EXCAVATIONS AT 41 LK 106, A Prehistoric Occupation Site in Live Oak County, Texas

Darrell Creel, A. Joachim McGraw, Fred Valdez, Jr.
and Thomas C. Kelly

With an Appendix by Ralph L. Robinson

Center for Archaeological Research
The University of Texas at San Antonio
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ACKNOWLEDGMENTS

Freezing winds and cold south Texas winter rains predominated the field conditions throughout the excavation period. Hubcap-deep mud often made it impossible to drive across country to the site, and the field crew were frequently forced to make their way on foot. Keeping in mind these discomforts, it must be noted that the timely and successful completion of the field work was due in large part to the friendly help and cooperation of many Exxon-Felder personnel. These efforts ranged from clearing a road to the site to furnishing on-site geologic expertise in the form of Mr. Jerry Oliver and Mr. Mike Barker, Mining Engineers for the Felder Uranium Operations. The writers of this report sincerely acknowledge the cooperation of these people and their responsible efforts toward preserving the fragile remains of indigenous populations that helped shape the environment of North America for thousands of years.

The authors would also like to thank Dr. Thomas R. Hester and Mr. Jack D. Eaton of the Center for Archaeological Research, The University of Texas at San Antonio, for their guidance and encouragement throughout this report.

INTRODUCTION

During February and early March 1978, personnel from the Center for Archaeological Research, The University of Texas at San Antonio (UTSA) conducted limited excavation and testing operations at the archaeological site of 41 LK 106, 11.3 km east of Three Rivers in Live Oak County, Texas. A field crew consisting of Thomas C. Kelly, A. Joachim McGraw, Darrell Creel and Tom Miller investigated the prehistoric, multi-functional site located on a steep bluff above the main channel of Sulphur Creek (see Fig. 1). The testing of 41 LK 106 was conducted under the terms of a contract between the Center for Archaeological Research (UTSA), Thomas R. Hester, Director, and the Exxon Minerals Company, U.S.A. (Felder Uranium Operations), as represented by Mr. Ken Barrett.

The aboriginal site of 41 LK 106 was first identified in a Phase I preliminary survey by Kelly and Hester (1977). The site was of such potential value, as indicated by the variety and frequencies of diagnostic projectile points collected, that the authors nominated it to the National Register of Historic Places and recommended that it be preserved if at all possible. Shortly after the identification of the site's importance, Exxon-Felder Uranium engineers, who had planned a major Sulphur Creek stream diversion in the area, found their land-moving operations would destroy the central portion of the site. Since a redesign of the Sulphur Creek diversion was not feasible, additional archaeological work was initiated to ascertain the significance of the central portion of the site prior to construction of the diversion, and also to gather information necessary for a possible Phase III (full scale mitigation excavation), should such a final phase of work be necessary.

The three-week field program involved careful subsurface examination, a general evaluation of archaeological remains and accurate mapping of the site. Excavation methodology consisted of a series of hand-excavated test units in the form of 1-m^2 or 2-m^2 units, with all deposits screened through 1/4- or 1/8-inch wire mesh. Mechanical excavation in the form of a backhoe was also utilized to selectively excavate a series of narrow transects across the central portion of the site. Broad deposition areas were opened to determine the type, frequency and extent of cultural depositions.

In addition to excavations, special studies were also initiated, including detailed analyses of lithic materials, animal bones, land and freshwater snail/mollusc shells (for dietary information), charcoal (for radiocarbon dating) and a series of soil samples. A portion of the latter is currently being used for phytolith research. Phytoliths are generally defined as plant opals, or the microscopic silica bodies which occur within the cells of certain plants, particularly the grasses. Recent research indicates that some of these can be analyzed to genera and sometimes to species. Data derived from phytolith identification can supplement the current knowledge of aboriginal plant utilization (Evans 1978).

