm. mesh screen, and ten samples contained vegetal material held in a #60 sieve. The uncharred or uncarbonized material was apparently modern and intrusive into the cultural fill; however, the charred and carbonized material was associated with the Oneota occupation of the Cribb's Crib site.

Corn (Zea Mays)

The majority of the charred material recovered from the Cribb's Crib site was identified as *Zea Mays* (maize or corn). Several hundred,
Table 24. Material found in the heavy fraction units from the pit fill samples, Cribb's Crib site

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3871</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bone</td>
<td>Wood</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wood</td>
</tr>
<tr>
<td>28</td>
<td>4242</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Wood</td>
</tr>
<tr>
<td>39</td>
<td>4366</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Shell Corn Cob Wood</td>
</tr>
<tr>
<td>111</td>
<td>4543</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>124</td>
<td>4633</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>130</td>
<td>4695</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>140</td>
<td>4831</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>141</td>
<td>4832</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>150</td>
<td>4939</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>155</td>
<td>4986</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Present</td>
<td>Present</td>
</tr>
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</table>
if not several thousand, charred corn kernels were identified in the light fraction units. Several carbonized corn stalk fragments were also recovered. More important to the identification of the type of corn was the recovery of a number of corn cobs. Appendix F lists the measurement data concerning the corn cobs recovered from 13WA105.

The corn was identified by Dr. Blake as a "western form of a flint race called Eastern Eight-Row," formerly called Northern or Eastern Flint (Cutler and Blake 1976:6). The origins of this type of flint corn were the eight-rowed varieties from the Southwest and Mexico.

By A.D. 800, the Eastern Eight-Row had reached as far north as Ontario, Canada. This variety of corn dominated much of the region east of the Mississippi by A.D. 1200. Within 300 years, Eastern Eight-Row dominated much of the region west of the Mississippi River to the Rocky Mountains (Cutler and Blake 1976:6). Eastern Eight-Row crossed with dent corn varieties produced the Corn Belt Dent hybrids important to modern corn production.

Table 25 compares corn cobs recovered from 13WA105 to other Oneota sites. It should be noted the majority of the corn cobs was recovered from a single storage/refuse pit (Feature 130). The ten-row variant dominates the Eastern Eight-Row from 13WA105. The eight-row variant is more numerous over the entire temporal span of the Oneota occupation of the Mississippi region. The ten and twelve-row variants are the residual marks left by older Midwest Twelve Row corn variety. The high occurrence of the ten-row variant may represent a stage in the diffusion of the Eastern Eight-Row from east of the Mississippi River to the Rocky Mountains.
Table 25. Corn cobs from 13WA105 compared with those from other Oneota sites [All cobs were carbonized and not adjusted for shrinkage. Data compiled by Dr. Leonard Blake (1983)]

<table>
<thead>
<tr>
<th>Site Name and Number</th>
<th>Culture and Date</th>
<th>Mean Cupule Width</th>
<th>Median Cupule Width</th>
<th>No. Cobs</th>
<th>% of Total Cobs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean Row No.</td>
<td>Median Row No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOWA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cribb's Oneota</td>
<td>Oneota</td>
<td>9.3</td>
<td>6.9 mm.</td>
<td>26</td>
<td>38 58 4</td>
</tr>
<tr>
<td>Crib 13WA105</td>
<td>ca. A.D. 1220+50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malone II Oneota</td>
<td>A.D. 1600-1700</td>
<td>8.8</td>
<td>7.0 mm.</td>
<td>19</td>
<td>68 21 11</td>
</tr>
<tr>
<td>MISSOURI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>King Hill Late Oneota</td>
<td>Late Oneota,</td>
<td>9.8</td>
<td>8.2 mm.</td>
<td>742</td>
<td>39 34 20 4 3</td>
</tr>
<tr>
<td>23BN1</td>
<td>probably Kansa.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ca. A.D. 1700</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utz Late Oneota</td>
<td>Late Oneota,</td>
<td>9.4</td>
<td>8.5 mm.</td>
<td>66</td>
<td>47 38 13 2</td>
</tr>
<tr>
<td>23SA2</td>
<td>Missouri?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ca. A.D. 1400-1714</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISCONSIN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carcajou Oneota</td>
<td>Oneota</td>
<td>10.7</td>
<td>7.0 mm.</td>
<td>30</td>
<td>7 53 37 3 -</td>
</tr>
<tr>
<td>Point 47JE2</td>
<td>ca. A.D. 1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diamond Oneota or</td>
<td>Oneota or Miss.</td>
<td>9.7</td>
<td>6.9 mm.</td>
<td>36</td>
<td>39 41 17 3 -</td>
</tr>
<tr>
<td>Bluff 47PI2</td>
<td>ca. A.D. 1150+150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walker-Hooper</td>
<td>Aberrant Oneota</td>
<td>9.9</td>
<td>6.0 mm.</td>
<td>19</td>
<td>53 21 10 6 -</td>
</tr>
<tr>
<td>47GL65</td>
<td>ca. A.D. 1200-1250</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mountains.

No other cultigens were present in the light fraction units from the fill samples. Several samples contained small pieces of unidentified wood charcoal. Four fragments of a small unidentified fruit seed were present in the fill from Feature 141. The light fraction units from Feature 141 also contained two charred goosefoot seeds (Chenopodium 'sp.') and two charred pigweed seeds (Amaranthus 'sp.'). Although the presence of these seeds does not represent significant gathering activities, they may indicate the possibility of such activities in association with the agricultural pursuits of Oneota inhabitants of the Cribb's Crib site.
CHAPTER 7.

SUMMARY AND CONCLUSIONS

Five main topics have been dealt with in the preceding sections. These topics have been discussed primarily in descriptive terms. First, background information was presented, describing the general location of the Cribb's Crib site, the reason for conducting the emergency salvage excavations, and the theoretical basis for the present study. Second, the ecological setting was examined, focusing on the diversified nature of the archaeological region, the exploitive potential of the site catchment, and the environmental impact upon the archaeological remains. Third, the cultural-historical sequence for the region was described. Fourth, the history, rationale, and methodology of the site investigations, along with a description of the site stratigraphy, were presented. Fifth, the analysis of the archaeological material was presented; ceramics, lithics, bone and shell artifacts, and miscellaneous materials were described along with the faunal and vegetal ecofacts. Sixth, information obtained from flotation activities was described.

This section presents conclusions based upon the interpretation of the preceding data. First, the cultural affiliation of the occupants of the Cribb's Crib site is presented. Second, the socio-cultural activities of the Oneota occupants are reconstructed based upon the
existing data. Third, the site significance, problems encountered, and areas of future research are presented in the final reflections of the archeological investigation of the Cribb's Crib site.

Cultural-Historical Affiliation

The major emphasis of this study deals with the Oneota occupation of the Cribb's Crib site. Although evidence suggest the probability of an earlier Woodland occupation, the artifacts do not clearly indicate its presence. The only evidence which suggest such an occurrence, is a small grit-tempered, cord-roughened body sherd from the surface along the eastern periphery of the site. It may be that some of the stemmed and/or notched, medium-sized projectile points also indicate an earlier occupancy at the site. Euro-American historic debris of the late 19th and the 20th century, associated with a nearby farmstead, also litters the site. A modern structure, i.e. a corn crib, was located in the middle of the site until its destruction prior to levee construction.

The remaining material is associated with Oneota occupation. The Cribb's Crib site is an Oneota habitation site, generally described as a village. The site covers approximately 20-30 acres. The site was officially located in 1966 during an archaeological reconnaissance of the area, although it had previously been known to private collectors in the Carlisle vicinity. The amount of material removed from the site by private collectors is unknown.

The materials recovered during the ISU archaeological investigations of the site, are quite similar to materials from other Oneota
components in the central Des Moines River Valley. Significant uniformity exists among these materials. Aware of formal, spatial, and temporal uniformity of these Oneota components, Dr. David Gradwohl (1967:211-212) has designated this group as the part of the Moingona Phase. His usage of the term "phase" follows the definition presented by Willey and Phillips:

. . . an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order or magnitude of a locality or region and chronologically limited to a relatively brief interval of time (1958:22).

Designation of the Moingona Phase, by Gradwohl, is based on data collected from 19 sites in the southern subregion of the central Des Moines River Valley (Gradwohl 1974:95). Four sites, including the Cribb's Crib site have been extensively excavated. Two sites have been tested and the remaining eleven sites are known from surface collections.

Comparison of the Cribb's Crib site to other Moingona Phase sites and to other Oneota Tradition sites, in general, is based primarily on the ceramic material. Shell-tempered, trailed and punctated vessels dominate the ceramic assemblage.

Rim forms and the symmetric globular vessel shapes identified at the Cribb's Crib site are similar to those recovered at other Moingona Phase Oneota sites (Gradwohl 1973, 1974:95; Osborn 1982). Design components are also similar with the noticeable exception of the cross and the circle-cross motifs. A small percentage of cord-roughened, shell-
tempered sherd are also present. Appendages include strap, loop, buttress (carinate) handles, and occasionally, lugs. Bowls also occur among the ceramic assemblage of both the Cribb's Crib site and the more general Moingona Phase material. Even the presence of S-shaped rims have been noted at least at one other Moingona Phase site (13PK1). No ceramic or ground stone pipes are among the material recovered from the Cribb's Crib site, although they have been reported at other Moingona Phase sites (Gradwohl 1973; 1974).

Lithic materials include abundant numbers of small plain triangular points, end scrapers and side scrapers. Other chipped stone tools, including drills, knives, and gravers, from Cribb's Crib site are similar to those found at other Moingona Phase sites. Ground stone artifacts, bone and shell artifacts recovered from the Cribb's Crib site also reflect similarities to the artifact assemblages of other Moingona Phase sites in the region. The occurrence of native copper artifacts and galena, noted at other Moingona Phase sites, is completely lacking at the Cribb's Crib site. When compared to other Oneota sites throughout the Prairie-Plains region, there is also a noticeable paucity of catlinite artifacts at all the Moingona Phase Oneota sites.

The earlier reported radiocarbon dates for the Moingona Phase were enigmatic. Two different assays from the same feature (Mohler Farm site) yielded dates of A.D. 690 and A.D. 1500 (Gradwohl 1973:127). Other dates from the Mohler Farm site and Howard Goodhue site clustered between the 11th and 13th centuries. More recent reported dates from the Clarkson site (Osborn 1982:76) also cluster between the 11th and
13th centuries. The radiocarbon date from the Cribb's Crib site assayed at A.D. 1220. It is within the clustering of dates reported by Osborn (1982:76). It appears this clustering of dates between the 11th and 13th centuries represents the most feasible temporal setting for the Moingona Phase.

The Moingona Phase is contemporaneous with several other Oneota Phases throughout the Prairie-Plains. Those Oneota Phases include Lake Koshkonong in Wisconsin, Sivernale in Minnesota and Wisconsin, Lake Winnebago in Wisconsin, Grand River in Wisconsin, Blue Earth in Minnesota and northern Iowa and earlier Orr Phase sites in northeastern Iowa (Dobbs 1983:96-97). Attributes of the Moingona Phase sites are similar to those described by Overstreet (1978:39-41) for the developmental horizon (A.D. 1000-1300) in his model of Oneota settlement patterns in eastern Wisconsin.

The origin of the Moingona Phase is as obscure as those of other Oneota Phases. Much time and energy has been spent working with this problem (Gibbon 1983:85). General theories on Oneota origins can be categorized into one of two types: 1) migration theories, or 2) in situ development theories. One of the earliest and most successful migration model has been formulated by James B. Griffin (Gibbon 1983:85). This model describes the Oneota culture as developing from Middle Mississippian people who migrated north from Cahokia into the upper midwest. From this Middle Mississippian base, these people adapted to the northern deciduous forest and/or to a climatic deterioration around A.D. 1300. More recent radiocarbon dates have demonstrated this model.
is no longer consistent with the data. Other models for the migration theories indicate Oneota groups moved into the upper midwest from the "southeast" (Gibbon 1983:85).

In situ development models indicate Oneota groups were local Woodland peoples whose life-style was modified through their contact and acculturation with Mississippian groups. Other models have stressed an unidentified "common ancestor" to both the Middle Mississippian and Oneota populations (Gibbon 1983:85-86).

Neither type of origin theory is sufficiently substantiated at the present time to be accepted as an approximation of past reality. It is possible a combination of the two types of theories will elucidate matters more completely.

Socio-Cultural Reconstruction

The archaeological remains recovered from the Cribb's Crib site form the basis for the reconstruction and interpretation of the interactions between the Oneota occupants of the site and their surrounding environment. A number of activities is represented by the data base. The following discussion covers the general aspects of the socio-cultural activities.

The main activities, represented by the data, involve the acquisition, processing, and storage of food. These activities are discussed first under the general topic of subsistence activities. Other activities, involving the processing of shelters, etc., are discussed in the appropriate section following the subsistence activities.
Subsistence activities

Subsistence activities of the Oneota inhabitants of the Cribb's Crib site can be subdivided into three major aspects: 1) hunting, 2) gathering, and 3) agriculture. These aspects are inferred from an abundance of artifacts, and faunal and floral ecofacts. The gathering aspect is less clearly represented but is probably no less important than the other two aspects. Each aspect forms an integral part of the overall subsistence pattern.

Hunting The practice of hunting may be inferred from an abundance of faunal remains (Chapter 5). The majority of the faunal remains is interpreted as residue resulting from the processing and consumption of game at the site. The presence or absence of certain osteological material is assumed to indicate a portion of the butchering process has occurred at the kill site, especially with the larger game animals, i.e. bison and wapiti. White-tailed deer is the main large game animal represented by the faunal remains. The osteological remains of smaller game indicates they were butchered at the village once the hunter had returned. Although the majority of the faunal material is too fragmentary for species identification, the percentages represented by identified faunal material indicate the active hunting of large game played a major role in the acquisition of meat by the Oneota inhabitants. The presence of numerous small plain triangular projectile points indicate the method of acquisition was by bow and arrow.

It is probable smaller game was not only hunted but taken by traps or snares; however, this particular aspect is not represented in the
artifact assemblage. This may due to the limited survivability of material used to construct such objects, i.e. wood and/or fiber. Fishing also played a role in the subsistence activities at the Cribb's Crib site. Although the evidence for fishing is limited, it is probable fish added a small but perhaps significant amount of protein to the diets of the Oneota occupants.

