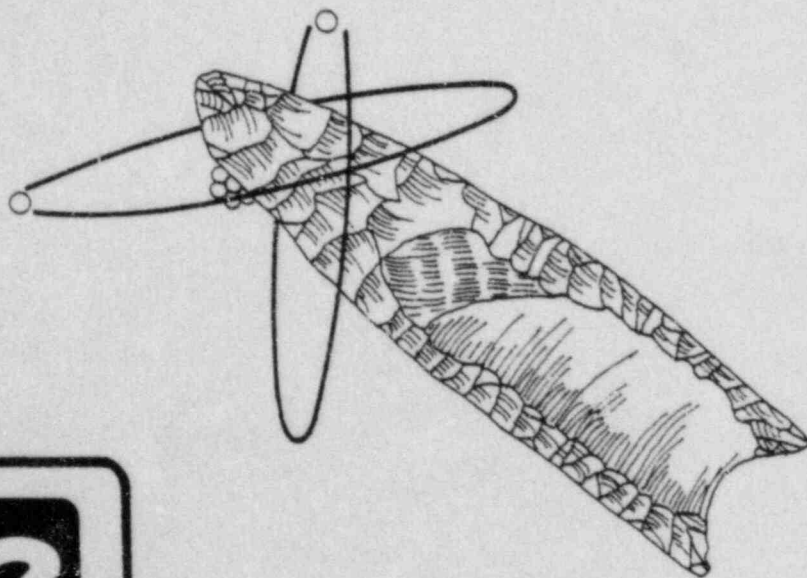


PHASE II TESTING AT SITES 23CY-20, 23CY-352, 23CY-359, UNION ELECTRIC COMPANY'S CALLAWAY NUCLEAR POWER PLANT, CALLAWAY COUNTY, MISSOURI.

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Union Electric Company

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FINAL REPORT

Phase II Cultural Resource Testing and Assessment of Sites
23CY-20, 23CY-352, and 23CY-359 at Union Electric Company's
Callaway Nuclear Power Plant, Callaway County, Missouri

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Carbondale, Illinois

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ABSTRACT

Phase II archaeological testing was conducted at sites 23CY-20, 23CY-352, and 23CY-359 for Union Electric Company at the Callaway Nuclear Power Plant, Callaway County, Missouri. Alluvial terrace sites 23CY-20 and 23CY-352, located in the lower reaches of the Logan Creek watershed, contain undisturbed cultural deposits with preserved faunal and floral remains, charcoal, ceramics, chert tools, and debitage. A possible terminal Middle Woodland occupation and a Late Woodland Boone phase occupation were identified at site 23CY-20. Two pits at site 23CY-352 have furnished dates of A.D. 470 \pm 140 and A.D. 830 \pm 100. Corn was recovered from the feature with the earlier radiocarbon date. A possible terminal Middle Woodland occupation and a Late Woodland occupation containing Maramec Spring phase, Boone phase, and Moreau subphase elements were identified. Site 23CY-359, occupying a north-south oriented ridge, contains chert tools and debitage with cultural deposits extending for 1/2 mi. This site has Early Archaic, Middle Archaic, Middle Woodland, and Late Woodland cultural affiliations. All three sites are recommended eligible for nomination to the National Register of Historic Places (NRHP).

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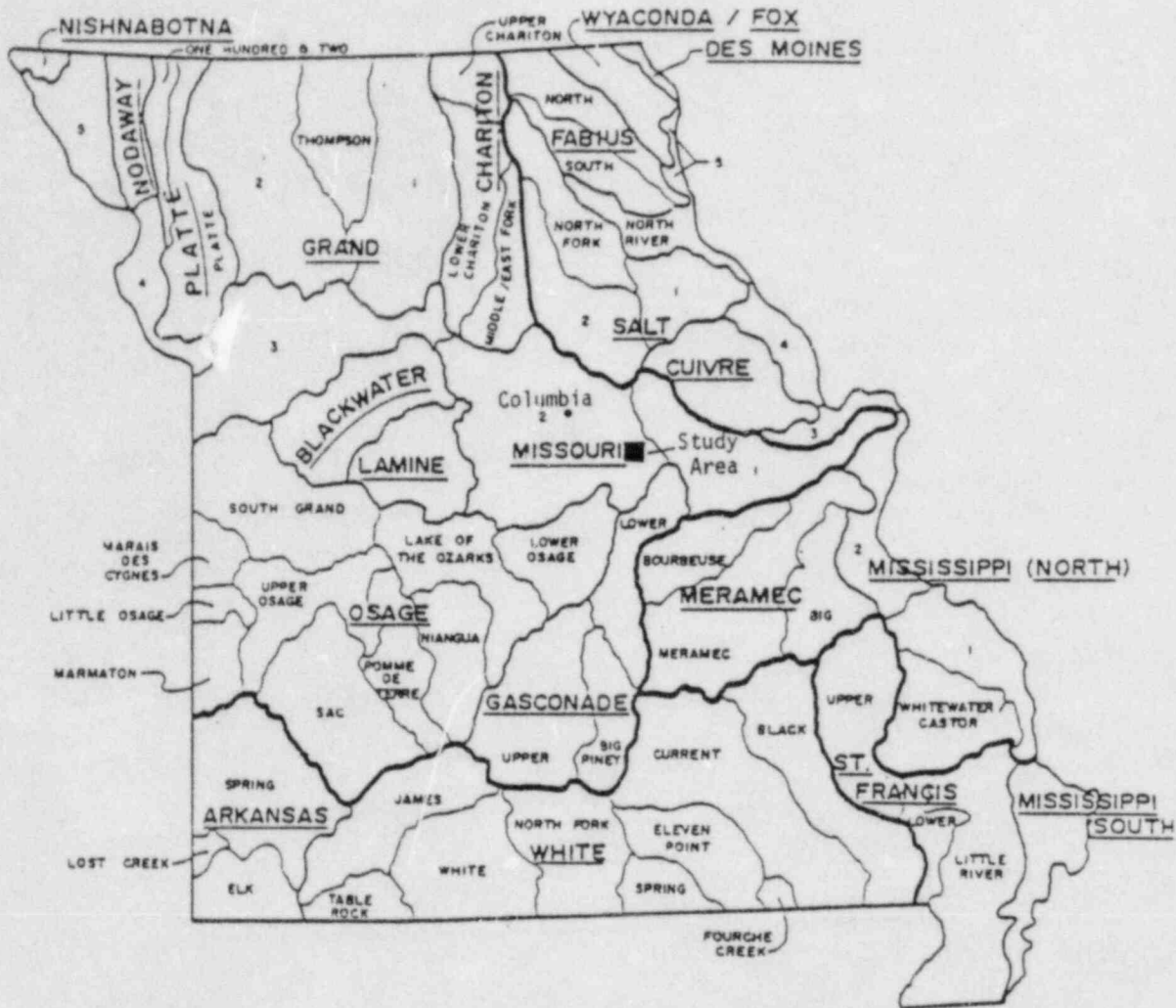
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INTRODUCTION

Project Description

The following report presents the results of a Phase II archaeological testing program at sites 23CY-20, 23CY-352, and 23CY-359 for Union Electric Company at the Callaway Nuclear Power Plant site, Callaway County, Missouri. The Nuclear Regulatory Commission (NRC) has asked for a determination of eligibility for nomination to the National Register of Historic Places (NRHP) for the three archaeological sites which are within the operations and maintenance zone of the Callaway Nuclear Power Plant. These three sites were identified previously during the Phase I survey (Ray et al. 1984) of residual lands and were recommended potentially eligible for nomination to the NRHP (McNerney 1983:21-36). The Missouri State Historic Preservation Office (SHPO) guidelines (Welchman 1979) recommends Phase II testing to further evaluate eligibility of a site for nomination to the NRHP. This report describes the results of the Phase II testing and offers recommendations at the three sites.

The project area is located approximately 24 mi northeast of Jefferson City near the village of Steedman on Highway 94. The study area occupies a portion of the Missouri-2 Watershed Management Unit (Map 1) (Welchman 1979:Appendix D) in the Lower Missouri Valley II locality of the Northeast Prairie archaeological-physiographic region defined by Chapman (1975:3-4).



MAP 1

Project Location
 Union Electric Company,
 Callaway County Nuclear Power Plant

(Missouri Watershed Management Plan,
 Missouri State Historic Preservation Office)

Potential Impact

The three sites (23CY-20, 23CY-352, and 23CY-359) on which Phase II archaeological investigations were conducted lie within the operation and maintenance zone of Union Electric Company's Callaway Nuclear Power Plant. Facilities in this zone include electrical transmission lines, heavy haul roads, railroad spurs, and waterlines. Activities that may take place within the operations and maintenance zone include inspection, repair, and maintenance. The foregoing activities could pose both direct and indirect potential adverse impacts to the sites investigated. Both sites 23CY-20 and 23CY-352 were partially impacted by construction activities. Future construction at these sites is not anticipated; however, the movement of heavy trucks and maintenance equipment could cause a direct impact to sites 23CY-352 and 23CY-359. Management of these cultural resources as proposed by McNerney (1983) will minimize future direct and indirect impacts to the sites. Union Electric Company has complied with the foregoing management recommendations, and sites are currently protected by avoidance and limited agricultural use.

Justification

The location and assessment of archaeological sites is authorized by the National Historic Preservation Act of 1966, Executive Order 11593, the Archaeological and Historical Conservation Act of 1974, and in particular, Regulatory Guide 4.2 (Section 2-6, July 1976) of the Nuclear Regulatory Commission.

Personnel

Field work was conducted during July 1984. Supervising Archaeologist was Jerome D. Traver. Other crew members were Bonnie L. Gums, Barney Nashold, Mark E. Phillips, and Bonnie Swift. Laboratory analysis was conducted by the author, assisted by Dr. George Holley (ceramic analysis) and Jonathan Bloom (faunal analysis). Dr. George Fraunfelder, Department of Geology, Southern Illinois University at Carbondale, was the geomorphological consultant; and Leonard Blake, Washington University, St. Louis, conducted the paleobotanical analysis. Michael J. McNerney served as Principal Investigator.

METHODS

Introduction

The primary objective of the Phase II testing of sites 23CY-20, 23CY-352, and 23CY-359 was to conduct additional limited archaeological investigations of sufficient scope to provide data for an evaluation of their significance and the nomination of significant sites to the National Register of Historic Places. Data necessary for an evaluation of significance is embodied in the presence of substantive diagnostic cultural remains that may be useful in addressing questions of resource procurement and utilization, subsistence, settlement pattern, and cultural affiliation. According to the Missouri SHPO guidelines (Welchman 1979:1), nomination cannot be made until Phase II investigations have been conducted and the final report reviewed by the Missouri SHPO. At a minimum, these investigations must provide information about the horizontal and vertical extent of the sites, the nature and density of occupation, and provide sufficient data to determine the potential or lack of potential that each site has for answering regional research questions. Under the Missouri guidelines (Welchman 1979:4), at least one 1 m by 1 m test unit must be hand excavated at each site being investigated.

Field Methods

As a general procedure and as proposed (American Resources Group, Ltd. 1984:4, 5, 6), a series of screened shovel probes was placed in a

systematic grid pattern at each site in order to determine the horizontal and vertical extent of cultural deposits. The fill from each shovel probe was sifted through 1/4 in mesh screen. The results of this effort determined the number and placement of 1 m x 1 m excavation units and backhoe trenches.

Grids were established using a transit and 50 m tape. Flagging was placed at 10 m intervals along the established central grid lines at sites 23CY-20 and 23CY-359 and at 50 m grid points at site 23CY-352. Sampling strategy at all sites included the use of an offset shovel probe interval in every other transect. This was achieved at sites 23CY-20 and 23CY-359 by placement of the first probe of every other transect at 5 m, instead of 10 m, along the transect. Remaining probes were spaced at 10 m intervals. At sites 23CY-20 and 23CY-359, coverage was made in a single sweep of transects spaced 10 m apart. The technique of staggering the shovel probe interval resulted in a checkerboard pattern that allowed an intensive investigation of site boundaries and cultural materials without adversely affecting the site by placement of a greater number of shovel probes. Sampling strategy was altered at site 23CY-352 to allow a more rapid definition of site boundaries. This was achieved by utilizing a two-sweep technique. The first sweep of the site area was made at 25 m transect intervals, with probes spaced 25 m apart. The first probes of every other transect were placed at 12.5 m and the remainder of probes in these transects at 25 m. After roughly defining the areas of cultural deposits, a second sweep of these areas was made at 25 m intervals to more accurately define boundaries and evaluate cultural deposits. Transects were offset 12.5 m from transects sampled in the first sweep. Overall coverage of areas

with cultural deposits in the combined sweeps was at 12.5 m intervals. Shovel tests ranged from 10 cm to 30 cm below surface and extended 10 cm to 20 cm and more below the base of the plow zone into culturally sterile subsoil.

Probe location was controlled by pacing from the established grid lines. The results of each probe were marked on each artifact bag. This included location (e.g., N85, E100), soil stratigraphy (depth of plow zone, subsoil type, depth of cultural deposit, and type of material recovered), the date, and initials of the recorder. Artifact bags were cataloged several times daily. A soil probe was used regularly to determine subsoil composition and depth below the shovel probes at sites 23CY-20 and 23CY-352. Negative and positive probes were recorded on the site grid map by the crew chief on a continuing basis.

Diagnostic artifacts found on the ground surface were collected. The provenience of surface material was recorded on the artifact bag.

Test units were placed in areas that produced high concentrations of subsurface cultural material during shovel testing. These units were utilized to ascertain depth and significance of cultural deposits; they were placed to complement the backhoe trenches at sites 23CY-20 and 23CY-352.

Two 1 m x 1 m test units were placed at each site. The units were dug by 10 cm levels, and all fill was passed through 1/4 in or 1/2 in mesh hardware cloth, depending on soil conditions. When the 1/2 in screen was used, the 1/4 in mesh was employed to sample 10 liters of tailings from the larger screen. This process was repeated in each level of the test unit. Test units were dug to a depth of approximately 20 cm below cultural deposits. As proposed (American Resources Group,

Ltd. 1984:4), excavations were limited in extent in order to minimize the adverse impacts of extensive data recovery.

The technical proposal (American Resources Group, Ltd. 1984) provided for the excavation of at least one backhoe trench at sites 23CY-20 and 23CY-352 because it was recognized that these sites could contain buried cultural deposits. Backhoe trenches were not recommended at site 23CY-359 because it was located on a ridge subject to erosion. The Supervising Archaeologist decided, in consultation with the Principal Investigator and Geomorphologist, to excavate two backhoe trenches at 23CY-20 and five backhoe trenches at 23CY-352. Depth and horizontal extent of these trenches varied and depended upon presence or absence of cultural deposits and soil stratigraphy. The width of the trenches was .6 m.

Charcoal samples for radiocarbon dating and samples for flotation of botanical and faunal remains were taken from excavation units and features when these remains were encountered. All test excavations and cultural features were sketched and photographed.

Laboratory Procedures

All cultural material recovered from the shovel probes, surface collections, test excavations, and backhoe trench features were washed, sorted, labeled and cataloged. The Supervising Archaeologist inventoried the artifacts and lithic materials. Radiocarbon dates from charcoal samples recovered at site 23CY-352 were provided by Beta Analytic, Inc., of Coral Gables, Florida. Analyses of faunal and ceramic materials were conducted at the facilities of American Resources Group, Ltd., Carbondale, Illinois. Analysis of botanical remains from

site 23CY-352 was conducted by Leonard Blake of Washington University. Artifacts are curated by the University of Missouri, Columbia.

The following classification was used to inventory the artifacts recovered during this project.

Bifacial Tools - tools which were formed by removing flakes from two sides of a piece of chert. Bifacially worked tool fragments which have no diagnostic attributes are included in this general category.

Projectile Point/Hafted Knife - a biface exhibiting a pointed blade and a stem or hafting element (Ray et al. 1984:160). Diagnostic tools in this category were compared with known projectile point types in the literature and, when possible, assigned a type name.

Drill - a biface with a base and a narrow, parallel-sided blade with steep-angled lateral edges and a bi-triangular cross section (Ray et al. 1984:160).

Preform - a carefully flaked biface that is unfinished but suggestive of the final product (e.g., a relatively thin, percussion flaked, square-based biface which basically lacks only final shaping and notching via pressure flaking to become a projectile point/knife (Ray et al. 1984:160).

Unifacial Tools - tools made by removing flakes from only one side of a piece of chert.

Endscraper - a tool that is unifacially worked on the steep distal end.

Turtleback Scraper - a tool that is unifacially worked on all sides and usually is circular or rounded in appearance.

Sidescraper - a tool that generally is unifacially worked along one edge (the long axis).

Retouched Debitage - any of the debitage categories below (primarily flakes) which have had small flakes removed from their edges.

Core - any block, nodule (or flake) from which flakes have been removed (White et al. 1963:6).

Debitage - residual lithic material resulting from all stages of tool manufacture (Crabtree 1972:58). Debitage can be further classified into shatter and flakes. Some debitage contains cortex, generally referring to the natural surface or "rind" on chert-like material (Crabtree 1972:56).

Shatter - cubical and irregularly shaped chunks or pieces having few or no definitive characteristics such as bulb of force, platform, etc. Shatter generally is the result of both heavy percussion techniques and the cleavage of raw materials along old fracture planes such as frost cracks (Binford and Quimby 1963:278-279).

Shatter has been divided into categories determined by the cortex:

Primary Shatter - shatter which has at least one surface predominantly covered with cortex.

Secondary Shatter - shatter with only a portion of a surface covered with cortex.

Shatter - shatter with no cortex.

Flake - any piece of stone removed from a larger mass by the application of force. Flakes exhibit a platform and bulb of

force of the proximal end. They may be of any size, shape, or dimension, depending on which technique was used for detachment, the size of the piece of raw material or core, and the desired finished product (Crabtree 1972:64).

Decortication Flake - a flake which has the dorsal surface partially or entirely covered by the unmodified cortex of the raw material with the ventral surface showing scarring from the heavy percussion (Binford and Quimby 1963:287).

Primary Decortication Flake - a decortication flake with the majority of the dorsal side covered with cortex. Generally, these flakes are assumed to have been removed solely for the purpose of removing the cortex, which generally renders the flake unsuitable for most types of tools, and were discarded (White et al. 1963:5).

Secondary Decortication Flake - a decortication flake whose dorsal surface, lateral or distal sides, is only partially covered with cortex. These flakes also were removed for the purpose of removing the remaining cortex. However, edges which are free of cortex permit the flake to be used for certain types of tools (White et al. 1963:5).

Interior Flake - a flake with no cortex.

Bifacial Thinning Flake - flakes removed from bifacial blanks or large bifacial tools which exhibit a small portion of one surface of the biface. This small

bifacial surface exhibits an overhang (bulbar surface) and constitutes the striking platform (McNerney 1975:5).

Polished Flake - a flake whose dorsal surface has a high degree of polish. These flakes usually are considered to be flakes from bifacial digging implements such as hoes. They also may be attributable to adzes and other woodworking tools.

Modified Rock - any altered sandstone, limestone, or igneous/metamorphic rock, including manos, metates, hammerstones, or other groundstone tools.

Hammerstone - a hard stone that exhibits battering and crushing on one or more ends, surfaces, or edges.

Worked Hematite and Catlinite - an ore chunk with one or more ground, faceted surfaces.

Abrader - a rock (usually sandstone) with one or more linear grooves produced by abrasion.

Unmodified Rock - any unmodified sandstone, limestone, sedimentary rock, igneous/metamorphic rock, or hematite.

Ceramics

Prehistoric ceramics were classified according to temper, morphology, and decoration (Appendix A).

Major portions of the Environmental Setting and the Prehistoric Cultural Context sections of this report were taken from the Phase I survey report (Ray et al. 1984).

ENVIRONMENTAL SETTING

Topography

The topography of the northern part of Union Electric Company's residual lands consists of gently rolling to level upland. Glaciation of this region resulted in relatively level plains; however, erosion and downcutting of the Missouri River and its tributary streams have deeply dissected the plain in the southern half of the area, leaving a nearly isolated plateau of approximately 8 mi² called Coates Plateau (Union Electric Company 1979a). This plateau has a maximum elevation of 858 ft msl, and the Missouri River base level is approximately 505 ft msl; therefore, maximum topographic relief between the crest of the plateau and the Missouri River is approximately 350 ft msl.

Drainage

The general surface drainage flow pattern in the project area is from north to south. Logan Creek to the east and northeast of the site area has sharply downcut the local terrain, forming a floodplain that is approximately 1,000 ft wide. This creek extends some 6 mi north of its confluence with the Missouri River. For a more detailed discussion, see Appendix D.

Auxvasse Creek, a major tributary of the Missouri River, is located about 2 mi west of the area. This creek drains the western and northern flanks of the upland plateau. It is more than 30 mi in length and has a number of large tributary branches.

Mud Creek drains the southern and southwestern sides of the Union Electric property. Intermittent branches of this creek have cut deeply into the southern flank of the upland plateau, forming steep stream gradients.

The rugged relief of the project area is due to numerous lateral streams of Logan and Mud creeks that have deeply downcut the plateau. To the north of the study area, dissection of the landscape is not as severe. Surface drainage in this area is intercepted by Cow Creek, a major tributary of Auxvasse Creek. Gradients along intermittent streams flowing into Cow Creek are relatively low.

Soils

Soils in the project area vary from fertile soils on the Missouri River floodplain to less fertile, cherty soils on weathered limestone bedrock along steep upland ridge slopes. High plasticity clays are found on the lower elevations of the plateau, while eroded loess deposits are found at higher elevations. The Missouri River floodplain is composed of alluvial deposits containing large amounts of silt and sand (Appendix D). The steep slopes of the dissected upland contain rock debris of various types and sizes.

There are five major soil groups near the project area: the Mexico, Putnam, Menfro, Goss, and Sarpy series (Missouri Department of Conservation 1976). The Mexico and Putnam soils have developed in thin (2.5 ft to 5.5 ft) loess deposits overlying glacial till with a prairie vegetation cover. Both soils have "clay pans" about 14 in to 17 in below the soil surface (Scrivner et al. 1966:16). During rainy seasons, the slowly permeable subsoils combine with the nearly level topography

to create a soil saturation problem, forming ponds and shallow muddy areas.

The Menfro soils are light colored, having developed under a forest cover on narrow ridge tops and steep slopes bordering the Missouri River. These soils are well drained and have a high moisture storage capacity. Their value for agriculture is seriously limited because they are located on steep slopes and are susceptible to erosion.

Goss soils are characterized by moderate permeability and rapid runoff, having formed from weathered, cherty limestone. Sarpy soils occupy the alluvial Missouri River floodplain. These soils are very fertile and are intensively farmed. The USDA Soil Conservation Service estimates that approximately 50% are subject to extreme flooding, 40% are not subject to serious overflow, and 10% are subject to overflow so frequently that their usefulness is doubtful.

Geology

The stratigraphy of the exposed geological formations in the study area (Figure 1) is composed of seven sedimentary Paleozoic formations and three Quaternary deposits (Ray et al. 1984:6). The latter deposits consist of mantles of glacial till and loess in upland areas and alluvial deposits in the floodplains and valleys.

Jefferson City dolomite is the oldest Ordovician-aged formation. This chert bearing formation underlies site 23CY-359 but is exposed as the prominent bluffs adjacent to sites 23CY-20 and 23CY-352. While Jefferson City is predominantly dolomite, it does contain up to 40% chert (Conselman 1934:104). Small amounts of sandstone and shale occur in this formation, but they probably were not used by prehistoric




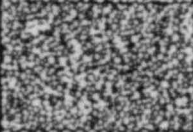





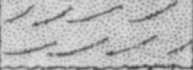
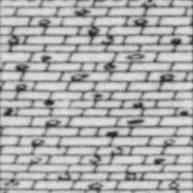
SYSTEM	SERIES	STAGE	FORMATION OR UNIT	LITHOLOGIC COLUMN	DESCRIPTION	RANGE OF THICKNESS (FEET)
QUATERNARY	PLEISTOCENE	WISCONSINAN AND/OR ILLINOIAN	LOESS		WIND-BLOWN SILT - ALTERED TO BROWN SILTY CLAY BY WEATHERING	3-17
		KANSAN	ACCRETION-GLEY		GRAY SILTY CLAY - MODERATELY PLASTIC.	4-28
		KANSAN	GLACIAL-TILL		REDDISH-BROWN SILTY CLAY WITH SOME SAND AND GRAVEL (GLACIAL TILL)	3-27
PENNSYLVANIAN			GRAYDON - CHERT CONGLOMERATE		REDDISH-BROWN, BUFF, PURPLE, AND GREEN CLAY CONTAINING 20% TO 65% ANGULAR TO ROUNDED, GRAVEL TO BOULDER SIZE CHERT PARTICLES. INDURATED SANDSTONE AND SANDY CHERT CONGLOMERATE DEVELOPED LOCALLY	4-61
MISSISSIPPIAN			BURLINGTON		GRAY TO TAN LIMESTONE, COARSE GRAINED, CHERTY, CRYNOIDAL	0-42
			BUSHBERG		GREENISH TO YELLOWISH-BROWN SANDSTONE, FINE TO MEDIUM GRAINED, FRIABLE	0-6
DEVONIAN			SNYDER CREEK		BROWN LIMESTONE, SILTY, FOSSILIFEROUS; GRADES DOWNWARD TO PURPLE AND GREEN, CALCAREOUS SILTSTONE WHICH IS UNDERLAIN BY GRAY SILTY SHALE	10-47
			CALLAWAY		BROWNISH-GRAY LIMESTONE - FINE TO COARSE GRAINED, FOSSILIFEROUS, PYRITE AT TOP, SANDY AT BASE	11-49
			JOACHIM		BROWN DOLOMITE, SILTY, CALCITIC, SANDY AT BASE	0-10
ORDOVICIAN			ST. PETER		WHITE SANDSTONE, FINE GRAINED, MASSIVE TO CROSS BEDDED, FRIABLE, WEATHERS TO BROWN	0-11
			COTTER-JEFFERSON CITY		LIGHT GRAY DOLOMITE - FINE TO MEDIUM GRAINED, THIN BEDDED, NUMEROUS GREEN SHALE STRINGERS IN ZONES, GRAY BANDED CHERT	~ 200

Figure 1. Generalized Columnar Section of the Geological Stratigraphy in the Project Area (adapted from Union Electric Company 1979b)

cultures (Ray et al. 1984:9). Jefferson City chert occurs in discontinuous lenticular beds as "free" nodules and as thin seams in the dolomite matrix. Often, orthoquartzite is associated with Jefferson City chert (Ray et al. 1984:9). Jefferson City chert is a fine grained, chalcedony-like chert which is highly variable in color. This chert occurs in shades of blue, gray, brown, and white as well as pink, purple, black, and reddish brown. Some white and gray-brown varieties could be confused with Burlington chert. Jefferson City chert occurs as oolitic, banded, or mottled in appearance. The most diagnostic characteristic of Jefferson City chert is the near absence of fossils (Ray et al. 1984:10). The Phase I survey conducted in the study area (Ray et al. 1984) indicated that Jefferson City chert was utilized by the area's prehistoric inhabitants.

The Ordovician St. Peters sandstone formation (Figure 1) occurs in isolated masses throughout the southeastern portion of Callaway County. These sandstone monoliths often are more than 100 ft thick and are thought to be ancient stream channels or karstic depressions filling in the top portion of the Jefferson City formation (Conselman 1934:107; Miller 1951:10; Unklesbay 1955:2). One of these exposures occurs in the study area and may have been a source of sandstone for tools (Ray et al. 1984:10).

Union Electric Company (1979b:2.5-13) recognizes a nonchert-bearing Joachim dolomite formation (Figure 1) overlying the St. Peter or Jefferson City formation. It is thin (0-10 ft) and discontinuous. It does not seem to have provided any raw materials that were used by the prehistoric inhabitants of the study area.

The Callaway formation (Figure 1), a Devonian limestone,

unconformably overlies the Jefferson City or St. Peter formation. The Callaway formation averages about 10.5 m thick in the study area and predominantly consists of fine grained limestone, although a sandy limestone or sandstone up to 1.5 m thick is common in the basal beds (Union Electric Company 1979b:2.5-12). The sandy member at the base may have been exploited aboriginally for sandstone tools (Ray et al. 1984:12).

The Callaway formation provides a minor source of prehistorically exploited chert in the area. This chert is neither common nor widespread but does occur in quantity in localized areas (Conselman 1934:112; Unklesbay 1955:3). Callaway chert occurs in small nodules, is fine to coarse grained, and is a light and dark gray chert with small white fossils.

The Snyder Creek formation (Figure 1), which conformably overlies the Callaway limestone, also is a Devonian deposit. This formation is composed of shale and limestone and contains no chert resources.

A relatively thin but widespread Mississippian-aged sandstone formation known as Bushbert unconformably overlies the Snyder Creek formation. This fine to medium grained, poorly sorted sandstone (Figure 1) ranges in thickness from 10 cm to about 2 m (Union Electric Company 1979b:2.5-11). This sandstone probably was a major source of raw material for tools such as manos and abraders (Ray et al. 1984:12).

The youngest Mississippian formation is the chert bearing Burlington limestone (Figure 1) which caps the plateau to the north of the sites being tested. Burlington is a coarse grained and highly fossiliferous limestone which varies from 0-13 m in thickness (Union

Electric Company 1979b:2.5-11). Burlington is predominantly limestone, but chert makes up a major portion of the upper section of the formation.

Burlington chert occurs in the form of continuous layers and discontinuous lenses but more commonly in large irregular nodules. Burlington chert varies in color from white, cream, buff, tan, brown, and light gray to pinkish and red. Banding and mottling is rare. This chert ranges from fine to coarse grained and usually is opaque. Burlington chert can be easily altered by heat treatment and often obtains a waxy luster and turns deep red and pink due to iron oxidation (cf. Struever 1973:64). The basal portion of the Burlington formation probably was the major source of hematite in the area (Ray et al. 1984:14).

Between the Burlington limestone and overlying deposits is a conglomeration of Burlington chert nodules embedded in sand and clay. This is referred to as the Graydon Chert Conglomerate (Figure 1) and is thought to be of Pennsylvanian age (Miller 1951:61, 69; Union Electric Company 1979b:2.5-9, 10). This formation accounted for much of the Burlington chert that was available in the northern sections of Union Electric residual lands (Ray et al. 1984:15); it was extensively exploited by the aboriginal inhabitants of the area.

A deposit of blue, gray, and red Pennsylvanian clay known as Cheltenham clay overlies the Graydon Chert Conglomerate (Miller 1951:70). This clay occurs only on the northern plateau area of Union Electric residual lands and may have been exploited by prehistoric potters during the Woodland period (Ray et al. 1984:15).