The investigation of 41 LK 106, under the field direction of T. C. Kelly, was based upon a systematic analysis directed toward: (1) the location and identification of intra-site activities; (2) an assessment of the site's content and importance; (3) the detailed recording of such information for future research; and (4) recommendations for any further work. We took note of the presence or

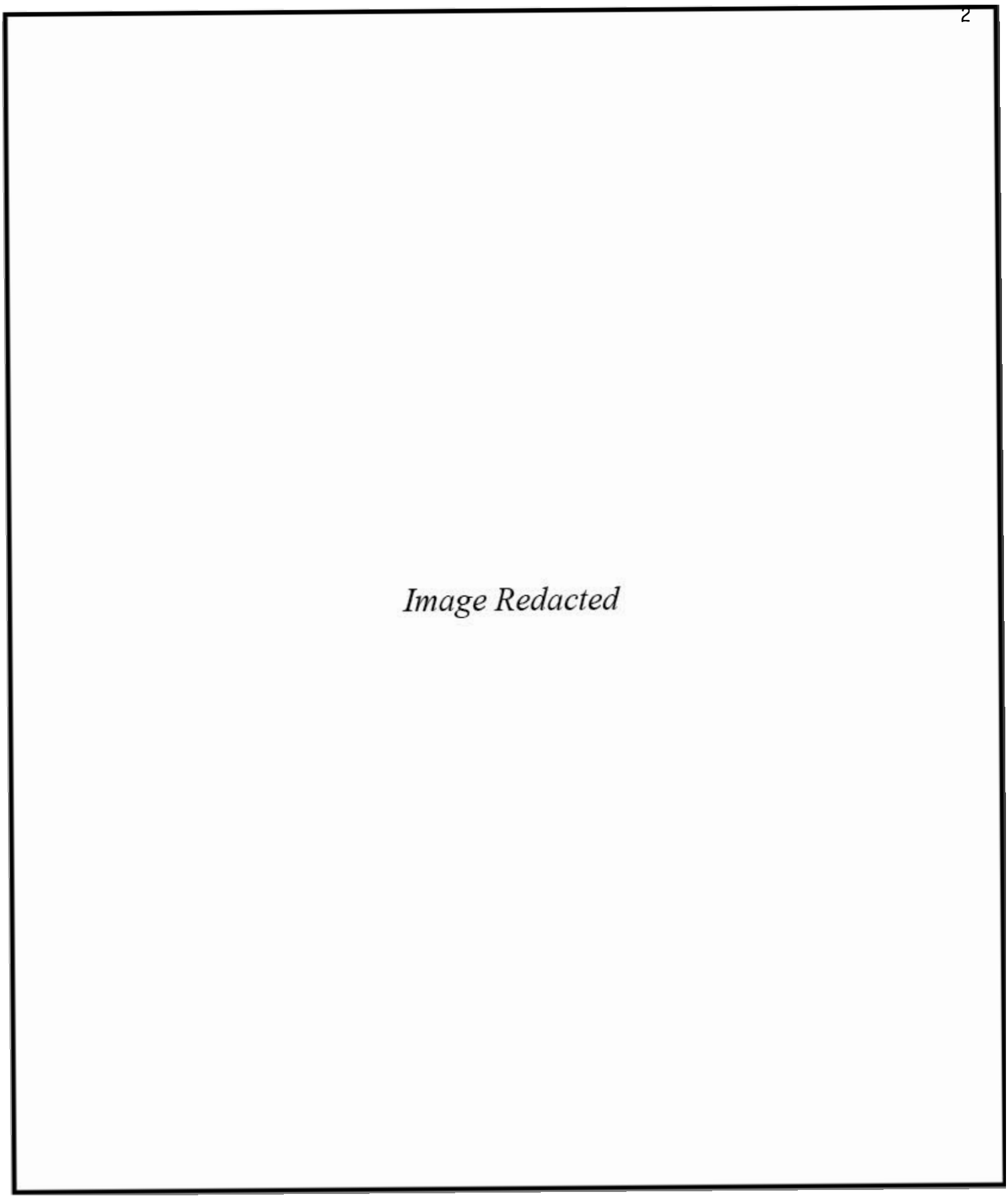


Figure 1. General Locations of Sites 41 LK 105 and 41 LK 106.

absence of particular cultural materials, and the distances from material and water resources were also of particular consideration.