The nature of the faunal assemblage indicated the inhabitants of the Cribb's Crib site exploited the various ecosystems surrounding the site. Within the catchment area discussed in Chapter 2, four major biomes were identified and analyzed for their resource potential. These included the prairie, a transitional area of mixed prairie and forest, the forest, and the riverine or aquatic biomes. These biomes were identified by means of the soil description available for the area. Large game, i.e. bison and wapiti, roamed the prairie areas before the introduction of modern farming practices by the Euro-Americans. Deer and other woodland creatures were available in the forest areas within the catchment area. The riverine and aquatic areas also contained a number of animals, birds, and fish which were utilized as food resources and for other functions, i.e. clothing and decorations. Game was readily obtained from the prairies, the woodlands, and the riverine and aquatic environments within the immediate vicinity of the site.

The butchering process is indicated by butcher marks on the bones and a variety of cutting tools, including knives and utilized flakes. The highly fragmentary nature of the faunal assemblage suggests the extraction of marrow and/or bone grease.
Gathering Data collected during the archaeological investigations at the Cribb's Crib site also indicate significant gathering activities. Gathering activities include food procurement and processing, fabrication, and storage aspects of the Oneota economy.

The gathering and utilization of mussels (Chapter 5) are indicated by the presence of numerous mussel shells and shell fragments. Mussel shell is the major tempering agent in the Oneota ceramic vessels produced by the inhabitants of the Cribb's Crib site. In addition to its technological usage in ceramic manufacture, the mussels probably supplied a supplemental source of protein to the diet of the Oneota inhabitants. Shell was also used as spoons, scoops, or bowls. In addition, some shell was used to process corn either in a ceremonial or non-ceremonial aspect (Gradwohl 1982b). Other cut, incised, or serrated shell may have served either a ceremonial or personal decorative function.

Little actual evidence is available for the collection of wild plant resources for food by the Oneota inhabitants at the Cribb's Crib site. This evidence consists of a single walnuthull, two goosefoot seeds, two pigweed seeds, and fragments of an unidentified fruit seed (Chapters 5 and 6). It is extremely difficult to describe this aspect of gathering activities based on such slim evidence. It would not be surprising that gathering of wild plants for food played an important role in the subsistance pattern of the Oneota inhabitants of the site. Before the arrival of the Euro-Americans the area, surrounding the Cribb's Crib site contained a wide variety of wild edible plants as identified in the description of the environmental setting in Chapter
2. The transitional zone between the prairies and woodlands contained a number of edible fruits and berries. The floral resource potential of the catchment area, described in Chapter 2, also indicated a variety of nuts from the various forest associations were available to the Oneota inhabitants of the Cribb's Crib site. It is probable the majority of the wild plant resources were consumed quickly or decomposed within a short time subsequent to deposition; however, at the time the site was excavated, flotation was not a standard archaeological procedure. As a result this may have been overlooked.

The utilization of wood is indicated by the abundant quantities of wood charcoal present at the site. Analysis of the wood charcoal indicates it was obtained within the immediate vicinity of the site. A variety of species has been utilized by the Oneota inhabitants. Charcoal specimens indicate wood was collected from the various forest associations from the river's edge to the upland ridges. The continual need for firewood for cooking, heating or other activities probably indicates the gathering of wood occurred in conjunction with other gathering activities. Specific wood gathering forays may have also occurred. The selection of specific woods for arrow shafts, bows, and implement handles may have also resulted in special forays. Wood may have also been needed in the construction of structures.

The gathering and utilization of plant material for non-dietary functions is represented by the presence of cord impressions on part of the ceramic assemblage. The usage of vegetal fiber in other activities is non-existent at the site. This is probably due to the poor preser-
vation characteristics of such material in a temperate climate. Grasses have also utilized by the Oneota occupants of the site. Several storage/refuse pits exhibit charred grass linings. Grasses were readily available from the prairies in the vicinity of the site.

Agriculture The final aspect of the subsistence system involve corn agriculture (Chapters 5 and 6). Cultigens probably included the corn-bean-squash triad, common in the Late Prehistoric period; however, only corn has been positively identified at the Cribb's Crib site. From the flotation evidence contained in several storage/refuse pits, it would seem corn agriculture played an important aspect of the subsistence system; however, this may represent a biased view. The majority of the feature fill samples, collected during the excavation of the site, was from pits which contained charred corn. No samples were collected from features which contained no artifacts.

Gardening implements recovered from the Cribb's Crib site include two scapula hoes. It is possible a few chipped stone hoes are also present in the artifact assemblage; however, their identification is only a tentative one. Food processing tools were also present at the site. Mullers and grinding stones indicate the grinding of vegetal resources, including wild and domestic. Corn and other plant seeds were often ground before being cooked. These artifacts may have also been used to process meat or extract marrow. Mussel shell and utilized deer-jaw may have also been used to shell corn.

Storage The presence of numerous subterranean pit-shaped structural features is interpreted as storage pits which were later used as
refuse pits. These pits indicate the Oneota inhabitants either stored the resources they procured or products produced from these resources. The concentration of such features may also represent probable locations of structures. Some features are intersected by others. These may indicate an extended occupation of the site or the reoccupation of the site over a period of several years. Pottery may have also been utilized as a storage medium, as well as the features or in conjunction with them. It is apparent the Oneota inhabitants of Cribb's Crib site relied heavily on the storage of resources.

Summary of subsistence technologies

The evidence from the Cribb's Crib site indicates the Oneota inhabitants practiced a three-fold subsistence strategy based on hunting, gathering, and corn agriculture. The evidence also indicates the products procured by these activities were returned to the village for further processing and consumption. Finally, the procurement of adequate resources allowed the Oneota inhabitants to store products, not immediately consumed, for future usage.

Ceramic technology

The major emphasis of the analysis of the artifact assemblage from the Cribb's Crib site has been concerned with the description of the ceramics (Chapter 5) recovered during the archaeological investigations. Ceramic style and form comprise the major diagnostic aspects of the material culture used to define the Oneota Tradition. They form the basis for the universal comparisons of Oneota sites.
Analysis of the ceramics indicated the Crib's Crib Oneota inhabitants were proficient potters. Their shell-tempered wares were apparently superior to the preceding grit-tempered Woodland ceramics. The shell was readily available from the nearby aquatic environments. The clay also used in ceramic manufacture was also obtained in the vicinity of the site.

The trailed and punctated decorations occur in a repetitive manner which allows classification of the design motifs by the archaeologist. The typical vessel form represented at the site is the symmetrically rounded and globular jar. The neck varies from rounded to sharply angular with the rim being either upright or slightly everted. Decoration consisting of geometric motifs, commonly occurs on the shoulder of the vessel. Lip and interior rim modification are also common. Apparently, the paddle and anvil techniques are utilized to shape the vessel at least in a limited number of cases as represented by the cord roughened body sherds.

Lithic technology

The lithic technology (Chapter 5) can be divided into two major activity categories: 1) food procurement and processing, and 2) general processing and fabrication. Both chipped stone and ground stone implements are represented in the artifact assemblage from the Crib's Crib site.

The food procurement activities are represented by the presence of chipped stone projectile points. The majority of these points are small
plain triangular points manufactured either from locally available cherts or cherty material from the glacial till or river gravels. Another source appears to be some unidentified centralized quarry area located in the Mississippian formation outcropping further down the Des Moines River Valley or along the South Skunk River Valley further east of the Des Moines River. The majority of the projectile points are bifacially retouched flakes which exhibit basal thinning presumably for hafting of the point to the shaft. Several fragmented points may indicate the process returning to the village with the broken piece still hafted, then replacing it with a new point.

A number of activities are represented by processing and fabricating tools. These activities provided tools, clothing, shelter, and food. The production of stone tools is represented by the presence of finished tools and large amounts of debitage. In addition, tools used to produce other tools are also among the artifact assemblage. These include hammerstones, anvil stones and flint-knapping, sandstone abraders. The chipped stone assemblage contains numerous chipping debris which indicates the practice of core reduction for flake tools. Flakes from the cores are modified to form various tools. Ground stone tools are produced by pecking and grinding activities. Celts and axes represent wood working activities while mullers and grinding stones or slabs represent food processing.

Meat processing tools include various knives and flakes which could be used to skin and butcher the game caught by the Oneota inhabitants. Various flakes, perforating tools, and scrapers indicate the importance
of skin-dressing to the economy of the Oneota inhabitants of the Cribb's Crib site.

Bone and wood processing stone tools are also represented in the artifact assemblage. Spokeshaves and U-shaped sandstone abraders indicate the processing and shaping of arrow shafts. Spokeshaves, scrapers, various flakes and wedges may have been used to produce wooden and/or faunal derived implements.

Faunal technology

A variety of faunal material (Chapter 5) is modified into tools and recreational or ornamental items. Food procurement items include two bison scapula hoes. Fabricating and processing tools represent skin-dressing, food processing, and perhaps fiber production. Bone hide-grainers, a flesher, and a thong stretcher represent skin-dressing or processing implements. The processing of hides provided the Oneota inhabitants with a number of finished products, including clothing and shelter covers. Shell implements include spoons, scoops, bowls and corn shellers.

Two bird bone tubes and a single horn or hoof bead represent ornamental items. A number of cut or incised shells may also represent ornamental or ceremonial items.

Cordage technology

Cordage manufacture (Chapter 5) is inferred by the presence of cord-impressions on the exterior surface of a few ceramic sherds. It is probable the Oneota inhabitants produced other materials from cordage.
Although physical evidence is non-existent, it is probable such evidence decomposed rather than being preserved under the climatic conditions which existed at the site.

Shelter technology

No direct evidence for structures has been observed at the Cribb's Crib site. The lack of post-molds does not preclude the existence of structures. Although post-molds may have been overlooked during the excavation of the site, it is possible the post-molds were destroyed by scraping activities related to the levee construction or during plowing activities. Light structures, such as bark-covered lodges or wattle and daub structures, were constructed with shallow set posts, generally under one foot (Bushnell 1919, 1922). These types of structures were utilized by the Chiwere Siouan groups during the historic period.

Indirect evidence includes the clustering of features and the presence of daub. Three clusters of features are oval shaped with dimensions of approximately 75 feet by 35-50 feet. Similar shaped structures have been described in the literature. Wattle and daub structures are also described in the literature for Mississippian groups like the Oneota.

Settlement type and seasonality

The intensity of the archaeological debris at the Cribb's Crib site indicates an extensive occupation. The evidence seems to support a long-term occupation; however, it may be the occupation was intermittent with seasonal movement away from the more permanent agricultural village
represented by the Cribb's Crib site. Evidence for such seasonal movement away from the major village site may be indicated by the smaller Moingona Phase sites indicated by surface collections. These smaller sites may represent either hunting forays for large game animals, i.e. bison or wapiti, or they may be winter camp sites.

The archaeological evidence (Chapter 5) from the Cribb's Crib village site indicates the site was inhabited for a large portion of the year. The corn and corn cobs along the scapula hoes indicate agricultural activities which would involve the planting, weeding, and harvesting of the gardens. From the analysis of the site catchment in Chapter 2, the village is situated on the stream terrace overlooking the Middle River. This location would have served as an ideal location for the gardens of the Oneota inhabitants of the Cribb's Crib site. It can be assumed from this data a portion, if not the entire village population, resided at the site during the spring and fall months and perhaps during at least part, if not all, of the summer months.

The fish remains and mussel shell probably indicate that the fish and mussels were caught during the period of open water from mid-spring to mid-fall. The remainder at the faunal osteological material belong to animal species which could be hunted over the entire year, with the possible exception of bear, beaver, and reptiles whose activities are extremely limited during the winter months.

Floral remains at the village site indicate occupation at the site during the late summer and fall months. *Chenopodium* 'sp.' is present during the summer from June to September. *Amaranthus* 'sp.' is present
from June to October. The occurrence of seeds of these species along with the corn and corn cobs indicates the presence of the Oneota inhabitants at the site at least during the late summer and early fall months.

From the archaeological evidence at the Cribb's Crib site and other Moingona Phase sites in the central Des Moines River Valley, it seems with great certainty that the Cribb's Crib village site was occupied during the spring and fall months. It also appears the village site may have also been occupied during a portion of the summer; however, there seems to be a lack of evidence for a winter occupation. One other piece of evidence for the movement to smaller winter camp sites, not previously mentioned, is the lack of numerous, well defined hearths.

When the environmental positioning of the site (Chapter 2) and the intensity of the cultural material (Chapters 5 and 6) are considered, a striking resemblance can be drawn between the Moingona Phase occupation of the Cribb's Crib site and characteristics of the Developmental Horizon established by Overstreet (1978:39-41) for the Oneota settlement pattern in Eastern Wisconsin.

The Cribb's Crib site occupies an area of 20 to 30 acres. It is located on a terrace above the Middle River. It is adjacent to the major waterway of the Des Moines River Valley. The clustering of features may represent the location of structural units. Although the structures may have existed at the same time, it seems more probable several different construction periods existed. Overstreet proposes
... villages were periodically relocated and the actual duration of habitation for any specific settlement remains to be accurately determined. While relocation may have occurred as often as every 3 to 4 years, settlements may have been occupied for as long as 10-15 years. The inhabitants may have abandoned their settlements as a result of soil depletion relating to horticultural practices, lack of firewood, or reduction of exploited animal species such as mussels, beaver or deer. The uniformity of patterning does indicate the settlements were inhabited for relatively short periods of time. In addition, all the developmental Oneota sites mentioned show evidence of having been intermittently occupied (1978:40).

It appears the Moingona Phase settlements also fit this general pattern exhibited by the Developmental Horizon Oneota sites in Wisconsin. There are undoubtably some variations. One noticeable difference is the lack of fortifications surrounding Moingona Phase Oneota sites.

**Summary**

The Cribb's Crib site represents a fairly large, stable, intensively occupied village. The inhabitants utilized a widely diversified resource base, including corn agriculture of an unknown degree. Although the village site may represent a single long term occupation of unknown duration, it is more probable the site was occupied by a series of short term habitations. It was then abandoned for an unknown duration and subsequently reoccupied.

Several "small scale" sites are known in the Red Rock vicinity from surface collections. Although little excavated information is available, it appears smaller Oneota habitation sites existed (Benn and Bettis 1981:21; Benn and Harris 1982:38-52). 13PK407 appears to represent a short duration seasonal habitation site. It may represent a functionally specific activity, involving subsistence or other
structural poses (Gearing 1958:1148), different from the main activities at the village site.