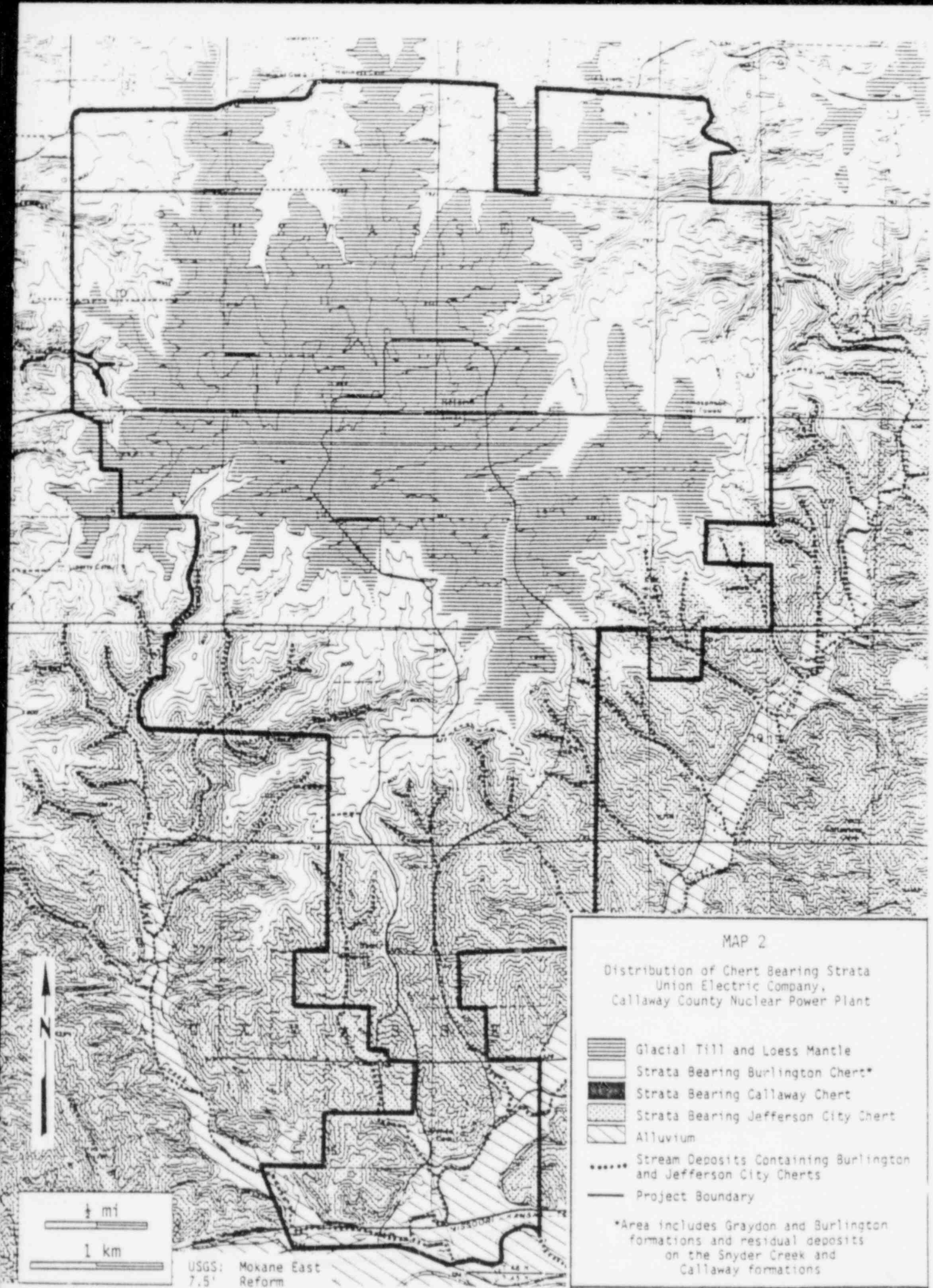
Three major Pleistocene deposits cover the Cheltenham clay (Figure 1). A mantle of Kansan glacial till up to 8 m thick (Union Electric Company 1979b:2.5-9), composed of material of local and nonlocal geological origin (Unklesbay 1955:9), overlies the Cheltenham deposit. This till has eroded into local creeks and provided prehistoric peoples with hard igneous rocks for the manufacture of groundstone tools and may have contained various redeposited chert types (Ray et al. 1984:15). A later Kansan stage deposit is represented by a moderately plastic gray silty clay referred to as accretion-gley (Figure 1), which ranges from 0-8 m thick and may have been a prehistoric clay source. The youngest deposit in the stratigraphic sequence is a blanket of modified loess (Figure 1) 1-4.5 m thick deposited during either the Wisconsinan or Illinoian glacial stages (Union Electric Company 1979b:2.5-8).

For a more detailed discussion of chert and lithic resources in the area of Union Electric Company's residual lands, see Ray et al. (1984). Map 2 shows the distribution of chert bearing strata in the study area.

Flora








Tall grass prairie and oak-hickory forest (Missouri Department of Conservation 1976) compose the two major vegetation communities in the area. The tall grass prairie occupies the high, relatively flat portion of Coates Plateau. This land presently is being used for agricultural purposes, but historic records and accounts (Boone 1816-1817:227-248; Kucera 1961) indicate that presettlement climax vegetation (Map 3) was a tall grass prairie dominated by little bluestem, big bluestem, and Indian grass (Ray et al. 1984:23).

On the ridge tops and slopes in the immediate area, where moisture

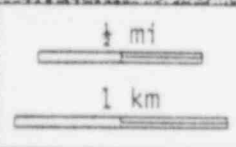


MAP 2

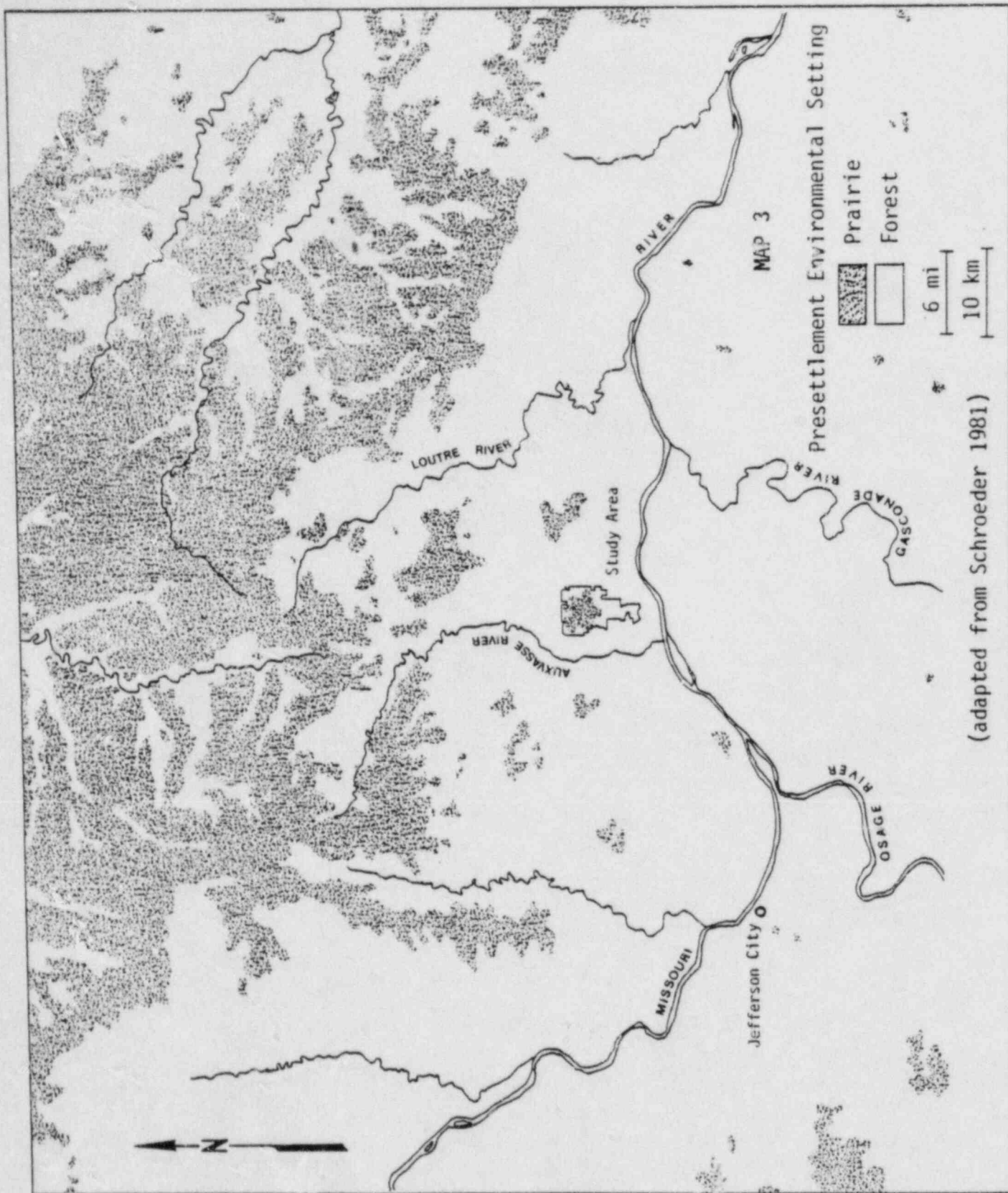
Distribution of Chert Bearing Strata
 Union Electric Company,
 Callaway County Nuclear Power Plant

-  Glacial Till and Loess Mantle
-  Strata Bearing Burlington Chert*
-  Strata Bearing Callaway Chert
-  Strata Bearing Jefferson City Chert
-  Alluvium
-  Stream Deposits Containing Burlington and Jefferson City Cherts
-  Project Boundary

*Area includes Graydon and Burlington formations and residual deposits on the Snyder Creek and Callaway formations



USGS: Mokane East
 7.5' Reform



(adapted from Schroeder 1981)

generally is more available, the dominant vegetation is an oak-hickory forest (Steyermark 1940). Several oak species are present, including white oak, black oak, and northern red oak. Shagbark hickory is the major hickory species present in the drier areas, while bitternut hickory occupies the moister areas. Other tree species that occur in the area include dogwood, persimmon, white ash, hackberry, hornbeam, black cherry, sumac, sassafras, maple, slippery elm, and cedar (Union Electric Company 1979a).

An account of pioneer or presettlement vegetation in the project area is provided by Government Land Office survey notes of Nathan Boone (1816-1817:141-248). Four vegetation communities or environmental zones tentatively were defined according to descriptions in Boone's survey notes: Bottomland Forest, Bottomland/Swamp (presumably slough areas), Dissected Upland Forest, and Level Upland Prairie. In each zone, the frequencies of arboreal species were calculated using witness trees along section lines and a general timber description at the end of each section of Boone's notes as the data base (Table 1). For a detailed discussion of presettlement vegetation in the study area, see Kilppel (1971a) and Ray et al. (1984).

Within the Union Electric property, approximately 36% of the land is forested, 28% is in cultivation, and 36% is pasture or is early successional. The Level Upland (Coates Plateau) is primarily used for cropland and grazing.

Fauna

The study area provides sufficient water, food, and ground cover for wildlife in the vicinity. The predominant game species are

Table 1

Presettlement Vegetation Counts as Recorded
by Nathan Boone (Fall 1816)

Bottomland Forest			Bottomland Swamp			Dissected Upland Forest		
Trees	No.	%	Trees	No.	%	Trees	No.	%
†*Hackberry	16	28.1	†*Hackberry	2	25.0	†*White Oak	64	38.8
*Elm	13	22.8	*Elm	2	25.0	†*Black Oak	47	28.5
†*Walnut	9	15.8	*Coffeenut ²	1	12.5	*Red Oak	15	9.1
†*Cottonwood	7	12.3	*Maple	1	12.5	†*Hickory	12	7.3
Sycamore	5	8.8	†*Oak	1	12.5	Cedar	9	5.5
*Boxelder ¹	3	5.3	Swamp Ash	1	12.5	*Sugartree ³	6	3.6
†*Bur Oak	2	3.5	Total	8	100.0	*American Elm	3	1.8
†*Hickory	1	1.7	Undergrowth	No.	%	*Boxelder ¹	2	1.2
*Ash	1	1.7	Spicebush	1	50.0	†*Black Walnut	2	1.2
Total	57	100.0	*Blackberry	1	50.0	†*White Walnut ⁴	1	0.6
Undergrowth	No.	%	Total	2	100.0	†*Mulberry	1	0.6
Spicebush	9	47.4			†*Bur Oak	1	0.6	
*Pawpaw	9	42.1			*Ash	1	0.6	
†*Grapevine	2	10.5			*Linden ⁵	1	0.6	
Total	19	100.0			Total	165	100.0	
					Undergrowth	No.	%	
					Spicebush	13	39.4	
					†*Oak	9	27.3	
					†*Hazel	8	24.2	
					*Pawpaw	3	9.1	
					Total	33	100.0	

¹Ashland Maple

²Kentucky Coffeetree

³Sugar Maple

⁴Butternut

⁵Basswood

*Potentially exploitable food bearing plants (after Zawacki and Hausfater 1969). For seasonality, see Steyermark (1963).

†These plants may leave identifiable remains in an archaeological context (Moore and Burge 1981:170-180).

white-tailed deer, wild turkey, bobwhite quail, cottontail rabbit, fox and gray squirrel, and mourning dove. Furbearing and nongame animal species include opossum, long-tailed weasel, raccoon, fox, coyote, striped skunk, field rodents, pond and predatory birds, amphibians, and reptiles. Waterfowl are found along the Missouri River. An extensive list of bird species observed in the project area is presented by Union Electric Company (1979a:Table 2.2-34).

A complete listing of fish species found in the Missouri River and Logan Creek is given by Union Electric Company (1979a:Table 2.2-18). Some of the more common present-day species include large- and small-mouth bass, crappie, shad, sunfish, bluegill, catfish, carp, and shiners. Two species of mussels were found in the Missouri River, and a third mussel species was collected from Logan Creek.

Climate

The contemporary climate of the study area is continental and is characterized by warm, humid summers with considerable convective rainfall and highly variable winter weather with moderate amounts of rain and snow (Union Electric Company 1979a:2.3-1). The climatic pattern is dominated by warm and moist maritime tropical air from the Gulf of Mexico during late spring and summer and by cold, dry continental polar air during the winter months.

Mean seasonal temperature and precipitation data recorded in nearby Fulton, Missouri, are presented in Table 2.

Most of the precipitation in the research area falls during the spring and summer months; however, the character of the rains in the two periods usually is quite different. Spring rains generally are light

Table 2

Mean Seasonal Temperatures (1888-1960)

<u>Months</u>	<u>Mean Temperature</u>
Jan. - March	35.2°F
April - June	64.1°F
July - Sept.	74.5°F
Oct. - Dec.	44.8°F
Annual Mean Temperature	54.7°F

(Adapted from Union Electric Company 1979a:Table 2.3-4)

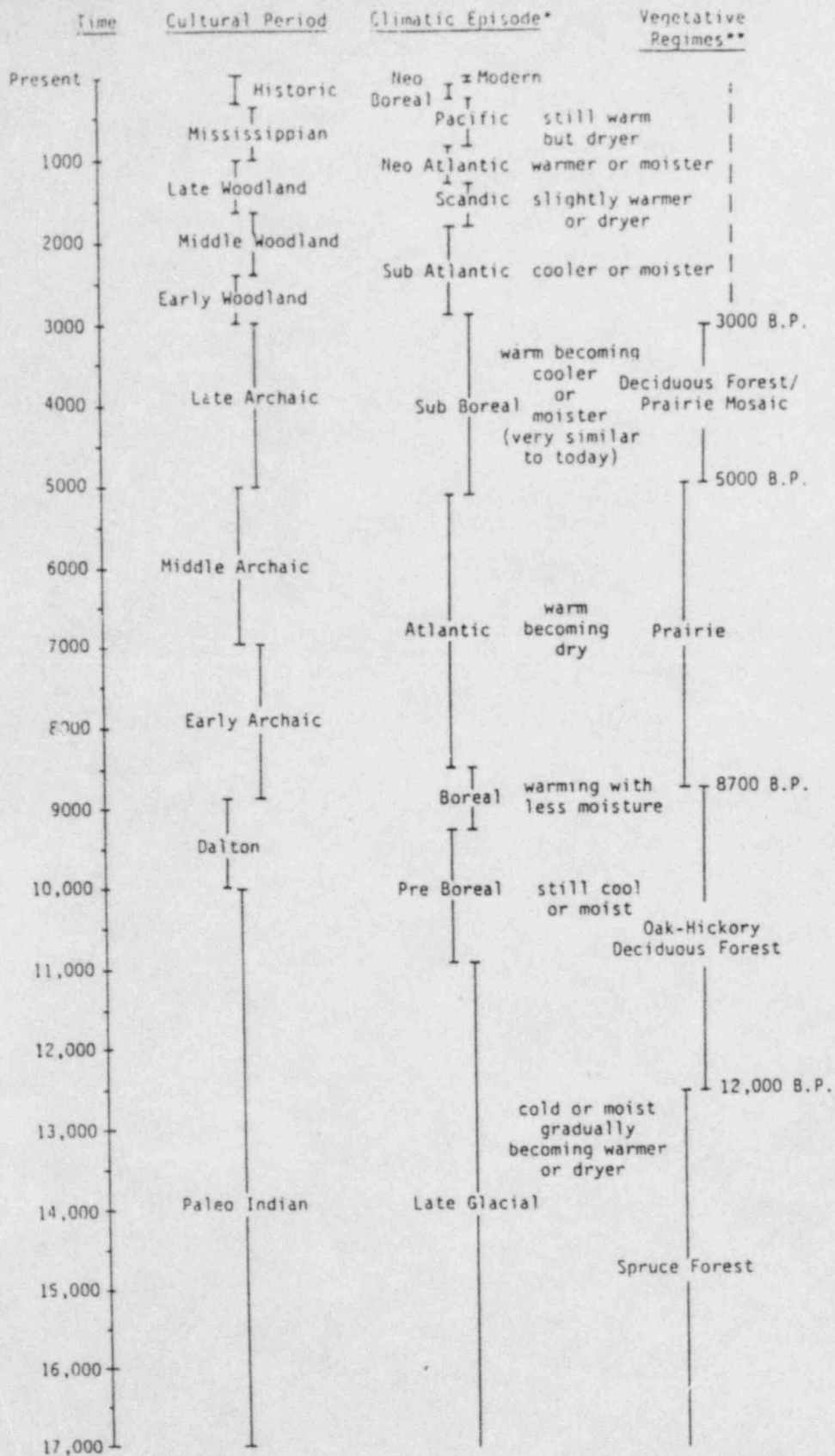
Mean Seasonal Precipitation (1941-1970)

<u>Months</u>	<u>Mean Precipitation</u>
Jan. - March	5.88 in
April - June	12.83 in
July - Sept.	11.35 in
Oct. - Dec.	7.38 in
Annual Mean Precipitation	34.44 in

(Adapted from Union Electric Company 1979a:Table 2.3-8)

but of long duration, whereas summer precipitation often comes in the form of heavy thunderstorms of relatively short duration. The average growing season in east-central Missouri is from early April to late October.

Studies of paleo-climates (Bryson et al. 1970; Wendland 1978) have shown that over the past 12,000 years, climate has been variable and often produced dramatic shifts in vegetal patterns. In Missouri, these shifts in climate are reflected in archaeological data from Rodgers Shelter and the Pomme de Terre River area (Wood and McMillan 1976) and at Graham Cave (Klippel 1971b). Figure 2 is a schematic chart of the paleo-climatic periods and vegetation regimes and their relationship to



*After Wendland, 1978

**After King (1981), King and Allen (1977), King and Lindsay (1976)

Figure 2. Cultural and Environmental Sequences of Missouri

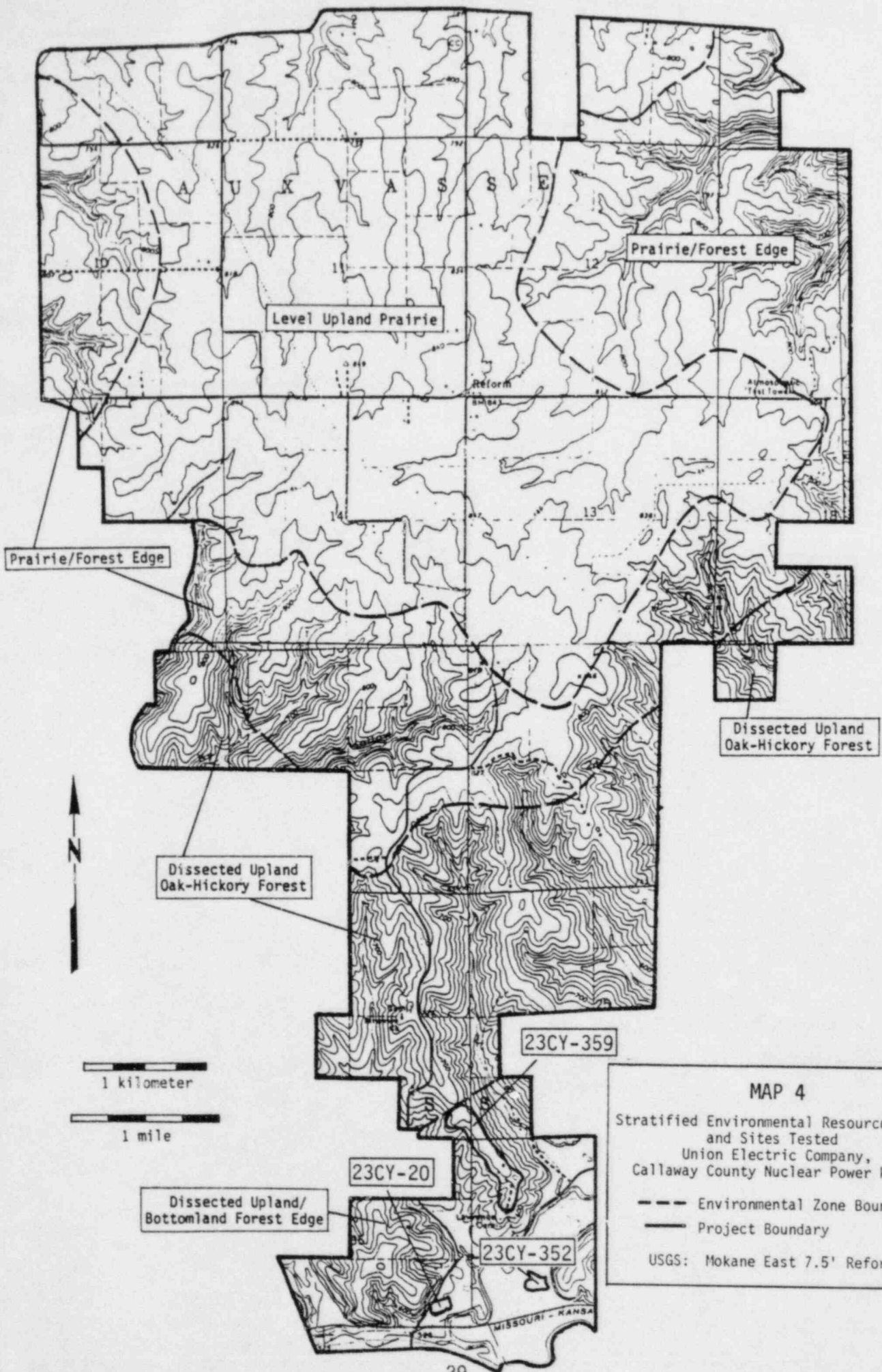
prehistoric cultural periods. For a more detailed discussion of these paleo-climatic episodes, see Ray et al. (1984:29-31).

Callaway Plant Residual Lands

The study area is geographically located in the southeast portion of Callaway County in east-central Missouri. Topographically, the Callaway Nuclear Power Plant site area is located between the southern border of the Dissected Till Plains modified by glaciation and the northern boundary of the Ozark (Salem) Plateau (Fenneman 1946). The Dissected Till Plains were formed by erosion of a mantle of drift and till deposited during the Quaternary period. In the southern portion of the Till Plains, gently rolling and hilly topography was created by geophysical processes. The hilly-to-mountainous topography of the Ozark Plateau was developed by erosion of the Ozark uplift.

The Missouri River flows in an easterly direction 8 km (5 mi) south of the plant site. The floodplain in this area is 3.8 km (2.4 mi) wide, with contour elevations of 157.5 m (520 ft) bordering the north and south sides of the river. Logan Creek flows in a southwesterly direction entering onto the Missouri River floodplain.

Physiographically, the project area consists of heavily dissected upland with narrow ridges and valleys and fertile bottomlands of Logan Creek and the Missouri River. Ray et al. (1984) have identified the physiographic zones which are based on topography and vegetation (Map 4) within the confines of Union Electric Company's residual lands. There are four physiographic zones: Level Upland Prairie, Prairie/Forest Edge, Dissected Upland Oak-Hickory Forest, and Dissected Upland/Bottomland Forest Edge. Vegetation in the Level Upland Prairie



MAP 4
 Stratified Environmental Resource Zones
 and Sites Tested
 Union Electric Company,
 Callaway County Nuclear Power Plant

- - - Environmental Zone Boundary
 — Project Boundary

USGS: Mokane East 7.5' Reform

zone primarily consists of grasses. The Prairie/Forest Edge is an eastward trending belt which flanks the Level Upland Prairie on the east and west sides. This zone contains both woodland and prairie species of flora and fauna.

Prehistorically, the Dissected Upland Oak-Hickory Forest contained a variety of nuts, seeds, and berries as well as small and large game mammals (Ray et al. 1984:139). The Dissected Upland/Bottomland Forest Edge contains marsh, swamp, small oxbow lakes, several creeks, and stream terraces. This is a floodplain belt ideal for a variety of fauna, including large and small mammals, waterfowl, fish, and mussels. This zone encompasses vertical bluffs and ridge tops that contain oak-hickory forest species. Sites 23CY-20, 23CY-352, and 23CY-359 are located within the Dissected Upland/Bottomland Forest Edge zone.

Environmental Setting of Sites

Site 23CY-20 is located in bottomland on a second terrace of Logan Creek. It is flanked by Logan Creek on the east and marshy wetland on the southeast. This marshy area extends to the confluence of Mud Creek and Logan Creek, 200 m southeast of the site. Immediately to the northwest of the site, a steep, wooded bluff rises over 100 ft to a northwest trending ridge. A slightly higher terrace occurs to the northeast of site 23CY-20. This terrace is dissected by a small intermittent stream 150 m north of the site. Site 23CY-20 is subjected to flooding by Logan Creek and the Missouri River (Appendix D) and erosion by water runoff from the steep ridges to the northwest. In this geological context, site 23CY-20 has been subjected to soil deposition

and soil removal processes. Chert occurs as cobbles in Logan Creek and on nearby ridges and bluffs (Ray et al. 1984).

Site 23CY-352 is located on a similar terrace east of Logan Creek. This terrace rises approximately 3 m above the floodplain of southwesterly flowing Logan Creek immediately north of site 23CY-352. Immediately east of site 23CY-352, the terrace merges with a sheer, wooded bluff with dolomite outcroppings rising 100 ft above the terrace. Southwest and south of site 23CY-352, marshy wetland occurs. This area is bounded by Logan Creek, which flows easterly after its confluence with Mud Creek, approximately 600 m southwest of site 23CY-352. Sites 23CY-352 and 23CY-20 share a stream bottom environment with access to resources of the Oak-Hickory Upland Forest.

Site 23CY-359 is located on a northwest trending linear ridge which rises from an elevation of 620 ft at the south end of the site to almost 700 ft at the northern end of the site. Grass covers the ridge top, with oak-hickory forest covering the slopes. The site is located on Jefferson City chert bearing limestone. The site area has been subjected to erosional processes. The ridge upon which site 23CY-359 is located is bounded on the northeast and southwest by small intermittent streams and by Logan Creek on the southeast. This ridge extends northwest of site 23CY-359 for approximately 1,600 m, where it becomes broader and flatter and forms an extension of the Level Upland Prairie.

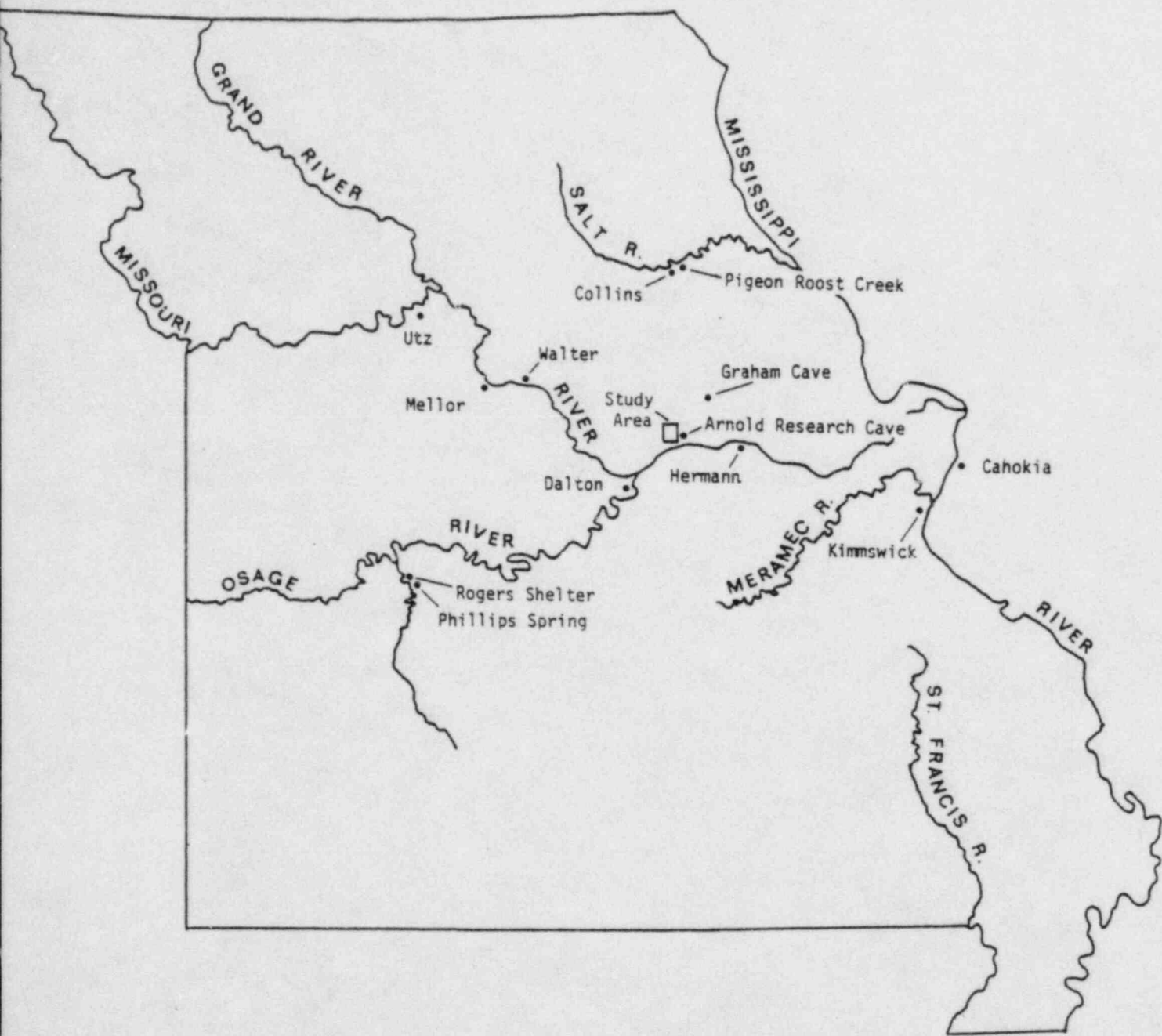
PREHISTORIC CULTURAL CONTEXT

Prehistoric

The following is a brief synopsis of prehistoric cultural sequence of the Missouri-2 Watershed Management Unit as defined by archaeological investigations. Discussions of settlement-subsistence adaptations and site locational patterns attributable to certain periods are presented. The data discussed encompass large scale syntheses concerning the state as a whole, surveys of major drainage areas, published and unpublished site reports, and information extracted from site files of the Archaeological Survey of Missouri. The cultural sequence relies heavily on work conducted at nearby Graham Cave (Klippel 1971b; Logan 1952) and at Arnold Research Cave (Shippee 1966); the chronological framework used in the temporal constructions is based largely on Chapman (1975) and has been previously employed in the study area (Ray et al. 1984). All dates in this report are given in years before present (B.P.). Certain archaeological sites central to understanding the prehistory of the project area and Missouri in general are presented in Map 5.

Paleo-Indian (14,000-10,000 B.P.)

Current evidence indicates that man arrived in the New World some 15,000 years ago. Most archaeologists believe that bands of Asiatic hunters traversed what is now the Bering Sea on a land bridge which connected the two continents during the final stages of the last ice



Map 5

Prehistoric Sites Discussed
in this Report in Missouri

Age. These first Americans were hunters of big-game animals and probably wandered here while following herds of the now extinct mammoth. Artifacts found in direct association with these and other extinct species have established the antiquity of man in the New World. These early hunters are referred to as Paleo-Indians, and their sites mark the beginning of a long cultural development which continued until the arrival of the Europeans.

The Paleo-Indian period is best known from the western United States, where numerous archaeological sites have produced cultural material in association with late Pleistocene fauna. These are the well known Clovis and Folsom complexes which are associated with extinct mammoth and bison. Although major Paleo-Indian sites are distributed throughout parts of eastern North America, the incidence of Paleo-Indian artifacts in association with extinct big-game animals is rare in the East. This raises the possibility of differing cultural adaptations in the East, possibly due to differing environmental and climatic conditions. Paleontologists and archaeologists working near Kimmswick, Missouri, recently documented Clovis fluted projectile points in direct association with the bones of the American mastodon (Mammot americanum) (Graham 1979, 1980). This exciting new discovery represents the most easterly location of Paleo-Indian tools in association with extinct fauna and the first concrete evidence of man hunting the forest-dwelling mastodon.

Paleo-Indian peoples probably lived in small bands or family units, pursuing a nomadic existence related to big-game hunting. This high degree of mobility, combined with low population levels, produced highly dispersed campsites with low densities of cultural debris. In central

Missouri, as elsewhere in the Midwest, sites of this period are characterized by scattered surface finds of fluted and unfluted lanceolate projectile points. According to Shippæ (1966:8), three Clovis points were found on a hill top site near Arnold Research Cave.