Data from site 41 LK 106 were recorded on standard field forms used by the Center for Archaeological Research, The University of Texas at San Antonio. Color slides (35mm) and black and white photographs were taken as a visual record of features and operations. All collected materials were placed in plastic or paper bags and labeled as to site, collected area, level (if applicable), date, type of collection and collector's name. All artifacts were collected and processed according to standard archaeological procedures; the assessments presented in this report are based upon an analysis of field records, photographs, maps and artifact analyses. Detailed data are on file with the Center for Archaeological Research, The University of Texas at San Antonio.

ENVIRONMENT

Introduction

Live Oak County lies near the boundary between the dry, subhumid and semi-arid regions of Texas. Covering an area of 1,072 square miles, most of the county is rolling to moderately hilly, although some areas are nearly flat. The altitude ranges from ca. 460 feet above mean sea level in the southwestern portions of the county to ca. 90 feet above msl near Lake Corpus Christi. The county is drained by the Nueces River and its tributaries, the Frio and Atascosa Rivers (Anders and Baker 1961).

A brief description of portions of the prehistoric environment of the general area, the Rio Grande Plain, has been presented by Hester (1976a, 1976b). Commenting on Paleo-Indian environments, he suggests (1976a:2-3) that both grasslands and forests were present in southern Texas, based on the discovered remains of both mammoths and mastodons (mammoths are associated with grasslands, while mastodons foraged in forest elements). From climatic sequences developed for adjacent central and Trans-Pecos Texas (Bryant and Larson 1968; Bryant 1970), Middle and Late Pleistocene environments on the Rio Grande Plain are thought to have been similar to prevailing central Texas conditions described by Bryant (1970) as "parkland." Pollen sequences from adjacent areas suggest the aridity of the climate increased in post-Pleistocene times. Hester (1976a) conceives of this environment as having similar temperatures as today but with a savannah vegetation. These grasslands, interspersed with trees, are thought to have been altered by the invasion of mesquite and other thorny brush in Late Prehistoric times (Bogusch 1952).

A complete discussion of the modern environmental aspects of the county is beyond the scope of this report, and only the most relevant elements are presented.

Climate

Thornthwaite (1948) has described the present climate of the general area as semi-arid and thermal, although Russell (1945) suggests two major climatic divisions on the Rio Grande Plain: the interior has a mesothermal steppe climate

with the dry season occurring in winter, while the coastal area and its margins have occasional tropical or desert years and precipitation in all seasons.

Live Oak County is subjected to periods of climatic extremes which range from arid to wet subhumid. The average annual precipitation at George West, the county seat, has been measured at 26.90 inches. Precipitation has often been below normal, with May, June and September being the wettest months; January, February and November are the driest months. The average monthly precipitation at George West is ca. 2.65 inches between February and September (Anders and Baker 1961).

In the past, records of temperature and evaporation were not kept in Live Oak County. However, records were kept at the slightly more humid Beeville station about 25 miles east-northeast of George West and are available for the period 1915 to the present. The mean daily temperature at Beeville was 52.2°F in January and 83.8°F in July; the mean annual temperature for this period was 70.9°F. The maximum recorded temperature was 111°F; the minimum was 5°F (*ibid.*:6).

Geology

The geologic formations of Live Oak County range in age from the Eocene to Recent. All outcropping rocks are of sedimentary origin and consist primarily of alternating beds of sand, silt and clay that normally strike north-northeast and dip toward the coast at rates ranging from ca. 20 feet to the mile for the younger formations to more than 140 feet per mile for the older.

The depositional environment of the outcropping formations in the Gulf Coastal Plain was at or near an oscillating shoreline during the Pleistocene; thus terrestrial depositions are alternated with marine or brackish water deposits. Downdip of the terrestrial deposits grades into marine sands, silts and clays and, where deeply buried, into marine clays. During the Late Tertiary, the sea withdrew toward the present coastline where the deposits are now exposed. The Upper Eocene and Lower Miocene formations contain large volumes of volcanic ash, ejected from an undefined source. In the Late Pliocene, gravel, sand and silt were spread over much of the Coastal Plain south and east of the Balcones Fault Zone. Erosion has lowered much of the land surface leaving a few hills capped with ancient stream gravels, sand, silt and clay of Quaternary age.