Final Reflections

The investigation of the Cribb's Crib site demonstrates the pronounced Oneota presence in the central Des Moines River Valley, particularly in the southern subregion. The information and range of material recovered from the Cribb's Crib site has provided more data concerning the Oneota occupation of this region. The site was excavated under emergency salvage conditions during levee construction around the southeastern part of Carlisle.

Although it is extremely unfortunate the majority of the Cribb's Crib site was destroyed, much information concerning the occupation of the site, which would have been missed under normal archaeological investigations, was saved. The monitoring of construction activities provided access to a large number of subterranean features which would have otherwise been missed by the standard excavation procedures implemented at the site. Information concerning these features provided a better view of prehistoric activities at the habitation site. Unfortunately the upper portion (approximately one foot) of the site was removed for levee construction before archaeological investigations could be conducted over the majority of the site.

The data recovered from the site justified the time spent during salvage archaeological operations at the Cribb's Crib site. The site would have otherwise been destroyed and the information lost if the
excavations had not occurred. The information has added to the database concerning the prehistoric occupation of the central Des Moines River Valley, and the relationship between the inhabitants and their environment. It is apparent more research is necessary to clarify our understanding of the cultural processes active in the central Des Moines River Valley.

During the analysis of the archaeological material from the Cribb's Crib site, the author encountered several problems. The majority of these relate to the inconsistent nature of the field notes and the recordings procedures. If time was available, the notes and records were adequate; however, when under pressure from the construction activities, the quality of the recording practices deteriorated. Although emergency conditions existed at the site, the inconsistency of adequate documentation has hindered this author's investigation of specific activities, particularly those concerned with the storage features at the site.

The author has noted several areas for future research concerning the Moingona Phase Oneota occupation of the central Des Moines River Valley. First, further archaeological investigations of the region are needed to locate possible quarry sites. A high percentage of chipped stone material appears to represent homogeneous cherts from Mississippian formations which outcrop in the region. These outcrops have been reported in the geological surveys of the region but little is known about the archaeological significance of such areas. It is apparent from the artifact inventory that utilization of quarried material played
an important role in the lithic technology of the prehistoric inhabitants. Second, information concerning the ceramic source materials and method of manufacture are needed to obtain a realistic view of the ceramic industry. Third, research concerning the micro-environments of storage pits would aid our understanding of the storage of materials. Temperature, moisture content, pit-shape and type of material stored are only a few variables which affect the preservation characteristics of the storage pits. Little information concerning these variables is presently known. Finally, information concerning the Moingona Phase settlement patterns within the central Des Moines River Valley is generally restricted to the floodplain of the Des Moines River within the flood pool of the Red Rock Reservoir. Areas outside these specific areas were ignored due to contract restrictions. To gain a better understanding of the Oneota activities in the region, it will be necessary to conduct archaeological investigations outside these limited areas. If seasonal occupation of the Moingona Phase sites is a viable consideration, smaller secondary habitation sites must exist. One area for future research involves the investigation of the tributary valleys of the Des Moines River.

It is hoped the preceding information will aid in our understanding of the Moingona Phase activities in the central Des Moines River Valley. It is also hoped this information will elucidate our understanding of Oneota development in the Prairie-Plains region.
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While all these people provided invaluable assistance, the author alone takes full responsibility for any errors contained herein.
APPENDIX A:
LIST OF FEATURES, CRIBB'S CRIB SITE

**Feature 1** Storage/refuse pit

**Location:** N900/W1100  
**Shape:** Large basin  
**Horizontal dimensions at defined orifice:** 11.35 feet (EW) x 5.8 feet (NS)  
**Depth at which orifice was defined:** 1.0 feet below surface (b.s.)  
**Vertical depth of feature:** 1.3 feet

**Contents:**

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<thead>
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<th>Category</th>
<th>Description</th>
<th>Quantity</th>
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<td>Thin bifaces</td>
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<td>Mammal</td>
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Deer ........................................... 6
Plains pocket gopher .......................... 3
Reptile .......................................... 4
Snake ............................................. 2
Bird ................................................ 3
Fish ................................................. 9
Mussel shell ...................................... 138
Vegetal remains
Charcoal
Red elm
Black ash
Black walnut
Elm 'sp.'
Charred seeds
Corn
Unworked stone
Hematite ........................................... 138

Description of Fill: Loam-clay mixture more humic than surrounding soil, includes ash, burned earth, and charcoal.

Feature 2 Storage/refuse pit

Location: N930/W1100
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 3.7 feet (NE/SW) x 3.3 feet (NW/SE)
Depth at which orifice was defined: 1.7 feet b.s.
Vertical depth of feature: 2.0 feet

Contents:

Ceramics
Bowl rim, decorated ............................ 1
Jar rims
Decorated ........................................... 6
Undecorated ......................................... 5
Necks ................................................ 4
Decorated body sherds .......................... 47
Undecorated body sherds ....................... 171

Chipped stone
Projectile point fragments ....................... 3
Thin bifaces ....................................... 2
Knife ............................................... 1
Retouched flakes .................................. 4
Flakes/scrapers ................................... 3

Lithic debitage
Waste flakes ...................................... 39
Shatter ............................................. 4
Daub .................................................. 49
Faunal remains  .................................................. 84
   Mammal .................................................. 3
   Deer .................................................. 4
   Bird .................................................. 2
   Turkey .................................................. 28
   Fish .................................................. 128
Mussel shell .................................................. 49
Vegetal remains  .................................................. 84
   Charcoal  .................................................. 3
   Basswood .................................................. 4
   American elm .................................................. 28
   Red elm/hackberry .................................................. 128
   Elm 'sp.' .................................................. 49
   Red oak .................................................. 84
   White oak .................................................. 3
   Hickory .................................................. 4

Description of Fill: Rich cultural mix of ash, charcoal, dark loam, and clay.

Feature 3 Storage/refuse pit

Location: N910/W1070
Shape: Straight-walled
Horizontal dimensions at defined orifice: 3.2 feet (EW x 2.9 feet NS)
Depth at which orifice was defined: 1.1 feet b.s.
Vertical depth of feature: 1.9 feet

Contents:
Ceramics
   Bowl rim, undecorated ........................................... 1
   Jar rim, undecorated ........................................... 1
   Neck ........................................... 1
   Decorated body sherds ........................................... 6
   Undecorated ........................................... 27
Chipped stone
   Projectile point fragment ........................................... 1
   Utilized flake ........................................... 1
Lithic debitage
   Waste flakes ........................................... 56
   Shatter ........................................... 1
Daub ........................................... 11
Faunal remains
   Mammal ........................................... 5
Vegetal remains
   Charcoal  ........................................... 11
Unworked stone
Gneiss pebble .......................... 1
Limonoite ................................ 11

Description of Fill: Dark humic fill overlain by an ashy layer and yellowish clay and loam mixed fill.

Feature 4  Rodent Krotovinas

Location: N900/W1070
Horizontal dimensions at defined orifice: 4.1 feet (EW) x 3.6 feet (NS)
Depth at which orifice was defined: Data not recorded
Vertical depth of feature: .24 feet

Contents:
Ceramics
Neck .................................. 1
Decorated body sherds ................. 5
Undecorated body sherds .............. 18
Lithic debitage
Waste flakes ............................. 3
Faunal remains
Mammal ................................ 1
Deer .................................... 1
Vegetal remains
Charcoal
Bark

Description of Fill: Ash--apparently a natural complex of rodent runs

Feature 5  Hearth

Location: N900/W1130
Shape: Basin
Horizontal dimensions at defined orifice: 2.6 feet (NE/SW) x 2.2 feet (NW/SE)
Depth at which orifice was defined: .64 feet b.s.
Vertical depth of features: .64 feet

Contents:
Ceramics
Neck .................................. 1
Decorated body sherds ................. 2
Undecorated body sherds .............. 25
Chipped stone
Side scraper ............................ 1
Retouched flake ........................ 1
Lithic debitage
  Waste flakes ........................................ 318
  Shatter .................................................. 45
Faunal remains
  Mammal ................................................... 8
  Plains pocket gopher ................................... 1

Description of Fill: Mixed fill consisting of burned earth, ash, and charcoal flecks.

Feature 6 Storage/refuse pit

Location: N780/W610 (N786.74/W610.80---approximate orifice center)
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.9 feet (EW) x 3.4 feet (NS)
Vertical depth of feature: Data not recorded

Contents:
  Ceramics
    Decorated body sherds .................................. 2
    Undecorated body sherds ................................ 5
  Chipped stone
    End scraper ............................................ 1
  Lithic debitage
    Waste flake ........................................... 1
    Shatter ................................................ 1
  Faunal remains
    Fish ..................................................... 2
  Vegetal remains
    Charcoal
    Carbonized corn stalks
    Charred corn kernels

Description of Fill: Humic fill with charcoal flecks, carbonaceous matter, and charred grass.

Feature 7 Storage/refuse pit

Location: N740/W580 (N745.57/W580.76---approximate orifice center)
Shape: Data not recorded
Horizontal dimensions at defined orifice: 1.7 feet (NS) x 1.6 feet (EW)
Depth of which orifice was defined: Data not recorded
Vertical depth of feature: .2 feet (truncated)

Contents:
  Chipped stone
    Projectile point fragment ............................ 1
Ground stone
  Sandstone abrader .................................. 1
Faunal remains
  Mammal ............................................... 1
  Deer .................................................. 1
Vegetal remains
  Charcoal

Description of Fill: Humic fill.

Feature 8 Storage/refuse pit

Location: N750/W590 (N750.57/W591.52---approximate orifice center)
Shape: Basin
Horizontal dimensions at defined orifice: 3.9 feet (NS) x 3.9 feet (EW)
Depth at which orifice was defined: At least 1 foot bulldozed away
Vertical depth of feature: 1.35 feet below bulldozed surface

Contents:
  Ceramics
    Jar rims
      Decorated ........................................... 2
      Undecorated ....................................... 3
    Decorated body sherds ............................. 5
    Undecorated body sherds .......................... 41
    Unattached handle ................................ 1
  Chipped stone
    Projectile point .................................... 1
    Retouched flakes .................................. 2
    Utilized flake ..................................... 1
  Daub .................................................. 17
  Faunal remains
    Mammal ............................................. 19
    Mussel shell ...................................... 17
  Vegetal remains
    Charcoal
      American elm
      Elm ('sp.')

Description of Fill: Humic fill with ash, burned earth and charcoal.

Feature 9 Storage/refuse pit

Location: N750.35/W589.66 (approximate orifice center)
Shape: Shallow basin
Horizontal dimensions as defined orifice: 3 feet (NS) x 3 feet (EW)
Depth at which orifice was defined: .35 feet below scraped surface
Vertical depth of feature: .35 feet

Contents:
- Chipped stone
  - Retouched flake
  - Lithic debitage
  - Waste flake
- Vegetal remains
  - Charcoal

Description of Fill: Black humic fill with ash, charcoal and burned earth. Emergency job, feature was partially destroyed by graders. Estimated depth from the surface was approximately one foot

Feature 10 Hearth

Location: N900/W1000
Shape: Shallow basin
Horizontal dimensions at defined orifice: 2.4 feet (EW) x 2.0 feet (NS)
Depth at which orifice was defined: .7 feet b.s.
Vertical depth of feature: .45 feet

Contents:
- Ceramics
  - Undecorated body sherds
- Chipped stone
  - End scrapers
  - Spokeshave
  - Graver
  - Thin bifaces
- Lithic debitage
  - Waste flakes
- Faunal remains
  - Mammal
  - Mussel shell

Description of Fill: Burned earth, ash, and charcoal.

Feature 11 Storage/refuse pit

Location: N800/W930 (N804.1/W930.5---approximate orifice center)
Shape: Large slightly belled pit (undercut)
Horizontal dimensions at defined orifice: 5.1 feet (EW) x 4.75 feet (NS)
Depth at which orifice was defined: .5 feet b.s.
Vertical depth of feature: 2.1 feet

Contents

<table>
<thead>
<tr>
<th>Ceramics</th>
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<tbody>
<tr>
<td>Jar rim, decorated</td>
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<tr>
<td>Retouched flakes</td>
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</table>

| Lithic debitage           |          |
| Waste flakes              | 3        |
| Shatter                   | 2        |

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Vegetal remains

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<tr>
<th>Charcoal</th>
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</thead>
<tbody>
<tr>
<td>Carbonized corn stalks</td>
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</tbody>
</table>

Description of Fill: Mixed humic fill with charcoal and burned earth.

Feature 12  Storage/refuse pit

Location: N802/W918
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 4.0 feet (EW) x 3.6 feet (NS)

Depth at which orifice was defined: 1.2 feet b.s.
Vertical depth of feature: 1.8 feet

Contents:

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<td>14</td>
</tr>
<tr>
<td>Undecorated body sherds</td>
<td>33</td>
</tr>
</tbody>
</table>

| Chipped stone             |          |
| Projectile point          | 1        |
| End scraper               | 1        |
| Thin biface               | 1        |
| Retouched flake           | 1        |

| Lithic debitage           |          |
| Waste flakes              | 6        |
| Shatter                   | 2        |

| Worked bone               |          |
| Flake-knapping tools      |          |
| Wapiti antler             | 26       |

<table>
<thead>
<tr>
<th>Daub</th>
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<tbody>
<tr>
<td>Mammal</td>
<td>93</td>
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</table>
Wapiti • • • • • • • • • • • • • • • • • • • 78
Vegetal remains
Charcoal
   Red elm/hackberry
   Carbonized corn stalk
   Carbonized grass
   Charred corn kernel
Unworked stone
Hematite • • • • • • • • • • • • • 1

Description of Fill: Mixed with burned earth, charcoal, gray clay and ferruginous sandstone.

Feature 12A Storage/refuse pit

Location: N804/W915
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.4 feet (NS) x 3.3 feet (EW)
Depth at which orifice was defined: 1.5 feet b.s.
Vertical depth of feature: 1.1 feet

Contents:
Ceramics
   Decorated body sherds • • • • • • • • • • • • • 3
   Undecorated body sherds • • • • • • • • • • • • 3
Lithic debitage
   Waste flake • • • • • • • • • • • • • • • • • • • • 1
   Shatter • • • • • • • • • • • • • • • • • • • • • • 1
Worked bone
   Flint-knapping tool
   Wapiti antler baton • • • • • • • • • • • • • • • 1
Faunal remains
   Mammal • • • • • • • • • • • • • • • • • • • • • • • 6
Vegetal remains
   Charged corn kernels
Human remains
   Portion of parietal and occipital • • • • • • • • • 1

Description of Fill: Mixed humic fill with burned earth and charcoal flecks.