Paleo-Indian sites frequently are located on high bluffs or high ridge tops along major stream valleys such as the Missouri and Mississippi rivers. In a distributional survey of fluted points (Chapman 1967a, 1967b, 1973), the majority of reported finds came from counties bordering the lower Missouri River. From Howard and Cooper counties in the west to St. Charles and St. Louis counties in the east, 15 times as many finds were reported for this area than from the rest of Missouri's counties (Chapman 1975:75). Although there are problems with this type of survey (i.e., nonprobabilistic sampling, bias towards upland site locations, buried bottomland sites, etc.), enough information was gathered to suggest this site location pattern.

Dalton (10,000-9000 B.P.)

With the glacial recession some 10,500 years ago and the disappearance of the big-game animals previously exploited, man shifted his economic pursuits in response to changing environments. These cultural adaptations are manifested in the Dalton period, when there was a change in subsistence techniques from primarily hunting large mammals to foraging (Chapman 1975:45). Subsistence activities expanded to include trapping of small-game animals and collecting of nuts, berries, seeds, fruits, and shellfish. This pattern probably continued into the subsequent Early Archaic period; however, the transition for the most part took place in approximately 600 years (Goodyear 1982:391).

The Dalton complex generally is considered a transitional Late Paleo - Early Archaic cultural manifestation which is evident in Dalton assemblages. Goodyear (1982:392) indicates that the time period 10,500 to 9,900 B.P. also represents a marked transition from glacially influenced to relatively modern climatic conditions. Lanceolate projectile point forms and specialized tool kits reflect Paleo-Indian origins; however, subsistence activities clearly are Early Archaic in emphasis.

Along the Ozark border in northeast Arkansas, Dalton occupations were situated in territories that crosscut major physiographic and resource zones irrespective of drainage boundaries (Price and Krakker 1975:35; Schiffer 1974:220-244). The Dalton complex is represented at several locations in Missouri, including the lowest levels of Graham Cave (Klippel 1971b), Arnold Research Cave (23CY-64) (Shippee 1966), Rodgers Rock Shelter (Wood and McMillan 1976), the Walter site (Biggs et al. 1970; Chapman 1975:79), the Dalton site (Chapman 1975), the Pigeon Roost Creek site in Monroe County (Teter and Warren 1979), the Bergfried No. 4 site at the confluence of the Gasconade and Missouri rivers (Diaz-Granados 1980), several open sites in the Columbia area (Schmits and Wright 1981), and along the Loutre and Little Femme Osage rivers in Montgomery and St. Charles counties (Haas 1978).

Early Archaic (9000-7000 B.P.)

The diversification of subsistence activities begun during the Dalton era continued into the Early Archaic period, when people began to exploit an even greater variety of ecological niches, using base camps as points to return to from hunting-gathering excursions. Having analyzed vertebrate fauna from the lower deposits of Arnold Research

Cave, Falk (1970:28) suggests an unspecialized mixed game adaptation as characteristic of the early subsistence base. Social units were small but probably occasionally organized into extended families.

Early Archaic peoples also began to alter their stone tool manufacturing techniques. Although the lanceolate shape generally was retained, fluting was no longer practiced as new hafting attributes appeared, such as side and corner notching.

Sites containing Early Archaic components in the lower Missouri Valley II locality include Graham Cave (Klippel 1971b; Logan 1952), Arnold Research Cave (Shippee 1966), the Dalton site at the mouth of the Osage River (Chapman 1975), 23GA-142 (the Hermann site) (Schmits 1982) and 23GA-130 (Diaz-Granados 1980) in Gasconade County, the Pigeon Roost Creek site in the Salt River valley (Teter and Warren 1979), the Dalton period in the Cannon Reservoir (Teter and Warren 1979), and seven sites along the Loutre and Little Femme Osage rivers (Haas 1978).

Middle Archaic (7000-5000 B.P.)

Between 8000-5000 B.P., climatic changes in the form of reduced rainfall and warmer temperatures started a trend toward drier environments and the expansion of grasslands (Klippel 1971a). Middle Archaic peoples responded to these changing conditions by intensifying their hunting and trapping of small animals and the collection of vegetal foods, especially nuts, berries, and seeds. By the end of the period, there may have been a complete economic adaptation from a mesic to a moderately dry environment with a greater utilization of the expansive prairies that had formed over much of western and northern Missouri (Chapman 1975:158).

Stone tool assemblages and lithic technologies changed from the earlier periods with the introduction of the full-grooved groundstone ax, smaller triangular blade side-notched and stemmed projectile points which frequently show evidence of thermal alteration, and milling stones. Middle Archaic occupations are represented at Graham Cave (Klippel 1971b), Arnold Research Cave (Shippee 1966), the Loutre River and Little Femme Osage River areas (Haas 1978), the Hermann site (Schmits 1982) and 23GA-131 (Diaz-Granados 1980) on the northern border of Gasconade County, the Cannon Reservoir area (Hunt 1976; Teter and Warren 1979), and in Long Branch Reservoir (Grantham 1977).

Late Archaic (5000-3000 B.P.)

Around 5000 B.P., the climate began to change toward more moist conditions, a trend which has continued to the present (Klippel 1971a). The effect of this trend appears to be a reduction of grasslands and an expansion of forest environments in east-central Missouri. Late Archaic peoples responded to these environmental shifts by expanding into newly created environmental zones, utilizing a wide range of wild plant and animal products. Tool assemblages, although varying from site to site, again reflect this shift and include an apparent increase in manos, grinding slabs, mortars, pestles, and digging implements, suggesting an increased use of wild plant foods. Cultigens have been reported from the Phillips Spring site and dated to 4280 B.P. (Chomko 1978:251), suggesting that Late Archaic populations were experimenting with squash (Cucurbita pepo) and wild sunflower (Compositae sp.). Squash remains also have been found at two Late Archaic sites in Kentucky (Chomko and Crawford 1978:405-407), providing additional evidence for incipient horticulture during the Late Archaic period.

Site densities increase, and sites are found in a variety of locations. Ridge and hill top locations are common and often contain hammerstones, drills, gouges, and woodworking tools. Occupations of this period are represented throughout east-central Missouri, as reported by Chapman (1975), Haas (1978), Klippel (1971a), Teter and Warren (1979), and Grantham (1977). Radiocarbon dates from buried cultural deposits in the Hinkson-Perche Creek valley in Boone County revealed two Late Archaic components 80 cm (Wright 1981:137) and 130 cm (Powell 1982:51) below the surface.

The best known complex of this period is the Sedalia phase, which is represented at the Geiger and Booth sites (Chapman 1975:203) in northeastern Missouri. The Booth site produced Clear Fork gouges, Sedalia diggers, Etley and Stone Square Stemmed knives, and probably was primarily used as a base of operations for collecting and processing vegetal materials (Klippel 1969 cited in Chapman 1975:211). If we consider the Sedalia and Etley complexes, it would appear that there is considerable cultural diversity during Late Archaic times, possibly more than is evident at the present time.

Early Woodland (3000-2500 B.P.)

Early Woodland cultural processes and adaptations are not clearly defined in east-central Missouri at this time. Here, as in other parts of the Midwest, Midsouth, and East, the first appearance of pottery generally marks the beginning of the Early Woodland period. Often, this pottery accompanies a Late Archaic tool assemblage. Sites from this time period often exhibit Middle Woodland traits as well. Thus, evidence for the period is blurred by traits of these earlier and later

cultural manifestations. The presence of pottery and the possibility of incipient horticulture suggest a more sedentary lifestyle.

The blending of Late Archaic and Early Woodland cultural traits is clearly indicated in the Salt River locality of northeastern Missouri (Angus and Ruppert 1977; Klippel 1972; Ruppert 1976; Teter and Warren 1979). The Collins site reported by Klippel (1972) was the first site to shed light on the nature of Early Woodland period manifestations in the Northeast Prairie Region. Although no early pottery was found, a radiocarbon date of 2500 B.P. was obtained from two refuse pits (Klippel 1972:51). Logan (1952:60) reported finding a possible Early Woodland fiber-tempered sherd at Graham Cave, and 23MN-243 in the Salt River locality contained a possible Black Sand Incised rim sherd (Chapman 1980:15). Haas (1978:169) reported three possible Early Woodland sites in the Loutre River and Little Femme Osage River areas based on contracting stemmed projectile points. It should be noted that neither the temporal nor cultural dimensions of the period are well established in Missouri.

Middle Woodland (2500-1500 B.P.)

Pottery became more elaborate, stone tool assemblages showed greater diversity, and lithic technology became more sophisticated with the emergence of the Middle Woodland period about 2500 B.P. Local and regional groups appeared to be linked by a rich religious and economic exchange system which Struever (1964:89) has called the Hopewellian Interaction Sphere. Conical burial mounds, a trait that made its first appearance in Late Archaic times (Klepinger and Henning 1976:133), were now commonly constructed for the interment of important leaders, and these burials often contained elaborate grave goods. This practice and

the related socioeconomic developments stimulated an extensive trade in copper from the Lake Superior area; obsidian from the Rocky Mountains; shark teeth, conch shells, and pearls from the Gulf coast; mica from the Carolinas; and high quality chert from various parts of the Midwest.

Maize is known from the period, but there is little evidence to support extensive cultivation of this domesticate which was to prove so important in later times. Subsistence was still predominantly dependent upon intensive wild plant food harvesting and hunting.

In Missouri, the period is best known from Hopewell sites near the junction of the Grand and Missouri rivers (Big Bend area), Lamine River locality, and the Kansas City area (Johnson 1979; Kay 1975, 1979, 1980). Kay (1980:46) suggests a nodal settlement pattern with a village center and less complex satellite communities surrounding the center (Mellor) for the Lamine locality as opposed to a closely-knit network of less complex settlements for the Big Bend area.

Middle Woodland sites, several lacking Hopewellian material, are reported from the Northeast Prairie Region. These include 23MA-3 on the west bank of the Mississippi River (Chapman 1980:47), the Creve Coeur site in the Greater St. Louis locality (Chapman 1980:47), eleven sites along the Loutre and Little Femme Osage rivers (Haas 1978:166), and 23CY-30 and 23CY-20 in Callaway County. Site 23CY-30, a small camp on Cedar Creek approximately 35 km west of the study area, produced Havana type dentate-stamped pottery sherds along with Snyders points and may represent a Hopewell intrusion into the area (Chapman 1980:52). A somewhat less definite Middle Woodland component was reported by Evans and Ives (1973:9) for 23CY-20 on the basis of grit-tempered pottery and heat-treated chert.

Late Woodland (1500-1000 B.P.)

Sometime around 1600-1500 B.P., the socio-economic and ceremonial ties which had linked Middle Woodland populations began to wane. For reasons not fully understood at this time, Late Woodland peoples developed locally oriented societies, dispersed settlement patterns, and began to intensively exploit a wider variety of environments. Fishing, hunting, and gathering of wild plant foods provided a broad economic base.

Ceramic decorations and burial practices became less elaborate, with the emphasis now on utilitarian pottery forms and small earthen or rock mounds with sparse burial goods. The introduction of the bow and arrow, combined with changing subsistence patterns, produced a marked change in the chipped stone tool assemblage, most notably small side- and corner-notched arrow points.

In east-central and northeast Missouri, this period is represented by the Boone phase and Ralls phase, respectively (Chapman 1948, 1980; Denny 1964). Stone filled, stone chambered, and earthen burial mounds occupying prominent bluff tops along major rivers and creeks are characteristic of these complexes. Villages and base camp sites often are located on terraces and ridges near burial mounds. To the south, various Late Woodland phases of the Ozark Highlands have replaced the old taxonomic unit "Highland Aspect" (Chapman 1948:100-110, 1980:100). In the Meramec valley, the Kimberlin component (Geler 1973, 1975) of the Meramec phase shows extensive overlap along the northern Ozark border region with the Boone phase (Denny 1964) to the north and the Lindley phase and Fristoe burial complex (Wood 1961, 1967) to the southwest in the Pomme de Terre Reservoir area. While there are marked regional

distinctions, there also appears to be an area of cultural and ecological overlap shared by all three. These phases exist in similar environments sharing similarities in technology, seasonal subsistence cycles, and slightly different variations of mortuary interment centering on the construction of mounds and cairns. According to Geier (1975:25), these phases "apparently reflect regional interpretations of similar culture patterns, coupled with variation, in the source, duration and effects of contact with external societies."

An early stage of Late Woodland Boone phase development probably is a direct outgrowth of an unrecognized Hopewellian base (Denny 1964:158-159). This would indicate that mound groups were consistently oriented towards high upland bluff and hill tops along major river systems and secondary tributary streams during the Woodland period. Surveys of the lower Osage and central Gasconade rivers would tend to support this contention. Rock cairns containing limestone slab chambers with burials frequently are found on the highest point of escarpment locations at the confluence of a smaller tributary stream with the Gasconade River (McMillan 1963:15). In the lower Osage River valley, all rock cairns or tumuli located were found to be situated on elevated areas directly over large escarpments and ridge spurs at the confluence of two or more streams and on narrow divides between two streams (Klippel 1965:32).

Open habitation sites during the Late Woodland period usually are situated in floodplain environments on knolls, terraces, and terrace remnants at the junction of smaller streams and major rivers (Klippel 1965:32) or at the base of hills and bluff tops paralleling river floodplains (McMillan 1963:15) and at the mouth of a hollow or spring.

Late Woodland peoples also inhabited nearby Arnold Research Cave, which contained a rich inventory of perishable materials such as wooden and woven artifacts (Henning 1966; Shippee 1966) in the upper levels of the dry cave deposits. One wooden dart foreshaft with a Rice side-notched projectile point hafted in place attested to the affiliation with the Late Woodland period. Other wooden artifacts, cordage, matting, fabrics woven from bast and other vegetal fibers, as well as bark and woven sandals and leather moccasins, have given tremendous insight into a portion of Woodland material culture usually lost in humid climates of the Midwest.

Additional Late Woodland sites in east-central Missouri, not previously mentioned, have been reported from the Cannon Reservoir (Hunt 1977; O'Brien and Warren 1979), Long Branch Reservoir (Grantham 1977), along the Loutre and Little Femme Osage rivers (Haas 1978), lower portion of the Moreau and Missouri rivers (Sturdevant 1977, 1978, 1980), Boone County (Schmits and Wright 1981), Graham Cave (Klippel 1971b), and within the general vicinity of the Callaway Plant site (Evans and Ives 1973; Ray et al. 1984). Based on previous work in central Missouri, Evans and Ives (1973:2, 5) state that the Mealy Mounds group (23CY-202) located just north of Mokane, Missouri, and 23CY-74 within the Union Electric property boundaries probably represent Late Woodland mounds.

Several investigators in the central portion of the state, north (Angus 1976; Henning 1979; Teter and Warren 1979) and south (Klippel 1965; McMillan 1963; Vehik 1978) of the Missouri River, have noted that Late Woodland phases probably persisted well beyond 1000 B.P. Although Mississippian type artifacts occasionally occur throughout the region, Late Woodland components are interpreted as persistent manifestations,

contemporary with, but only slightly affected by, peripheral contacts with the Mississippian cultural center in the Mississippi River valley.

Mississippian/Oneota (1000-500 B.P.)

Urban centers, central plazas, platform mounds, fortified villages, and exotic and sophisticated art forms are archaeological traits which have become synonymous with the Mississippian period. Beginning about 1000 B.P. and continuing until about 500 B.P., Mississippian culture flourished throughout the midwestern and southeastern United States. As in the preceding Middle Woodland period, regional expressions of Mississippian culture were linked by an elaborate socioreligious system known as the Southeastern Ceremonial Complex or the Southern Cult. We see much of the same kind of ceremonial elaboration as in the earlier Hopewellian complexes, but now the economic basis for food surplus and settled village life is clearly evident. Domesticated seeds of maize, beans, and squash are found in most Mississippian archaeological sites. When we combine this kind of stable economic base with archaeological evidence in the form of fortified villages, organized urban plans with rows of houses and open plazas, high status burials with rich grave offerings, and evidence of long distance trade in exotic goods, inferences regarding social stratification, chiefdom-type political organization, and organized warfare during Mississippian times is on firm theoretical ground.

Of course, the best known sites of this period are the spectacular remains of the Cahokia Mound Group in East St. Louis, Illinois, and the associated satellite villages in the surrounding American Bottom. A similar mound group was destroyed in St. Louis, Missouri, during the eighteenth and nineteenth centuries. Mississippian developments in

western Missouri are represented by the Steed-Kisker complex in the Kansas City area (O'Brien 1978; Wedel 1943). Mississippian (Caddoan) developments in the southwest Missouri Ozarks are represented at the Loftin Site 1, 23SN-42, at the confluence of the James and White rivers in southern Stone County, Missouri (Wood 1983:63-64).

Important to the studies of Central Missouri is the absence of major Mississippian villages or hamlets in the region. Mississippian artifacts are known from rock shelters and a few open sites in central Missouri and the Ozark Highlands, but they usually consist of small amounts of shell-tempered pottery and small side-notched triangular projectile points. Such materials have been reported for Boulder Cave (Chapman 1948), Merrell Cave (McMillan 1963:25-31), and Wet Hollow Cave, to name a few in the Meramec and Gasconade River valleys. At Doyle Cave, 23PU-40, a Mississippian burial associated with a shell-tempered vessel was excavated (McMillan 1963:77). A few shell-tempered pottery sherds have been found on sites along the lower Osage River (Klippel 1965:147) and in the upper levels of Graham Cave (Chapman 1952:89) and Arnold Research Cave (Shippee 1966:36), but they were not well represented. Shell-tempered pottery and small side-notched triangular point forms also have been found on sites in the Pomme de Terre, Truman, and Stockton reservoir areas. The "Nemo Complex" (Wood 1961:108) was defined as predating Steed-Kisker in the Pomme de Terre basin on the basis of cord-marked and smooth shell-tempered pottery from Fairfield Mound 1, Blackwell Cave, and the Mount India and Lytle cairns. Such sparse remains, however, suggest minor contact and influence of Mississippian societies situated in the St. Louis and Kansas City areas

on local Late Woodland populations (Schneider 1974:28; Vehik 1978:40-42).

Somewhat contemporaneous with Mississippian cultural developments in Missouri and Illinois are the well-known Oneota cultural manifestations centered in Iowa and southern Wisconsin. The complex has fairly well-defined limits on the eastern plains border and over much of the Prairie Peninsula. Subsistence was based on hunting, fishing, and gathering and was supplemented by gardening (Henning 1969:3). The artifact assemblage includes shell-tempered ceramic vessels with punctations and parallel incised lines placed on the upper body. Other tools include small triangular projectile points, bifacial blades, grooved mauls, abraders, bison scapula hoes, and socketed antler projectile points. Gibbon (1972:181) suggests that the Oneota lifeway emerged from a Woodland base about 1000 B.P. in Wisconsin, participated in the Mississippian pattern for some time, and persisted into the seventeenth and eighteenth centuries, being reflected in historic Winnebago culture (Gibbon 1972:182). Henning (1969:4) also notes the close relationship of the Oneota archaeological complex with a number of historic tribal groups including the Ioway, Missouri, and perhaps the Oto, Kansas, and Osage.

Oneota sites of the Missouri River valley show far ranging external contacts primarily with Orr phase sites along the upper Iowa River valley and Correctionville-Blue Earth phase sites along the Little Sioux River in western Iowa (Henning 1970:165). From the Utz site in west-central Missouri, items indicative of an extensive prehistoric trade system include catlinite from quarries in southwest Minnesota, marine shells from the Gulf Coast, turquoise from the American southwest, and

native copper from the Lake Michigan area. In addition, engraved artifacts containing various zoomorphic and anthropomorphic motifs of the southeastern ceremonial complex from Utz (Bray 1963:39-40) suggest diffusion and trade relationships with contemporary Mississippian populations near Cahokia. Recent studies of plant remains at Utz (Blake and Cutler 1982) and pit features and associated material from the site (Lubensky 1983) have contributed to knowledge of Oneota lifeways and subsistence.

Unfortunately, little comparable data are offered for Mississippian or Oneota site settlement patterns within the lower Missouri River drainage basin. Mississippian sites appear to be concentrated in the St. Louis and Kansas City areas and apparently are lacking in the valley between the two cities (Henning 1969:97). Most well-known and excavated Oneota sites are located within the Big Bend region (Bray 1963; Henning 1970:14).

Protohistoric and Historic (500-100 B.P.)

In the Missouri River valley near the mouths of the Grand and Chariton rivers, late prehistoric and protohistoric sites known as "Oneota" are common. Some of these, such as Utz, McRoberts, Plattner, and Gumbo Point, are historic contact sites, while Old Fort, Dowell Site No. 1, Dowell No. 2, Guthrey, and other smaller Oneota sites lack European trade goods indicative of contact. Precontact Oneota sites in this area date prior to A.D. 1683 (Bray 1978:23). A series of radiocarbon dates from Utz (Henning 1969:300-301) established it as a long-term site with repeated occupations from A.D. 1400-1723 that probably represented a culture continuum through time.

The Plattner site has been identified as the village occupied by the Little Osage between A.D. 1727-1777 (Chapman 1959:6), while Gumbo Point appears to represent the Missouri village visited by Bourgmund between A.D. 1714-1724 (Bray 1978:72). Utz may represent a Missouri Indian village prior to A.D. 1750 (Berry and Chapman 1942).

Numerous eastern and midwestern Indian groups passed through the lower Missouri region with the westward expansion of the nation. Two Indian tribes were native to Missouri: the Osage and the Missouri. The Kaskaskia, an Illinois tribe, lived occasionally on the west side of the Mississippi River. Prior to 1825, the Kickapoo, Delaware, and Shawnee were moved to reservations in the southern part of the state, retaining them until 1832. The Sauk and Fox, primarily residents of what is now Iowa, also hunted and raided in Missouri (Chapman and Chapman 1964:15). There is reference that a band of Miami resided in what is now Saline County along the Missouri River near the town of Miami (Chapman 1946:15), but little information is available regarding this occupation. There is no information on historic Indian groups residing in the Callaway research area.

A chart outlining the chronological sequence for the immediate Callaway Nuclear Power Plant study area is presented in Table 3. Sites assignable to particular cultural period(s) were included.

Table 3

Archaeological Sites In the Callaway Nuclear Power Plant Study Area

Time (B.P.)	Period	Study Area	Sites
100	Protohistoric/Historic		23CY-353
500			23CY-352*
	Mississippian/Oneota		23CY-359*
1000			23CY-74
	Late Woodland	23CY-356	23CY-20*
		23CY-350	23CY-359*
			23CY-74
			23CY-20*
1500	Middle Woodland	23CY-20*	23CY-359*
2500	Early Woodland		
3000			
	Late Archaic	23CY-20*	23CY-353
		23CY-359*	23CY-356
5000	Middle Archaic		23CY-356
			23CY-353
7000	Early Archaic	23CY-359*	
9000	Dalton		
10,000			23CY-346
14,000	Paleo-Indian		

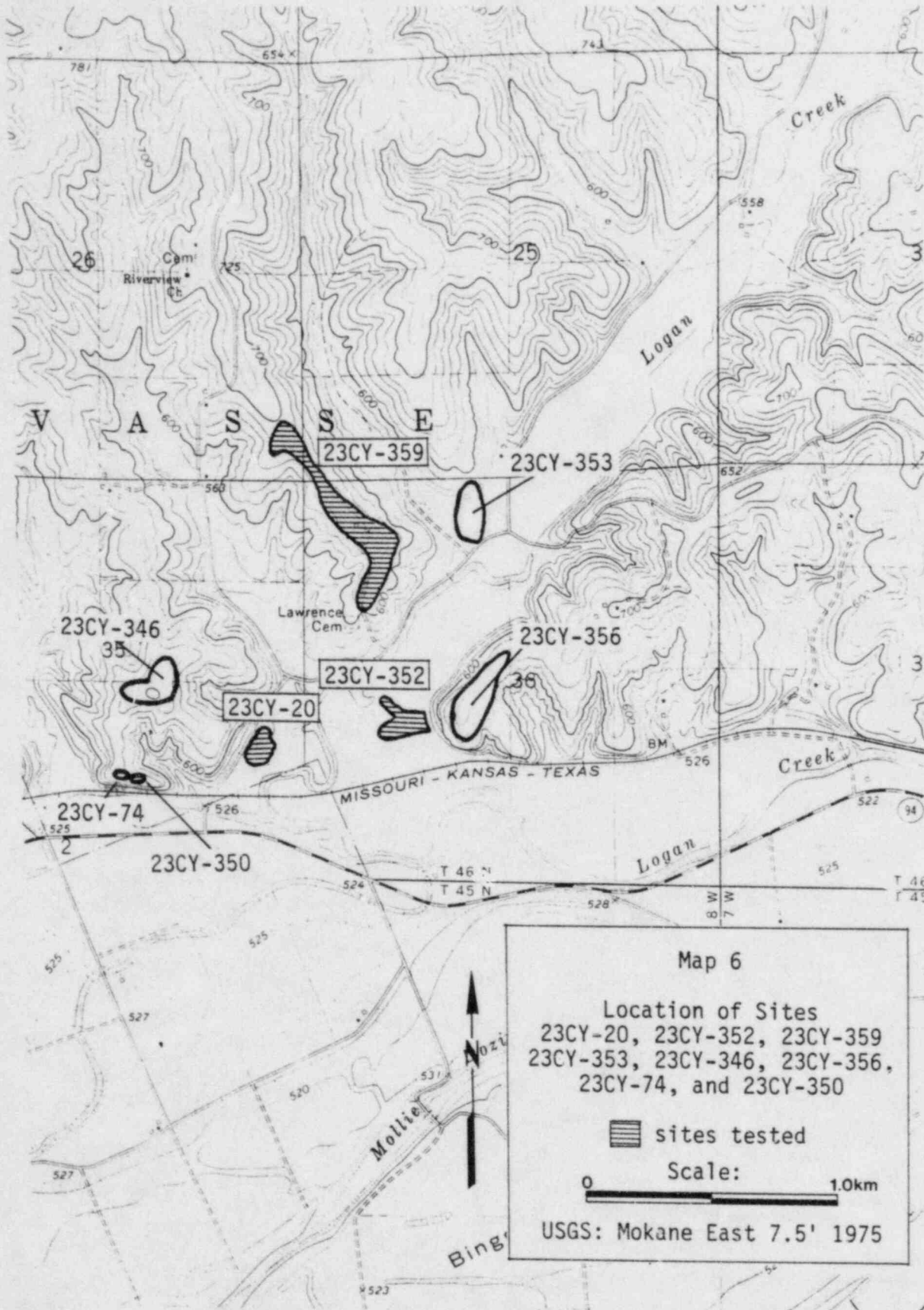
*Sites Tested

INVESTIGATIONS AT SITE 23CY-20

Site Description

Site 23CY-20 occupies a four acre fenced area on a second terrace of a stream bottom at an elevation of 530 ft msl. The site is 100 m west of Logan Creek and 300 m north of the confluence of Mud and Logan creeks (Map 6). The western boundary of the site adjoins gravel County Road 324. This boundary and the road are oriented in a northeast/southwest direction. Immediately west of the road cut, a steep wooded bluff rises over 100 ft to a southeast oriented ridge. The terrace where site 23CY-20 is located is approximately 3 m above a marshy floodplain which extends to the confluence of Logan Creek and Mud Creek on the south. Beyond Mud Creek is the Missouri River floodplain. Site 23CY-20 is bounded on the east by a spur of the Missouri, Kansas and Texas Railroad. Northeast of the site, the terrace is dissected by a small intermittent stream. Site 23CY-20 has been used as an agricultural field in the past, but at the time of Phase II testing, the site was overgrown with saplings, weeds, and briars (Plate 1a).

The ridge upon which site 23CY-359 is located joins the Logan Creek bottom 600 m northeast of site 23CY-20 (Map 6). Site 23CY-352 is located 250 m north of site 23CY-20 on a terrace on the east side of Logan Creek (Map 6). Site 23CY-356 is located on a bluff top immediately east of site 23CY-352. Sites 23CY-74, 23CY-346, and 23CY-350 are located on the bluff tops west of site 23CY-20 (Map 6).



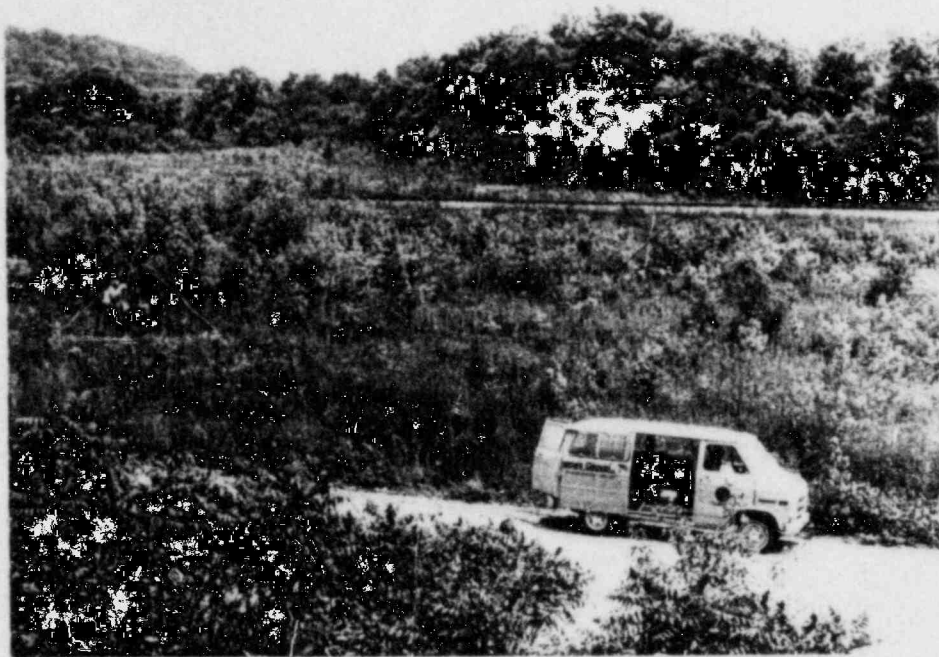


Plate 1a. Site 23CY-20, View Facing East.



Plate 1b. Excavation Unit 2, Site 23CY-20, General View of Midden Level at 50cm, Facing South.

Summary of Previous Investigations

Site 23CY-20 was reported to the Missouri Archaeological Survey a number of years before 1973 (Evans and Ives 1979) but was relocated during an initial survey of Union Electric lands (Evans and Ives 1973). Subsequent investigations indicated that the area of the site was 3,000 m² (Evans 1975). The site was partially excavated in advance of railroad construction by Evans and Ives (1979). Test excavations consisted of three 1 m by 3 m units and two controlled surface collections made along an established grid. Evans and Ives (1979) found three subsurface features: one possible post mold and two "concentrations of materials at the base of the plow zone," one of which was thought to be a pit feature (Evans and Ives 1979:17, 20). A total of 229 artifacts was recovered in two of the three test units excavated (Evans and Ives 1979:18). Cultural material was not recovered from the unit in the railroad right-of-way. Of the specimens recovered, 2% were bifacial tools, 77% were chert debitage (14% shatter and 63% primary, secondary, and interior flakes), 16% were unmodified rock, and 4% were ceramics. Ceramics were recovered only from the units on the terrace edge. Artifact-bearing deposits in these test units extended to a depth of 40 cm from the ground surface. The results of the controlled surface collection were not described by Evans and Ives (1979) in their final report, but a compilation of their laboratory notes for this study indicates that 736 1 m square surface units were collected, yielding an artifact assemblage of 3,452 items (Table 4). Subsequent to the above testing, additional investigations were made by placement of 8" power auger probes at 10 m intervals along a proposed railroad right-of-way. Evidence of subplow zone cultural deposits was not found. Four cuts

Table 4

Frequencies of Material Recovered by Evans and Ives at Site 23CY-20*

	Surface	Excavation Units	Percent
Bifacial Tools	27	5	0.8
Unifacial Tools	12	0	0.3
Cores	43	0	1.2
Retouched Flakes	20	0	0.5
Debitage:			
Shatter	736	31	20.8
Primary Flakes	60	16	2.0
Secondary Flakes	1,657	96	47.6
Interior Flakes	63	33	2.6
Modified:			
Hematite	2	0	0.05
Sandstone	2	0	0.05
Unmodified:			
Limestone	529	23	15.0
Hematite	1	1	0.05
Igneous/Metamorphic	157	14	4.6
Ceramics:			
Grit Tempered	140	9	4.0
Limestone Tempered	2	1	0.08
Bone	1	0	0.02
Total:	3,452	229	100.0

* Compiled from laboratory notes on file with Union Electric Company, St. Louis, Missouri

were made later in this right-of-way using earthmoving power equipment; subsurface features were not identified (Evans and Ives 1979:21). Evans (1975:3) suggested that site 23CY-20 was a multicomponent site with occupations spanning 10,000 years. This assessment was based on stylistic analysis of temporally diagnostic projectile points and ceramics. Early and Middle Archaic point types were identified in the collection. Evans (1975) assigned the grit-tempered pottery from the site to the Middle Woodland period. Although extensive investigations were carried out, the 1979 report did not provide the types of information necessary for NRHP evaluation.