Outcropping formations in the vicinity of site 41 LK 106 include recent alluviums overlying Tertiary Catahoula tuff: tuffaceous clay and tuff containing beds of sand and conglomerate of possible Miocene age.

A brief discussion of the geologic aspects of south-central Texas cannot be complete without mentioning the significance of Uvalde gravels and their implication in a prehistoric cultural context. In parts of central and north-central Texas, Late Tertiary deposits exist in the form of ancient stream terraces and upland interstream gravel deposits. These materials occur sporadically, scattered along hill tops, bluff faces or ridges. First labeled Uvalde by Hill (1891:368), these materials are defined as "lag deposits of waterworn siliceous gravels anomalous to the geology of central and south Texas and unrelated to

the present river channels and terrace deposits of Pleistocene age" (Byrd 1971:5). It is believed that these gravels were laid down during the Pliocene (Late Teritary) as deposits of an alluvial plain derived indirectly by erosion from the easternmost ranges of the southern Rocky Mountains in central New Mexico (*ibid.*:5). When deposited, these gravels occupied the bottom of river valleys which were thus protected from erosional factors during the Pleistocene, while interstream uplands eroded more rapidly. Current theory suggests this eventually resulted in a reversal of the original topographic position. The present definition of Uvalde gravels is:

> a dissemination of cobbles ranging in size from 2 to 6 inches in diameter, generally composed of limestone, quartzite, quartz, chert, jasper and igneous rock and occurring in isolated patches on stream divides far above any well-developed terraces (Byrd 1971:9).

Since the gravels include workable cobbles of chert, jasper and quartzite, they provide a lithic source otherwise absent in the area. It is assumed that their occurrence is a major factor in the analysis of prehistoric settlement patterns not only at site 41 LK 106 but also for upland areas within the general region (Betancourt 1977).

The occurrence of these gravel resources is supplemented by lithic materials such as chalcedony in the nearby Tertiary Whitsett beds where they are exposed (Lynn, Fox and O'Malley 1977); a variety of sandstone beds suitable for technological exploitation as grinding implements and hearthstones is available from steep bluffs or cuestas. Fayette sandstone layers also outcrop in various places along stream channels (*ibid*).

Hydrology of the Area

Early Spanish and Anglo records imply that the surface water of south Texas was much more abundant in the past. Many springs and creeks which were still active into the early 20th century have since gone dry due to lowered water tables resulting from well irrigation and watershed destruction (Hester 1976b).

Most of the ground water in Live Oak County is substandard in quality for modern purposes, although potable water is perennially available from the major rivers and from pools along the intermittent Sulphur Creek in the study area. Perennial and intermittent lakes have been noted in flood plain areas, and rainwater occasionally accumulated in depressions of Pleistocene terrace remnants. No evidence of springs was noted during archaeological field operations. The rocks of Tertiary and Quaternary age which underlie Live Oak County are composed mostly of sand and silt interbedded with clay and silty or sandy clay. The position of the present water table ranges from at or near the surface in the valleys of the Atascosa, Frio and Nueces Rivers to more than 100 feet below the surface along the divides. Although all deposits below the water table are saturated, only the sandy beds yield water easily to present day wells. Anders and Baker (1961) suggest the quality of ground water in Live Oak County may differ greatly between formations and from area to area. Within a single formation, the quality in one strata may be considerably different from the quality in another.

Flora and Fauna

The Rio Grande Plain, as discussed by Inglis (1964) and Hester (1976b), follows the geographic extent of the Tamaulipan Biotic Province (Blair 1950) and a mesquite-chapparal region as defined by Tharp (1939). Blair (1950) identifies the interior of this area as a savannah with desert grasses and mesquite. Two major ecological zones are included in this construct: the uplands and the flood plains. The former are characterized by vegetation dominated by mesquite and other thorny brush, native grasses and prickly pear; the flood plains of rivers and their tributaries include a plant community composed of oak, ash, elm, hackberry and pecan (Lynn, Fox and O'Malley 1977). An extensive survey of flora in the locality of the present study is presented by these same authors.