Feature 13 Storage/refuse pit

Location: N810/W910 (815/W917---approximate orifice center)
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.5 feet (NS) x 4.2 feet (EW)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 2.2 feet

Contents:

Ceramics
Jar rim, decorated .............................................. 1
Necks ........................................................................ 1
Decorated body sherds .............................................. 2
Undecorated body sherds ........................................... 20

Ground stone
Sandstone abrader ....................................................... 1
Grinding slabs ................................................................ 1
Pecked and ground stone .......................................... 1

Lithic debitage
Waste flakes .................................................................. 8
Shatter ........................................................................ 1

Vegetal remains
Charcoal
Carbonized grass
Charred corn kernels
Charred walnut shell

Description of Fill: Mixed fill with much charcoal; brown clay matrix on the sides with gray clay matrix at the bottom; possible carbonized grass lining on the floor.

Feature 14

Location: N440/W570 (N440.55/W574.85--approximate orifice center)
Horizontal dimensions at defined orifice: 5.3 feet (EW) x 5.2 feet (NS)

Vertical depth of feature: .5 feet (truncated)
Description of Fill: Dark humic and charcoal fill with every even mottling of clay, loam, and charcoal flecks; thin layer of charcoal possibly grass or leaf lining covered bottom and edges of the pit.

Feature 15

Location: N430/W560 (N433.8/W565.3--approximate orifice center)
Horizontal dimensions at defined orifice: 3.5 feet (EW) x 3.2 feet (NS)

Vertical depth of feature: .09 feet (truncated)
Description of Fill: Dark humic fill with charcoal flecks; very even mottling of clay, loam, and charcoal.
Feature 16  Storage/refuse pit

Location: N430/W570 (N439.41/W573.28—approximate orifice center)
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.4 feet (SW) x 3.2 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .4 feet (truncated)

Contents:
Faunal remains
Mammal ................. 28

Description of Fill: Dark fill-soil and charcoal in light clay soil; very even, clear mottling of charcoal, clay and loam.

Feature 17

Location: N450/W570 (N451.32/W579.2—approximate orifice center)
Horizontal dimensions at defined orifice: 3.4 feet (EW) x 3.3 feet (NS)
Vertical depth of feature: .7 feet (truncated)
Description of Fill: Dark humic fill; even mottling of loam, clay, and some charcoal.

Feature 18

Location: N430/W560 (N431.8/W561.35—approximate orifice center)
Horizontal dimensions at defined orifice: 3.4 feet (NS) x 3.1 feet (EW)
Vertical depth of feature: Approximately .2 feet (truncated)
Description of Fill: Dark humic discoloration in yellow-white clay; mixed (some) charcoal, loam and clay.

Feature 19  Hearth

Location: N784.2/W923
Shape: Basin
Horizontal dimensions at defined orifice: 1 feet (NS) x 1 feet (EW)
Depth at which orifice was defined: .5 feet b.s.
Vertical depth of feature: .6 feet

Contents:
Ceramics
Undecorated body sherds ................. 3
Chipped stone
End scraper ......................... 1
Lithic debitage
Waste flake ....................... 1

Description of Fill: Mixed fill with ash, charcoal and rock.

Feature 20  Storage/refuse pit

Location: N592.53/W874.85
Shape: Basin
Horizontal dimensions at defined orifice: 3.2 feet (EW) x 3.4 feet (NS)
Depth at which orifice was defined: 1.22 feet
Vertical depth at feature: .2 feet (truncated)

Contents:
Chipped stone
Graver .................................. 1
Retouched ................................ 1
Ground stone
Hematite cube .......................... 1
Smooth diorite with hematite stain ........ 1
Lithic debitage
Waste flakes ............................ 2
Daub .................................... 1
Vegetal remains
Charcoal

Description of Fill: Circular ashy discoloration in gray clayey soil with much charcoal and burned earth; some fire-cracked rock.

Feature 21  Storage/refuse pit

Location: N628.5/W875
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4 feet (EW) x 3.4 feet (NS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 2.6 feet

Contents:
Ceramics
Undecorated body sherds ................. 3
Vegetal remains
Charcoal
Willow
Cottonwood
Description of Fill: Mixed humic fill with charcoal and burned earth flecks.

**Feature 22 Storage/refuse pit**

Location: N613.52/W875
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3 feet (EW) x 2 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .85 feet (truncated)

Contents:
- Ceramics
  - Undecorated body sherds
  - Chipped stone
    - Utilized flake
  - Ground stone
    - Sandstone abrader
  - Vegetal remains
    - Charred corn cob
    - Charred corn kernels

Description of Fill: Humic fill.

**Feature 23 Hearth**

Location: N752.49/W896.2
Shape: Basin
Horizontal dimensions at defined orifice: Data not recorded
Depth at which orifice was defined: 1.2 feet b.s.
Vertical depth of feature: 1.9 feet

Contents:
- Ceramics
  - Bowl rim, decorated
  - Neck
  - Decorated body sherds
  - Undecorated body sherds
- Chipped stone
  - Projectile point
  - Projectile point fragment
  - End scraper
  - Spokeshave
  - Retouched flakes
- Lithic debitage
  - Waste flakes
  - Shatter
Worked bone
  Flint-knapping tool
    Deer antler baton ........................................ 1
  Daub .......................................................... 6
Faunal remains
  Mammal .......................................................... 27
    Deer ............................................................ 5
    Wapiti .......................................................... 1
Vegetal remains
  Charcoal ..........................................................
  Basswood

Description of Fill: Mixed humic fill with charcoal and burned earth.

Feature 24 Storage/refuse pit

Location: N737/W888.1
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.3 feet (EW) x 3 feet (NS)
Depth at which orifice was defined: .55 feet below scraped surface
Vertical depth of feature: 1.6 feet

Contents:
  Ceramics
    Bowl rim, undecorated ....................................... 4
    Jar rims
      Decorated ..................................................... 5
      Undecorated .................................................. 4
    Necks ........................................................... 7
    Decorated body sherds ........................................ 35
    Undecorated body sherds ...................................... 94
  Chipped stone
    End scraper ..................................................... 1
    Thin biface .................................................... 1
    Retouched flakes ............................................. 5
    flake/scaper ................................................. 1
  Ground stone
    Pestle .......................................................... 1
    Sandstone abraders .......................................... 2
  Lithic debitage
    Waste flakes ................................................ 19
    Shatter ........................................................ 9
  Worked bone
    Bison hide grainer .......................................... 1
  Daub ............................................................. 1
  Faunal remains
    Mammal .......................................................... 14
Beaver
Mussel shell
Vegetal remains
American elm
Elm
Red Oak
White Oak
Unworked stone
Hematite

Description of Fill: Humic fill.

Feature 24A Storage/refuse pit

Location: N737.97/W890.1
Shape: Data not recorded
Horizonal dimensions at defined orifice: 4.4 feet (WS) x 3.8 feet (EW)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.4 feet

Contents:
Ceramics
Jar rims, decorated
Necks
Decorated body sherds
Undecorated body sherds
Chipped stone
Retouched flake/scrapers
Lithic debitage
Waste flakes
Unworked stone
Hematite

Description of Fill: Mixed fill with burned earth and charcoal.

Feature 25 Storage/refuse pit

Location: N728.43/W885.91
Shape: Data not recorded
Horizonal dimensions at defined orifice: Data not recorded
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.2 feet

Contents:
Ceramics
Jar rims
Decorated
Undecorated
<table>
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<th>Quantity</th>
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<td>58</td>
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<td>Chipped stone</td>
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</tr>
<tr>
<td>Projectile point</td>
<td>1</td>
</tr>
<tr>
<td>Sidescraper</td>
<td>1</td>
</tr>
<tr>
<td>Retouched flakes</td>
<td>2</td>
</tr>
<tr>
<td>Utilized flakes</td>
<td>2</td>
</tr>
<tr>
<td>Lithic debitage</td>
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<td>Waste flakes</td>
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<td>Shatter</td>
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<td>Daub</td>
<td>1</td>
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<td>Faunal remains</td>
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<td>Mammal</td>
<td>23</td>
</tr>
<tr>
<td>Deer</td>
<td>1</td>
</tr>
<tr>
<td>Wapiti</td>
<td>1</td>
</tr>
<tr>
<td>Unworked stone</td>
<td></td>
</tr>
<tr>
<td>Hematite</td>
<td>1</td>
</tr>
</tbody>
</table>

Description of Fill: Mixed humic fill with burned earth and charcoal.

**Feature 26 Storage/refuse pit**

Location: N823/W920
Shape: Irregularly shaped oblong pit
Horizontal dimensions at defined orifice: 4.55 feet (NS) x 3.3 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2.3 feet

Contents:
- Ceramics
  - Undecorated body sherds: 9
- Lithic debitage
  - Waste flakes: 8

Description of Fill: Mixed fill.

**Feature 27 Three intersecting rodent krotovinas**

Location: N732.44/W905.66
Horizontal dimensions at defined orifice: 5.0 feet (EW) x 2.4 feet (NS)
Depth at which orifice was defined: 1.2 feet b.s.
Vertical depth of feature: .45 feet
Contents:

Ceramics
- Decorated body sherd ........................................... 1
- Undecorated body sherds ......................................... 26

Chipped stone
- Retouched flake .................................................... 1
- Flake/scrapers ................................................... 2

Lithic debitage
- Waste flakes ....................................................... 4

Unworked stone
- Hematite ............................................................ 2
- Ferruginous siltstone .......................................... 24
- Sandstone .......................................................... 2

Description of Fill: Mixed humic fill with charcoal flecks and sandstone fragments.

Feature 28  Storage/refuse pit

Location: N262.04/W764.3
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.4 feet (EW) x 3.2 feet (NS)
Depth at which orifice was defined: .6 feet below scraped surface
Vertical depth of feature: .5 feet (truncated)

Contents:
- Vegetal remains
- Charcoal
- Charred dense carbonaceous material
  (possible grass matting)

Description of Fill: Mixed fill containing burned earth, charcoal flecks; charred (grass) pit lining.

Feature 29

Location: N267.24/W776.09
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.2 feet (EW) x 4 feet (NS)
Depth at which orifice was defined: .6 feet below scraped surface
Vertical depth of feature: .8 feet (truncated)

Description of Fill: Loam, burned earth, and charcoal flecks; cut into sand stratum.
Feature 30
Location: N626.6/W843.8
Description of Fill: Humic fill.

Feature 31 Storage/refuse pit
Location: N625.8/W853.4
Shape: Data not recorded
Horizontal dimensions at defined orifice: Data not recorded
Depth at which orifice was defined: Data not recorded
Vertical depth of feature: Data not recorded

Contents:
Ceramics
Jar rim, decorated ..................... 1
Vegetal remains
Charred dense carbonaceous matter
(possible grass matting)

Description of Fill: Data not recorded.

Feature 32 Rodent krotovina
Location: N640/W1099.5

Contents:
Ceramics
Jar rim, undecorated ..................... 1
Neck ........................................ 1
Undecorated body sherd ................... 1

Feature 33
Location: N625/W1099.5
Destroyed by construction activities.

Feature 34 Storage/refuse pit
Location: N624/W1098
Shape: Straight-walled
Horizontal dimensions at defined orifice: 4.1 feet (EW) x 3.8 feet (WS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.2 feet
Contents:

Ceramics
   Jar rims
      Decorated ........................................ 6
      Undecorated ...................................... 1
   Necks ............................................... 3
   Decorated body sherds ................................ 16
   Undecorated body sherds ............................. 70

Chipped stone
   Projectile point fragment ................................ 1
   Retouched flakes ..................................... 2
   Flak/scraper ........................................ 1
   Utilized flake ....................................... 1

Ground stone
   Hammerstone, chert ................................... 1

Lithic debitage
   Waste flakes ......................................... 17
   Shatter ................................................ 5

Faunal remains
   Mammal ................................................ 3
   Deer .................................................. 2

Vegetal remains
   Charcoal .............................................
   Charred carbonaceous material

Description of Fill: Charcoal and burned earth in a humic
and clay fill; fill in a clay matrix.

Feature 35 Storage/refuse pit

Location: N371.75/W903.45
Shape: Straight-wall
Horizontal dimensions at defined orifice: 4.2 feet (EW) x 3.95
feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.1 feet

Contents:

Ceramics
   Decorated body sherd .................................... 1
   Undecorated body sherd ................................ 1

Lithic debitage
   Waste flakes .......................................... 2
   Daub .................................................. 4

Faunal remains
   Mammal ................................................ 2

Vegetal remains
   Charcoal
Description of Fill: Humic black fill with charcoal and burned earth; dug into sandy clay.

**Feature 36** Storage/refuse pit

Location: N611.23/W866.74
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.6 feet (EW) x 4.4 feet (NS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.6 feet

Contents:
- Ceramics
  - Jar rim, decorated
  - Chipped stone
  - Retouched flake

Description of Fill: Dark humic fill with charcoal and some evidence of grass lining on bottom.

**Feature 37** Storage/refuse pit

Location: N610.92/W872.12
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.8 feet (EW) x 4.3 feet (NS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.2 feet

Contents:
- Ceramics
  - Jar rim, decorated
  - Undecorated body sherds
- Ground stone
  - Sandstone abrader
- Lithic debitage
  - Waste flakes
- Vegetal remains
  - Charcoal
    - Elm ('sp.')
    - Charred dense carbonaceous matter (possible grass lining or matting)

Description of Fill: Humic fill with charcoal and burned earth; grass lined on bottom and lower walls.
Feature 38 Storage/refuse pit

Location: NG15.96/W880.47
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 4.6 feet (EW) x 3.3 feet (NS)
Depth at which orifice was defined: 1.6 feet b.s.
Vertical depth of feature: 1.0 feet

Contents:
Ceramics
  Jar rim, decorated ........................................... 1
  Neck .................................................................... 1
  Decorated body sherd .......................................... 1
  Undecorated body sherds ..................................... 9
Chipped stone
  Sidescrapers ...................................................... 2
Daub ..................................................................... 1
Faunal remains
  Mammal .................................................................. 1
  Deer ..................................................................... 1
Vegetal remains
  Charcoal
  Charred dense carbonaceous matter
    (grass matting)

Description of Fill: Mixed fill with charcoal flecks.