The site had protective fencing placed around it following these earlier investigations. The natural vegetation cover was allowed to regenerate.

During the 1981 cultural resource survey, 80 artifacts were collected from the surface of the site (Ray et al. 1984:256). This collection consisted of 4 tools, 74 pieces of debitage, and 2 pottery sherds (Table 5). Ray et al. (1984:257) suggested that the site is a Boone phase Late Woodland village or residential base camp and that it may be associated with site 23CY-74, mound 23CY-350 located on the top of the adjacent ridge, or with mound group 23CY-356 on the ridge 700 m to the east of site 23CY-20 (Map 6). Ray et al. (1984) also suggested that site 23CY-20 is at least contemporaneous, if not affiliated, with site 23CY-352 because the ceramics recovered from these two sites were similar. In addition, preliminary geomorphological investigations had suggested that site 23CY-20 might have a high potential for buried cultural components from Paleo-Indian through Late Archaic times (Ray et al. 1984:390). However, Ray et al. (1984:257-258) proposed that the

Table 5
Materials Recovered During 1981 Investigations
at Site 23CY-20 (Ray et al. 1984:256)

	Amount	Percent
Bifacial Tools (graver)	1	1.3
Unifacial Tools	0	0.0
Retouched Flakes	3	3.7
Cores	3	3.7
Debitage:		
Shatter	1	1.3
Primary Decortication Flakes	2	2.5
Secondary Decortication Flakes	28	35.0
Interior Flakes	38	47.5
Bifacial Thinning Flakes	2	2.5
Ceramics:		
Grit Tempered Smoothed or Graham Plain (Chapman 1980:281)	2	2.5
Total	80	100.0

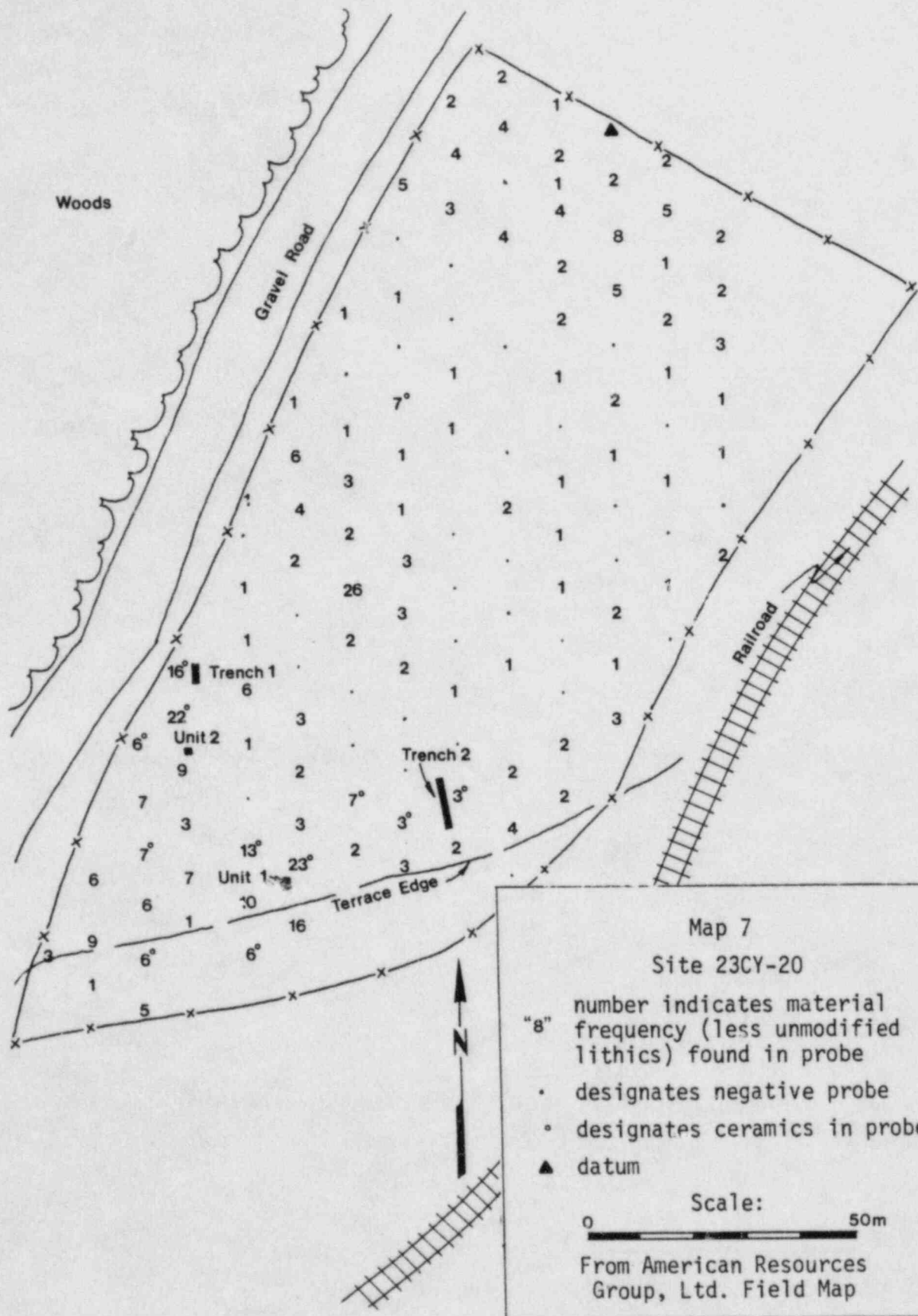
major occupation occurred during the Late Woodland period. This conclusion was based on a reanalysis of the Woodland period artifacts recovered by Evans and Ives (1979:19). Ray et al. (1984:395, 397) suggested that research problems for future study in the project area should include investigations of prehistoric settlement/subsistence patterns, focusing particularly on Late Woodland/Mississippian occupations, along with further investigation of prehistoric chert exploitation. Site 23CY-20 was considered to have the potential to contribute to investigations focusing on these research problems.

Phase II Testing

Shovel Probes

The grid used to conduct the test excavations was established along a north-south line from an arbitrary datum point (N200, E200) starting near the middle of the north fence boundary. At N100, E200, an east-west grid line was established. At N100, E117, a second north-south grid line was surveyed. The resulting grid could not be tied to the earlier grid of Evans and Ives (1979) because they failed to establish a permanent datum point. A total of 130 screened shovel probes was made at site 23CY-20. Frequency of recovered materials (excluding unmodified rock) is indicated on Map 7.

As might be expected on a site subject to erosion and deposition from flooding, the depth of the plow zone and artifact bearing topsoil varied greatly across the site. In areas where few or no cultural materials were recovered, the topsoil and plow zone ranged from 15 cm to 20 cm. The northern two thirds of the site had two areas with relatively dense artifact clusters (Map 7), which ranged in depth from 20 cm to 30 cm in the west central cluster and from 22 cm to 30 cm in the northern cluster. The depth of the deposit along the south terrace slope ranged from 20 cm to 32 cm below ground surface but averaged 25 cm. The depth of materials in three shovel probes suggested that a buried deposit had been encountered at these places. The depths of the three probes were: 50 cm at N100, E117; 41 cm at N115, E150; and 38 cm at N50, E117. The composition of the topsoil varied across the site. A dark gray gumbo clay subsoil containing manganese particles was found over much of the area north of N100. The composition of this subsoil suggests that these soils have been subjected to long periods of



standing water. The top of this deposit was encountered at depths of 10 cm to 25 cm below ground surface. Soil probes showed that this strata still was present at 71 cm below surface.

Excavation Units

Two 1 m x 1 m test units were placed in areas that produced high concentrations of subsurface ceramics and other cultural material during shovel testing (Map 7). Unit 1 was placed on the terrace edge where the greatest possibility of locating cultural deposits existed. Unit 2 was placed 25 m north and 6 m west of unit 1. Cultural features were not encountered in either test excavation.

Unit 1 had four distinct soil zones. The top 25 cm of unit 1 contained a topsoil zone consisting of a medium to dark gray brown clayey silt with organic material, followed by a 10 cm to 15 cm zone consisting of a homogeneous gray/yellow brown clayey sand containing charcoal and artifacts (Plate 1b). This zone was followed by a lightly mottled blue gray and gray brown undisturbed cultural level that varied from 2 cm to 10 cm in thickness beginning at 38 cm below surface. The fourth level (46 cm - 60 cm) was made up of a lightly mottled grayish brown and yellow sandy clay. This level was largely devoid of cultural material. One 10 liter flotation sample was taken from Level 5 (40 cm - 50 cm) of unit 1, with negative results.

Unit 2 basically had only two distinct soil zones. The top 25 cm was comprised of an indistinct plow zone about 15 cm thick and a possibly undisturbed cultural level below it. This upper level was composed of a gray brown sandy silt. This level was followed by a brown sandy clay that contained cultural material to a depth of 40 cm. This soil gradually became a yellow brown sandy clay at about 45 cm and

continued to the bottom of the excavation unit. The type of cultural deposit in unit 2 did not warrant the collection of samples for flotation analysis.

Backhoe Trenches

Backhoe trench 1 was placed at N100, E117, immediately south of the datum point, where a deep shovel probe had encountered a broken biface at a depth of 50 cm. This trench was 3 m long and 2 m deep. The profile of this trench (Figure 3) shows a plow zone and subplow zone of gray brown clayey silt and organic material 30 cm to 40 cm thick, followed by a medium brown grayish clay subsoil with some mottling and manganese and iron inclusions. This level had a cultural zone that extended to 83 cm below ground surface with inclusions of chert, flakes, limestone, and charcoal. This subsoil was followed by a culturally sterile blue-gray silty clay with iron and manganese inclusions. At about 100 cm below surface, this subsoil became more clayey, with fewer inclusions. At 140 cm below surface, the subsoil gradually graded to a homogeneous brownish yellow clayey sand which continued to the bottom of the trench (190 cm).

Backhoe trench 2 was placed on the terrace edge 30 m east and 10 m north of excavation unit 1. This trench extended northwest for 9 m and was slightly over 2 m deep. The bottom of the plow zone and culture bearing level was 35 cm deep at the thickest point. This zone contained organic staining and was followed by a culturally sterile homogeneous light brown clay with iron staining that continued to the bottom of the trench (230 cm).

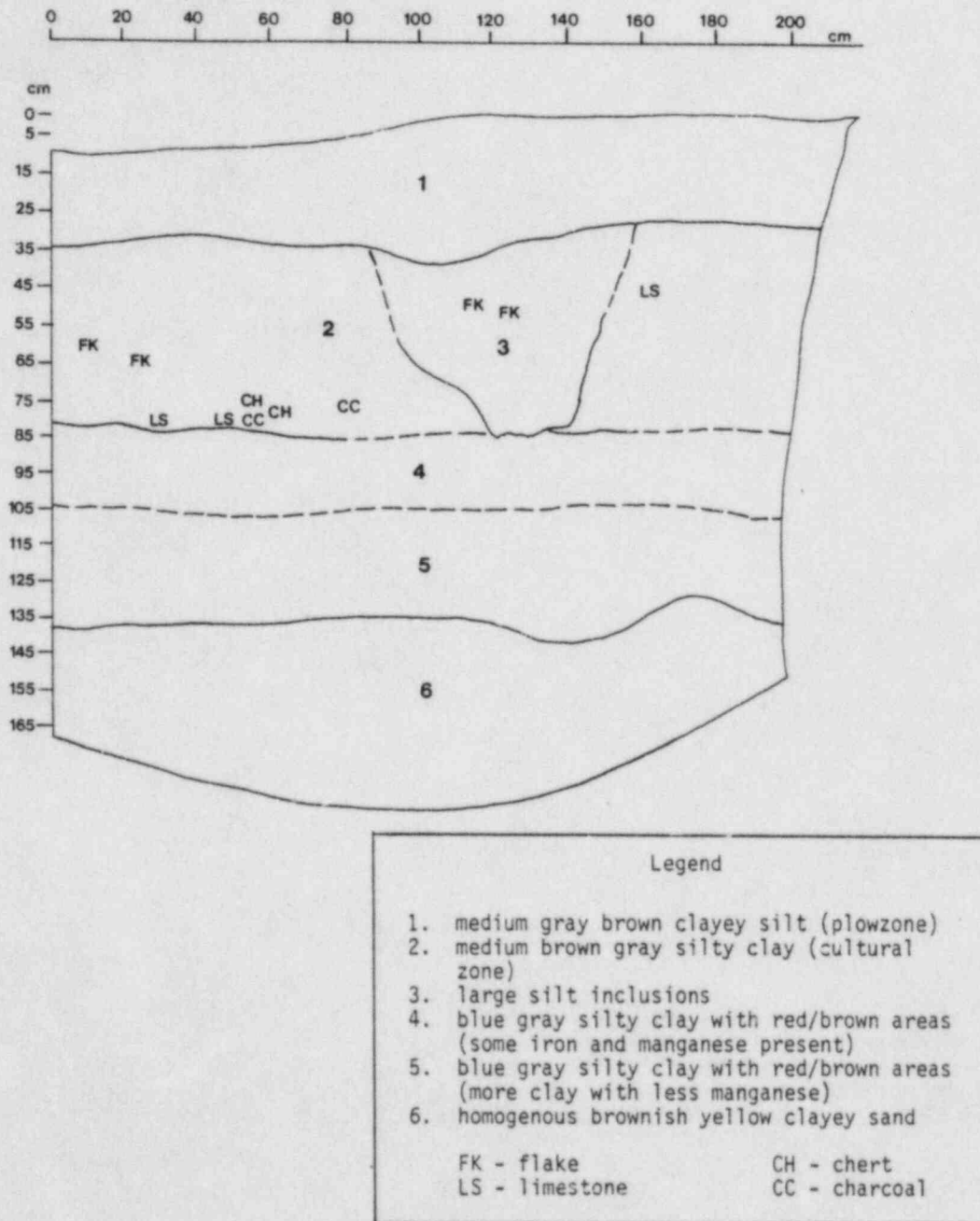


Figure 3. West Wall Profile, Trench 1, Site 23CY-20

Artifact Provenience and Analysis

The plot of artifact distributions (Map 7) shows concentrations of cultural materials along the south 10 m of the terrace and about 50 m north along the western edge of the site. Buried deposits were encountered by shovel probes at N115, E150 and N100, E117; however, other shovel probes north of E100 suggest that cultural material exists largely in the plow zone in this area. Prehistoric artifacts recovered from surface collection, shovel probes, and test excavations totaled 1,144 (Table 6). Five historic artifacts, 2 water-worn pieces of whiteware, 2 water-worn pieces of glass (1 blue, 1 aqua), and 1 brown glass bottle fragment were recovered. These historic artifacts suggest that the site has been subject to flood water action many times and that cultural deposits in these areas have been removed or damaged by water action. This interpretation is reinforced by the distribution pattern of cultural materials north of the terrace deposits and the area northeast of N100, E117.

Prehistoric ceramics are present in the higher area on the terrace slope near the western boundary and extend 80 m northeastward along the south terrace edge (Map 7). All ceramics appear to represent one Late Woodland phase (Boone) and consist of Graham Plain sand and grit-tempered sherds. The base of a Steuben Expanding Stemmed point was recovered in Level 2 (10 cm - 20 cm) of test unit 2. This is a diagnostic artifact of the late Middle Woodland, early Late Woodland Boone phase (Chapman 1980:115), and it appears to be contemporaneous with the Graham Plain sand and grit-tempered pottery; two sherds of this type were recovered in the same level.

Table 6

Prehistoric Materials Recovered During 1984 Phase II Testing
at Site 23CY-20

Item	Shovel Probes	Surface	Excavation		Percent
			Unit 1	Unit 2	
Bifacial Tools	4	3	2	1	0.9
Unifacial Tools	0	2	0	0	0.2
Retouched Flakes	4	7	3	1	1.3
Cores	0	0	0	0	0.0
Debitage					
<u>Shatter</u>					
Primary Decortication	41	4	2	8	4.8
Secondary Decortication	35	3	1	2	3.6
Shatter	36	7	3	4	4.4
<u>Flakes</u>					
Primary Decortication	8	1	1	5	1.3
Secondary Decortication	16	6	0	6	2.4
Interior	211	25	62	38	29.4
Polished	0	0	2	0	0.2
Bifacial Thinning	0	2	0	0	0.2
Modified Rock					
Catlinite	0	0	2	0	0.2
Hematite	1	0	0	0	0.1
Unmodified Rock					
Limestone	18	0	0	0	1.5
Sandstone	9	0	0	5	1.2
Igneous/Metamorphic	346	0	86	69	43.8
Hematite	0	0	0	1	0.1
Ceramics (Sand/Grit-Temp.)					
Graham Plain	18	1	13	5	3.2
Graham Plain Brushed	0	0	1	0	0.1
Burnt Clay/Daub	8	0	0	3	0.9
Burned Bone	1	0	1	0	0.2
Charred Nuts/Shells	0	0	0	0	0.0
TOTAL	756	61	179	148	100.0
Total Artifacts: 1,144					

Organic materials consisted of 2 small, unidentifiable calcined bones and a small quantity of charcoal.

Debitage Analysis

Most of the debitage was obtained from shovel probes in the plow zone and the two test excavation units. Because of the multicomponent nature of the site (see Summary of Previous Investigations) and the limited archaeological context, few specific statements may be made about chert exploitation by cultural period.

Data from the site (Table 6 and Table 7) indicate a preponderance of debitage representative of later stages in the tool production sequence (e.g., interior flakes). The frequencies of the debitage categories (Table 7) suggest that Jefferson City cherts were used for the manufacture of tools on the site. However, the lack of hammerstones and the paucity of primary and secondary decortication flakes indicate that tool maintenance (e.g., resharpening) was a more prevalent activity than tool manufacture.

The bulk of the debitage is composed of Jefferson City chert, but most tools were made of Burlington and heat-treated Burlington chert. Most of the Burlington chert tools were made at another location, since very little of the debitage present at site 23CY-20 is attributable to the reduction of Burlington chert nodules.

Tool Analysis

Tools recovered from 23CY-20 consisted of broken projectile points and various cutting/scraping implements. The only temporally diagnostic biface recovered was a Steuben Expanding Stemmed point manufactured of heat-treated Burlington chert (Figure 4a). Two other biface fragments

Table 7
 Site 23CY-20
 Debitage Categories by Treatment and Chert Type

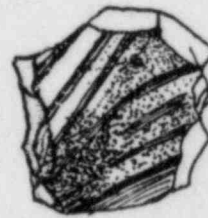
Chert Type	Burlington		Jefferson City	
	Untreated	Heat Treated	Untreated	Heat Treated
Primary Decortication	4	0	10	1
Secondary Decortication	5	5	17	0
Interior	120	88	113	18
Bifacial Thinning	1	0	0	0
Polished	2	0	0	0
Primary Shatter	0	1	52	0
Secondary Shatter	4	0	37	1
Shatter	8	0	40	1
Total	144	94	269	21
Percent	27	18	51	4

of heat-treated Burlington chert were recovered, along with two untreated Burlington chert biface fragments and a crude biface of Burlington chert that may have been utilized as a cutting tool. One of these artifacts was an expanding base projectile point fragment. Three biface fragments of Jefferson City chert also were recovered.

Two Burlington chert unifacial tools were collected, and one of these had been heat treated. Two polished Burlington chert flakes from a digging implement or woodworking tool were recovered. The remainder of the tools consisted of retouched flakes of Burlington chert. Six of these had been heat treated.



a



b

- a. Basal portion of late Middle Woodland, early Late Woodland Steuben Expanding Stemmed point, heat-treated Burlington chert, unit 2
- b. Sand and grit-tempered Late Woodland Graham Plain brushed pottery sherd

Figure 4. Artifacts from Site 23CY-20

Interpretations

Results of Phase II archaeological investigations at site 23CY-20 have indicated that the Boone phase occupation occurred on the south terrace slope and western edge of the site (Map 7). The site covers an area 100 m along the south terrace edge by 150 m northeast along the western fence periphery. The most intense and least disturbed occupational deposits occur in a zone 40 m wide along the entire western edge of the site and in a 40 m strip along the entire south terrace edge. This amounts to a surface area of 8,800 m² and generally conforms to the original site area suggested by Evans and Ives (1979). If marginal surface deposits are included (the entire fenced area), the area of the site would be 16,200 m². The deposits in the northeast section of the site have low artifact densities (Map 7).

An unstratified cultural level underlies the plow zone, the terrace slope, and the terrace edge. The depth of the deposit suggests that in some areas artifact bearing deposits have not been disturbed by plowing (Figure 3). Undisturbed features are likely to be present at site 23CY-20 as well. Physical remains of structures or features were not identified during the 1984 investigations. The density of subsurface material was moderate and primarily consisted of chert debitage and unmodified rock, much of which was restricted to the plow zone.

Diagnostic ceramics recovered in this investigation place the major occupation in the Late Woodland Boone phase. These ceramics consisted of 38 sherds of sand and grit-tempered Graham Plain pottery. Older materials were not evident, other than a Steuben Expanding Stemmed point, which is associated with both the Middle Woodland period and the early Late Woodland period. The earlier occupants of the site may have

deposited some of the chert artifacts and debitage. Buried Paleo-Indian or Archaic components were not identified.

Faunal remains consisted of two unidentifiable pieces of calcined bone. Floral remains found during Phase II investigations were limited to a small amount of charcoal, but a charred nut shell was reported by Evans and Ives (1979).

Debitage recovered from 23CY-20 indicates the major activity at the site was tool maintenance. However, the pottery sherds and the small amount of charcoal present suggest that cooking associated with domestic activity did occur on the western and south terrace edges of the site. The polished flakes suggest digging or woodworking activities as well. The presence of hematite and catlinite (pipestone) may be evidence of ceremonial preparation or activity on the site, perhaps in relation to the mounds on the adjacent bluff. Catlinite also offers evidence of trade or travel up and down the Missouri River. The major source of this material is in southwestern Minnesota, near Pipestone.

Site 23CY-20 may be interpreted as a habitation site that served as a field camp during the Late Woodland Boone phase. While site 23CY-20 covers a small area, Chapman (1980:115) states that Boone phase camps were relatively small. Binford (1980:10) has defined a field camp as "a temporary operational center for a task group which maintains itself while away from the residential base and may be expected to be further differentiated according to the nature of the resources to be procured." This habitation site may have been affiliated with mound sites on the adjacent ridges west of site 23CY-20. Earlier cultural occupations may have used site 23CY-20 sporadically as a location - "a place where extractive tasks are exclusively carried out" (Binford 1980:9).

Statement of Significance

The results of Phase II testing indicate that site 23CY-20 contains a small Late Woodland Boone phase component representing a habitation camp. This habitation appears to have occurred within a relatively narrow time span based on the uniformity of ceramics, the light to medium density of cultural material, and few archaeological features. Since the evidence does suggest that differentiated activities, such as manufacture of ceremonial equipment as well as tool manufacture and maintenance, occurred on the site, investigation of this small camp could contribute to an understanding of the Late Woodland Boone phase activities and settlement patterns in the Missouri River valley and the immediate locality. The Boone phase component identified at site 23CY-20 appears to have been affiliated with at least one of the Late Woodland components at site 23CY-352 and one of the mounds at site 23CY-356. This Late Woodland camp also may be affiliated with the mortuary mound, sites 23CY-74 and 23CY-350, on the bluff west of site 23CY-20. Site 23CY-20 is, therefore, important to interpretation of all these sites, as well as the ridge top site, 23CY-359. The main occupation areas of the Boone phase camp at site 23CY-20 probably would coincide with the distribution of ceramics (Map 7). These areas require further investigation in order to define and interpret the exact nature of the Boone phase activities at site 23CY-20. It will be important to obtain an absolute temporal span for the Boone phase occupation at site 23CY-20 in order to establish the cultural relationships at site 23CY-352, which may have been a Late Woodland residential base camp.

Phase II testing at site 23CY-20 recovered a small quantity of organic materials consisting of two small pieces of bone and small quantities of charcoal. Previous Investigations by Evans and Ives (1979) recovered a charred nut shell. The small charcoal sample recovered during Phase II testing could have been used for radiocarbon dating. However, the interpretation of the resulting data would have been difficult because the contextual associations of the sample were questionable. The full nature of subsistence activities at site 23CY-20 cannot be determined from the existing data. Excavation of undisturbed pit features probably could provide data that would permit reconstruction of the subsistence activities carried out at the site.

A total of 4,675 artifacts has been recovered during all investigations at site 23CY-20. The bulk of this material is chert debitage and unmodified rock that is not assignable to a specific cultural period. Site 23CY-20 had Late Archaic and possible Middle Woodland occupations (Ray et al. 1984:195), as well as Late Woodland occupations. Occupations earlier than the Late Woodland period appear to have been temporary. Chert tools and debitage recovered at site 23CY-20 have provided information about chert selection and utilization. The recovery of catlinite (pipestone) at site 23CY-20 suggests external contacts. Ceramic materials and diagnostic chert tools recovered during the project provided a basis for determining the cultural affiliation of the site. Chert tools and debitage suggest that hunting, cutting, tool manufacture, and tool maintenance activities also took place at site 23CY-20. The presence of a polished flake suggests that woodworking or digging activities, and possibly horticulture, occurred. Some, if not

most, of these activities probably are assignable to the Late Woodland Boone phase and will aid in defining and understanding the Late Woodland period in the central Missouri valley and the immediate vicinity.

INVESTIGATIONS AT SITE 23CY-352

Site Description

Site 23CY-352 occupies approximately seven acres on an alluvial terrace rising 3 m above the floodplain of Logan Creek at an elevation ranging from 520 ft to 525 ft msl. The terrace is located at the junction of Logan Creek valley and the Missouri River valley floodplain on the east side of Logan Creek. The confluence of Logan and Mud creeks is 600 m southwest of site 23CY-352 (Map 6). The southern and western ends of the terrace are bordered by low, marshy wetlands. To the east, the terrace merges with a steep wooded dolomite bluff rising 100 ft. above the site. Mound group 23CY-356 is situated at the top of this bluff. Site 23CY-20, located on a similar terrace on the west side of Logan Creek, is 250 m southwest of site 23CY-352. Site 23CY-359 occupies a northwest trending ridge 260 m northwest of site 23CY-352. The Missouri, Kansas and Texas Railroad is 150 m south of the site, and State Highway 94 is 545 m south of the site. Site 23CY-352 had been cultivated in the past, but at the time that investigations reported here were carried out, the site was covered by weeds and tall grass (Plate 2a, b).

Summary of Previous Investigations

In the 1981 Phase I survey at site 23CY-352, Ray et al. (1984) found a moderate to dense scatter of artifacts in a harvested milo field. Surface distribution at that time indicated a site size of

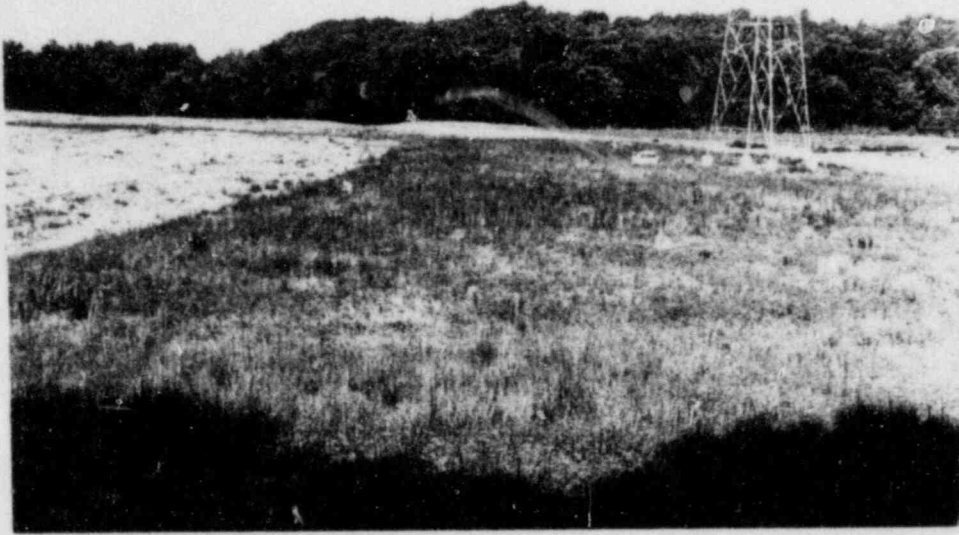


Plate 2a. View of Site 23CY-352 Facing West.

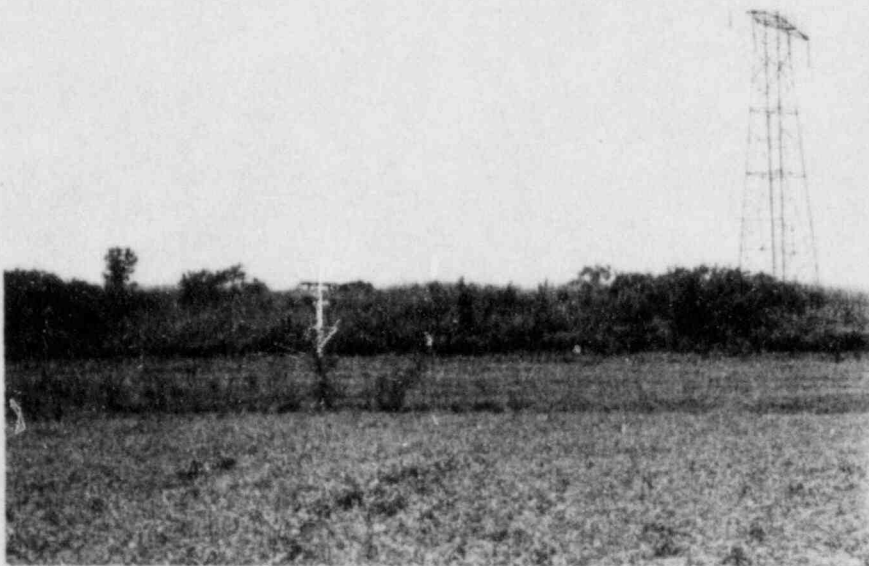


Plate 2b. View of North Terrace Edge at Site 23CY-352, Facing South.

25,000 m². Random shovel tests yielded cultural material to a depth of 20 cm. Plow zone depth was measured to 23 cm. Subsurface features were not found. A total of 190 artifacts consisting of 19 tools, 150 pieces of chert debitage, and 21 pottery sherds was collected. The tools consisted of 9 utilized flakes, 5 biface fragments, 1 drill, 1 uniface, 1 spokeshave, 1 quartzite mano, and 1 chunk of ground hematite. Chert debitage consisted of 2 primary decortication flakes, 34 secondary decortication flakes, 92 interior flakes, 12 pieces of shatter, 7 cores, 1 bifacial thinning flake, 1 polished flake, and 1 chunk of modified chert. Six of the tools and 28 pieces of debitage had been heat treated. The 21 pottery sherds were classified into five categories. These included: 10 sherds of sand and grit-tempered, Darnell Cord Marked (or Graham Cord Impressed) pottery (Chapman 1980:280); 1 sherd of grit-tempered, smooth, and slightly brushed Graham Plain pottery (Chapman 1980:281); 1 sherd of dolomite and grit-tempered Moreau (Boone) Cord Marked pottery (Chapman 1980:288-289; Denny 1964:72, 75); and 2 sherds of dolomite tempered, smooth, undecorated Boone Plain pottery (Chapman 1980:270-277; Denny 1964:96, 99). Seven sand and grit-tempered sherds with an indeterminate body finish were thought to be either Darnell Cord Marked or Graham Plain pottery.

Ray et al. (1984:272) considered site 23CY-352 to be a village or residential base camp, probably associated with mound group 23CY-356 atop the adjacent bluff (Map 6). Because of ceramic similarities, the site was considered to be contemporaneous, if not affiliated, with site 23CY-20. The major component was determined to be Late Woodland and probably was associated with the Boone phase of central and east central Missouri (Chapman 1980:276-277, 288-289).