Fauna in the region is characteristic of the Tamaulipan Biotic Province (Blair 1950). Wildlife includes white tailed deer, javelina, wild turkey, bobwhite, scaled quail, hawk, mourning and white-wing dove, fox, squirrel, jackrabbit, cottontail rabbit, raccoon, opossum, skunk, ringtailed cat, rodents, turtles, snakes, fish and lizards (Blair 1950, 1952; U.S. Department of the Interior 1975:B-25).

CHRONOLOGY OF PREHISTORIC HABITATION

The prehistoric habitation of Live Oak County can be generally described in terms of the prehistory of south Texas. Hester (1971, 1975) has provided a chronological overview for south Texas in which he postulates four major time periods: Paleo-Indian, Archaic, Late Prehistoric and Historic. The Paleo-Indian and Historic periods are briefly discussed. The Archaic and Late Prehistoric are also introduced as they are both represented at 41 LK 106.

Paleo-Indian: Various sites of this time period (ca. 9200-6000 B.C.) have been located in Live Oak County. *Folsom*, *Clovis*, *Angostura* and *Scottsbluff* points are representative of Paleo-Indian points found within the county (Grant D. Hall, personal communication; Hester 1974a; House 1974). There is increasing evidence in south and central Texas for a transitional phase between the Paleo-Indian and Archaic time frames. Hester (1975) has been most instrumental in defining this time period, tentatively labeled the "Pre-Archaic."

Archaic: (ca. 6000 B.C.-A.D. 1200) Presently, this time unit is tentatively divided into three phases: Early, Middle and Late. The Archaic represents a long time span of hunting and gathering lifeways. Hester (1976c:85-86) has noted that many Archaic sites are located near present waterways, and that, among the projectile points, unstemmed forms (triangular) are quite common. Recent interpretations as well as discussions of the problems and complexities of the Archaic time unit have been compiled by Hester (1976).

Late Prehistoric: This major time period (ca. A.D. 1200-1600) is generally characterized by the introduction of the bow and arrow and bone-tempered ceramics. The material evidence resulting from bison hunting in several areas of south Texas has been noted by Hester and Hill (1977). Hester and Hill (*ibid.*) have also provided a detailed synthesis of the Late Prehistoric.

Historic: The Historic period for south Texas (A.D. 1600+) is generally represented by Historic Indian groups and Anglo-European activities. Northern aboriginal groups (Apache, Comanche) were moving southward, and the introduction of the horse provided a means of rapid expansion. Spanish intrusions, combined with the southward movement of the Plains Indian groups, served to disrupt the native hunting and gathering cultures of southern Texas. The southern Texas Indian groups, frequently lumped under the term "Coahuiltecan," are described in Newcomb (1961) and in Lynn, Fox and O'Malley (1977).

PREVIOUS RESEARCH

Until recently, little sustained archaeological work had been carried out in Live Oak County. As with most of south Texas, the archaeological reporting and recording of sites had been mostly general surveys and amateur investigations.

The preliminary Choke Canyon Reservoir survey (Lynn, Fox and O'Malley 1977) provided the first professional attempt at discussing various type sites within Live Oak County. The University of Texas at San Antonio Nueces River Project, funded by the Bureau of Reclamation, has been investigating various sites near the study area since early summer 1977. Research at these sites includes testing as well as full-scale excavation of sites ranging from Paleo-Indian to Historic times (Grant D. Hall, personal communication). The results of such an investigation will undoubtedly provide valuable information on the archaeology of both Live Oak County and south Texas. Also of particular interest and importance is site 41 LK 28, currently being worked by archaeologists of the State Department of Highways and Public Transportation. This site is largely of the Archaic period and, in one area, contains more than 160 burials. Information derived from these excavations will provide much needed information on Archaic lifeways and burial practices. Hester (1974b) lists numerous reports dealing with the archaeology of south Texas which may be applied to the study area in general terms. In other publications, Hester (1975, 1976a, 1976b and 1976c) has provided general chronological information on south Texas as well as site-specific data.