Feature 39 Storage/refuse pit

Location: N632.02/W890.77
Shape: Data not recorded
Horizontal dimensions at defined orifice: Data not recorded
Depth at which orifice was defined: Data not recorded
Vertical depth of feature: Data not recorded

Contents:
Ceramics
  Decorated body sherds ........................................... 3
  Undecorated body sherds ..................................... 3
Chipped stone
  Sidescraper ....................................................... 1
  Utilized flake ...................................................... 1
Lithic debitage
  Waste flakes ...................................................... 7
  Shatter ............................................................. 5
Faunal remains
  Fish .................................................................... 1
Vegetal remains
Charcoal
Charred corn cob
Charred corn kernels
Charred dense carbonaceous matter

Description of Fill: Dark humic fill.

Feature 40 Storage/refuse pit

Location: N628.93/W880.7
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.3 feet (EW) x 3.9 feet (NS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 3.2 feet

Contents:
Ceramics
Jar rims, decorated .............................................. 2
Neck ................................................................. 1
Decorated body sherds ........................................... 7
Undecorated body sherds ......................................... 66
Chipped stone
Thin biface ......................................................... 1
Retouched flakes .................................................. 2
Ground stone
Celt fragment ...................................................... 1
Sandstone abraders ............................................... 2
Grinding slabs ..................................................... 3
Lithic debitage
Waste flakes ....................................................... 5
Worked bone
Deer jaw sickle (sheller) ........................................ 1
Faunal remains
Mammal ............................................................. 56
  Deer ............................................................... 5
  Dog/canid ........................................................ 2
Bird ................................................................. 1
Mussel shell ....................................................... 5
Vegetal remains
Charcoal
Unworked stone
Hematite ........................................................... 1

Description of Fill: Clay cap on much of the pit (0-1.0 feet deep); contains much ash and burned earth.
Feature 41
Location: N625.15/W895.61
Destroyed by construction activities.

Feature 42
Location: N626.43/W896.2
Destroyed by construction activities.

Feature 43
Location: N658.60/W889.81
Destroyed by construction activities.

Feature 44
Location: N658.65/W878.84
Destroyed by construction activities.

Feature 45
Location: N620.04/W900.31
Destroyed by construction activities.

Feature 46
Location: N649.72/W880.26
Destroyed by construction activities.

Feature 47
Location: N655.77/W856.59
Destroyed by construction activities.

Feature 48 Storage/refuse pit
Location: N176.45/W1153.3
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.15 feet (EN) x 3.0 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .9 feet

Contents:
Ceramics
Jar rim, decorated . . . . . . . . . . . . . . . . . . . . . . . . . . 1
Undecorated body sherds . . . . . . . . . . . . . . . . . . . . 3
Description of Fill: Dark humic fill with charcoal flecks.

**Feature 49  Storage/refuse pit**

Location: N248.16/W1117.55  
Shape: Data not recorded  
Horizontal dimensions at defined orifice: 4 feet (EW) x 3.4 feet (NS)  
Depth at which orifice was defined: Scraped surface  
Vertical depth of feature: 1.65 feet  

Contents:  
- Ceramics  
  - Jar rims, decorated ........................................ 2  
  - Neck ......................................................... 1  

Description of Fill: Mixed humic clayey fill with dark carbonaceous matter.

**Feature 50  Storage/refuse pit**

Location: N235.68/W1113.56  
Shape: Data not recorded  
Horizontal dimensions at defined orifice: 3.1 feet (NS) x 3.05 feet (EW)  
Depth at which orifice was defined: Scraped surface  
Vertical depth of feature: 1.25 feet (truncated)  

Contents:  
- Vegetal remains  
- Charcoal  
- Red oak  

Description of Fill: Humic fill with charcoal at base of pit (1.2 feet).

**Feature 51**

Location: N233.22/W1133.37  
Horizontal dimensions at defined orifice: 3.3 feet (EW) x 3.5 feet (NS)  
Vertical depth of feature: 1.5 feet  
Description of Fill: Mixed clay-loam-sand, with charcoal and burned earth; charred grass and charcoal bottom.

**Feature 52**

Location: N241.47/W1129.38
Horizontal dimensions at defined orifice: 4.2 feet (NS) x 4.4 feet (EW)
Description of Fill: Mixed clay and loam with charcoal flecks.

**Feature 53-54**

Location: N228/W1140
Horizontal dimensions at defined orifice: 5.8 feet (NS) x 5.5 feet (EW)
Vertical depth of feature: .5 feet (truncated)
Description of Fill: Two circular discolorations when dug, they melted together into one large feature. Mixed humic fill containing some charcoal flecks.

**Feature 55**

Location: N226.63/W1157.95
Horizontal dimensions at defined orifice: 4.4 feet (EW) x 3.4 feet (NS)
Vertical depth of feature: 1.0 feet
Description of Fill: Mixed sandy, clayey loam, down to sterile loose sand; contains charcoal flecks and sandstone rocks.

**Feature 56**

Location: N222.63/W1157.95
Horizontal dimensions at defined orifice: 3.8 feet (EW) x 3.3 feet (NS)
Vertical depth of feature: 1.95 feet
Description of Fill: Sandy clayey loam mix with charcoal flecks.

**Feature 57**

Location: N205.93/W1139.33
Description of Fill: Humic fill with charcoal flecks.

**Feature 58**

Location: N207.87/W1125.2
Horizontal dimensions at defined orifice: 4.1 feet (EW) x 3.9 feet (NS)
Vertical depth of feature: .3 feet (extremely truncated)
Description of Fill: Dark humic fill.

**Feature 59**

Location: N205.82/W1145.57
Horizontal dimensions at defined orifice: 5.6 feet (NS) x 5.1 feet (EW)
Vertical depth of feature: 1.15 feet
Description of Fill: Humic fill with charcoal flecks.

Feature 60
Location: N192.93/W1140.99
Horizontal dimensions at defined orifice: 3 feet (NS) x 2.5 feet (EW)
Vertical depth of feature: .1 feet (extremely truncated)
Description of Fill: Humic fill.

Feature 61
Location: N187.55/W1153.71
Horizontal dimensions at defined orifice: 1.8 feet (NS) x 1.7 feet (EW)
Vertical depth of feature: .175 feet (extremely truncated)
Description of Fill: Humic fill.

Feature 62
Location: N219.98/W1151.8
Horizontal dimensions at defined orifice: 3.5 feet (NS) x 3.5 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .3 feet (truncated)
Description of Fill: Mixed humic fill with charcoal flecks.

Feature 63
Location: N249.59/W1144.8
Horizontal dimensions at defined orifice: 4.45 feet (EW) x 3.8 feet (NS)
Vertical depth of feature: 1.6 feet
Description of Fill: Humic fill with burned earth flecks.

Feature 64
Location: N351.42/W1102.52
Horizontal dimensions at defined orifice: 4.1 feet (EW) x 3.8 feet (NS)
Vertical depth of feature: .3 feet (truncated)
Description of Fill: Humic fill with some charcoal.

Feature 65
Location: N257.34/W1160.04
Horizontal dimensions at defined orifice: 2.7 feet (EW) x 2.5 feet (NS)
Vertical depth of feature: .9 feet
Description of Fill: Mixed clay, sand, and loam fill with charcoal flecks.

Feature 66
Location: N266.18/W1155.35
Horizontal dimensions at defined orifice: 3.7 feet (EW) x 3.3 feet (NS)
Vertical depth of feature: .4 feet
Description of Fill: Humic fill with charcoal flecks.

Feature 67
Location: N252.69/W1172.4
Horizontal dimensions at defined orifice: 4.8 feet (NS) x 4.5 feet (EW)
Vertical depth of feature: 1.8 feet
Description of Fill: Humic fill.

Feature 68
Location: N246.12/W1181.13
Horizontal dimensions at defined orifice: 5.3 feet (NS) x 5 feet (EW)
Vertical depth of feature: .8 feet (truncated)
Description of Fill: Humic fill with charred grass pit lining.

Feature 69
Location: N255.9/W1178.11
Horizontal dimensions at defined orifice: 5.1 feet (EW) x 5.0 feet (NS)
Vertical depth of feature: 1.0 feet
Description of Fill: Mixed humic fill with charcoal.

Feature 70 Storage/refuse pit
Location: N259.18/W1183.77
Shape: Straight walled
Horizontal dimensions at defined orifice: 4.6 feet (NS) x 4.3 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2.0 feet
Contents:

Ceramics
  Necks ........................................... 2
  Undecorated body sherds ....................... 18
Chipped stone
  Side scraper .................................... 1
Ground stone
  Anvil or grinding stone ....................... 1
Faunal remains
  Mammal ........................................... 2

Description of Fill: Humic fill with charcoal flecks.

**Feature 71**

Location: N250.57/W1188.85
Horizontal dimensions at defined orifice: 4 feet (EW) x 3.7 feet (NS)
Vertical depth of feature: .6 feet (truncated)
Description of Fill: Humic fill with charcoal.

**Feature 72** Storage/refuse pit

Location: N272.23/W1116.36
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5 feet (EW) x 4.1 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .5 feet

Contents:
  Ground stone
  Anvil or grinding stone ....................... 1

Description of Fill: Humic fill with much charcoal.

**Feature 73**

Location: N270.18/W1162.71
Horizontal dimensions at defined orifice: 3.1 feet (NS) x 2.95 feet (EW)
Vertical depth of feature: .2 feet (very truncated)
Description of Fill: Humic fill with charcoal.

**Feature 74**

Location: N273.74/W1148.24
Horizontal dimensions at defined orifice: 3.5 feet (NS) x 3.4 feet (EW)
Vertical depth of feature: .25 feet  
Description of Fill: Humic fill contains much burned earth.

**Feature 75  Flint-knapping cache pit**

Location: N325.57/W1431.59  
Shape: No discernible limits  
Depth at which orifice was defined: Scraped surface  

Contents:

- Chipped stone  
  - Large quarry flakes ............................................. 12  
  - Large preforms .................................................. 24  
- Lithic debitage  
  - Waste flakes .................................................... 36

Description of Fill: No discernible pit fill or limits; just concentration of artifacts.

**Feature 76**

Location: N169.33/W1441.66  
Horizontal dimensions at defined orifice: 4.1 feet (EW) x 3.8 feet (NS)  
Vertical depth of feature: 1.7 feet  
Description of Fill: Humic fill with charcoal flecks.

**Feature 77**

Location: N173.81/W1446.19  
Horizontal dimensions at defined orifice: 2.5 feet (NS) x 2.8 feet (EW)  
Vertical depth of feature: 1.65 feet  
Description of Fill: Humic fill.

**Feature 78  Storage/refuse pit**

Location: N157.3/W1472.07  
Shape: Straight walled  
Horizontal dimensions at defined orifice: 3.9 feet (NS) x 3 feet (EW)  
Depth at which orifice was defined: Scraped surface  
Vertical depth of feature: 1.3 feet  

Contents:

- Ceramics  
  - Necks ............................................................. 2  
  - Undecorated body sherds ..................................... 2
Description of Fill: Clay and carbonaceous loam with bottom layer of carbonized grass.

Feature 79

Location: N195.02/W1424.98
Horizontal dimensions at defined orifice: 4.2 feet (SW) x 4.1 feet (NS)
Vertical depth of feature: 1.2 feet
Description of Fill: Sand fill--possibly just a non-cultural stain in the sand.

Feature 80 Storage/refuse pit

Location: N189.84/W1430.16
Shape: Data not recorded
Horizontal dimensions at defined orifice: 2.4 feet (NS) x 2.3 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.45 feet
Contents:
Ceramics
  Bowl rim, decorated ......................... 1
  Jar rim, decorated .......................... 1
Description of Fill: Humic fill with charcoal and small bone fragments.

Feature 81

Location: N152.6/W1467.4
Horizontal dimensions at defined orifice: 3.35 feet (EW) x 3 feet (NS)
Vertical depth of feature: 1.6 feet
Description of Fill: Dark humic fill with charcoal flecks.

Feature 82

Location: N251.7/W1190.76
Horizontal dimensions at defined orifice: 5.2 feet in diameter
Depth at which orifice was defined: Scraped surface
Destroyed by construction activities.

Feature 83

Location: N222.34/W1200
Destroyed by construction activities.
Feature 84
Location: N252.94/W1162.39
Destroyed by construction activities.

Feature 85
Location: N203.58/W1460.84
Horizontal dimensions at defined orifice: 2 feet (EW) x 1.8 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.0 feet
Description of Fill: Dark humic fill with much charcoal flecks.

Feature 86 Storage/refuse pit
Location: N221.61/W1450.2
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.4 feet (NS) x 4.3 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2.4 feet
Contents:
Ceramics
Jar rim, decorated •••••••••••••••••••• 1
Undecorated body sherds • • • • • • • • • • • • • • • • 14
Description of Fill: Dark humic fill with some charcoal.

Feature 87
Location: N150/W1200.5
Destroyed by construction activities.

Feature 88
Location: N139/W1202
Destroyed by construction activities.

Feature 89
Location: N256.98/W1180
Destroyed by construction activities.

Feature 90
Location: N256.98/W1180
Destroyed by construction activities.
Feature 91
Location: N170.33/W1453.47
Horizontal dimensions at defined orifice: 3.6 feet (NS) x 3.6 feet (EW)
Vertical depth of feature: 1.3 feet
Description of Fill: Humic fill.

Feature 92
Location: N252.9/W1450.91
Horizontal dimensions at defined orifice: 4 feet (EW) x 2.4 feet (NS)
Vertical depth of feature: .3 feet
Description of Fill: Humic fill.

Feature 93
Location: N249.55/W1166.66
Destroyed by construction activities.

Feature 94
Location: N247.52/W1164.74
Destroyed by construction activities.