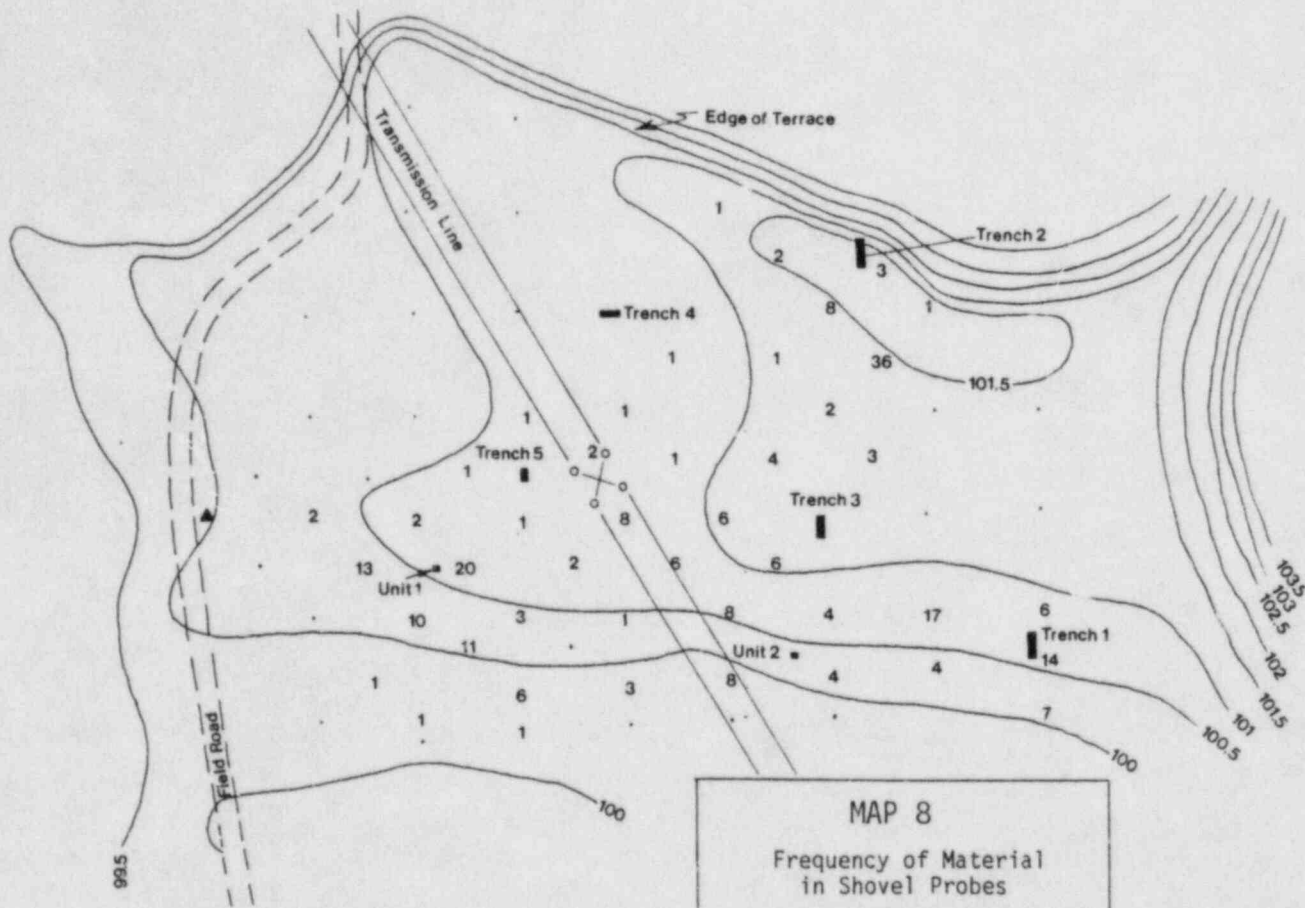
Site 23CY-352 appeared to meet several of the working criteria on which sites are considered potentially eligible for nomination to the NRHP in that it seemed to offer the potential to answer specific local or regional research questions. The cultural materials present related to a period which had received little research attention, and the location of the site on an alluvial terrace suggested a high potential for buried cultural deposits (McNerney 1983:23, 32).

Phase II Testing

Shovel Probes

Using the west site boundary post as datum, a 50 m grid pattern was established on the site. An east-west line was established and designated N150. The southernmost grid line was designated N100, and the southwest grid point was designated N100, E100. This point was located in the field road 50 m south of datum, and all units were east and/or north of this point. A total of 84 shovel probes was made at site 23CY-352. Shovel tests extended at least 10 cm or more into culturally sterile subsoil. The deepest probe, at N137, E137, extended through 76 cm of sterile sand to reach a buried cultural deposit. Frequency of material (excluding unmodified rocks) is shown on Map 8.

Shovel probes indicated that flooding and erosion had removed topsoils from some portions of the site while depositing sterile sand over cultural deposits in other areas of the site. A very firm, dark brown silty clay topsoil and subsoil made up the cultural horizon along the northwest trending terrace edge (Appendix D, Booker soils). Cultural deposits in this area generally were shallow (10 cm - 15 cm). This ridge is separated from the main site to the south by a low swale



MAP 8

Frequency of Material
in Shovel Probes
Site 23CY-352

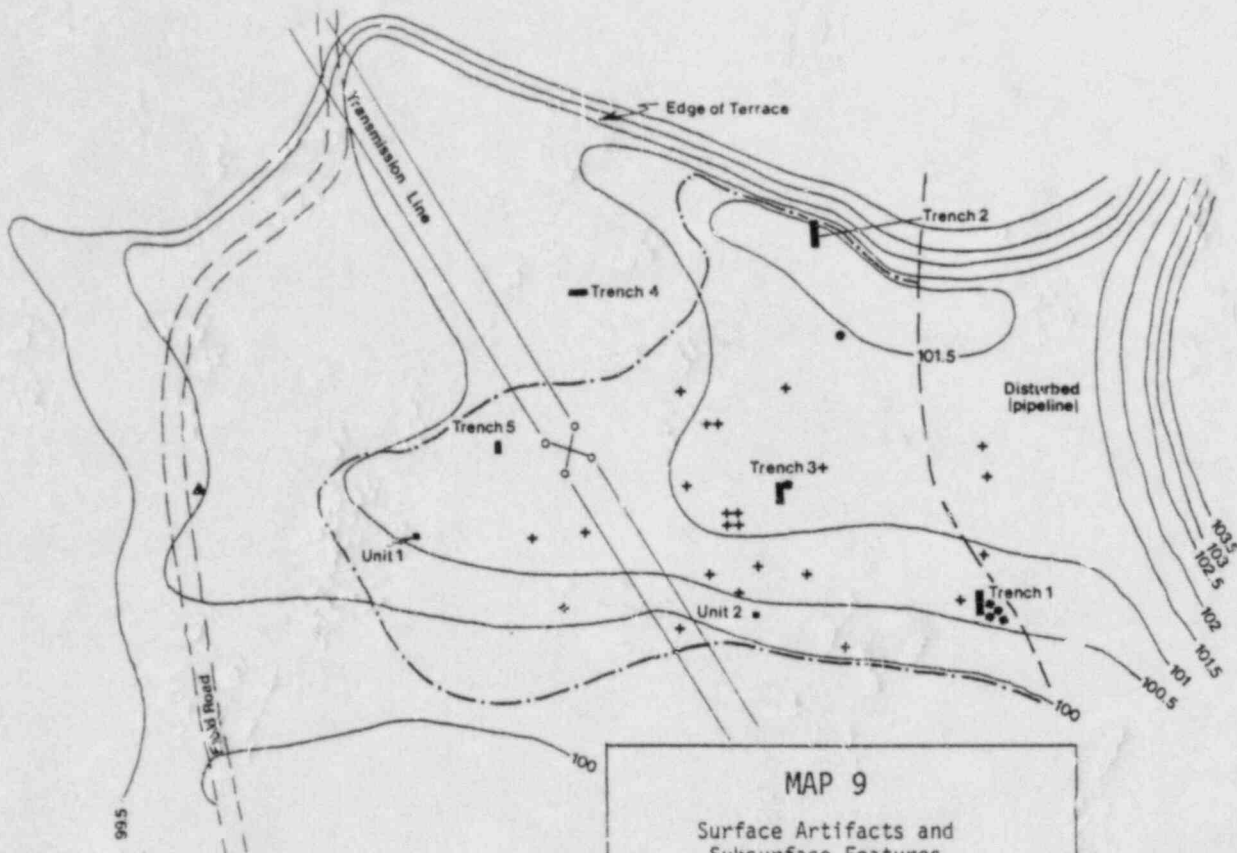
(3) number indicates material
frequency in shovel probes

- negative shovel probes
- backhoe trenches
- 1m x 1m excavation units
- ▲ datum

Scale
0 ————— 50m

From American Resources
Group, Ltd. Field Map
0.5 meter contour interval

that has a topsoil and subsoil similar to the terrace edge. Most of this area tended to be culturally sterile, and the soil consistency suggests that this area had been subject to topsoil removal and standing water. The major part of the site occupies a terrace ridge that extends westward from the base of the bluff. A low swale marks the southern boundary of the site. Cultural material appears in buried soil horizons at the base of the south terrace ridge slope. Deep shovel probes indicated cultural material extended from the surface to 50 cm below surface at N113, E300. This was confirmed by subsequent testing (test unit 2), which showed buried culture bearing soil horizons extending more than 85 cm below surface. The culture bearing soil horizon along the central east-west ridge largely was confined to plow zone. Subsurface features occurred from about 10 m east of the transmission tower to the east site boundary. The plow zone and culture bearing soil horizon in this area extended to 20 cm to 25 cm below surface. The area southwest of the transmission tower had a deposit of sterile sand over a buried culture bearing soil horizon that became deeper as the probes were placed further west. The sand deposit was very thin (5 cm) at N137.5, E212.5. At N137.5, E167.5, the sand covered the deposit to a depth of 30 cm. Thirty meters west, at N137.5, E137.5, the cultural deposit was covered by 76 cm of sterile sand. North of the transmission tower, the ridge slopes to the swale described above; and west of the transmission tower, a large deposit of sterile sand was observed. The extent of surface and subsurface cultural materials are shown on Map 9.



MAP 9

Surface Artifacts and
Subsurface Features
Site 23CY-352

- + surface finds of chert tools and pottery
- features in probes or trenches
- ▬ backhoe trenches
- 1m x 1m excavation units
- ▲ datum
- limits of cultural deposit

Scale:
0 50m

From American Resources
Group, Ltd. Field Map

0.5 meter contour interval

Excavation Units

Cultural materials were found in buried soil horizons in both hand-excavated 1 m x 1 m test units.

Unit 1. Test unit 1 was located southwest of the transmission tower at N154, E137.5. The top 10 cm consisted of a plow zone of light, silty, fine sand. One rock and one pottery sherd were found in this level. The 10 cm - 20 cm level was a transitional level between the plow zone and subplow zone and consisted of deposits similar to the top 10 cm, with yellow fine sand mottling. The top half of Level 3 (20 cm - 30 cm) consisted of a homogeneous brown silty fine sand. The lower half consisted of a gray silty, sandy clay mixed with a yellowish brown silty fine sand. Cultural material was associated with the lower half of this level (Plate 3a). Level 4 (30 cm - 40 cm) had a dark sandy clay matrix mixed with light brown silty sand; soil admixture was minimal at 40 cm. The entire level contained cultural material consisting of bone, chert tools, pottery sherds, burned limestone, and charcoal flecks. Level 5 (40 cm - 50 cm) consisted of a dark gray clay containing some sand. Burned bone, charcoal, chert flakes, and pottery sherds were found in this level. The top half of Level 6 (50 cm - 60 cm) was a gray sandy clay with charcoal flecks. This clay became lighter in color toward the bottom of the level. The bottom half of the level was culturally sterile. Unit 1 was excavated to a depth of 70 cm.

Unit 2. Test unit 2 was placed at N115, E240 at the bottom of the south ridge slope at what appeared to be the terminal southern edge of site 23CY-352. Several buried soil horizons were noted in the east profile of the unit (Plate 3b). Artifacts were recovered throughout the excavation unit, including the lowest level. Earlier cultural deposits



Plate 3a. Test Unit 1. Buried Soil Horizon Bearing Cultural Material.



Plate 3b. Test Unit 2. Buried Soil Horizons Showing the Various Deposition Episodes at the South Slope Base.

were made on a steeper slope than later cultural deposits, as siltation gradually filled the swale to the south of the site. The top 25 cm of unit 2 consisted of a plow zone made up of a light gray brown silty clay. The second subsurface soil horizon consisted of a 12 cm to 20 cm band of medium gray brown clay. This was followed by 7 cm to 12 cm of a light tan silt over a thin 2 cm deposit of medium brown clay. The southern portion of the unit had a 5 cm to 16 cm deposit of light tan silt. The northern half of the unit had a thick 20 cm deposit of gray clay followed by a 15 cm thick deposit of grayish yellow clay. Since it had been demonstrated that buried cultural deposits existed to a depth of 85 cm with a probability of greater depth to the cultural deposit, the excavations in unit 2 were discontinued (Plate 3b). A carbonized broken corn cob cupule was recovered in Level 5 (40 cm - 50 cm) (Appendix C), while one Middle Woodland sherd was located in Level 4 (30 cm - 40 cm). Due to the slope of the soil horizons, it is possible that both were deposited in the same natural soil horizon. The deepest levels of unit 2 produced 3 grit-tempered, cord-marked sherds and 2 plain limestone-tempered sherds. These sherds are similar to the Late Woodland ceramics found in unit 1 and features 1, 3, and 4. Prehistoric mixing and soil erosion may account for the location of the Middle Woodland sherd at a higher level in the excavation unit.

Backhoe Trenches

Five backhoe trenches were excavated at site 23CY-352. Trenches 1 and 3 were placed in areas of the site where buried cultural deposits were anticipated. The remainder were placed to sample other areas of the site and to validate the results of shovel tests.

Backhoe Trench 1. This north-south trench was located at the east boundary of the site at N113, E298. This trench is approximately 2 m to 5 m west of the area disturbed by the pipeline excavations of 1979. Placement of the trench in this area was suggested by the shovel probe at N113, E300, which showed disturbance of the top 25 cm by pipeline construction, followed by a feature or cultural level. A carbonized corn kernel was recovered in this shovel probe at 50 cm (Appendix C). Backhoe trench 1 was slightly over 6 m long and 180 cm deep. Three archaeological pit features were discovered in this trench (Figure 5). The top 10 cm to 20 cm of backhoe trench 1 consisted of a topsoil plow zone made up of a gray brown clayey, sandy silt. At the south end of the trench, this level was followed by a 14 cm to 20 cm level containing cultural material. This soil horizon was made up of a gray brown clayey silt that gradually became a silty clay. The next 80 cm was made up of a white to light gray sandy silt with lenses of light gray silty clay and white/gray silty sand. The bottom 30 cm consisted of a medium yellow/brown clay with lenses of medium yellow silty clay. The pit features extended from 46 cm to 60 cm below ground surface. The features will be addressed in a following section.

Backhoe Trench 2. Backhoe trench 2 was laid out at the north terrace edge at N216, E267. This north-south trench was about 8 m long and varied from 75 cm to about 2 m deep. The upper soil horizon consisted of a light gray brown silty clay between 25 cm and 50 cm thick at the terrace edge. Two and one half meters from the terrace edge, this horizon gradually became a medium gray brown silty clay over 75 cm in depth. Beneath this soil horizon was a deposit of light brown sandy

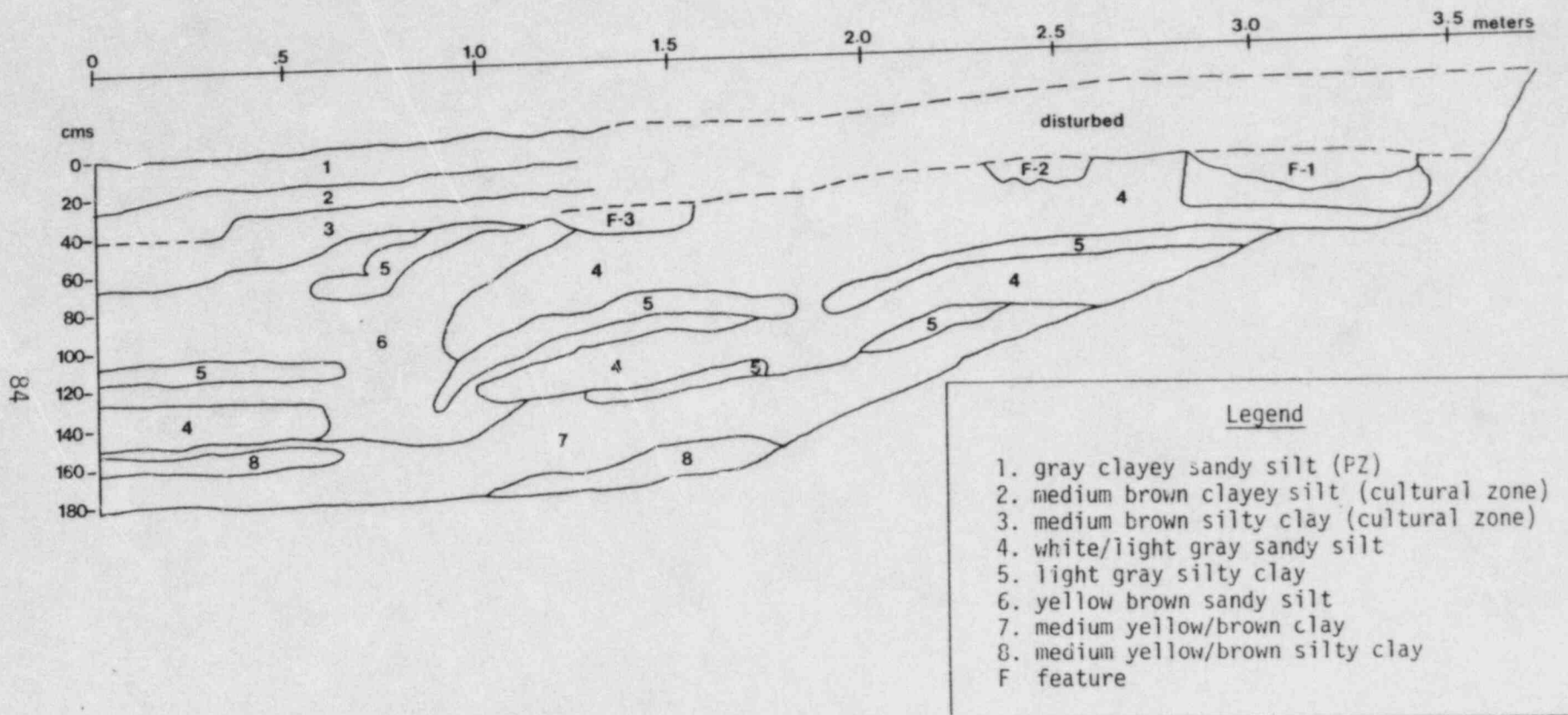


Figure 5. West Profile of Backhoe Trench #1, Site 23CY-352

silt 75 cm to 1 m thick. This deposit was present at the base of the backhoe trench. Cultural materials were absent in the trench profile.

Backhoe Trench 3. Backhoe trench 3 was placed in the center of the central east-west ridge of site 23CY-352 at N148, E248. It was oriented north-south and was over 5 m long and 1.75 m deep. Excavation of this trench was stopped when backhoe excavation encountered an archaeological pit feature (Feature 4). The plow zone varied from 16 cm to over 20 cm in thickness. This horizon consisted of dark brown sandy clay. In most of the southern end of the trench profile, it was followed by a layer of yellow brown clay varying in thickness from 10 cm to 32 cm. Below this level, a thick layer of silty, clayey, fine sand extended to the base of the excavation. This 1 m thick deposit was broken by a 7 cm to 8 cm thick lense of clay at 120 cm below ground surface. One disturbed area located 40 cm to 80 cm below surface was observed. This disturbance apparently was the result of animal burrows or roots. Feature 4 was located at the north end of the trench. The top portion of the feature was removed by the backhoe shovel at 70 cm below ground surface, leaving about the bottom 14 cm of the pit exposed in the profile. The feature disturbed by the backhoe was kept separate from the other backdirt and was bagged for flotation and analysis.

Backhoe Trench 4. This east-west oriented trench was placed in the low swale between the terrace edge and the main site area at N200, E200. The trench was 5 m in length and 2 m deep. From the top of the excavation to the base of the trench, the soil was a bluish gray homogeneous clay exhibiting characteristics of a marl or gumbo clay exposed to long periods of standing water. Manganese oxide particles

were present as infrequent mottling in this homogeneous deposit. Evidence of cultural deposits or features was absent.

Backhoe Trench 5. Backhoe trench 5 was placed about 10 m west of the transmission tower in an area where little surface evidence of prehistoric cultural material had been encountered. This 3.3 m long north-south trench was about 1.5 m deep. The plow zone consisted of a light grayish brown sandy silt that varied from 22 cm to 32 cm in thickness. This was followed by a 12 cm to 14 cm thick soil horizon consisting of yellow brown sand. The next soil horizon was a dark gray clay which gradually became lighter as the bottom of the excavation was approached. Cultural materials were absent in this trench.

Features

Four pit features were discovered during the excavation of the backhoe trenches on site 23CY-352. In all instances, soil flotation samples were taken from the feature fill. Charcoal samples were taken for radiocarbon dating; and all artifacts, including bone, ceramics, and chert, were collected for analysis. The features in backhoe trench 1 were largely removed by the backhoe shovel, but pit profiles in the trench wall were mapped (Figure 5), and samples were taken from the parts of the features left in situ. The bottom of Feature 4 (backhoe trench 3) was excavated and mapped (Figure 6).

Feature 1. Feature 1 is a large, deep, flat-bottomed, bell-shaped pit (Plate 4a). This pit was 122 cm long and extended 20 cm to 25 cm beneath the plow zone. Evidence of in situ burning was observed during the excavation of the feature. The pit may have been filled by refuse after the burning episode. The feature fill was dark gray and contained burned orange particles, charcoal, and cultural material. A total of

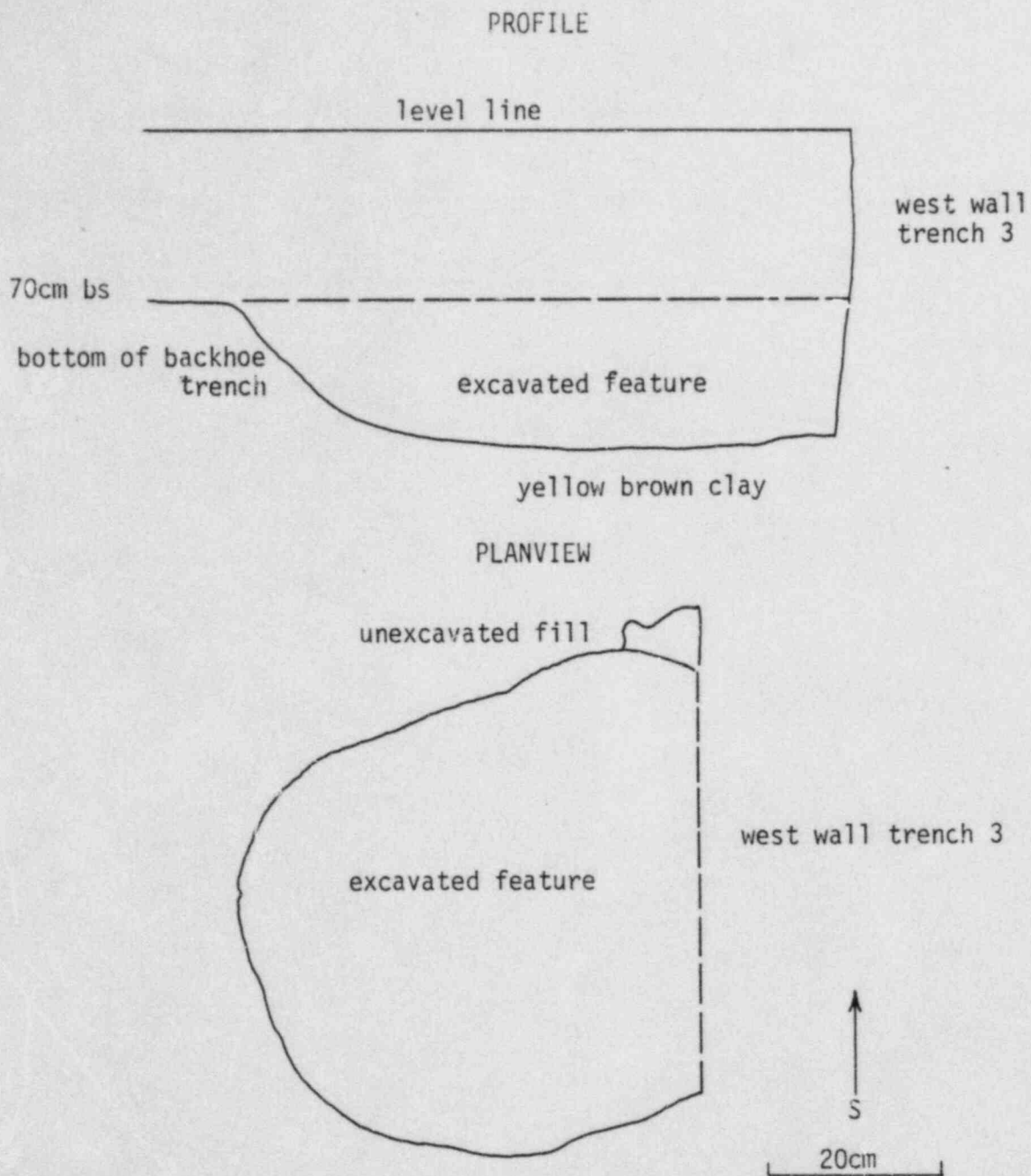


Figure 6. Profile and Planview of Feature #4, Site 23CY-352



Plate 4a. Feature 1, Backhoe Trench 1, Site 23CY-352, Facing West.



Plate 4b. Feature 2, Backhoe Trench 2, Site 23CY-352, Facing West.

360 items were recovered from this feature, including 42 pieces of chert debitage, 62 rocks, 36 pottery sherds, 51 pieces of clay daub, 91 pieces of bone, and 30 seed and nut specimens. Charcoal from this feature was radiocarbon dated at A.D. 470±140 (Beta 10349). This feature produced evidence for early corn horticulture in the central Missouri River valley. A carbonized corn cob cupule from a 10-rowed ear of corn was identified by Leonard Blake (Appendix C). Although the early date associated with evidence of corn is attractive, it does not provide enough reliable evidence to demonstrate corn horticulture during late Middle Woodland times in the Missouri valley. However, the occurrence of the charred cupule contributes to the National Register of Historic Places significance of site 23CY-352. Hickory and nut shells and seeds from mayweed, plum, grape, and possibly *Chenopodium*, made up the remainder of floral materials (Appendix C). Faunal remains recovered consisted of squirrel, bird, turtle, and indeterminate large mammals (Appendix B). Most of the bone had been burned. A brushed limestone-tempered pottery sherd was recovered from Feature 1, as well as 10 cord-marked and 3 plain grit-tempered sherds, and 1 cord-marked and 5 plain limestone-tempered sherds. Chert tools were absent in this feature.

Feature 2. Feature 2 is a shallow, basin-shaped pit feature with a burned layer of limestone 5 cm to 10 cm thick at the base (Plate 4b). Most of this feature was removed by the backhoe, but materials in the trench profile suggested that the pit was 70 cm long. This feature extended to a depth of 14 cm beneath the plow zone. The feature fill was medium brownish gray clayey silt with flecks of charcoal. Cultural material recovered from this feature included 53 pieces of chert debitage, 97 rocks (37 limestone), 7 pieces of daub or burned clay, 11

pieces of bone (Appendix B), 5 pieces of hickory nut shell, and a seed (Appendix C). Ceramics and chert tools were absent. A deer bone with butchering marks was retrieved from this feature.

Feature 3. Feature 3 was a basin-shaped pit. This pit was recorded at the base of the plow zone; it extended to 48 cm below ground surface (Figure 5) and was 72 cm long. The feature fill was dark gray clayey silt with charcoal flecks and burned orange-yellow clay throughout. Like Feature 1, this feature contained limestone, chert debitage, burned bone, possible carbonized seeds, and ceramics, but there was no evidence of in situ burning. Artifacts from this feature consisted of a bifacial tool, 42 pieces of chert debitage, 14 rocks, 3 pottery sherds, 11 pieces of burned clay, 47 pieces of bone, and 3 possibly carbonized seeds. The bone material was heavily burned, preventing identification of species.

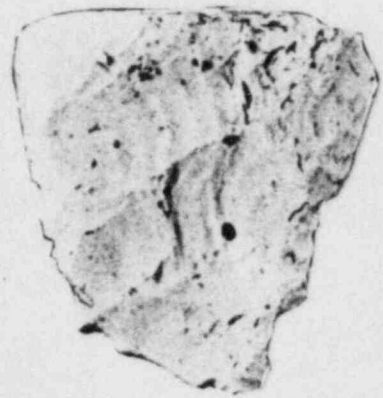
Feature 4. Feature 4 was a deep basin-shaped pit. The top of the pit was observed at the base of the plow zone, and it extended to a depth of 84 cm below ground surface (Figure 6). The pit was 52 cm long and 48 cm wide with a fairly flat bottom. The feature fill consisted of a dark brown clayey loam and carbonized organic material, including charcoal, bone, chert debitage, burned clay, ceramics, rock, and a seed. Charcoal from Feature 4 provided a radiocarbon date of A.D. 830±100 (Beta 10348). Two fine, sand-tempered rim sherds were included among the ceramics recovered from this feature (Appendix A). One rim sherd is a cord-marked, straight-necked jar with a slightly extended rim (Plate 5h), while the other rim is from a plain, rounded to shallow bowl with a tapered lip (Plate 6k). These tentatively have been identified as



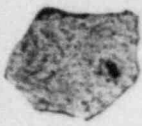
a



b



c



d



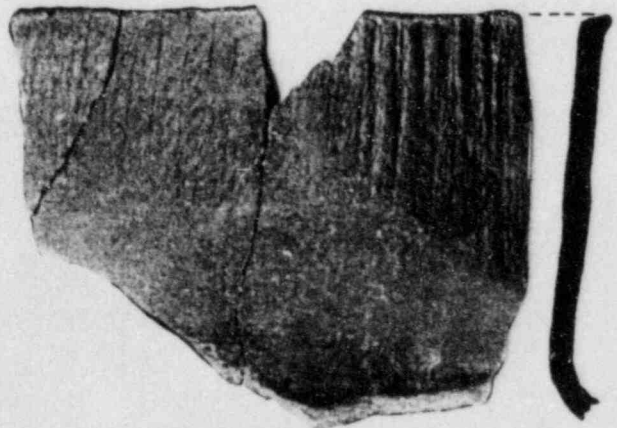
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f



g



h

Actual Size



a



b



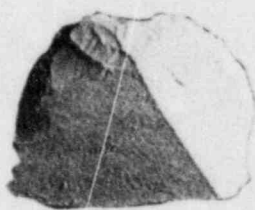
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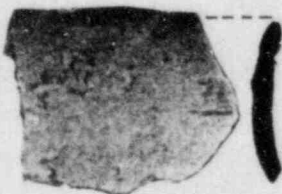
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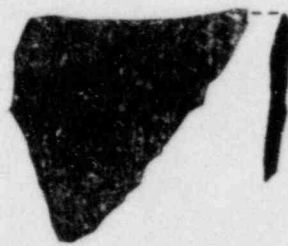
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k



l



m

Actual Size

Darnell Cord Marked (cf. Chapman 1980:280) and Graham Plain (cf. Chapman 1980:280-281), respectively. Other ceramics from this feature included 14 cord-marked, grit-tempered sherds and 5 plain limestone-tempered sherds. The feature also contained 1 unifacial tool and 1 retouched flake, 32 pieces of chert debitage, 18 rocks, 28 pieces of burned clay, and 72 bone fragments. Faunal material from Feature 4 included bones of deer, squirrel, vole, and unidentified large mammals, plus one indeterminate fish scale (Appendix B).

Possible Features. Three possible features were encountered during the shovel testing of site 23CY-352. Due to the nature of the investigation at the time, these areas were designated only as shovel probes that had encountered possible features or buried cultural horizons. The first of these cultural deposits is not considered a feature.

N125, E225. This shovel probe encountered a deposit containing cultural material extending 6 cm below the base of the plow zone. The plow zone extended to a depth of 17 cm below ground surface. The fill of this subplow zone deposit was dark brown, silty clay loam. It contained a burned sherd. Due to the extreme shallowness of the deposit, this cultural level probably represents an extension of the culture bearing soil deposit that has not been disturbed. On the southern slope of site 23CY-352, this soil horizon tends to vary between 20 cm and 30 cm in depth below surface (Figure 5).