DESCRIPTION OF THE SITE

Site 41 LK 106 was first identified in early spring 1977 by Thomas C. Kelly of the Center for Archaeological Research (UTSA) during the course of an archaeological survey of the J. C. Felder and Marrs McLean Exxon leases in Live Oak County (Kelly and Hester 1977). Investigations of the site included a general survey and the excavation of two one-meter units. Artifacts recovered during these investigations indicated a Middle to Late Archaic and Late Prehistoric occupation of the site. Conclusions from preliminary investigations indicated the possibility of this site's nomination to the Register of Historic Places.

The site is located on eroded and dissected uplands between an S-shaped bend of Sulphur Creek to the north and an unnamed intermittently flowing tributary to the south. Uplands slope to the west and eventually broaden into the flood plain of the meandering Sulphur Creek drainage. Across the creek and due north of the site lies a low and extensive flood plain densely vegetated with hack-

berry, wild grape vines, mesquite and other thorny brush, oak and tall grasses (see Fig. 2). Vegetation at the site and in the upland areas generally is composed of dense thorny brush, prickly-pear cactus and tall grasses (see Fig. 3).

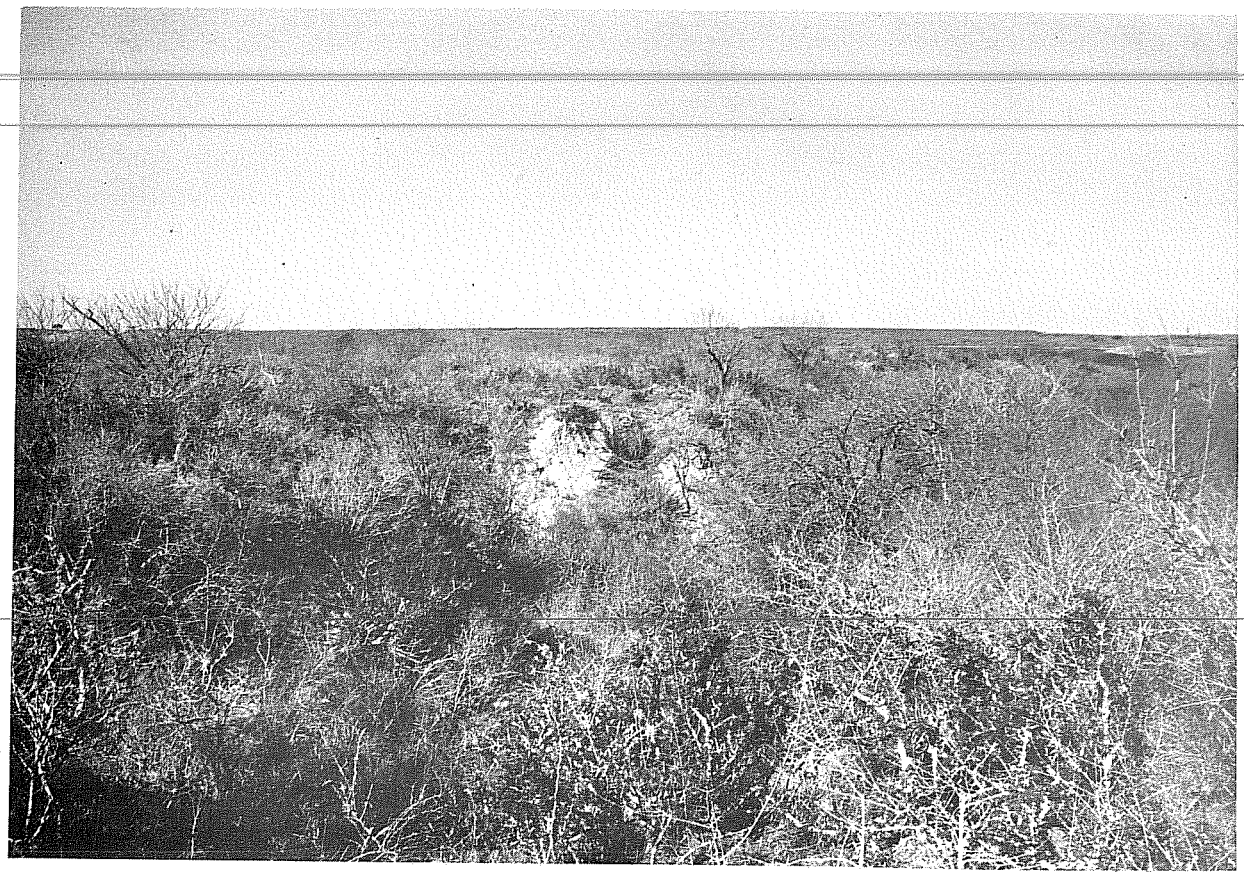
Materials from the Tertiary-associated Oakville formation are exposed in the 41 LK 106 locality, while Quaternary deposits, Recent and Pleistocene materials are deposited as alluvium in the flood plain. A moderate scatter of Uvalde gravels was also noted in the creek below the site. Miocene clays, thought to be stream deposited, were exposed in backhoe trenches with upper limits ranging from 40-80 cm below the surface. The fine-grained sandy clay is associated with the Catahoula tuff of the Miocene epoch. Overlying the Miocene deposits as an unconformity, more recent soils are dark brown to gray with much organic matter and often heavily eroded (J. Oliver, personal communication). The nature of soil deposition at the site, as revealed by backhoe trenching running north to south and east to west, is presented in Fig. 4.