Feature 95
Hearth over storage/refuse pit
Location: N630/W925
Shape: Data not recorded
Horizontal dimensions at defined orifice: (Hearth) 7.0 feet (WS) x 6.8 feet (EW) --(Pit) 5.2 feet (NS) x 5.05 feet (EW)
Depth at which orifice was defined: .45 feet below scraped surface
Vertical depth of feature: 2.4 feet (Hearth - .4 feet) (Pit - 2.0 feet)

Contents:
Ceramics
Neck .................. 1
Decorated body sherds .................. 6
Undecorated body sherds .................. 30
Chipped stone
Projectile point fragments .................. 2
Retouched flake/scraper .................. 1
Lithic debitage
Waste flakes .................. 8
Faunal remains
Mammal
Deer 2

Vegetal remains
Charcoal
Red oak

Description of Fill: Concentration of ash, burned earth, and charcoal flecks; hearth overlying darker colored storage pit fill.

Feature 96
Location: N424.28/W1089.66
Horizontal dimensions at defined orifice: 3.8 feet (EW) x 3.6 feet (NS)
Vertical depth of feature: 2.2 feet
Description of Fill: Humic fill with charcoal and burned earth flecks.

Feature 97
Location: N391.5/W1082.09
Horizontal dimensions at defined orifice: 4.9 feet (NS) x 4.5 feet (EW)
Vertical depth of feature: 2.05 feet
Description of Fill: Humic fill.

Feature 98  Storage/refuse pit
Location: N403.04/W1082.58
Shape: Basin
Horizontal dimensions at defined orifice: 4.2 feet (NS) x 4.1 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .95 feet
Contents:
Chipped stone
Thick biface 1
Utilized flake 1
Ground stone
Pecked and ground stone 1

Description of Fill: Dark humic fill with much charcoal and hematite flecks in bottom of pit.
Feature 99
Location: N417.2/W1082.58
Horizontal dimensions at defined orifice: 4.4 feet (EW) x 4 feet (NS)
Depth which orifice was defined: Scraped surface
Vertical depth of feature: .5 feet
Description of Fill: Humic fill.

Feature 100
Location: N425.68/W1091.98
Horizontal dimensions at defined orifice: 4.8 feet (EW) x 4.4 feet (EW)
Vertical depth of feature: 1.35 feet (truncated)
Description of Fill: Humic fill with some charcoal and burned earth flecks.

Feature 101  Storage/refuse pit
Location: N432.77/W1093.88
Shape: Straight walled
Horizontal dimensions at defined orifice: 4.8 feet (SW) x 4.3 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.9 feet
Contents:
   Ceramics
   Undecorated body sherds .................. 7
   Ground stone
   Anvil or grinding stone ................. 1
Description of Fill: At a depth of 1.0 feet below the orifice there was a 2.2 foot thick clay cap underlain by burned grass; beneath this was .9 feet of cultural mix.

Feature 102  Storage/refuse pit
Location: N445.43/W1094.96
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.5 feet (SW) x 4.4 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2.5 feet
Contents:

Ceramics
- Jar rim, undecorated .......... 1
- Decorated body sherd ........... 1

Description of Fill: Humic fill.

Feature 103 Storage/refuse pit

Location: N448.35/W1099.21
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.15 feet (EW) x 4.1 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.1 feet

Contents:

Ceramics
- Jar rims
  - Decorated ................... 2
  - Undecorated ................. 4
- Neck .......................... 1
- Decorated body sherds ........... 4
- Undecorated body sherds ......... 28

Chipped stone
- Graver ........................ 1
- Knife ........................ 1

Ground stone
- Sandstone abrader .............. 1

Lithic debitage
- Waste flakes ................... 4

Faunal remains
- Mammal ........................ 7
- Fish ........................... 1
- Mussel shell .................... 6

Vegetal remains
- Charcoal
  - Elm ('sp.')

Description of Fill: Humic fill.

Feature 104 Storage/refuse pits

Location: N432.85/W1084.51
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.1 feet (NS) x 4.05 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .9 feet (truncated)
Contents:

Ceramics
  Decorated body sherd .......................... 1
Chipped stone
  End scraper ..................................... 1

Description of Fill: Humic fill with some charcoal.

**Feature 105 Storage/refuse pit**

Location: N435.82/W1079.72
Shape: Bell shaped
Horizontal dimensions at defined orifice: 4.4 feet (EW) x 3.9 feet (NS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.4 feet

Description of Fill: Mixed clay and humic fill with burned earth and charcoal flecks.

**Feature 106**

Location: N434.52/W1077.5
Horizontal dimensions at defined orifice: 4.3 feet (EW) x 3.5 feet (NS)
Vertical depth of feature: 4 feet
Description of Fill: Sandy, clayey loam with burned earth and charcoal flecks.

**Feature 107**

Location: N439.49/W1076.09
Horizontal dimensions at defined orifice: 4 feet (NS) x 4 feet (EW)
Vertical depth of feature: 1.4 feet
Description of Fill: Humic fill.

**Feature 108 Storage/refuse pit**

Location: N436.96/W1091.9
Shape: Very slightly bell-shaped (undercut)
Horizontal dimensions at defined orifice: 4.8 feet (EW) x 4.5 feet (NS)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 2.8 feet (truncated)

Contents:

Chipped stone
  Utilized flake ................................. 1
Description of Fill: Mixed fill with charcoal flecks, burned grass lining on bottom.

**Feature 109**

Location: N677.32/W858.11  
Horizontal dimensions at defined orifice: 4.2 feet (NS) x 4 feet (EW)  
Vertical depth of feature: .05 feet  
Description of Fill: Humic fill.

**Feature 110** Storage/refuse pit

Location: N679.93/W882.88  
Shape: Data not recorded  
Horizontal dimensions at defined orifice: 4.6 feet (EW) x 4.4 feet (NS)  
Depth at which orifice was defined: Scraped surface  
Vertical depth of feature: .75 feet (truncated)

Contents:
- Ceramics  
  - Jar rim  
  - Decorated ........................................ 3  
  - Undecorated ........................................... 3  
  - Decorated body sherds .............................. 2  
  - Undecorated body sherds ......................... 12  
- Chipped stone  
  - Sidescraper ........................................ 1  
- Lithic debitage  
  - Waste flake ........................................ 1  
  - Shatter .............................................. 2  
- Faunal remains  
  - Mammal ............................................... 3  
  - Dog/canid ........................................... 1  
- Vegetal remains  
  - Charcoal  
    - American elm  
    - White oak  

Description of Fill: Clay-loam with ash, burned earth, and charcoal.

**Feature 111** Storage/refuse pit

Location: N656.09/W875.72  
Shape: Data not recorded
Horizontal dimensions at defined orifice: 6 feet (NS) x 5.85 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.85 feet (truncated)

Contents:
- Ceramics
  - Decorated body sherds
  - Undecorated body sherds
- Chipped stone
  - Retouched flake
  - Flake/scrapers
- Lithic debitage
  - Waste flakes
  - Shatter
  - Clay pit lining
- Faunal remains
  - Mammal
- Vegetal remains
  - Charcoal bark
  - Charred corn kernels

Description of Fill: Layer of burned earth 1.5 feet below truncated surface; layer of mixed clay approximately .2 feet thick about 1 foot below truncated surface; below mixed clay cap much charcoal (bark lining?); bottom of pit lined with charred grass.

Feature 112 Storage/refuse pit

Location: N651.84/W883.7
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5.7 feet (EW) x 5.4 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.3 feet

Contents:
- Ceramics
  - Jar rim, decorated

Description of Fill: Mixed fill consisting of clay, carbonaceous matter, charcoal and burned earth.

Feature 113 Storage/refuse pit

Location: N636.38/W886.58
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 5.3 feet (NS) x 5.25 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.75 feet

Contents:
Ceramics
   Jar rim, decorated .............................. 1
   Undecorated body sherds ....................... 6
Chipped stone
   Utilized flake ................................. 1
Ground stone
   Sandstone abrader ............................. 1
Worked bone
   Bison scapula hoe ............................. 1
   Bison scapula hoe fragments .................. 100
Faunal remains
   Mammal ......................................... 1

Description of Fill: Humic mix of clay, loam charcoal, and burned earth.

Feature 114 Storage/refuse pit
Location: N621.31/W887.08
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 5.4 feet (EW) x 5.1 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .7 feet (truncated)

Contents:
Ceramics
   Jar rim, undecorated ........................... 1
   Necks ........................................... 4
   Decorated body sherds .......................... 3
   Undecorated body sherds ........................ 23

Description of Fill: Humic fill with charcoal and bone flecks.

Feature 115 Storage/refuse pit
Location: N649/W879
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.2 feet (EW) x 3.8 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .3 feet (extremely truncated)
Contents:
Ceramics
Jar rim, decorated ........................................ 1

Description of Fill: Mixed fill with burned earth, ash, and charcoal.

Feature 116

Location: N650.73/W897.51
Horizontal dimensions at defined orifice: 4.75 feet (EW) x 4.7 feet (NS)
Vertical depth of feature: .6 feet (truncated)
Description of Fill: Mixed dark humic fill with charcoal and burned bone fragments.

Feature 117 Storage/refuse pit

Location: N587.15/W904.36
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.7 feet (EW) x 4.6 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.2 feet
Contents:
Ceramics
Undecorated body sherds ..................................... 10

Description of Fill: Humic fill.

Feature 118 Storage/refuse pit

Location: N614.17/W901.97
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.3 feet (NS) x 4.3 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .9 feet (truncated)

Contents:
Ceramics
Jar rims, decorated ........................................... 3
Unattached handle ........................................... 1
Decorated body sherds ....................................... 4
Undecorated body sherds ................................... 387
Chipped stone
 Projectile point fragment .................................. 1
End scraper ................................................... 1
Side scraper ............................................. 1
Lithic debitage
Core ....................................................... 1
Waste flakes ............................................ 2
Shatter ................................................... 2

Description of Fill: Mixed humic fill with some charcoal.

Feature 119 Storage/refuse pit

Location: N635.16/W906.4
Shape: Basin
Horizontal dimensions at defined orifice: 4.2 feet (EW) x 4.1 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.5 feet

Contents:
Ceramics
Jar rims, decorated .................................. 3
Necks ...................................................... 2
Decorated body sherds ................................ 3
Undecorated body sherds ............................ 29
Chipped stone
Side scraper ............................................. 1
Lithic debitage
Waste flakes ............................................ 11
Shatter ................................................... 6
Daub ........................................................ 2
Vegetal remains
Charcoal
Charred dense carbonaceous matter
Charred corn kernels
Unworked stone
Hematite .................................................. 1

Description of Fill: Dark humic and yellow clay mixed fill interspersed with charcoal and burned earth.

Feature 120 Storage/refuse pit

Location: N622.03/W898.3
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 5.4 feet (EW) x 5.3 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2 feet (truncated)
Contents

**Ceramics**
- Jar rims
  - Decorated ........................................... 3
  - Undecorated ......................................... 1
  - Unattached handles ................................. 1
  - Necks .................................................. 3
  - Decorated body sherds ............................. 26
  - Undecorated body sherds ............................ 283

**Chipped stone**
- Projectile points ..................................... 2
- End scraper ............................................ 1
- Thin biface ........................................... 1
- Retouched flakes ..................................... 4
  - flake/scrapers ...................................... 2
  - Utilized flake ....................................... 1

**Lithic debitage**
- Waste flakes .......................................... 39
- Shatter .................................................. 5

**Worked bone**
- Bison scapula hoe .................................... 1

**Faunal remains**
- Mammal ................................................. 7
- Deer ..................................................... 1

**Vegetal remains**
- Charcoal ................................................
- Red oak ................................................

**Unworked stone**
- Hematite ............................................... 4
- Igneous pebble ........................................ 1

Description of Fill: Mixed fill with burned earth flecks.

**Feature 121**

Location: N653/W865.91
Horizontal dimensions at defined orifice: 2.95 feet (NS) x 2.9 feet (EW)
Vertical depth of feature: .2 feet
Description of Fill: Mixed humic fill with charcoal flecks.

**Feature 122** Storage/refuse pit

Location: N669.48/W889.05
Shape: Slightly belled (undercut)
Horizontal dimensions at defined orifice: 4.4 feet (EW) x 4.1 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.0 feet
Contents:

Ceramics
- Jar rims, undecorated .................. 3
- Decorated body sherds .................. 1
- Undecorated body sherds ................ 25

Chipped stone
- Retouched flake/scaper .................. 1

Lithic debitage
- Waste flakes ............................. 3

Vegetal remains
- Charred grass lining

Description of Fill: Dark humic fill with charcoal flecks.

Feature 123 Storage/refuse pit

Location: N654.13/W887
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5.15 feet (NS) x 5.1 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.8 feet

Contents:

Ceramics
- Jar rim, decorated ...................... 1
- Decorated body sherds .................. 2
- Undecorated body sherds ................ 9

Chipped stone
- End scraper ............................. 1

Ground stone
- Sandstone abrader ...................... 1

Lithic debitage
- Waste flakes ............................. 2

Vegetal remains
- Charcoal
  - Red elm
- Charred corn kernels

Description of Fill: Dark humic fill with charcoal flecks.

Feature 124 Storage/refuse pit

Location: N640.94/W860.59
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5.5 feet (NS) x 5 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .9 feet
Contents:
  Ceramics
    Undecorated body sherds .......................... 2
  Vegetal remains
    Charred dense carbonaceous matter

Description of Fill: Mixed clay, sand and humus.

Feature 125
Location: N639.64/W862.77
Horizontal dimensions at defined orifice: 3.3 feet (NS) x 3.3 feet (EW)
Vertical depth of feature: .2 feet (truncated)
Description of Fill: Possibly natural dense black loam overlying white clay.

Feature 126
Location: N615.54/W955.97
Horizontal dimensions at defined orifice: 3.0 feet in diameter
Depth at which orifice was defined: Scrapped surface
Destroyed by construction activities.

Feature 127
Location: N593.12/W865.99
Horizontal dimensions at defined orifice: 3.0 feet in diameter
Depth at which orifice was defined: Scrapped surface
Destroyed by construction activities.

Feature 128
Location: N620.42/W862.42
Horizontal dimensions at defined orifice: 3.5 feet (NS) x 3.0 feet (EW)
Depth at which orifice was defined: Scrapped surface
Destroyed by construction activities.

Feature 129
Location: N673.59/W845.58
Horizontal dimensions at defined orifice: 3 feet in diameter
Depth at which orifice was defined: Scrapped surface
Destroyed by construction activities.