N113, E300. This shovel probe encountered an undisturbed cultural deposit at 38 cm below surface. Disturbance from pipeline construction extended to 24 cm below the ground surface. After excavation of backhoe trench #1, only 2 m west of this probe, it was

determined that buried cultural horizons did not exist in this area of the site (Figure 5), but that the frequency of pit features was high. On this basis, it was inferred that this shovel probe did encounter a pit feature extending from 38 cm to 69 cm below ground surface. The fill of this feature was a sandy clay loam containing chert debitage, sandstone, 2 pieces of burned clay, and a corn kernel. This corn kernel was recovered 50 cm below ground surface (Appendix C). A total of 22 artifacts was recovered in this shovel probe, including 1 secondary flake of Jefferson City chert; 10 interior flakes consisting of 4 Jefferson City chert flakes, 3 heat-treated Burlington chert flakes, and 3 untreated Burlington chert flakes; and 8 unmodified pieces of sandstone.

N187.5, E262.5. The shovel probe at this location encountered cultural materials to a depth of 60 cm. This is a probable pit feature, based upon the location on the site and material retrieved by the shovel probe. Fill of this feature consisted of a dark brown silty clay containing chert debitage, limestone, sandstone, pottery sherds, burned clay, burned bone, and charcoal flecks. A total of 39 artifacts was collected from this feature and included 2 retouched Burlington flakes; 10 interior flakes consisting of 1 Jefferson City flake, 2 heat-treated Burlington flakes, and 7 untreated Burlington flakes; 5 pieces of unmodified limestone; 2 pieces of unmodified sandstone; 10 pieces of burned clay; 9 pottery sherds consisting of 5 limestone-tempered and 2 grit-tempered, cord-marked sherds and 1 plain fine sand-tempered sherd; and 1 indeterminate calcined bone fragment (Appendix B).

Artifact Provenience and Analysis

Subsurface chert and ceramic artifact distributions were plotted on the site grid map (Map 8). The major concentration of cultural materials is confined to an area approximately 150 m east-west by 70 m north-south, or E125 to E300 and N100 to N170. Surface materials have the same north-south range but largely are confined to an area east and south of the transmission tower (Map 9). The second area containing materials adjoins the main site at its northeast corner. This portion of the site is a narrow 20 m strip that extends northwest along the terrace edge for 120 m. Materials in this area are largely confined to the plow zone. Features were encountered in shovel probes at N187.5, E262.5 and N113, E300. This latter probe influenced the placement of backhoe trench 1. Some 1,746 artifacts were recovered during Phase II testing (Table 8). More than 692 items were recovered from the float samples taken from the two test excavations and the four features discovered in backhoe trenches 1 and 3. Items recovered during testing include: 15 bifacial tools, 17 unifacial tools (including 1 soil polished flake from a digging implement), 16 retouched flakes, 477 pieces of chert debitage, 1 pitted nutting stone, 3 abrading stones, 444 unmodified rocks, 263 pottery sherds, 172 pieces of burned clay, 297 bone fragments, 43 charred seeds and nuts (including 2 charred corn cupules and a corn kernel), and 1 piece of metal.

Five historic artifacts were recovered in two shovel probes at N200, E250 and N215, E250. These included 3 whiteware sherds (1 green and white floral print) ca. 1880 - 1900 (McKay 1979:37), 1 piece of plain stoneware, and 1 square nail (ca. 1790 - 1895, 1900 - 1902)

Table 8

Prehistoric Materials Recovered During 1984 Phase II Testing
at Site 23CY-352

Item	Shovel Probes	Surface	Excavation		Feature				%
			Unit 1	Unit 2	1	2	3	4	
Bifacial Tools	3	7	3	1	0	0	1	0	0.9
Unifacial Tools	3	12	0	2	0	0	0	1	1.0
Retouched Flakes	8	4	1	2	0	0	0	1	0.9
Cores	0	0	0	0	0	0	0	0	0.0
<u>Debitage</u>									
<u>Shatter</u>									
Primary Decort.	8	0	2	6	5	3	4	0	1.6
Second. Decort.	0	0	1	2	0	0	1	5	0.5
Shatter	11	0	18	8	18	7	14	1	4.4
<u>Flakes</u>									
Primary Decort.	0	0	3	0	2	2	2	0	0.5
Second. Decort.	7	0	2	1	0	4	0	1	0.9
Interior	97	3	37	42	65	37	20	25	18.7
Polished	0	1	0	0	0	0	0	0	0.06
Bifacial Thinning	3	0	4	0	0	0	0	1	0.5
<u>Modified</u>									
Sandstone	0	1	1	0	0	0	0	0	0.11
Igneous/Metamor.	0	2	0	0	0	0	0	0	0.11
<u>Unmodified</u>									
Limestone	72	0	24	3	45	37	0	13	11.1
Sandstone	45	0	1	10	8	6	4	0	4.2
Hematite	0	0	0	1	0	0	0	0	0.06
Igneous/Metamor.	85	0	1	12	9	54	10	5	10.0
Ceramics	76	6	51	48	36	0	3	42	15.0
Burned Clay/Daub	41	0	11	23	51	7	11	28	9.9
Bone	3	0	72	1	91	11	47	72	17.0
Seeds/Nuts	1	0	0	3	30	5	3	1	2.5
Metal	0	0	0	1	0	0	0	0	0.06
TOTAL	463	36	232	166	360	173	121	195	100.0
Total Artifacts: 1,746									

(Fontana and Greenleaf 1962:44-60). These artifacts and flood data (Appendix D) suggest a historic occupation prior to 1903.

Prehistoric ceramic remains were recovered in the main portion of the site, as well as in a 75 m strip along the north terrace edge (E200 to E275). Ceramics consisted of both limestone-tempered and grit-tempered sherds. Surface treatments included smoothing, cord marking, and brushing (Appendix A). Although 263 sherds were recovered, only 180 sherds could be assigned to a ceramic type. One decorated Middle Woodland sherd was identified; the remaining ceramics appear to relate to the Late Woodland Boone and Maramec Spring phases of the Northeast Prairie region (Chapman 1980). However, the temper recipes at site 23CY-352 do not strictly meet the criteria for the Boone phase or Moreau subphase (Appendix A). Grit-tempered ceramic forms include the straight-necked jar, incurved bowl, and plain rounded shallow bowl. These have been identified as Darnell Cord Marked (cf. Chapman 1980:280), Maramec Cord Marked (cf. Chapman 1980:286), and Graham Plain (cf. Chapman 1980:280-281). The limestone-tempered sherds, which are thicker than the grit-tempered sherds, were typed as Moreau Cord Marked (cf. Chapman 1980:288-289) and Boone Plain (cf. Chapman 1980:276). Both ceramic pastes appear to be contemporary. The recovery of a corner-notched Scallorn arrow point in Level 4 (30 cm - 40 cm) of test unit 1 is consistent with a Late Woodland Boone or Maramec Spring phase occupation of the site (Plate 5e).

Radiocarbon dates from two of the four features discovered in two backhoe trenches are consistent with a terminal Middle Woodland through Late Woodland occupation of site 23CY-352. Feature 1 (backhoe trench 1) provided a radiocarbon dated sample of A.D. 470 \pm 140. Among the

botanical remains recovered from this feature was a corn cob cupule from a 10-rowed ear of corn, maygrass, hickory nut, grape, plum, and possibly *Chenopodium* (Appendix C). These finds indicate that corn gardening was an early activity at site 23CY-352. Maize horticulture also is suggested by the recovery of a corn kernel in a shovel probe from 50 cm below surface at N113, E300 and a broken corn cob cupule from Level 5 (40 cm - 50 cm) in test unit 2. Maygrass and nuts also were represented in the inventory of floral remains from this unit. Feature 4 (backhoe trench 3) provided charcoal that was dated to A.D. 830±100.

Faunal remains recovered in the two test units and four features indicated that white-tailed deer and squirrel, as well as bird, turtle, and fish, were among the subsistence items used by the Late Woodland occupants at site 23CY-352 (Appendix B).

Debitage Analysis

Chert debitage was recovered from shovel probes, the two test excavations, and the four pit features. Chert utilization during the early Late Woodland period (A.D. 470, Feature 1) appears to have been greater than during the later Late Woodland period (A.D. 830, Feature 4) at site 23CY-352. Data from the site (tables 8 and 9) indicate a preponderance of debitage representative of later stages in the tool production sequence (e.g., interior flakes). Almost 65% of all chert utilized at site 23CY-352 was Burlington chert, while 35% was Jefferson City chert (Table 9). This high percentage of Burlington chert is smaller than the 83% Burlington usage found by Ray et al. (1984:372), but the present sample is larger and probably more representative of the chert debitage sample population, since it was collected from subsurface

Table 9

Debitage Categories by Chert Type and Treatment
at Site 23CY-352

Debitage	<u>Burlington</u>		<u>Jefferson City</u>		<u>Callaway</u>	
	Un- Treated	Heat Treated	Un- Treated	Heat Treated	Un- Treated	Heat Treated
Core	0	0	0	0	0	0
Primary Decort.	3	2	6	0	0	0
Secondary Decort.	4	4	7	0	0	0
Interior	122	99	100	2	1	0
Bifacial Thinning	5	0	0	0	0	0
Primary Shatter	17	0	11	0	0	0
Secondary Shatter	3	3	7	0	0	0
Shatter	24	3	21	3	0	0
TOTAL	178	111	152	5	1	0
Percent	40	24.8	34	1	0.2	0

units and features as well as from the surface. The present finding shows a 2:1 preference for Burlington chert as opposed to the 3:1 ratio found by Ray et al. (1984:365). This high percentage of Burlington usage contrasts sharply with chert usage at site 23CY-20, where 55% of all chert utilized was Jefferson City chert.

Heat-treated Burlington chert accounted for 34.8% of the chert debitage at site 23CY-352 and only 18% at site 23CY-20. The percentage of debitage that was heat treated compared favorably with the findings of Ray et al. (1984:372), who found that one third of the debitage from the sites sampled in the Dissected/Bottomland area had been heat treated. Ray et al. (1984:372) suggest that more heat treatment of

chert occurred at the larger, more permanent settlements located in the Dissected Upland/Missouri River interface because the wider range of activities carried out at these sites required a greater expenditure of energy or because fluvial weathering reduced the knapping quality of the locally available Burlington raw material. They suggest that heat treatment may have increased the workability of the highly weathered Burlington chert used in this area. Site 23CY-359, however, also produced a high percentage (26%) of heat-treated Burlington chert. Untreated Burlington chert usage was highest at site 23CY-352 (40%) but amounted to only 27% of the total at sites 23CY-20 and 23CY-359. Cherts used for tool manufacture at 23CY-352 were about equally divided between Burlington and Jefferson City chert, but the low frequency of primary chert debitage and the lack of hammerstones suggest that initial chert reduction was a minor activity at this site. Both Burlington and Jefferson City chert tools appear to have been primarily prepared at another location.

Tool Analysis

Chert tools recovered at site 23CY-352 consisted of large bifacial tools, projectile points, biface knives, various unifacial cutting and scraping implements, and retouched flakes. Groundstone tools consisted of two sandstone abrading tools and a pitted nutting stone. Most of the bifacial and unifacial tools were recovered from the surface and apparently had been plowed out of pit features or midden on the eastern end of the site (Map 9). One diagnostic Late Woodland Scallorn corner-notched arrow point was recovered in Level 4 (30 cm - 40 cm) of test unit 1. One Burlington chert contracting stemmed lanceolate projectile point with a slight shoulder, which is similar to the Langtry Stemmed

(Chapman 1975:309-310), was found on the surface (Plate 6d). The straight fracture along one edge and blunted tip suggest that this tool is a broken knife. This biface type occurs from the Late Archaic period through the Woodland period (Chapman 1975:309-310). The long temporal span of the projectile type corresponds roughly to the temporal span of the barbed or shouldered Cypress projectile points found east of the Mississippi River in Illinois. Trotter and McNerney (1984:206) suggest that the latter projectile point primarily functioned as a cutting tool. Attributes noted most often on these tools include a high incidence of edge polish, edge rounding, marginal edge crushing, reworking, and the presence or absence of barbs. The particular specimen found at 23CY-352 exhibits marginal edge crushing, reworking, a barb and a broken section that may have been barbed, and edge rounding, indicating that this tool primarily was used for cutting.

Two large bifaces may have functioned as digging tools or hoes, although soil polish is absent (Plate 6a, Plate 7a). One soil-polished flake was recovered, indicating that digging was an activity at the site (Plate 6g). Several large unifacial scraping tools were recovered (plates 5c; 6c,r; 7b,c,f,g), as were several large retouched flakes that probably were utilized as knives (plates 5f; 6l,l; 7e). Two bifacial tools were found that may have been used as drills or perforators (Plate 6b and Plate 7d). Fifteen (45%) of the 33 unifacial and bifacial tools had been heat treated. This is smaller than the 65% figure noted by Ray et al. (1984:372).

The long, narrow, thick biface (Plate 6a) is similar to digging tools and picks of the Maramec Spring phase of the Prairie-Forest Potter

Plate 7

Artifacts from Site 23CY-352

- a. Large bifacial blade, possibly used as hoe, cutting or scraping tool, Burlington chert
- b. Large Burlington chert rounded end scraper
- c. Unifacial scraper/knife made on secondary flake of heat-treated Burlington chert
- d. Perforator/drill, Burlington chert
- e. Knife made on unifacial blade with bifacial retouch, Burlington chert
- f. Triangular unifacial end scraper, Burlington chert
- g. Round scraper, Burlington chert



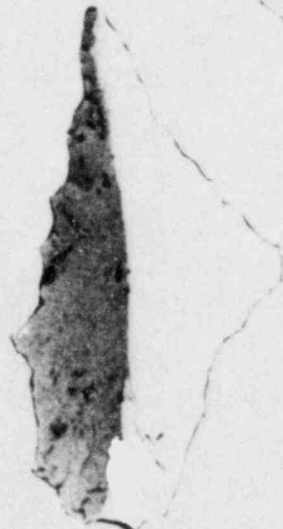
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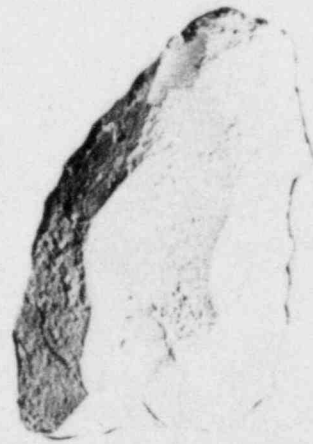
b



c



d



e



f



g

Actual Size

Tradition of the Late Woodland period (Chapman 1980:100-101). Other tools of this phase include Scallorn arrow points, Langtry Stemmed points (Chapman 1980:100), pitted nutting stones, rounded base drills (similar to Plate 6b), flake snubbed endscrapers, and rounded and large unifacial scraping tools, all of which are present at site 23CY-352. Since some ceramics tentatively have been identified as Maramec Cord Marked (Appendix A), this data and the overall tool assemblage at site 23CY-352 suggest a cultural affiliation with the eastern Ozark Highland cultures south of the Missouri River during the Late Woodland period. Chapman (1980:121) states that "there are close relationships between the Moreau subphase and the Boone and Maramec Spring phases." The tool assemblage and the ceramic materials (Appendix A) at site 23CY-352 suggest that traits of both these major phases and the subphase are present at site 23CY-352.

Interpretation

The main portion of site 23CY-352 on the terrace ridge covers an area 150 m east-west and 70 m north-south. The second portion of the site is a narrow 20 m strip that extends northwest along the terrace edge for 120 m and adjoins the main site at its northeast corner. Including both subareas, site 23CY-352 extends over a surface area of 12,900 m².

Results of the Phase II archaeological investigations at site 23CY-352 indicate that major occupations of the site occurred from the terminal Middle Woodland period through the terminal Late Woodland period. Radiocarbon dates from pit features of A.D. 470±140 and A.D. 830±100, the chert and groundstone tool assemblages, and the ceramic

materials are consistent with this temporal placement. Evidence of a Middle Woodland occupation is confined to one decorated pottery sherd. The buried cultural deposits located at site 23CY-352 were primarily Late Woodland in cultural affiliation.

Four pit features were found in the backhoe trenches, while two other features were encountered during shovel testing. The subplow zone deposits on the central east-west ridge of the site have been disturbed by construction of the 1979 water intake pipeline (Map 9), placement of the transmission tower, and by agricultural cultivation. However, investigations revealed that a major portion of the site was not impacted by construction of the pipeline. Substantial undisturbed subsurface features and buried cultural deposits still are present. The density of subsurface materials is moderate to heavy and consists of lithic tools and debris, ceramic sherds, and well-preserved faunal and floral remains. Evidence of early corn gardening is present on the site, having been found in three different areas of the site in pit features and buried contexts. The corn cob cupule from a 10-rowed ear of corn was dated at A.D. 470 \pm 140 in Feature 1, while a corn kernel was recovered nearby at a depth of 50 cm. A total of 43 seeds and/or nut shells was recovered, including corn, maygrass, grape, plum, hickory nut, and possibly *Chenopodium*. A total of 297 bone fragments was recovered in two test units and four pit features. The excellent preservation of these materials suggests that soils at 23CY-352 have a neutral to slightly basic pH. Faunal materials indicate that white-tailed deer and squirrel, as well as bird, turtle, and fish, were subsistence items at site 23CY-352.

Debitage recovered from site 23CY-352 indicates that a major activity at the site was tool maintenance; but ceramic remains, charcoal, and preserved food items from refuse pits indicate that site 23CY-352 primarily was a habitation site or village during the Late Woodland period. Gardening, as evidenced by the polished flake from a digging implement and the corn remains, was a significant activity at site 23CY-352. Other activities suggested by the artifact assemblage include flint knapping and tool maintenance, the manufacture of groundstone tools, hematite processing, plant food processing, cooking and food preparation, butchering and hide preparation, and pottery making.

Site 23CY-352 is interpreted as a habitation site that served as a residential base camp or village during the Late Woodland period and that is affiliated with mound group 23CY-356 on the adjacent bluff. Binford (1980:9) has defined a residential base as "the hub of subsistence activities, the locus out of which foraging parties originate and where most processing, manufacturing, and maintenance activities take place." The tool assemblage and the Maramec Cord Marked pottery suggest a Maramec Spring phase affiliation. Other ceramics suggest a Boone phase or Moreau subphase affiliation; however, the mixture of paste recipes present on site 23CY-352 (Appendix A) differs from the typical ceramic assemblage of the Boone phase (Chapman 1980; Denny 1964), the Moreau subphase (Chapman 1980), or Graham Cave (Chapman 1980). This suggests some mixing of cultural affiliations at site 23CY-352, with the presence on the site of some attendant traits of both major phases and the subphase, a variation of culture patterns influenced by contact with external societies (Geier 1975:25). Because

of the fairly long time span involved and the close relationship between the above Late Woodland phases, further excavations at this village site, neighboring sites, and associated mound groups are necessary in order to clearly define and make comparisons between the Maramec Spring phase, Boone phase, and Moreau subphase aggregate in the Callaway County area (Chapman 1980:121).

Statement of Significance

Phase II testing at site 23CY-352 indicates that this site contains substantial undisturbed archaeological remains that will significantly aid in defining settlement and subsistence patterns in the central Missouri River valley during the Late Woodland period. The relatively well preserved condition of faunal and floral remains at this site is somewhat unusual, since soil acidity frequently destroys these kinds of remains elsewhere in central Missouri. Furthermore, the geographical and cultural relationship of the site with sites 23CY-20 and 23CY-359 provides an opportunity to compare environmental and cultural factors relative to resource exploitation and settlement patterns. Sites 23CY-20 and 23CY-352 are thought to have had contemporary occupations during the Late Woodland period Boone phase, and both may have had occupations during the terminal Middle Woodland period. This site probably is associated with mound group 23CY-356 on the adjacent bluff. Data suggests that the floodplain environment where site 23CY-352 is located was a prime source of subsistence items such as turtle, fish, mammals such as deer, and some seeds and roots. The fertile bottomlands probably contained prime gardening areas as well. Other resources, such as nuts for subsistence and chert and sandstone for tools, were carried

to the site. Thus, site 23CY-352 can provide important data concerning settlement patterns and resource procurement and utilization practices of Late Woodland groups in the central Missouri River valley. Some artifacts, specifically the Maramec Cord Marked pottery, diagnostic chert tools, and the pitted nutting stone, suggest a Maramec Spring phase Late Woodland period cultural affiliation. This phase usually is associated with Ozark Highland cultures south of the Missouri River east of Callaway County. Other ceramics suggest a Boone phase and Moreau subphase cultural affiliation. The relationship between these phases is little understood (Chapman 1980:121).

One corn cupule from a 10-rowed ear of corn was recovered in Feature 1 (A.D. 470±140). A corn kernel was recovered in a shovel probe at 50 cm below surface, and one fragmentary corn cob cupule was located in Level 5 (40 cm - 50 cm) of test unit 2. According to Chapman (1980:15), evidence of maize agriculture was not obtained during previous investigations of Boone phase sites in Missouri. The discovery of maize in Boone phase contexts at site 23CY-352 establishes that maize was part of the subsistence system during this phase. The very early date established at this site for corn gardening in the central Missouri valley also provides evidence for a reevaluation of the use of polished digging tools in the Boone phase of the Late Woodland period. Chapman (1980:115) suggests that hoes were used only for digging roots in the Boone phase because there was no evidence of horticulture. The evidence for the practice of horticulture in the Late Woodland period at site 23CY-352 suggests that hoes may be associated with this activity. Significant information about prehistoric activities suggested by artifact type and debitage include flint knapping and tool maintenance,

the manufacture of groundstone tools for abrading and polishing, hematite processing for ceremonial use, plant food processing, cooking and food preparation, digging, and pottery making.

INVESTIGATIONS AT SITE 23CY-359

Site Description

Site 23CY-359 is linear in shape. It is situated along a narrow ridge top at an elevation of 580 ft - 710 ft msl and extends over 800 m north-northwest. The site is bounded on the south by Lawrence Cemetery, which is 200 m northwest of Logan Creek (Plate 8a,b). The ridge on which site 23CY-359 is located merges with the Logan Creek bottom. The south end of the site is located 700 m north of the Missouri, Kansas and Texas Railroad and 1,000 m northeast of State Highway 94. The north end of the site is 300 m south and 60 m west of Union Electric Company's gravel haul road. Site 23CY-359 varies in width, from 80 m on the south end to 60 m in the central portion, and narrows to 20 m - 30 m as an approach is made to the north end of the site. Beyond this narrow wooded and briar covered section, the site opens into a rather wide field. The southern 110 m of this field makes up the north end of the site. Some cultural materials extend down a westward trending ridge spur for 80 m. A small portion of this north field was cultivated and planted in corn during our investigations. A farmstead site (A-15) (Ray et al. 1984) consisting of a residence and outbuildings was located on the southern end of the highest ridge near the center of the site. Site 23CY-353 is located 150 m northeast of this central portion of site 23CY-359 (Map 6). Site 23CY-353 is situated on a terrace of the Logan Creek floodplain at the base and on the south slope of the adjacent



Plate 8a General View of South Terminal Ridge, Site 23CY-359,
Facing Southeast.



Plate 8b. General View from Central Ridge, Site 23CY-359,
Facing Southwest.

ridge. A small intermittent stream dissects the two ridges. Site 23CY-353 has both Archaic and Woodland occupations. Site 23CY-352 is located 260 m southwest of the southern end of site 23CY-359, and site 23CY-20 is located 600 m southwest of this point (Map 6). At the time of Phase II testing, site 23CY-359 was overgrown by tall grass.

Summary of Previous Investigations

Site 23CY-359 initially was located during a preliminary reconnaissance for historic architectural and historic background research for the Phase I survey of Union Electric Company's residual lands (Ray et al. 1984:285). Based on surface finds, the site was estimated to cover an area of 120,000 m², extending from Lawrence Cemetery on the south to approximately 150 m south of the heavy haul road on the north. This survey found a light scatter of artifacts extending down a southwest trending ridge lobe on the north end of the site and down an eastward trending lobe near the south end of the site (Ray et al. 1984:287).

A total of 14 artifacts was collected during reconnaissance. These included 4 projectile points, 7 other biface fragments, 1 utilized flake, 1 interior flake, and 1 pitted stone. The projectile points consisted of 2 side-notched points, 1 slightly expanding stemmed point, and 1 Scalloped Corner-Notched arrow point. All of the projectile points and five of the bifaces had been heat treated.

During the 1982 survey, only diagnostic artifacts were collected, but a sample of artifacts in a 75 m transect was recorded as to artifact type and chert type (Ray et al. 1984). Forty eight artifacts were recorded: 28 Burlington Interior flakes, 13 Jefferson City Interior

flakes, 3 Burlington secondary decortication flakes, 1 Jefferson City secondary decortication flake, 1 Jefferson City primary decortication flake, 1 Burlington shatter fragment, and 1 Burlington biface fragment. Artifacts noted in the road included a Burlington core and a Jefferson City core, a Burlington biface fragment, a pitted stone/mano, and 2 projectile point bases. The latter were side notched and Big Sandy-like and were made of heat-treated Burlington chert.

Ray et al. (1984:286) suggest that the site probably is a seasonal camp and knapping station. The chert analysis suggested a preference for the manufacture of tools from Burlington chert, since all projectile points and all but one biface were made from this material. Diagnostic artifacts indicate that the site was occupied during the Archaic and Woodland periods. A Graham Cave Notched point suggested an occupation during the Early Archaic (9000-7000 B.P.) period (Chapman 1975:249). A Big Sandy-like point probably is associated with the Middle Archaic period (7000-5000 B.P.), while Steuben Expanding Stemmed points are characteristic of the Middle Woodland and early Late Woodland periods (Boone phase) (Chapman 1980:115, 313). The Scallorn Corner-Notched arrow point dates to the Late Woodland period (1500-1000 B.P.) and also is associated with the Boone phase.

Ray et al. (1984:286) note that the site is located on chert bearing Jefferson City limestone and that numerous residual nodules occur on the local ridge slopes. While the nearest Burlington chert outcropping occurs 2 km north, both Burlington and Jefferson City chert nodules may be found in tributaries of Logan Creek 250 m east and 500 m west and in Logan Creek 200 m to the southeast. Further investigations

of prehistoric chert exploitation were recommended as a research goal in the Callaway study area (Ray et al. 1984:397).

Phase II Testing

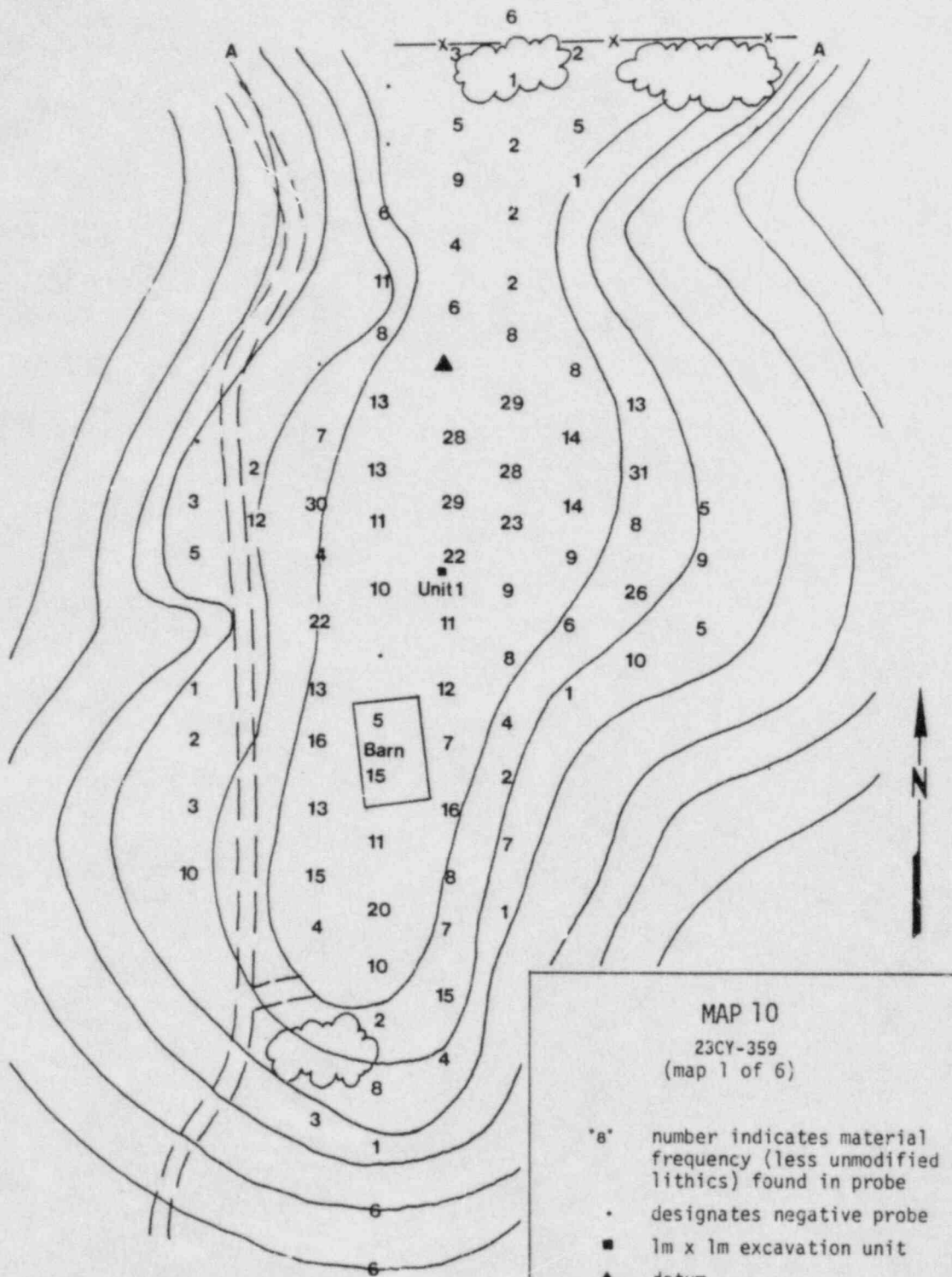
Shovel Probes

A north-south grid line was established along the center of the southernmost and lowest portion of the ridge north of Lawrence Cemetery. The datum selected was the flat circular concrete foundation for a silo or grain storage bin with an indentation (datum point) from which all measurements were made. This point was N0, E0. This grid was extended 800 m (1/2 mi) along the central ridge, following the slight northeast and northwest directional orientation of the ridge. An east-west grid line was established at the north end of the site in order to investigate the material on the southwestern trending ridge lobe. Three hundred sixty nine screened shovel probes were made at site 23CY-359. Frequency of materials recovered is shown on maps 10 through 15.

As might be expected on a site subject to topsoil erosion, the depth of the plow zone was 10 cm to 12 cm, while the depth of culture bearing deposits rarely exceeded 25 cm to 30 cm. Two deeper accumulations containing historical material were noted in the garden area east of the residence. This area may represent accumulations of trash dumped in the garden, or it may have been the former site of the privy, now located 5 m west.