Major activity areas within this prehistoric occupation site appear to be concentrated within 50 meters of the steep bluff that overlooks Sulphur Creek; lithic debris was observed on the surface for at least 350 meters. Southward and away from the drainage, lithic debris was lightly scattered across an extensive upland area bounded on the east by a fence line and on the west by dissected uplands that eventually slope steeply south and westward toward an unnamed tributary of Sulphur Creek. Elevations throughout the site varied with less than 30 feet between minimum and maximum elevations; the maximum elevation was about 185 feet above mean sea level, minimum about 160 feet.

The original investigation reported by Kelly and Hester (1977) was primarily concerned with survey, although two one-meter square test units were also excavated near the east end of the site. Two hammerstones, a broken preform, lithic debris and a sandstone hearth were uncovered, most at depths of 0-25 cm. Several diagnostic projectile points and fragments were also discovered from or near the bluff, and these were tentatively identified as *Matamoros*, *Scallorn*, *Desmuke* and *Ensor*. No intact hearths, other than the excavated example, were observed, but sandstone fragments from disturbed, eroding hearths were noted along the bluff face. Kelly and Hester (1977) suggested that the site represented a series of short-term occupational locations during the Middle to Late Archaic and Late Prehistoric periods of south Texas. Because of the frequency and extent of artifacts noted during this initial survey, the authors recommended that the site be nominated to the National Register of Historic Places and that efforts be made to preserve its important cultural resources.

SITE INVESTIGATIONS

Since a large part of the site is slated to be completely destroyed by a diversion of Sulphur Creek, test excavations were carried out primarily to assess the archaeological resources in the affected portion, and secondarily to assess those in adjacent but unaffected areas. Information gained from the investigations was