Feature 130 Storage/refuse
Location: N671.14/W743.95
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 5.1 feet (NS) x 5.1 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 3 feet

Contents:
Ceramics
Jar rims
  Decorated ........................................ 5
  Undecorated .................................... 1
Necks .............................................. 6
Decorated body sherds ............................... 22
Undecorated body sherds ............................ 188

Chipped stone
  Projectile point fragment .......................... 1
  End scrapers ...................................... 3
  Side scraper ...................................... 1
  Retouched flakes .................................. 5
    flake/scrapers .................................. 5
  Utilized flakes ................................... 3

Ground stone
  Sandstone abrader .................................. 1

Lithic debitage
  Waste flakes ....................................... 83
  Shatter ........................................... 5

Daub .................................................. 7

Clay pit lining ..................................... 144

Faunal remains
  Mammal ............................................ 3

Vegetal remains
  Charcoal
    Red elm
    White oak
  Charred corn cobs
  Charred corn kernels

Unworked stone
  Hematite .......................................... 2
  Limonite .......................................... 3

Description of Fill: Mixed humic and yellow clay interspersed with burned earth and charcoal in yellow clay matrix. Storage pit containing large quantity charred corn and charred cobs at the bottom of the pit.

Feature 130A Storage/refuse pit

Location: Extension of Feature 130 along NW edge
Contents:

Ceramics
- Jar rim, decorated ........................................... 1
- Unattached handle ........................................... 1
- Neck .................................................................. 1
- Decorated body sherds ....................................... 10
- Undecorated body sherds .................................... 124

Chipped stone
- Retouched flake .................................................. 1
- flake/scrapers .................................................... 2

Ground stone
- Anvil or grinding stone ....................................... 1
- Smoothed sandstone .......................................... 1

Lithic debitage
- Waste flakes ..................................................... 8
- Shatter .................................................................. 1

Daub .................................................................. 1

Vegetal remains
- Charred corn kernels

Description of Fill: Humic fill.

Feature 131  Storage/refuse pit

Location: N832.5/W942.5
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 3.4 feet (EW) x 3.35 feet (NS)
Depth at which orifice was defined: 2.0 feet b.s.
Vertical depth of feature: 2.0 feet

Contents:

Ceramics
- Jar rim, decorated ........................................... 1
- Decorated body sherds ....................................... 2
- Undecorated body sherds .................................... 1

Description of Fill: Humic fill with burned earth and charcoal flecks.

Feature 132  Storage/refuse pit

Location: N945/W1007.5
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.5 feet (NS) x 4.4 feet (EW)
Depth at which orifice was defined: 2.0 feet b.s
Vertical depth of feature: 1.1 feet
### Contents

#### Ceramics

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jar rims</td>
<td></td>
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<tr>
<td>Decorated</td>
<td>3</td>
</tr>
<tr>
<td>Undecorated</td>
<td>1</td>
</tr>
<tr>
<td>Unattached handle</td>
<td></td>
</tr>
<tr>
<td>Necks</td>
<td>4</td>
</tr>
<tr>
<td>Decorated body sherds</td>
<td>25</td>
</tr>
<tr>
<td>Undecorated body sherds</td>
<td>82</td>
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#### Chipped stone

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Projectile points fragments</td>
<td>2</td>
</tr>
<tr>
<td>Sidescrapers</td>
<td>2</td>
</tr>
<tr>
<td>Spokeshave</td>
<td>1</td>
</tr>
<tr>
<td>Retouched flakes</td>
<td>2</td>
</tr>
<tr>
<td>Utilized flake</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Ground stone

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandstone abraders</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Lithic debitage

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste flakes</td>
<td>17</td>
</tr>
</tbody>
</table>

#### Faunal remains

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammal</td>
<td>3</td>
</tr>
</tbody>
</table>

### Description of Fill: Humic fill.

#### Feature 133

Location: N599.76/W997.92

Destroyed by construction activities.

#### Feature 134

Location: N559.02/W997.8

Destroyed by construction activities.

#### Feature 135 Hearth

Location: N662.78/W916.3

Shape: Data not recorded

Horizontal dimensions at defined orifice: Data not recorded

Depth at which orifice was defined: Scrapped surface

Vertical depth of feature: Data not recorded

Description of Fill: Hearth; mixed fill with burned earth and fire cracked rocks.

#### Feature 136 Hearth

Location: N712.96/W901.61

Shape: Basin
Horizontal dimensions at defined orifice: 2.4 feet (EW) x 2.25 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .3 feet

Contents:
Ceramics
Jar rims, decorated .......................... 2
Unattached handle ................................ 1
Decorated body sherds .......................... 4
Undecorated body sherds ....................... 12
Chipped stone
End scraper ...................................... 1
Retouched flake .................................. 1
Utilized flakes .................................. 4
Ground stone
Sandstone abrader ................................ 1
Lithic debitage
Waste flakes ..................................... 5
Faunal remains
Mammal ........................................... 12
Fish ................................................ 9
Mussel shell ..................................... 5

Description of Fill: Mixed fill containing ash and burned earth.

Feature 137  Storage/refuse pit

Location: N782.93/W864.46
Shape: Data not recorded
Horizontal dimensions at defined orifice: 1.5 feet (EW) x 1 foot (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: Data not recorded

Contents:
Ceramics
Jar rims
Decorated ........................................ 2
Undecorated .................................... 4
Neck ............................................... 1
Decorated body sherds .......................... 8
Undecorated body sherds ....................... 17
Chipped stone
Projectile point fragment ....................... 1
End scrapers .................................... 2
Sidescraper ..................................... 1
Thick biface ..................................... 1
Retouched flakes ................................ 2
Utilized flakes ..........................  2
Ground stone
Scratched siltstone ........................  2
Lithic debitage
Core ........................................  1
Waste flakes ..................................  5
Shatter ........................................  2
Daub .............................................  1
Faunal remains
Mammal .........................................  2
Plains pocket gopher ..........................  2
Mussel shell ....................................  4
Unworked stone
Hematite .......................................  3
Historic artifacts
6d wire nail ....................................  1

Description of Fill: Mixed humic fill with some ash.

Feature 138 Storage/refuse pit

Location: N635.06/W904.73
Shape: Data not recorded
Horizontal dimensions at defined orifice: Data not recorded
Depth at which orifice was defined: Data not recorded
Vertical depth of feature: Data not recorded

Contents:
Ceramics
Neck .............................................  1
Decorated body sherd ...........................  1
Undecorated body sherd ........................  1
Faunal remains
Mammal ..........................................  3
Mussel shell .................................... 19

Description of Fill: Destroyed before completely excavated.

Feature 139 Storage/refuse pit

Location: N735.72/W926.34
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.45 feet (NS) x 3.2 feet (EW)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1 foot (truncated)
Contents:

Ceramics
- Unattached handle ........................................ 1
- Undecorated body sherds ................................... 8

Faunal remains
- Mammal ....................................................... 3
  - Deer ....................................................... 1
  - Dog/canid .................................................. 1
- Mussel shell .................................................. 48

Historic artifacts
- Stoneware .................................................... 1

Description of Fill: Clay-loam mix with charcoal flecks.

Feature 140  Storage/refuse pit

Location: N722.92/W898.22

Horizontal dimensions at defined orifice: 6 feet (NS) x 6 feet (EW)

Depth at which orifice was defined: Scraped surface

Vertical depth of features: 2.8 feet

Contents

Ceramics
- Jar rims
  - Decorated ............................................... 3
  - Undecorated ............................................. 3
- Neck ......................................................... 1
- Decorated body sherds .................................... 4
- Undecorated body sherds ................................ 16

Chipped stone
- End scraper .................................................. 1
- Retouched flake ............................................ 1
- flake/scraper .............................................. 1
- Utilized flakes ............................................ 2

Lithic debitage
- Waste flakes ............................................... 6

Faunal remains
- Mammal ..................................................... 3

Vegetal remains
- Charcoal
- Charred grass matting
- Carbonized corn shank
- Carbonized corn stalk

Description of Fill: Mixed humic fill with some charcoal; charred lining around pit walls.
Feature 141 Storage/refuse pit

Location: N718.99/W867.11
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.6 feet (NS) x 4.5 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .7 feet

Contents:
Ceramics
- Bowl rim, decorated .................. 1
- Decorated body sherds ................ 2
- Undecorated body sherds ............. 25
Chipped stone
- Graver .................................. 1
- Thin biface ............................. 1
Ground stone
- Sandstone abrader ...................... 1
- Scratched hematite .................... 1
Lithic debitage
- Waste flakes ........................... 4
Faunal remains
- Mammal .................................. 15
- Deer .................................... 12
- Mussel shell ............................ 4
Vegetal remains
- Charcoal ...............................
- Charred corn kernels
- Unidentified fruit seed fragments
- Charred Chenopodium seeds
- Charred Amaririhus seeds

Description of Fill: Dark humic fill with much charcoal flecks.

Feature 142 Storage/refuse pit

Location: N567.83/W906.65
Shape: Basin
Horizontal dimensions at defined orifice: 4.4 feet (NS) x 4.4 feet (SW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .55 feet (truncated)

Contents:
Ceramics
- Decorated body sherd .................. 1
Chipped stone
- Retouched flake/scaper ............... 1
Description of Fill: Humic fill.

Feature 143 Storage/refuse pit

Location: N665.63/W866.49
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 5.0 feet (NS) x 4.9 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 3 feet

Contents:
Ceramics
- Bowl rim, decorated ............ 1
- Jar rim, undecorated ............ 1
- Undecorated body sherds ........ 29
Chipped stone
- Graver ................................ 1
- Retouched flakes ................. 2
Lithic debitage
- Waste flakes .................... 3
- Shatter .......................... 2

Description of Fill: Humic fill with charcoal flecks.

Feature 144 Storage/refuse pit

Location: N657.48/W847.42
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5.5 feet (NS) x 5.3 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of features: .4 feet

Contents:
Ceramics
- Jar rims, decorated ............ 2
- Unattached handle ............. 1
- Necks ............................ 4
- Decorated body sherds ........ 19
- Undecorated body sherds ........ 100
Ground stone
- Scratched hematite ............. 1
Lithic debitage
- Waste flakes .................. 4
- Shatter ......................... 1
- Worked bone .................... 1
- Worked shell .................... 1
Faunal remains
Mammal ........................................... 2

Description of Fill: Humic mixed fill with charcoal, burned earth, yellow clay; dug down into gray ferruginous clay.

Feature 145 Storage/refuse pit

Location: N642.96/W970.92
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.7 feet (NS) x 4.5 feet (EW)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: 1.3 feet (truncated)

Contents:
Ceramics
Decorated body sherds ......................... 2
Undecorated body sherds ....................... 6
Faunal remains
Mammal ........................................... 5
Deer ............................................... 1
Vegetal remains
Charcoal
White oak

Description of Fill: Ash-clay-loam mix with burned earth and charcoal flecks.

Feature 146 Hearth

Location: N791.13/W878.08
Shape: Basin
Horizontal dimensions at defined orifice: 4.0 feet (NS) x 3.7 feet (EW)
Depth at which orifice was defined: Scrapped surface
Vertical depth of feature: .7 feet

Contents:
Ceramics
Decorated body sherds ......................... 2
Undecorated body sherds ....................... 3
Lithic debitage
Waste flakes ..................................... 4
Vegetal remains
Charcoal
Unworked stone
Hematite ......................................... 1
Description of Fill: Mixed fill with charcoal, burned earth and fire cracked rock.

Feature 147 Storage/refuse pit

Location: N771.09/W879.99
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.3 feet (EW) x 3.8 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .5 feet (truncated)

Contents:
Ceramics
  Decorated body sherds .................................. 2
  Undecorated body sherds .................................. 2
Chipped stone
  Sidescraper ............................................. 1
  Retouched flakes ........................................ 2
Lithic debitage
  Waste flakes .............................................. 4
Worked bone
  Deer jaw sickle (sheller) .................................. 1
Faunal remains
  Mammal ................................................... 15
  Deer ....................................................... 1

Description of Fill: Humic fill with charcoal flecks.

Feature 148 Storage/refuse pit

Location: N742.53/W913.87
Shape: Slightly belled (undercut)
Horizontal dimensions at defined orifice: 5.0 feet (NS) x 4.9 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.7 feet

Contents:
Chipped stone
  End scraper .............................................. 1
Ground stone
  Hammer stone, chert ..................................... 1
  Anvil or grinding stone ................................ 1
Lithic debitage
  Core ..................................................... 1
  Waste flake .............................................. 1

Description of Fill: Humic fill with charcoal flecks.
Feature 149  Storage/refuse pit

Location: N760.33/W899.3
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5.4 feet (EW) x 4.75 feet (NS)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2.15 feet

Contents:
Ceramics
  Jar rims
    Decorated ........................................... 1
    Undecorated ........................................ 3
  Decorated body sherd .................................. 2
  Undecorated body sherd ................................ 15
Chipped stone
  Projectile point fragments ............................ 2
  End scraper .......................................... 1
  Graver ................................................ 1
Ground stone
  Anvil or grinding stone ............................... 1
Lithic debitage
  Waste flakes ......................................... 4
  Shatter .............................................. 3
Vegetal remains
  Charcoal .............................................
    Red oak

Description of Fill:  Mixed loam and clay with charcoal and burned earth.

Feature 150  Storage/refuse pit

Location: N756.4/W893.13
Shape: Bell-shaped (undercut)
Horizontal dimensions at defined orifice: 5.7 feet (NS) x 5.2 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 2.8 feet (truncated)

Contents:
Ceramics
  Jar rims
    Decorated ........................................... 1
    Undecorated ........................................ 1
  Decorated body sherd .................................. 1
  Undecorated body sherd ................................ 6
Chipped stone
   Thin biface ........................................ 1
Lithic debitage
   Core ............................................. 1
   Waste flakes ..................................... 2
   Shatter .......................................... 3
Clay pit lining ........................................ 22
Vegetal remains
   Charcoal
      Willow
      Cottonwood
   Charred corn kernels
   Charred corn cobs
   Carbonized corn stalks
   Carbonized grass stems
Human remains
   Deciduous teeth ................................. 4

Description of Fill: Grass-lined pit with loamy clay mix; pit floor lined with charred corn.

Feature 151 Storage/refuse pit

Location: N758.24/W909.3
Shape: Data not recorded
Horizontal dimensions at defined orifice: 3.7 feet (NS) x 3.4 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .6 feet (truncated)

Contents:
   Ceramics
      Undecorated body sherds ...................... 6
   Chipped stone
      Retouched flake ............................... 1
   Lithic debitage
      Waste flake ................................... 2
   Vegetal remains
      Charcoal

Description of Fill: Mixed humic fill with some charcoal flecks.