Excavation Units

Excavation units were laid out in areas that shovel probes suggested could provide concentrations of subsurface material, although placement in the central ridge portion of the site also was a

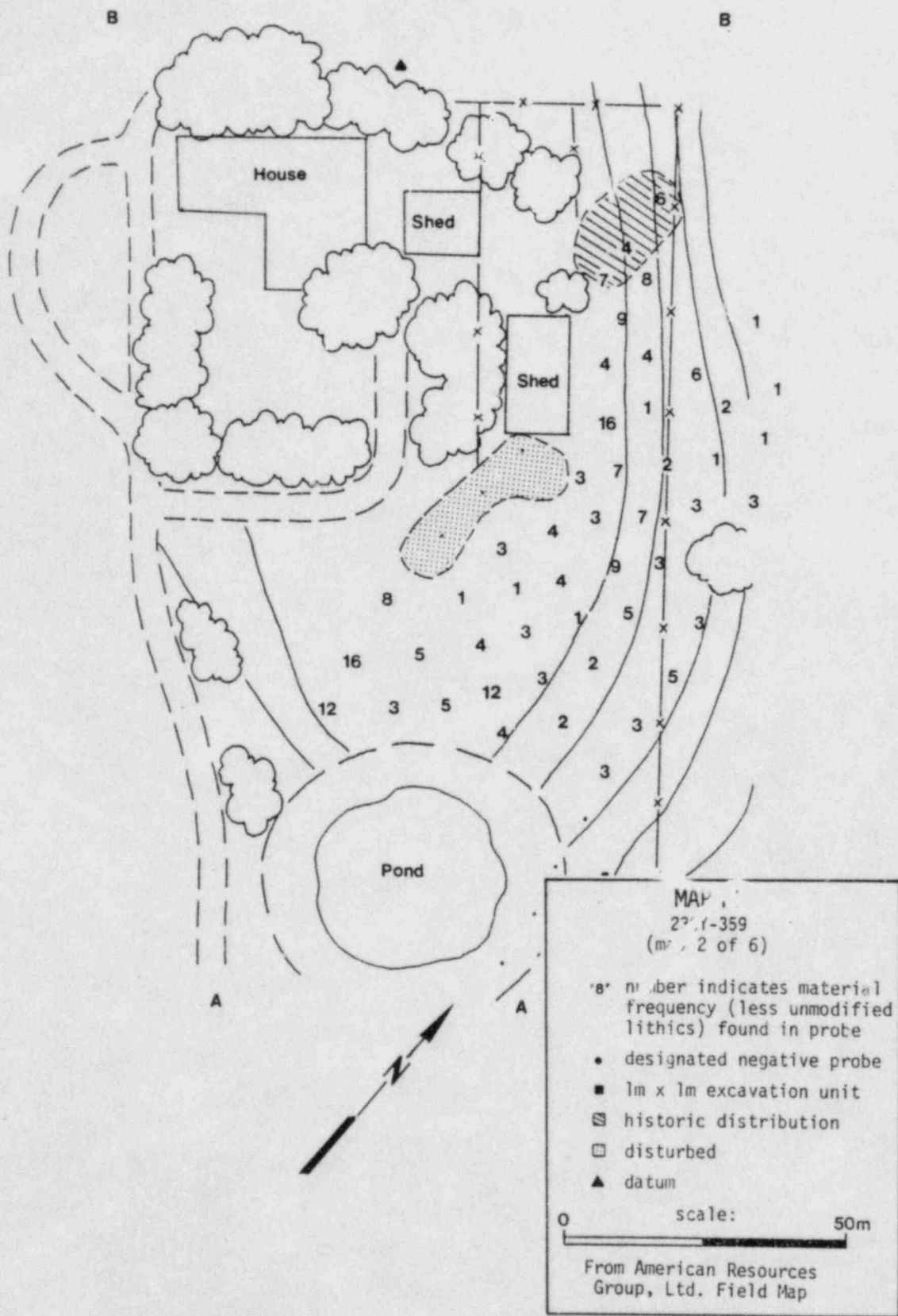


MAP 10
 23CY-359
 (map 1 of 6)

a number indicates material frequency (less unmodified lithics) found in probe
 . designates negative probe
 ■ 1m x 1m excavation unit
 ▲ datum

0 Scale: 50m

From American Resources Group, Ltd. Field Map



MAP 12
23CY-359
(map 3 of 6)

Number indicates material frequency (less unmodified lithics) found in probe

● designated negative probe

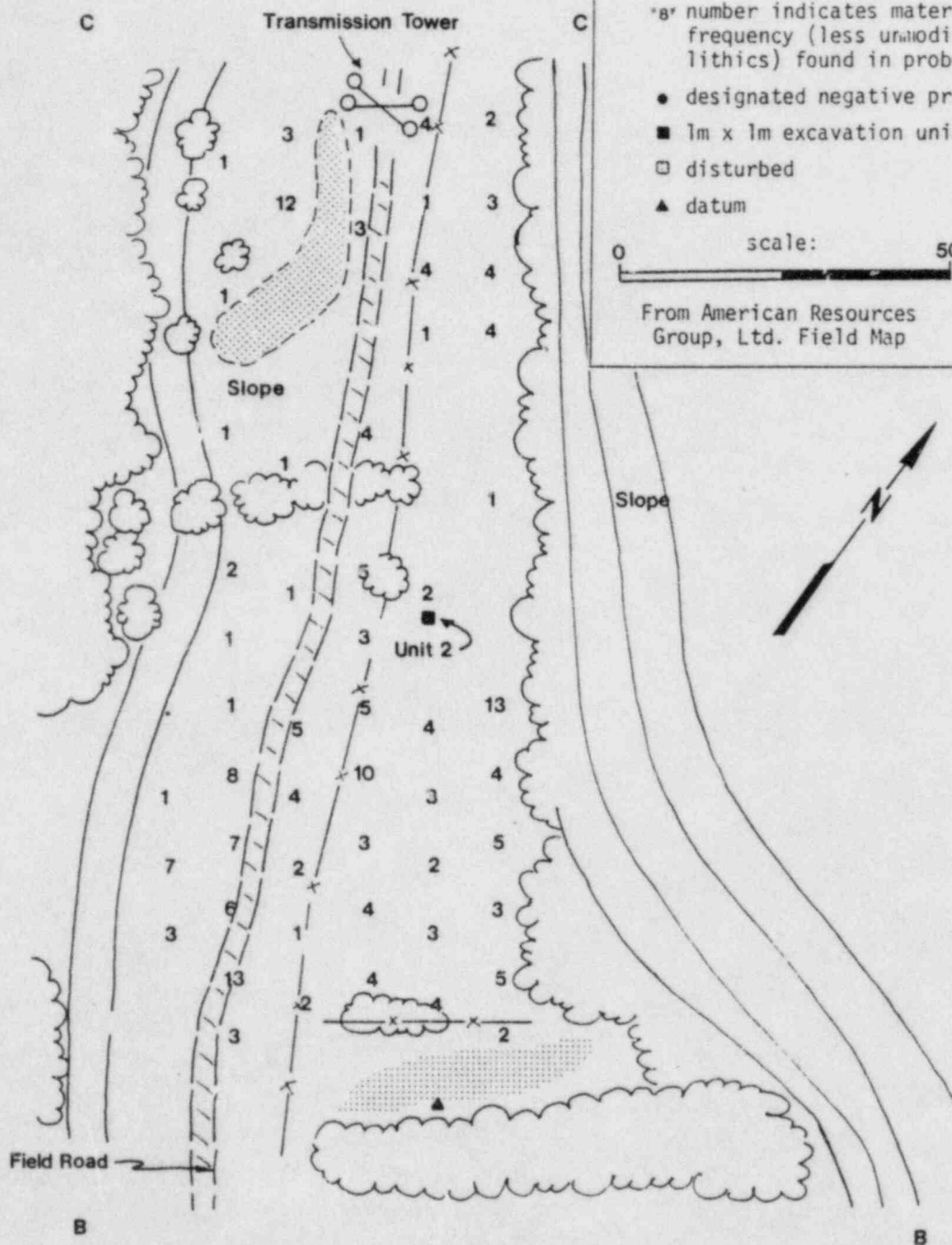
■ 1m x 1m excavation unit

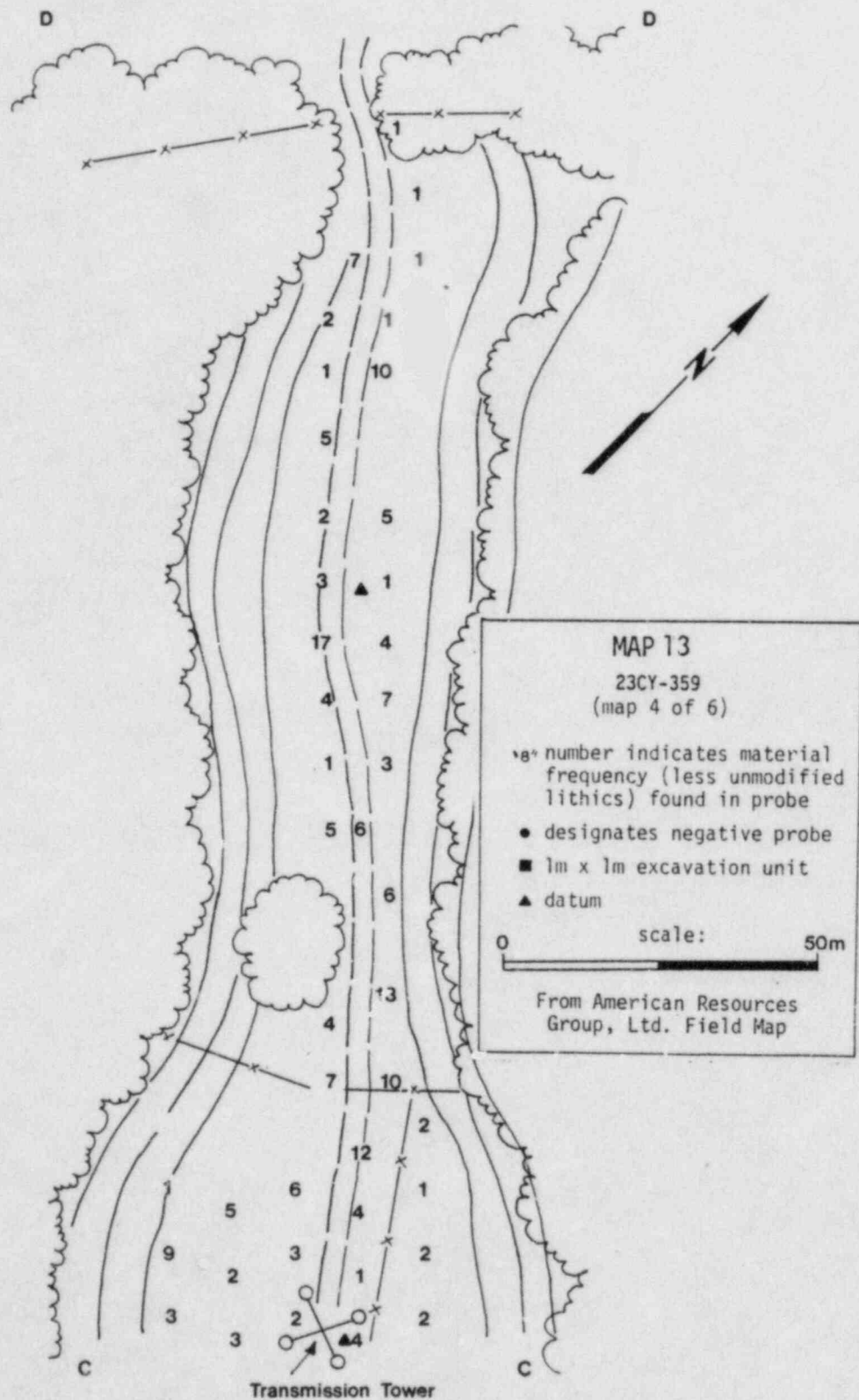
□ disturbed

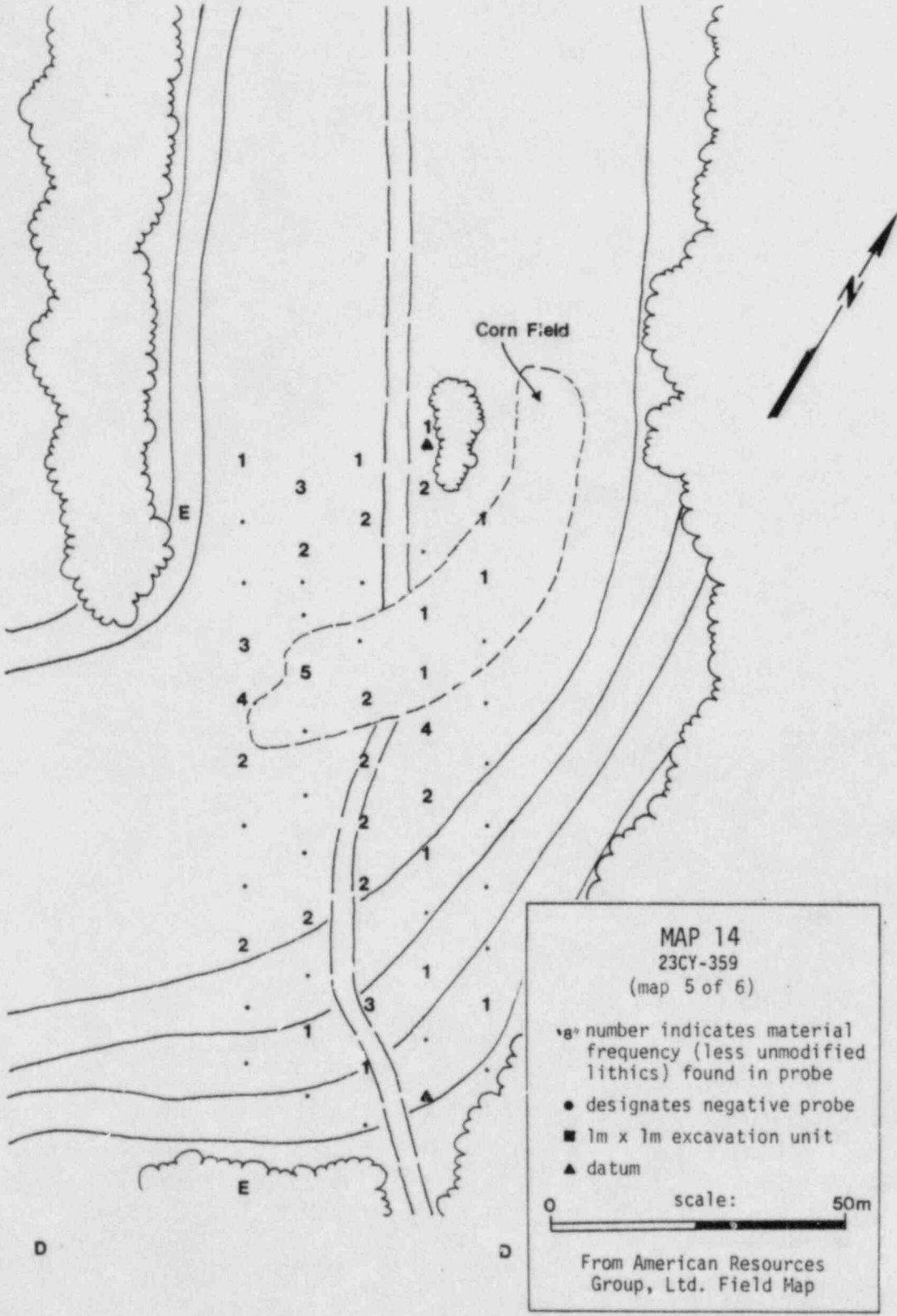
▲ datum

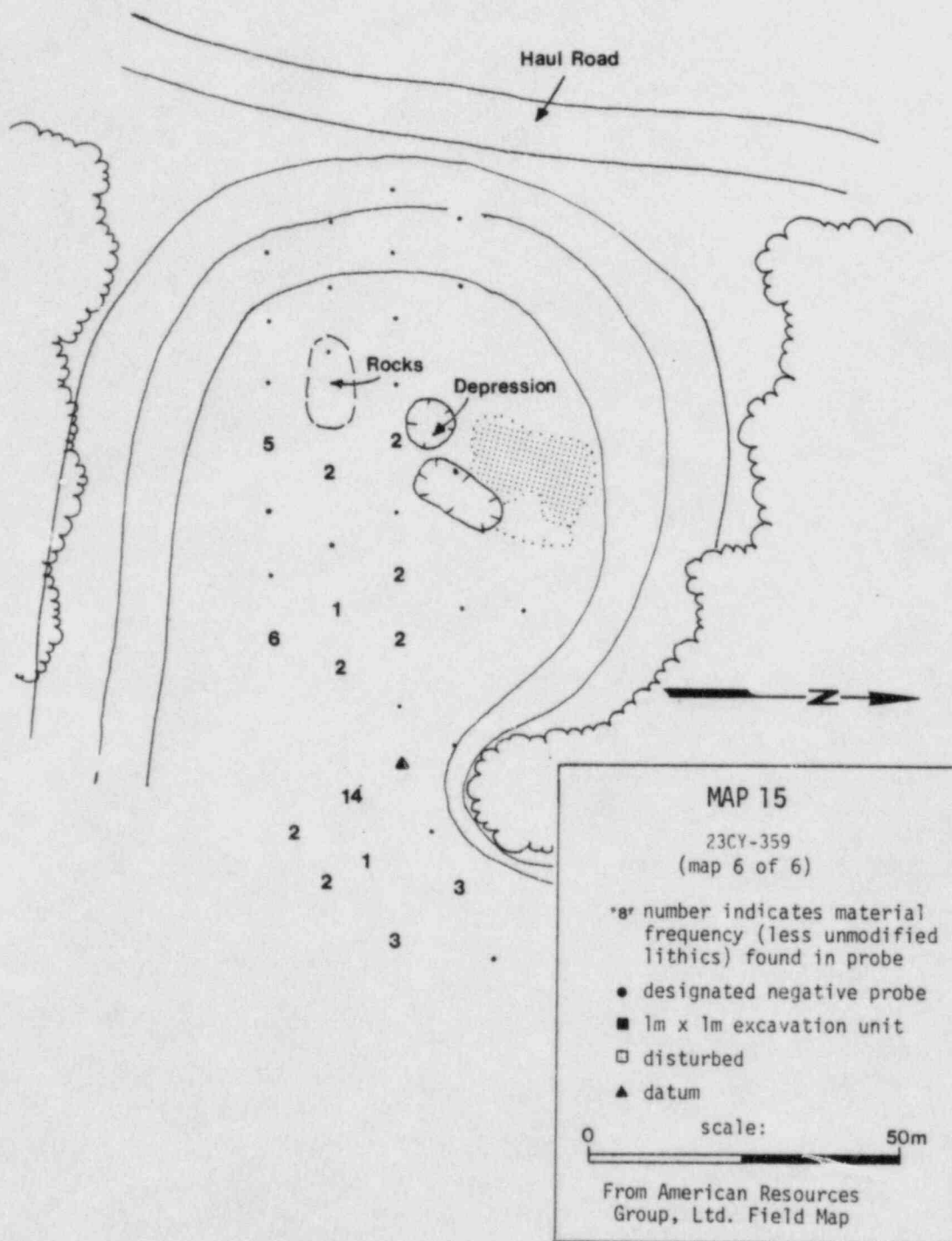
0 scale: 50m

From American Resources Group, Ltd. Field Map









consideration. Unit 2 was placed to avoid historic disturbance, but this was not entirely successful. The nature of the cultural deposits did not warrant the collection of samples for flotation analysis.

Excavation units exhibited soil stratigraphy similar to the shovel probes. In unit 1, the top 10 cm were composed of a light brown sandy silt, which became slightly more yellow near the bottom of the level. Cultural material consisted of rocks and chert debitage. Level 2 (10 cm - 20 cm) was a yellowish brown sandy silt. This level contained the greatest amount of cultural material. Level 3 (20 cm - 25 cm) was a dark yellowish brown clay that was culturally sterile (Plate 9a). The top level of unit 2 was similar to unit 1 (Plate 9b). Level 2 (10 cm - 20 cm) contained more clay, and most cultural material was found in this level at a depth of 12 cm to 15 cm. Unit 2 was excavated to a depth of 40 cm. Levels 3 and 4 consisted of a culturally sterile yellow brown clay. Some disturbance, probably a tree root, was noted in the north wall profile. Both excavation units had artifact bearing levels about 20 cm deep, followed by culturally sterile subsoil strata. Features were not observed in either of the excavation units.

Artifact Provenience and Analysis

The artifact distributions observed during the shovel testing were plotted on the site grid map. The greatest concentration of cultural material was located on the south terminal ridge top near the Lawrence Cemetery (Map 10). The area 40 m south and southeast of datum had the highest frequency of material per shovel probe. Unit 1 was placed on the grid line in this area. Prehistoric materials were recovered from one end of the site to the other, with very few negative probes.



Plate 9a. Test Unit 1, Site 23CY-359, Facing North.



Plate 9b. Test Unit 2, Site 23CY-359, Facing North.

The frequency of material was very light at the northern end of the site. A moderate artifact density was noted in the central portion of the site (north of the house and along the wooded lane). Unit 2 was placed in the pasture north of the house. Historic materials were recovered in some of the probes east and north of the house. Prehistoric material existed principally in the plow zone and a few centimeters below this level. Prehistoric materials recovered during surface collection, shovel probing, and test excavation totaled 1,929 (Table 10). Historic artifacts totaled 198.

Diagnostic prehistoric artifacts include a Godar-like side-notched projectile point manufactured of white Burlington chert, which was found in the eroded road surface on the northern wooded area of the site. This projectile point is affiliated with the Middle Archaic period (6000-3000 B.C.) (Plate 10b). A corner-notched projectile point made of heat-treated Burlington chert was recovered in a shovel probe in the area north and west of the house. This projectile point falls into the Affinis Snyders category (Chapman 1980:313) and probably has a Middle Woodland affiliation (Plate 10a). The unifacial scraper (turtle-back) is a type of tool often associated with Middle Woodland artifact assemblages (Chapman 1980:49D) (Plate 11b). A turtle-back scraper was found in the area of greatest material density (0E, 40S) at site 23CY-359. It was made of heat-treated Burlington chert.

Historic Artifacts

Historic artifacts recovered at site 23CY-359 included 10 pieces of whiteware, 2 pieces of stoneware, 46 glass bottle fragments, 40 metal artifacts, and gravel and rock associated with outbuildings. The metal artifacts consisted of 1 iron bolt, 1 round roofing nail, 7 square

Table 10

Prehistoric Materials Recovered During 1984 Phase II Testing
at Site 23CY-359

Item	Shovel Probes	Surface	Excavation		%
			Unit 1	Unit 2	
Bifacial Tools	5	5	1	0	0.6
Unifacial Tools	2	4	0	0	0.4
Retouched Flakes	6	1	0	0	0.4
Cores	2	2	0	0	0.2
Debitage					
<u>Shatter</u>					
Primary Decortication	127	3	1	5	7.0
Secondary Decortication	47	3	0	3	2.7
Shatter	250	2	19	1	14.1
<u>Flakes</u>					
Primary Decortication	19	0	2	0	1.0
Secondary Decortication	40	0	0	2	2.1
Interior	555	8	61	31	34.0
Polished	0	0	0	0	0.0
Bifacial Thinning	1	0	0	0	0.1
Modified					
Sandstone	3	0	0	0	0.2
Unmodified					
Limestone	24	0	2	15	2.1
Sandstone	185	2	28	6	11.5
Igneous/Metamorphic (gravel, cortex, dolomite, etc.)	404	0	21	31	23.6
TOTAL	1,670	30	135	94	100.0
Total Artifacts: 1,929					

nails, 16 other round nails, 3 pieces of wire, various pieces of tin, and a 1919 Lincoln penny. The majority of the bottle fragments was made of clear glass, although 7 aqua colored and 1 piece of milk glass also were recovered. Two of the clear glass bottle fragments exhibited

Plate 10

Artifacts from Site 23CY-359

- a. Corner-notched Affinis Snyder projectile point, heat-treated Burlington chert, Middle Woodland period
- b. Side-notched Godar-like projectile point, Burlington chert, Middle Archaic period
- c, e. Portions of large biface, Burlington chert, found in same area of site in corn patch, probably parts of same tool
- d. Retouched flake, Burlington chert
- f. Unifacial scraping/graving tool, Jefferson City chert
- g. Retouched flake, Burlington chert



a



b



c



d



e



f



g

Actual Size

Plate 11

Artifacts from Site 23CY-35

- a. Sandstone abrading/rubbing tool
- b. Middle Woodland round turtle-back unifacial scraping tool, heat-treated Burlington chert
- c. Sandstone abrading/rubbing tool
- d. Unifacial tool with spokeshave and cutting edge, heat-treated Burlington chert
- e. Unifacial scraping tool, banded Jefferson City chert



a



b



c



d



e

Actual Size

amethyst coloration, suggesting a late nineteenth to early twentieth century affiliation. Most artifacts appear to be associated with a presently standing two-story structure (A-15) and its past and present outbuildings. The 1919 coin and the amethyst colored glass were the only temporally diagnostic artifacts recovered. The latter are temporally diagnostic of the period 1880 to 1925 (Newman 1970:74). The historic association of these materials is with the nineteenth century and twentieth century Ralph Lawrence farmstead (Ray et al. 1984:338-339). Historic events or persons of historical significance are not known to be associated with this site (Ray et al. 1984:339). Part of the present house was rebuilt on an existing foundation in 1900 (Ray et al. 1984:338). Most of the glass and ceramic items were associated with a garden area east of the house, where they apparently were discarded as trash. Nails, rocks, and metal artifacts appear to be associated with an area where a barn may have stood. One shovel probe in the area of N295, W10 encountered a rock concentration that may have been part of a stone foundation for a barn. The nails and metal artifacts were scattered between this area and the house, 75 m to the south. The characteristics of the house and outbuildings, as well as the historic artifacts recovered, suggest that the house was constructed by people of middle or upper economic status (Ray et al. 1984:146).

Debitage Analysis

The majority of the debitage was obtained from the surface and the plow zone. Because of the multicomponent nature of the site (see Summary of Previous Investigations) and the limited archaeological context (i.e., absence of subsurface features and stratigraphy), few

specific statements may be made about chert exploitation by cultural period.

Data from the site (Table 11) indicate that the majority of debitage categories are representative of later stages in the tool production sequence (e.g., secondary decortication, interior flakes, and shatter). Primary decortication shatter comprise 7% of recovered material as opposed to primary decortication flakes (1%). The lack of hammerstones and the few primary decortication flakes suggest that tool maintenance (e.g., resharpening) was a more prevalent activity than resource procurement and tool manufacture. The majority of material used for tool manufacture at the site (primary decortication shatter and primary decortication flakes) were from Jefferson City formation cobbles available on the site (Table 11). Slightly over 53% of chert debitage consisted of Burlington chert, and 26% of the debitage consisted of heat-treated Burlington chert. This indicates that Burlington chert was being carried to the site in spite of the availability of Jefferson City chert on the site and suggests a preference for this material. Less than 1% of the chert debitage was Callaway chert. Percentage of heat treatment of both Burlington chert and Jefferson City chert was less than for other sites located on Jefferson City formations sampled by Ray et al. (1984:371).

Tool Analysis

Tools recovered from site 23CY-359 consisted of bifaces, various scraping/cutting tools, and two sandstone abraders. Eleven bifaces were recovered. The two diagnostic projectile points were a side-notched Godar-like biface of white Burlington chert representing the Middle

Table 11
 Site 23CY-359
 Debitage Categories by Treatment and Chert Type

	Burlington		Jefferson City		Callaway	
	Un- Treated	Heat- Treated	Un- Treated	Heat- Treated	Un- Treated	Heat- Treated
Core	0	1	3	0	0	0
Primary Decortication	4	2	16	1	4	0
Secondary Decortication	6	9	22	4	1	0
Interior	212	196	196	45	0	0
Bifacial Thinning	0	1	0	0	0	0
Primary Shatter	14	9	96	5	3	0
Secondary Shatter	18	3	35	1	2	0
Shatter	67	92	98	18	1	0
TOTAL	321	313	466	74	11	0
Percent	27	26	39	6	0.9	0

Archaic period (6000-3000 B.C.) and a corner-notched Affinis Snyders of heat-treated Burlington chert that probably is of Middle Woodland affiliation. A straight-stemmed biface fragment of white Burlington chert also was recovered along with six other biface fragments of Burlington chert, four of which had been heat treated. Two biface fragments of Jefferson City chert also were recovered. Two large Burlington biface fragments were found on the surface in the corn field,

and these may be parts of the same tool. This tool may have been a knife or a large Etley preform (Plate 10 c, e).

Unifacial tools consisted of a turtle-back scraper and a combination endscraper/spokeshave and graver tool of heat-treated Burlington chert. One heat-treated Jefferson City chert end/side scraper and two Jefferson City chert endscrapers were recovered. One of the latter had lateral graver spurs (Plate 10f). One unifacial flake scraper of Jefferson City chert was found. Six retouched utilized flakes were recovered. Four were made of Burlington chert (one heat treated), one was manufactured from Jefferson City chert, and one was made from an unidentified gravel chert.

Interpretation

Results of Phase II subsurface archaeological investigations at site 23CY-359 have indicated an extensive prehistoric occupation of the site. Earlier interpretations of the Early Archaic, Middle Archaic, Middle Woodland, and Late Woodland components at the site as representing seasonal camps and knapping stations (Ray et al. 1984:286) were substantiated. Physical remains or indications of features, midden, or structures were absent. The density of subsurface material was extremely heavy in the southern end of the site, becoming moderate to light as investigations progressed to the north end of the site. Materials consisted primarily of chert debitage and rock and were restricted to the plow zone and subplow zone. In situ faunal and floral remains were absent at the site.

A Middle Woodland turtle-back scraping tool was associated with the area of greatest artifact density. Tools of this type usually are

associated with encampments at which a greater variety of activities were carried out. This Middle Woodland occupation may have been temporary but of longer duration than a single isolated visit. Further investigations at this site may determine whether temporally diagnostic materials, such as this scraper, will show spatially distinct distributions.

Tools and debitage recovered from 23CY-359 indicate that activities at the site included hunting, hide and meat preparation, and tool maintenance, with some tool manufacture from local Jefferson City chert.

Site 23CY-359 may be interpreted as a temporary encampment under the context of Binford's (1980:9) definition of a location -- "a place where extractive tasks are exclusively carried out." All components appear to have functioned similarly.

Historic artifacts were found on the site in relation to present standing structures and possible past outbuildings. These artifacts consist of ceramics, glass bottles, nails, and metal. Diagnostic materials suggest a late nineteenth century and early twentieth century occupation, which corresponds to the known occupation of the structures present on the site.

Statement of Significance

The types of information and data which site 23CY-359 will provide and which support the eligibility of the site for nomination to the NRHP include: the presence of culturally diagnostic artifacts from Early Archaic through Late Woodland times, data on the procurement and reduction of Burlington and Jefferson City chert through time, the geographical and cultural relationship of the site with sites 23CY-352

and 23CY-20, information on site patterning, and site activities related to upland and bottomland resource exploitation.

EVALUATION AND RECOMMENDATIONS

Statement of Significance

The research objectives of the Phase II investigations at sites 23CY-20, 23CY-352, and 23CY-359 were to recover sufficient data to make an assessment of the potential significance of each site as it applies to National Register of Historic Places criteria of eligibility:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- (1) That are associated with events that have made a significant contribution to the broad patterns of our history; or
- (2) That are associated with the lives of persons significant in our past; or
- (3) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- (4) That have yielded, or may be likely to yield, information important in prehistory or history (Federal Register 1976:1595).

Using Criterion 4 (above) and based on data recovered and identified during Phase II test excavations at sites 23CY-20, 23CY-352, and 23CY-359, it is the opinion that the three sites are eligible for nomination to the National Register of Historic Places. All three sites have produced information important to local and regional prehistory and contain as yet unexcavated information useful in studying a variety of issues related to prehistoric lifeways in the mid-Missouri River valley.

Specific types of archaeological information that support the significance of the three sites and demonstrates potential eligibility for nomination to the NRHP include: temporally and culturally diagnostic stone tools representing Early Archaic through the Late Woodland periods; temporally and culturally diagnostic ceramics from the Late Woodland period (Maramec Spring phase, Boone phase, and Moreau subphase); subsistence data including floral and faunal remains (sites 23CY-20 and 23CY-352); evidence for early use of domesticated corn (site 23CY-352); wood charcoal and other organic materials for radiocarbon dating; abundant amounts of chert debitage with which to study flaked stone tool technology and chert procurement practices; environmental settings which are useful in studying floodplain exploitation and strategies; and a cultural setting (relationship to several nearby sites) useful in studying intra- and intersite settlement/subsistence patterns.

Finally, a non-archaeological consideration exists which enhances the significance of the three sites. Union Electric Company has demonstrated commitment to preserving not only sites 23CY-20, 23CY-352, and 23CY-359, but all of the archaeological resources on Union Electric Company property by preparing a cultural resource management plan (McNerney 1983). Thus, future generations will be assured of an archaeological context in which to study the three sites in question.

Nomination Forms

National Register of Historic Places nomination forms have been prepared for each of the above sites by American Resources Group, Ltd. The nomination forms have been forwarded to Union Electric Company with

a recommendation that the forms be reviewed and transmitted for Missouri SHPO certification. Certified forms are forwarded via the U. S. Nuclear Regulatory Commission to the Keeper of the National Register of Historic Places for a determination of eligibility for inclusion in the NRHP. Missouri SHPO guidelines require that when a determination of eligibility is made, necessary action must be initiated for sites 23CY-20, 23CY-352, and 23CY-359 in accordance with the Advisory Council on Historic Preservation's regulations, Protection of Historic and Cultural Properties 36 CFR Part 800.

Conclusions

Mitigation alternatives include avoidance and preservation, as well as data recovery through excavation. Unless adverse environmental impacts are anticipated in the planning of future developments at the Callaway Nuclear Power Plant site and if the three sites can be avoided and protected, the management recommendations for these cultural resources still apply (McNerney 1983). Limited agricultural use (disking to sow grass seed) was recommended for sites 23CY-20 and 23CY-352. Avoidance was recommended for site 23CY-359.

Should these sites be determined eligible for the NRHP and the management of Union Electric Company determines that sites 23CY-20, 23CY-352, or 23CY-359 cannot be avoided or protected, then mitigation through data recovery is recommended. If an evaluated site is determined to be ineligible for the NRHP, no further investigation or protection of the site is necessary. Normal operations and maintenance or development in the site area may proceed.

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APPENDIX A

Analysis of Ceramic Materials from Site 23CY-352

by

George R. Holley

ANALYSIS OF CERAMIC MATERIALS FROM SITE 23CY-352

The prehistoric ceramic collection consisted of 180 sherds that could be identified in a preliminary fashion. A definitive typological analysis is not possible due to the small sample size, the diminutive size of the sherds, and the differential preservation of the sherd surface. The sherds derive from shovel probes, test pits, and features.

Except for one probable Middle Woodland decorated sherd, the sample cannot be separated into Middle Woodland and Late Woodland types. However, the range in radiocarbon dates, A.D. 470 to A.D. 830, and the character of the sample suggest a terminal Middle Woodland through Late Woodland placement.

The sample is divided into two major categories on the basis of temper (grit or limestone), with subdivisions in each on the basis of surface features (Plain, Cord-marked, and Brushed). Grit-tempered sherds, especially those with a cord-marked surface, are more frequent (Table 1). Limestone-tempered sherds are predominantly plain surfaced. The fact that these two temper categories co-occur in all features and at most depths suggests contemporaneity.

Middle Woodland Decorated

One small sherd appears to be decorated with a medium incised line, enclosing a stamped or fabric-impressed surface. This sherd is similar to one illustrated by Chapman (1980:Figure 3:32f) for southeast Missouri. The sherd is 5 mm thick and tempered with grit.

Table 1
Frequency of Ceramic Temper Categories, Site 23CY-352

	CM	Plain	Brushed	Weathered	Total
Grit-Tempered	81	22	1	8	112
Limestone-Tempered	6	44	6	11	67

Grit-Tempered Sherds

This category accounts for most of the sherds recovered and are thinner-walled than limestone-tempered pottery. Grit tempering is the most frequent temper category at nearly all proveniences. Grit tempering is a generic label for a wide range in the type and density of paste inclusions.

At least three divisions are recognizable: dense, medium-to-fine sand; fine sand with a scattering of coarse rock fragments; and fine sand. The first category is gritty to the touch and accounts for approximately 70% of the grit-tempered sherds. The remaining categories are smoother to the touch. Both oxidized (yellow-to-red) and reduced (brown-to-black) firing conditions are represented in roughly equal proportion.

A majority of the sherds are cord marked, with a few examples of partially smoothed cord marking. The plain surfaces are either rough or smoothed to a low luster. One sherd may be brushed.

Wall thickness for the cord-marked sherds varies from 2.5 mm to 6.0 mm, with a mean of 4.12 mm. Gritty sherds are slightly thicker on the average than the finer pastes. Plain sherds range in thickness from 2.5 mm to 5.3 mm, with a mean of 3.96 mm.

Only five rims were recovered, of which only three are identifiable as to form. These include: 1) a cord-marked, straight-necked jar (Feature 4) with a slightly extended rim and fine sand temper (Figure 1a); 2) a cord-marked, incurved bowl-jar (unit 1, Level 4) with a gritty texture (Figure 1c); 3) a plain rounded to shallow bowl (Feature 4) with a tapered lip and fine sand temper (Figure 1b). On one jar body (Figure 1d) there is an indication that the neck may have been smoothed.

Possible typological affinities for this material include Darnell Cord Marked (Chapman 1980:280), Maramec Cord Marked (Chapman 1980:286), and Graham Plain (Chapman 1980:280-281).

Limestone-Tempered Sherds

Although less frequent than the grit-tempered sherds, the limestone-tempered sherds (Table 2) occur in roughly the same proportion in all proveniences. Temper consists of fine-to-coarse (largest 4 mm), chalky white limestone particles. The limestone does not react to a dilute solution of HCl and probably is dolomite. Most of the temper has been leached out due to reaction with the acidic soil. Nearly all of the sherds, especially the plain surfaced ones, are oxidized on the surface. The oxidation extends a few millimeters into the wall and grades to a darker, reduced paste at the interior wall. Plain surfaces with a rough to low lustrous surface predominate. The plain surfaces of the limestone-tempered sherds are much smoother than those of grit-tempered sherds. Cord-marked and brushed sherds are infrequent. Limestone-tempered sherds are noticeably thicker than grit-tempered sherds. Plain, limestone-tempered sherds range in thickness from 4 mm to 9 mm, with a mean of 5.50 mm. Cord-marked, limestone-tempered sherds

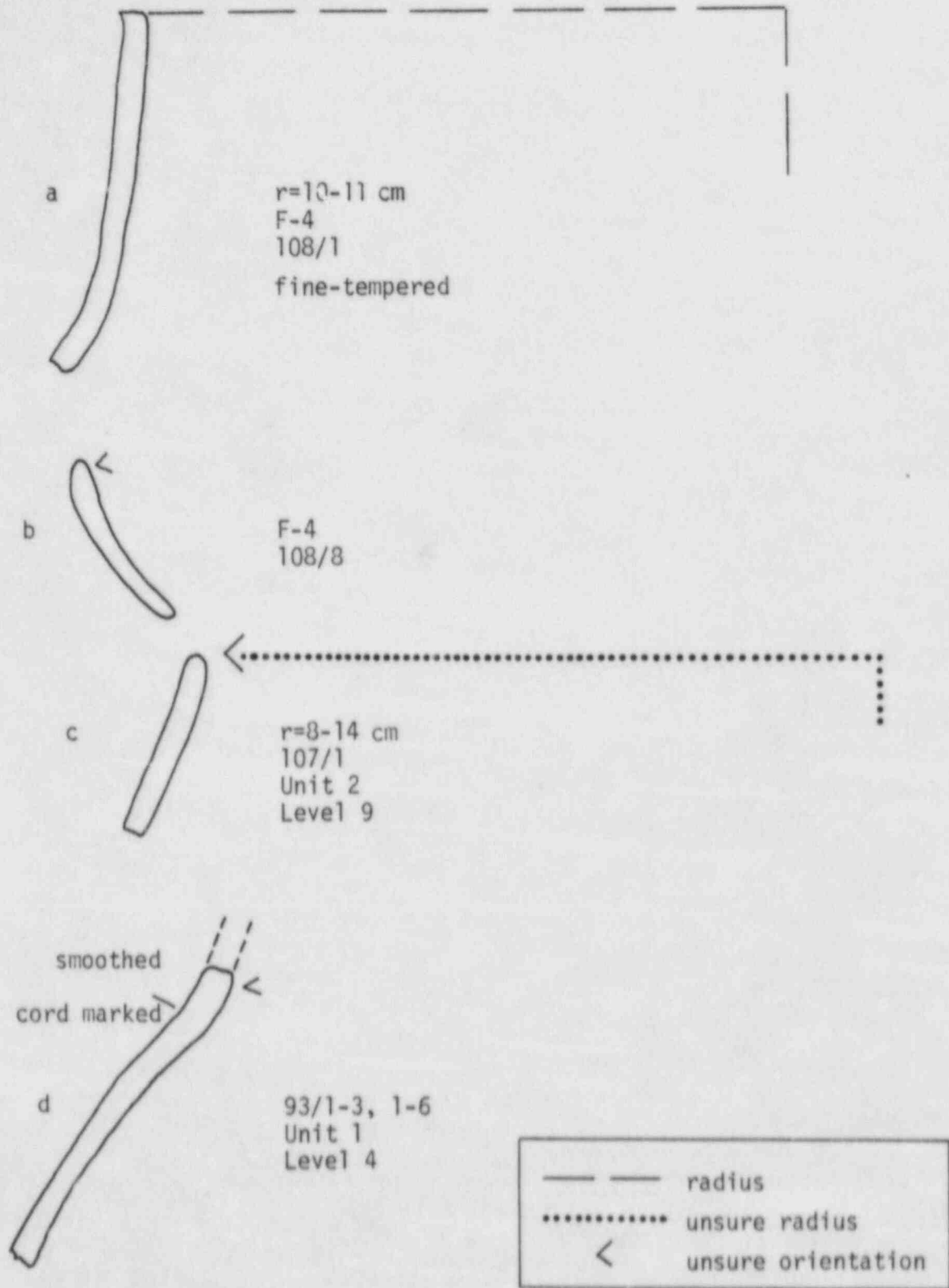


Figure 1. Ceramic Profiles Site 23CY-352

Table 2

Ceramic Frequency for Units and Features, Site 23CY-352

Provenience	cm	-----Grit-----			-----Limestone-----			Decorated Middle Woodland
		Plain	Brushed	Weath.	cm	Plain	Brushed	
Feature 1	10	3	-	-	1	5	1	-
Feature 3	1	-	-	-	-	-	-	-
Feature 4	15	1	-	-	-	5	-	-
Unit 1 L3	4	2	-	-	1	1	-	-
L4	9	5	-	-	-	3	-	-
L5	2	-	-	-	-	3	-	-
L6	-	-	-	-	1	-	-	-
Unit 2 L3	-	1	1	1	1	1	-	-
L4	3	2	-	1	-	4	1	1
L8	3	-	-	-	-	2	-	-

range in thickness from 4.5 to 5.6 mm, with a mean thickness of 5.01 mm. Brushed sherds range in thickness from 6 to 7 mm. Rims were not recovered; however, wall fragments indicate that the jar shape is present.

Possible typological affinities with this material include Moreau Cord Marked (Chapman 1980:288-289) and Boone Plain (Chapman 1980:276).

Discussion and Temporal Implications

Stratigraphy and radiocarbon dates do not support a clear temporal separation of the paste categories or surface features. There is the suggestion that the limestone-tempered pottery may be earlier. A brushed sherd was recovered from Feature 1 (A.D. 470), but no examples

of this type were found in Feature 4 (A.D. 830). Also, a single limestone-tempered sherd derives from the deepest level at unit 1. The interpretation of such evidence is quite speculative at the present. However, the vessel forms from Feature 4, the vertical-necked jar and the small bowl, are in accord with a late Late Woodland date.

The presence of two paste recipes, grit and limestone, and corresponding differences in wall thickness may suggest a functional difference that is worthy of further investigation. This mixture of recipes, with a preponderance of grit, does not fit the criteria for the Boone phase (Chapman 1980; Denny 1964) or Moreau subphase (Chapman 1980), nor does this situation fit with the strictly grit-tempered pottery from Graham Cave (Chapman 1980).

The placement of both paste strategies in the Late Woodland period appears confirmed on the basis of association unless, of course, there was a tremendous amount of mixing of archaeological deposits. At present, Middle Woodland sites without a substantial presence of Hopewellian features are poorly known (Chapman 1980:56, 58). Although one sherd may date to the Middle Woodland period, the bulk of the ceramics undoubtedly are Late Woodland.

APPENDIX B

Analysis of Faunal Remains from Site 23CY-352

by

Jonathan Bloom

ANALYSIS OF FAUNAL REMAINS FROM SITE 23CY-352

The Phase II testing of site 23CY-352 recovered a total of 297 bone fragments weighing 66.1 grams. Flotation samples utilizing a 2 mm mesh screen yielded 65% (n=193) of the total faunal remains. The remaining 104 fragments were recovered in the field using a 1/4 in mesh screen. The bulk of this assemblage was recovered from two test units and four pit features located in backhoe trenches 1 and 3.

Identified remains represent the white-tailed deer (Odocoileus virginianus), squirrel (Sciurus sp.), and vole (Microtus sp.). Indeterminate material consists of mammal, bird, turtle, fish, and miscellaneous bone fragments. Molluscan remains are completely lacking in this assemblage. Two indeterminate large mammal fragments revealed butchering cuts. Two others revealed a slight polish. Bone tools or ornaments were not noted during the analysis.

In general, the condition of the faunal assemblage is indicative of excellent bone preservation. Extensive bone deterioration from soil acidity was absent. Carnivore and rodent gnawing marks also were lacking. One fragment exhibited extensive modification from root leaching or the burrowing activities of a microfaunal inhabitant of the soil.

The primary focus of this analysis was to provide a data base (see Inventory) which will be compatible and combined with the formal faunal analysis of site 23CY-352 subsequent to more extensive excavation.

Hopefully, a predictive model will be devised allowing the prediction of certain intra-site activity areas based on the analysis of faunal remains recovered from the testing of archaeological sites.

Inventory of Faunal Remains

This inventory organizes the faunal samples by associated proveniences in a bipartite manner. That listed first consists of the Catalog Number (Cat.#) (=1/4" Screen) or Analytical Sample Number (A.S.#) (=2mm Flotation), followed by the provenience, total number of fragments, their weight in grams, and differential recovery data where bone fragments are grouped into a particular size range or are measured individually. All measurements are in millimeters. The size ranges are given in the following notation: 3mm<5<5mm, which means there were five fragments larger than 3mm but smaller than 5mm.

Cat.#10;N200 E250; 2 fragments; 4.1 grams; 1=4mm, 1=9mm.

Bone #10/1 is a postero-medial metaphyseal fragment from a femur of a deer (Odocoileus virginianus) and exhibits butchering cuts on the lateral aspect.

Bone #8 is a metaphyseal bone fragment from an indeterminate large mammal.

Cat.#35; N125 E150; 1 fragment; 0.1 grams; 5mm<1<10mm.

One indeterminate bone fragment, calcined white.

Cat.#88; N137 E154; Unit 1, L-3; 4 fragments; 0.2 grams; 5mm<2<10mm, 3mm<1<5mm, 2mm<1<3mm.

Two indeterminate turtle shell fragments, calcined white.

Two indeterminate bone fragments, calcined white.

Cat.#93; N137 E154; Unit 1, L-4; 52 fragments; 12.7 grams;
5mm<34<40mm, 3mm<18<5mm.

Two acetabular fragments of a right innominate of a deer
(Odocoileus virginianus).

Two distal metapodial fragments from a deer (Odocoileus
virginianus).

Forty eight indeterminate large mammal bone fragments,
probably associated with the above innominate and metapodial
bones, being fragmented during recovery.

Cat.#94; N137 E154; Unit 1, L-4; 3 fragments; 0.8 grams; 1=18mm,
1=11mm, 1=9mm.

Three indeterminate large mammal bone fragments, two are
calcined white and blue/gray.

A.S.#3; N137 E154; Unit 1, L-4; 11 fragments; 1.1 grams;
5mm<6<17mm, 3mm<5<5mm.

Two indeterminate large mammal metaphyseal fragments, calcined
white and blue/gray.

Three indeterminate mammal bone fragments.

One indeterminate turtle shell fragment, calcined white.

Five indeterminate bone fragments, one burned black, three
calcined white.

Cat.#100; N137 E154; Unit 1, L-5; 2 fragments; 0.6 grams;
5mm<2<15mm.

Two indeterminate large mammal metaphyseal fragments, calcined
black and blue/gray.

A.S.#2; N115 E240; Unit 2, L-5; 1 fragment; 0.2 grams; 1=14mm.

One indeterminate large mammal metaphyseal fragment.

Cat.#109; BHT 1, Fea. 1; 35 fragments; 6.5 grams; 5mm<33<25mm,
3mm<2<5mm.

Thirty three indeterminate large mammal bone fragments;
probably represent a single, larger element fragmented during
recovery.

Two indeterminate large mammal metaphyseal fragments, calcined
white.

A.S.#13; BHT 1, Fea.1; 56 fragments; 3.1 grams; 5mm<15<20mm,
3mm<36<5mm, 2mm<5<3mm.

One left cuboid of a squirrel (Sciurus sp.). One distal
tarsometatarsus fragment of an indeterminate bird, calcined
white/gray.

One indeterminate bird bone fragment with slight longitudinal
striatae, burned brown.

One indeterminate bird bone fragment, burned blue/gray.

One proximal humerus fragment of a small, indeterminate
turtle.

Three indeterminate turtle shell fragments, two are calcined
white.

Two indeterminate large mammal metaphyseal fragments, calcined
white and blue/gray.

Seven indeterminate large mammal bone fragments.

Fifteen indeterminate mammal bone fragments, one burned black,
one calcined white/blue.

Twenty four indeterminate bone fragments, seven calcined white, one calcined blue/gray.

Cat.#112; BHT 1, Fea. 2; 2 fragments; 7.8 grams; 1=80mm, 1=20mm.

Bone #112/1 is an antero-medial metaphyseal fragment of a right tibia of a deer (Odocoileus virginianus) with possible butchering cuts. It exhibits extensive modification from root leaching or from the burrowing activities of microfaunal inhabitants of the soil.

Bone #112/2 is an indeterminate bone fragment.

A.S.#16; BHT 1, Fea. 2; 9 fragments; 1.6 grams; 5mm<8<35mm, 3mm<1<5mm.

Three indeterminate large mammal metaphyseal fragments, burned black.

One indeterminate bird bone fragment.

Five indeterminate bone fragments.

A.S.#17; BHT 1, Fea. 3; 47 fragments; 2.8 grams; 5mm<19<15mm, 3mm<28<5mm.

One indeterminate large mammal dental fragment, burned black.

Twenty indeterminate large mammal bone fragments, eight calcined blue/gray, 12 calcined white.

Twenty six indeterminate bone fragments, one burned black, 21 calcined white, three calcined blue/gray.

Cat.#108; BHT 1, Fea. 4; 3 fragments; 10.5 grams; 1=91mm, 1=56mm, 1=44mm.

Bones #38 and #40 represent a single rib shaft fragment of a deer (Odocoileus virginianus). The proximal epiphysis is unfused and missing.

Bones #37 and #39 represent a single indeterminate large mammal metaphyseal fragment.

A.S.#12; BHT 3, Fea. 4; 69 fragments; 14.0 grams; 5mm<40<30mm, 3mm<25<5mm, 2mm<4<3mm.

One left lateral malleolus of a deer (Odocoileus virginianus).

One proximal metaphyseal fragment of left femur of a squirrel (Sciurus sp.), calcined white and blue/gray.

One left maxilla fragment of a squirrel (Sciurus sp.).

One left calcaneus of a vole (Microtus sp.).

Two indeterminate large mammal metaphyseal fragments with slight polish and slightly charred.

Fifty one indeterminate large mammal bone fragments, 25 burned black or charred.

Five indeterminate mammal bone fragments, four calcined white, one calcined white and blue/gray.

One indeterminate fish scale fragment.

Six indeterminate bone fragments, one burned black, one burned blue/gray.

APPENDIX C

Analysis of Botanical Material at Site 23CY-352

by

Leonard W. Blake

ANALYSIS OF BOTANICAL MATERIAL AT SITE 23CY-352

	<u>Wt. In Grams</u>
<u>N113 E300 7.30/84 Cat. #26</u>	
1 carbonized fragment 8.8 x 6.0 mm	0.03
Identification: 1 bloated corn kernel	
<u>Fea. 1 T-1 8/2/84 Flot. Hy. AS #13</u>	
1 thick shelled hickory nut shell (<i>Carya</i> sp.)	4.86
1 small fragment of thin shelled hickory nut	<0.01
Wood charcoal	0.43
<u>Fea. 1 T-1 Flot. Lt. 1 of 2 AS #13</u>	
1 thick hickory nut shell	1.73
Wood charcoal	10.43
1 seed of Vitaceae, grape family, 3.7 mm long x 3.7 mm wide, from single seeded fruit	<0.01
1 small dried fruit, possibly Vitaceae with stem attached, partly carbonized	<0.01
1 small piece of plum stone (<i>Prunus</i> sp.)	<0.01
2 seeds of maygrass (<i>Phalaris caroliniana</i>), both partly broken	<0.01
1 unidentified seed 2.0 mm long by 1.3 mm wide	<0.01
1 carbonized object - Identification: corn cob cupule, probably from 10-rowed ear	
<u>Fea. 1 T-1 Flot. Lt. 2 of 2 AS #13</u>	
1 seed Vitaceae 4.0 mm long by 3.0 mm wide)	
1/2 seed Vitaceae 4.3 mm long by 4.1 mm wide)	0.02
2 seeds of maygrass and parts of 3 others, and 3 bloated seeds, possibly goosefoot) (<i>Chenopodium</i> sp.))	<0.01
2 small broken seeds and 1 bloated seed,) unidentified)	
1 thick hickory nut shell	0.26
Wood charcoal	2.27
<u>Fea. 1 BHT 1 8/2/84 Hickory Nut Shell Cat. #109</u>	
6 pieces of thick hickory nut shell	0.44

<u>Fea. 2 T-1 8/2/84 Flot. Hy. AS #16</u>	
2 small pieces of thick hickory nut shell	0.07
1 small piece of heavily carbonized material, possibly hickory nut shell	0.03
1 small piece of wood charcoal	0.01
<u>Fea. 2 Flot. Lt. AS # 16</u>	
1 nut shell, mostly thick hickory	0.52
Wood charcoal	0.26
1 unidentified seed, 1.9 mm long by 0.9 mm wide	<0.01
<u>Fea. 3 T-1 8/2/84 Flot. Hy. AS #17</u>	
Wood charcoal	0.31
<u>Fea. 3 T-1 8/2/84 Flot. Lt. AS #17</u>	
Wood charcoal	3.47
3 heavily carbonized objects - possibly seeds	<0.01
<u>Fea. 4 T-3 Flot. Hy. AS #12</u>	
Wood charcoal	0.48
1 seed grape (<i>Vitis</i> sp.)	<0.01
2 small unidentified carbonized objects	<0.01
<u>N115 E240 Unit 2 L.4 8/21/84 Nut Shell 96/1 Cat #96</u>	
Dirt encrusted wood charcoal	0.45
1 thick hickory nut shell	0.41
<u>N115 E240 Unit 2 L.5 40-50 AS#2 Flot. SW Corner</u>	
Wood charcoal	0.24
1 carbonized object - Identification: 1 broken corn cob cupule	<0.01
1 small piece of wood fungus	<0.01
Unidentified small carbonized fragments	<0.01
<u>Unit 2 L. 5 8/1/84 Cat. #99</u>	
2 small pieces of wood charcoal	0.03
1 unidentified heavily carbonized fragment, possibly nut shell	0.05

APPENDIX D

Geomorphology of the Lower Reaches of Logan Creek,
Callaway County, Missouri

by

George Fraunfelder, Ph.D.
Geologist

GEOMORPHOLOGY OF THE LOWER REACHES OF LOGAN CREEK,
CALLAWAY COUNTY, MISSOURI

The Logan Creek area is located in southeastern Callaway County, Missouri, near the northern limit of the Salem Plateau subprovince of the Ozark Plateau Province. The headwaters of Logan Creek penetrate the Crystal and Burlington Escarpments, as well as the southernmost part of the Dissected Till Plains subprovince of the Central Lowlands province.

Site 23CY-352, to which this study principally applies, is located on a terrace in the lower reaches of Logan Creek near the creek's entrance onto the Missouri River floodplain. Logan Creek drains an area which is underlain by the Ordovician cherty dolomites of the Jefferson City formation; isolated patches of St. Peter sandstone (Middle Ordovician); Middle Devonian Callaway limestones, shales and sandstones; Upper Devonian Snyder Creek shale; Lower Mississippian sandstones and shales; Middle Mississippian limestones and shales; and Lower Pennsylvanian sandstones. The bluffs east of 23CY-352 are composed of Jefferson City dolomite and have been affected very little by erosional processes that have shaped the northern and western peripheries of the terrace.

The hill tops in the headwaters of Logan Creek are covered with Kansan Till and later Pleistocene loess deposits. According to Allgood and Persinger (1979), the surface of the terrace upon which site 23CY-352 is located is covered by soils classified as Hayne-Leta-Waldron and Haynie-Blake-Booker types. These are deep, nearly level to gently

sloping, moderately well drained to very poorly drained loamy and clayey bottomland soils on floodplains that are occasionally flooded. Specifically, the Booker soil consists of deep, poorly drained soil formed in loamy and clayey alluvium on low benches and first bottoms. It has a silty clay surface soil overlying a slightly permeable silty clay subsoil. Slopes range from 0% to 2%. The Leta is a deep, somewhat poorly drained soil formed in clayey and loamy alluvium composed of two contrasting soil materials. The surface is silty clay or clay overlying a stratified very fine sandy loam and silt loam. Both soil types were encountered during excavation.

Methods of Study

The sediments under site 23CY-352 making up the terrace under study were investigated by means of hand dug shovel probes, excavated units, and trenches dug with a backhoe. Profiles of these underlying sediments were drawn after the sediments had been measured and described. In addition, aerial photos, topographic maps, and U. S. Army Corps of Engineers river charts were used to trace the evolution of Logan Creek valley.

Evolution of Logan Creek Valley

Logan Creek largely carries fine grained sediments except in its lower reaches, where it cuts through cherty Jefferson City dolomite. This sediment is attributable in part to sandstone units exposed in the region which often are thin or not exposed over wide areas. Also, most of the glacial deposits in the region are fine grained due to the fact that the southern boundary of Kansan glaciation is located at the midlength of Logan Creek and that most of the bedrock exposed in the

Logan Creek drainage area is fine grained. Some medium to coarse grained sands and chert rubble (from the Jefferson City formation) are carried in the stream's lower reaches.

Auxvasse Creek, which is considerably larger than Logan Creek, also flows onto the floodplain of the Missouri River from the north about three mi upstream from Logan Creek. Auxvasse Creek sedimentation may have had an influence on deposition in the lower reaches of Logan Creek. The extent of influence is difficult to assess, since Auxvasse Creek drains a bedrock area similar in lithologies to that drained by Logan Creek.

The sediments that underlie the Logan Creek terraces containing sites 23CY-20 and 23CY-352 largely consist of dark gray to dark brown clays and silty clays where oxidized. Only trench 2 at site 23CY-352 contained quartz sand rather than the quartz silt found in some of the other trenches. This sand was more than likely deposited by Logan Creek, considering its coarseness, as a point bar which later was reworked by flood waters from the Missouri River. The generally fine grained nature of these clay sediments suggests that they largely are Missouri River slackwater deposits. The abrupt contacts among the various clays, silty clays, clayey silts, and sands indicate that a number of flood events were involved in producing these slackwater deposits. The quiet water origin of these clays and silty clays is indicated by their fine grained nature.

The terrace studied cannot be dated by relative methods except by elevation, since there have not been any previous studies of other slackwater deposits in this area. However, there are other terrace deposits at about the same elevation along the north side of the

Missouri River floodplain near the mouth of Hiller Creek. Radiocarbon dating of charcoal from pits intruding into the top of the in situ slackwater deposits will only establish the time of occupation of the site and not the age of the deposits in which the pits are found. The dates only tell us that the deposits are older than these cultural features.

The U. S. Army Corps of Engineers chart of the Missouri River's Chamois Reach area for October-November 1910 shows that Logan Creek was cutting the north edge of the present terrace containing site 23CY-352 at that time. Since then, Logan Creek gradually has shifted to the west side of its valley north of the terrace under study. An east-west channel just to the north of the terrace still is present, although it had been abandoned by Logan Creek according to the river chart of 1930-32. By October 1940, Logan Creek had cut diagonally across its valley from east to west north of the terrace. West of the terrace, Logan Creek has changed its course very little since 1910, except to develop a meander bend in the northwest corner of the terrace sometime between 1910 and 1930-32. This meander bend is now in the process of being abandoned. Hence, the terrace essentially has had the same size and configuration since 1910.

Historical records indicate the terrace has been flooded several times in the past 140 years. Flood records indicate that the Missouri River crested at 35 ft over flood stage at Kansas City in 1903. The flood of 1844 apparently reached an even higher crest. Readings are not available for Kansas City for the 1844 flood, but they are available for St. Louis.

Deposition of sediments by the flooding Missouri River accounts for the present configuration of the terrace. Since the top of the bank of the Missouri River presently is near the 520 ft level in the Logan Creek area, it seems likely that the flood of 1903 reached at least the 545 ft level and perhaps higher because the Missouri River probably had not cut as deeply into its floodplain at that time. The top of the terrace of site 23CY-352 is between the 520 ft and 540 ft level today. Thus, the deposits in question, and specifically the overlying sands deposited on the west end of site 23CY-352 (Figure 1), have been deposited in flood slackwater from the Missouri River. The top of this terrace would have been covered by more than 10 ft of water during the 1903 flood, unless there has been a large amount of erosion at the top of the terrace since that time. Erosion is not indicated by the available topographic maps and would have been partially compensated for by slope wash buildup of the top of the terrace.

The surface configuration of the bottom of Logan Creek valley has been and is controlled by the sediments deposited by flooding of Logan Creek, by sediments deposited by flooding of the Missouri River, and by deposits from slope wash along the valley walls of Logan Creek. In addition, the configuration of these valley bottom sediments has been continually altered by the downcutting and downstream migration of the meanders of Logan Creek.

Conclusions

The terrace containing site 23CY-352 was cut by the downstream meandering of Logan Creek north and west of the site. This terrace essentially had assumed its present size and configuration by 1910.

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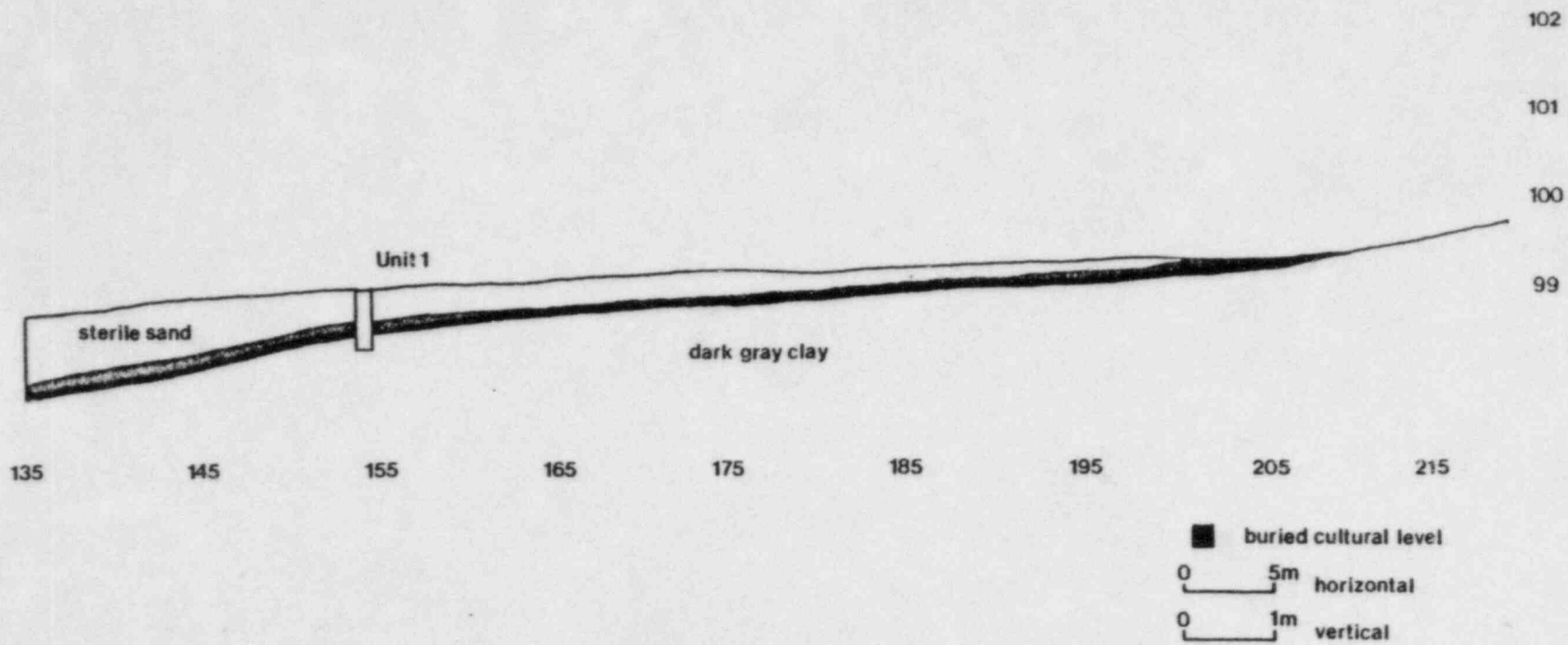


Figure 1. Buried Soil Horizon at N137, Site 23CY-352

The sediments that underlie the terrace of site 23CY-352 cannot be dated with any certainty, because these sediments do not contain radiometrically dateable material and because no comparable slackwater sediments in the area previously have been studied. The sediments underlying this terrace were deposited in slackwater from the Missouri River at flood stage, as evidenced by their fine grained nature. The cultural levels largely are in silty clays and lie on top or within clays or silty clays. Flooding of the site after occupation is indicated by in situ sediments above the cultural level at the unit 1 test excavation (Figure 1).