Feature 152 Storage/refuse pit

Location: N795.74/W870.94
Shape: Data not recorded
Horizontal dimensions at defined orifice: 5.1 feet (NS) x 5.0 feet (EW)
Depth at which orifice was defined: Scraped surface
Vertical depth of feature: 1.0 feet

Contents:

Ceramics
Jar rim, decorated ........................................... 1
Neck ......................................................... 1
Decorated body sherds ....................................... 3
Undecorated body sherds .................................. 14

Chipped stone
End scrapers .................................................. 2
Graver ....................................................... 1
Retouched flake/scaper .................................. 1

Ground stone
Sandstone abraders ....................................... 2
Scratched hematite ....................................... 1

Lithic debitage
Waste flake .................................................. 1
Shatter ..................................................... 1

Faunal remains
Mammal ..................................................... 5
Deer ........................................................ 2
Mussel shell ............................................... 77

Description of Fill: Humic fill.

Feature 153 Storage/refuse pit

Location: N797.25/W872.89
Shape: Data not recorded
Horizontal dimensions at defined orifice: 4.9 feet (EW) x 4.6 feet (NS)

Depth at which orifice was defined: Scraped surface
Vertical depth of feature: .7 feet

Contents:

Ceramics
Jar rim, undecorated ....................................... 1
Neck ......................................................... 1
Decorated body sherds ..................................... 5
Undecorated body sherds ................................ 31

Chipped stone
End scraper .................................................. 1

Lithic debitage
Waste flakes ................................................ 4
Shatter ..................................................... 5

Faunal remains
Mammal ..................................................... 17
Mussel shell ............................................... 20
Description of Fill: Humic fill.

**Feature 154**

Location: N445.1/W1072.12  
Horizontal dimensions at defined orifice: 4.8 feet (NS) x 4 feet (EW)  
Vertical depth of feature: .4 feet  
Description of Fill: Mixed humic fill with possible grass lining.

**Feature 155** Storage/refuse pit

Location: N422.01/W1097.9  
Shape: Data not recorded  
Horizontal dimensions at defined orifice: 2.8 feet (NS) x 2.8 feet (EW)  
Depth at which orifice was defined: Scraped surface  
Vertical depth of feature: .2 feet  
Contents:  
Ceramics  
- Jar rim, decorated .............................................. 3  
- Necks ................................................................. 2  
- Decorated body sherds ........................................... 4  
- Undecorated body sherds ....................................... 31  
Vegetal remains  
Charred grass lining.  
Description of Fill: Mixed humic fill.

**Feature 156**

Location: N381.89/W1099.2  
Horizontal dimensions at defined orifice: 3.8 feet in diameter  
Depth at which orifice was defined: Scraped surface  
Destroyed by construction activities.

**Feature 157**

Location: N411.8/W1096.7  
Horizontal dimensions at defined orifice: 2.9 feet in diameter  
Depth at which orifice was defined: Scraped surface  
Destroyed by construction activities.

**Feature 158**

Location: N433.26/W1106.05  
Horizontal dimensions at defined orifice: 2.5 feet in diameter
Depth at which orifice was defined: Scraped surface
Destroyed by construction activities.

Feature 159

Location: N423.08/W1105.69
Horizontal dimensions at defined orifice: 3.7 feet in diameter
Depth at which orifice was defined: Scraped surface
Destroyed by construction activities.

Feature 160

Location: N412.4/W1103
Horizontal dimensions at defined orifice: 4.4 feet in diameter
Depth at which orifice was defined: Scraped surface
Destroyed by construction activities.
APPENDIX B:
CATALOG LIST OF IDENTIFIED BISON REMAINS, CRIBB'S CRIB SITE

As identified by Dr. Holmes Semken

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Provenience</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>508</td>
<td>Surface (central area north of corn crib)</td>
<td>Lesser tuberosity of femur</td>
</tr>
<tr>
<td>542</td>
<td>Surface (east part of field)</td>
<td>Tibia, proximal portion</td>
</tr>
<tr>
<td>1323</td>
<td>N910/W1070</td>
<td>Metapodial fragment</td>
</tr>
<tr>
<td>3126</td>
<td>N660/W940, depth 2.6'-2.7'</td>
<td>Metacarpal</td>
</tr>
<tr>
<td>3473</td>
<td>N680/W940, depth 1.8'-2.5'</td>
<td>Humerus, head portion</td>
</tr>
<tr>
<td>4550</td>
<td>Feature 113</td>
<td>Scapula fragment</td>
</tr>
<tr>
<td>4612A</td>
<td>Feature 120</td>
<td>Scapula fragment</td>
</tr>
<tr>
<td>5351</td>
<td>N727.4/W920.57</td>
<td>Scapula fragment</td>
</tr>
</tbody>
</table>
APPENDIX C:

CATALOG LIST OF IDENTIFIED FISH REMAINS,

CRIBB'S CRIB SITE
### CATALOG LIST OF IDENTIFIED FISH REMAINS, CRIBB'S CRIB SITE

As Identified by Lynn Alex

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Provenience</th>
<th>Skeletal Component</th>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1031</td>
<td>N900/W1080</td>
<td>right quadrate</td>
<td>c.f. <em>Ictalurus punctatus</em></td>
<td>Channel catfish</td>
</tr>
<tr>
<td>3285</td>
<td>N670/W930</td>
<td>parasphenoid fragment</td>
<td>c.f. <em>Ictalurus punctatus</em></td>
<td>Channel catfish</td>
</tr>
<tr>
<td>3733</td>
<td>Feature 2</td>
<td>right cleithrum</td>
<td>c.f. <em>Ictalurus melas</em> or <em>I. natalis</em></td>
<td>Bullhead (black, brown, or yellow)</td>
</tr>
<tr>
<td>3761</td>
<td>Feature 2</td>
<td>left cleithrum</td>
<td><em>Ictaluridae</em></td>
<td>Catfish/bullheads</td>
</tr>
<tr>
<td></td>
<td>(bulk)</td>
<td>subopercle fragment</td>
<td><em>Castostomidae</em></td>
<td>Suckers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>opercular fragment</td>
<td><em>Castostomidae</em></td>
<td>Suckers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cleithrum fragment</td>
<td><em>Castostomidae</em></td>
<td>Suckers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>webberian apparatus fragment</td>
<td><em>Castostomidae</em></td>
<td>Suckers</td>
</tr>
<tr>
<td>3782</td>
<td>Feature 2</td>
<td>left coracoid</td>
<td><em>Ictalurus melas</em> or <em>I. natalis</em></td>
<td>Black or yellow bullheads</td>
</tr>
<tr>
<td></td>
<td>(bulk)</td>
<td>right premaxilla</td>
<td><em>Ictaluridae</em></td>
<td>Catfish/bullheads</td>
</tr>
<tr>
<td>3812</td>
<td>Feature 2</td>
<td>operculum fragment</td>
<td><em>Castostomidae</em></td>
<td>Suckers</td>
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<tr>
<td>2868</td>
<td>Feature 6</td>
<td>left cleithrum</td>
<td><em>Ictaluridae</em></td>
<td>Catfish/bullheads</td>
</tr>
<tr>
<td></td>
<td>(bulk)</td>
<td>right maxilla</td>
<td><em>Castostomidae</em></td>
<td>Suckers</td>
</tr>
<tr>
<td>4765</td>
<td>Feature 136</td>
<td>Sphenotic fragment</td>
<td>c.f. <em>Ictaluridae</em></td>
<td>Catfish/bullheads</td>
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<tr>
<td>5073</td>
<td>Test Pit C</td>
<td>rib fragment</td>
<td><em>Ictaluridae</em></td>
<td>Catfish/bullheads</td>
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### APPENDIX D:

**CATALOG LIST OF IDENTIFIED FLORAL REMAINS, CRIBB'S CRIB SITE**

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<th>Cat. No.</th>
<th>Provenience</th>
<th>Floral Remains</th>
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<td>930</td>
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<td>Corn kernels</td>
</tr>
<tr>
<td>934</td>
<td>Surface</td>
<td>Corn kernels</td>
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<tr>
<td>1210</td>
<td>N900/W1100 (1.5-2.0 feet b.s.)</td>
<td>Corn kernels</td>
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<tr>
<td>2576</td>
<td>N930/W1100 (1.24-1.8 feet b.s.)</td>
<td>Smartweed seed</td>
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<tr>
<td>3059</td>
<td>N660/W940 (1.65-1.8 feet b.s.)</td>
<td>Corn kernels</td>
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<tr>
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<td>N6600/W980 (.8 feet b.s.)</td>
<td>Corn kernels</td>
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<tr>
<td>3538A</td>
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</tr>
<tr>
<td>3538B</td>
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<td>3583</td>
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<td>3848</td>
<td>Feature 4</td>
<td>Bark</td>
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<td>3869</td>
<td>Feature 6</td>
<td>Corn kernels, stalks, cobs</td>
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<tr>
<td>3871</td>
<td>Feature 6</td>
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<td>3909</td>
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<tr>
<td>3921</td>
<td>Feature 11</td>
<td>Corn kernels</td>
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<tr>
<td>3966</td>
<td>Feature 12</td>
<td>Corn kernels, stalks, cobs, grass matting?</td>
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<tr>
<td>3976</td>
<td>Feature 12A</td>
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</tr>
<tr>
<td>3996</td>
<td>Feature 13</td>
<td>Corn kernels, grass matting?, bark</td>
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<tr>
<td>4000</td>
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<tr>
<td>4019</td>
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<td>4020</td>
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<td>4244</td>
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<td>4280</td>
<td>Feature 34</td>
<td>Grass matting?</td>
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<td>4342</td>
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<td>Charred dense carbonaceous material</td>
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<td>Cat. No.</td>
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<td>4365</td>
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<tr>
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<td>Charred dense carbonaceous material</td>
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<tr>
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<td>Feature 119</td>
<td>Corn kernels</td>
</tr>
<tr>
<td>4599</td>
<td>Feature 119</td>
<td>Grass matting?</td>
</tr>
<tr>
<td>4621</td>
<td>Feature 122</td>
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<td>4633</td>
<td>Feature 124</td>
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</tr>
<tr>
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<td>Feature 130</td>
<td>Corn kernels, cobs</td>
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<td>4697X</td>
<td>Feature 130A</td>
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<td>4830</td>
<td>Feature 140</td>
<td>Grass matting?</td>
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<td>4831</td>
<td>Feature 140</td>
<td>Corn stalks</td>
</tr>
<tr>
<td>4845</td>
<td>Feature 141</td>
<td>Corn kernels, small fruit seed fragments, goosefoot seeds, pigweed seeds, field peppergrass seed</td>
</tr>
<tr>
<td>4939</td>
<td>Feature 150</td>
<td>Corn kernels, stalks, cobs, grass matting?</td>
</tr>
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<td>Feature 155</td>
<td>Grass matting?</td>
</tr>
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APPENDIX E:

CATALOG LIST OF IDENTIFIED WOOD CHARCOAL, CRIBB'S CRIB SITE

As Identified by John Broihahn

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<th>Cat. No.</th>
<th>Provenience</th>
<th>Species</th>
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<tr>
<td>948</td>
<td>N900/W1000 (.8-1.6 feet b.s.)</td>
<td>Red oak</td>
</tr>
<tr>
<td>1053</td>
<td>N900/W1000 (1.4 feet b.s.)</td>
<td>White oak</td>
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<tr>
<td>1110</td>
<td>N900/W1000</td>
<td>White oak</td>
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<tr>
<td>1275</td>
<td>N900/W1120 (1.0-1.5 feet b.s.)</td>
<td>White oak</td>
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<tr>
<td>1324</td>
<td>N910/W1070 (1.1-1.35 feet b.s.)</td>
<td>Red elm or hackberry</td>
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<tr>
<td>1396</td>
<td>N910/W1080 (1.2-1.5 feet b.s.)</td>
<td>Soft maple</td>
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<tr>
<td>1492</td>
<td>N910/W1080 (1.5-1.8 feet b.s.)</td>
<td>American elm</td>
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<td>1613</td>
<td>N910/W1090 (1.8-2.0 feet b.s.)</td>
<td>Hackberry, elm</td>
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<td>1729</td>
<td>N910/W1090 (2.4 feet b.s.)</td>
<td>Willow, cottonwood</td>
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<td>N920/W1090 (1.5-1.7 feet b.s.)</td>
<td>Red elm or hackberry</td>
</tr>
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<td>N930/W1100 (1.25-1.8 feet b.s.)</td>
<td>American elm,</td>
</tr>
<tr>
<td>2585</td>
<td>N930/W1100 (1.6 feet b.s.)</td>
<td>Red elm, hackberry, willow, cottonwood</td>
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<tr>
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<td>N660/W950 (1.0-1.7 feet b.s.)</td>
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<tr>
<td>3543</td>
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<td>Black walnut, elm</td>
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<td>3708</td>
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<td>3726</td>
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<td>Red elm, hackberry</td>
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<td>3763</td>
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<td>Hickory</td>
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<td>Elm</td>
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<td>Species</td>
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<td>-------------</td>
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<td>4129</td>
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APPENDIX F:
LIST OF MEASUREMENTS FOR
CORN COBS FROM 13WA105
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<th>Feature No.</th>
<th>Cat. No.</th>
<th>Row No.</th>
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<th>Cupule Width (mm.)</th>
<th>Remarks</th>
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<td>6.9</td>
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<td>7.6</td>
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Measured cobs may be summarized as follows:

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<th>% of Total</th>
<th>Mean Row Number</th>
<th>Median Cupule Width</th>
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<td>38</td>
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Total 26
100%

Ranges (in mm.)

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<th>Kernel Thickness</th>
<th>Cupule Width</th>
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<td>3.0-3.8, Median 3.7</td>
<td>5.5-11.3, Median 8.1</td>
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<td>10</td>
<td>3.2-4.5, Median 3.8</td>
<td>4.7-9.2, Median 6.9</td>
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<tr>
<td>1</td>
<td>12</td>
<td>?</td>
<td>5.9</td>
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Measured corn grains, which had been charred on the cob.

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<tbody>
<tr>
<td>130</td>
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<td>8</td>
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<td>4.3</td>
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Appears to be immature