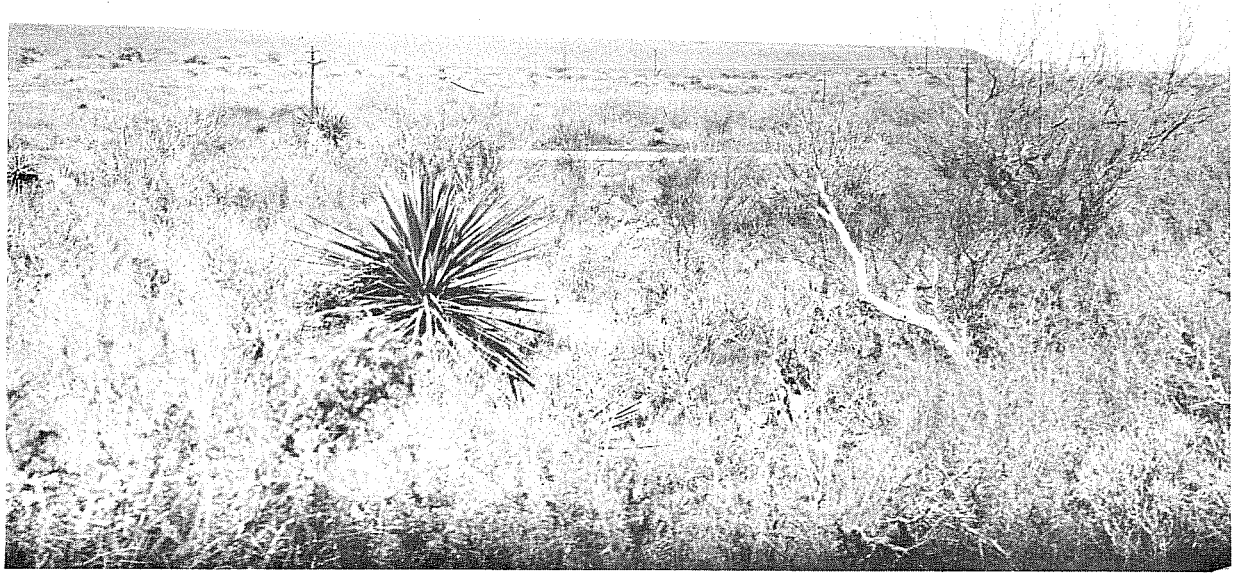


a

b

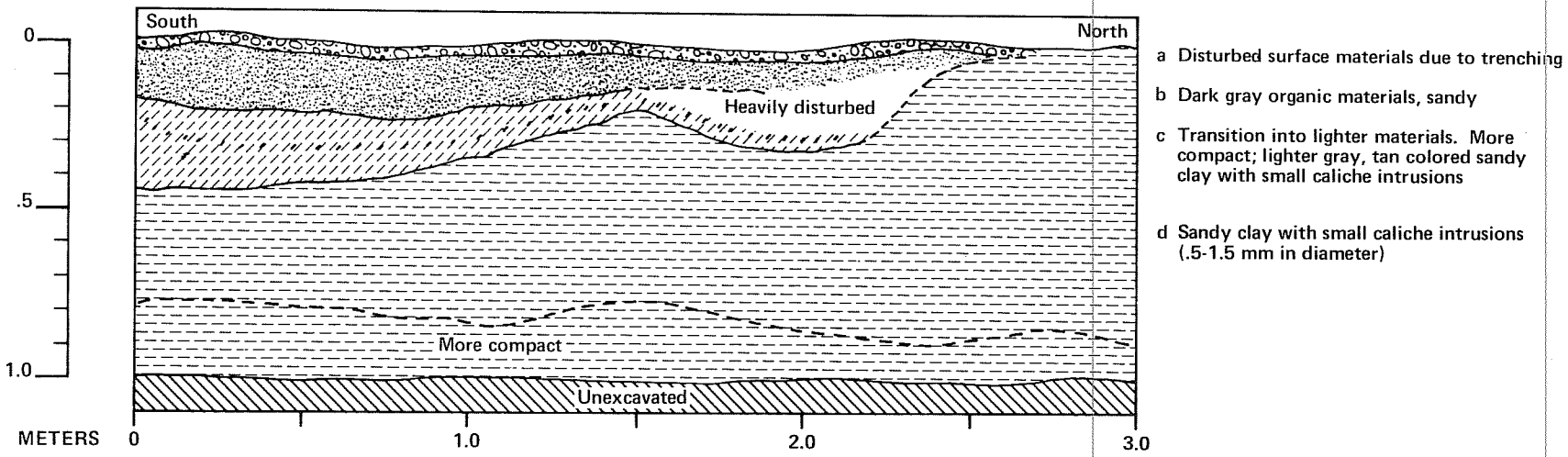
Figure 2. *Views of the Site Environment at 41 LK 106.* a, looking north from bluff edge toward flood plain of Sulphur Creek; b, looking south across site through dense south Texas brush.

a



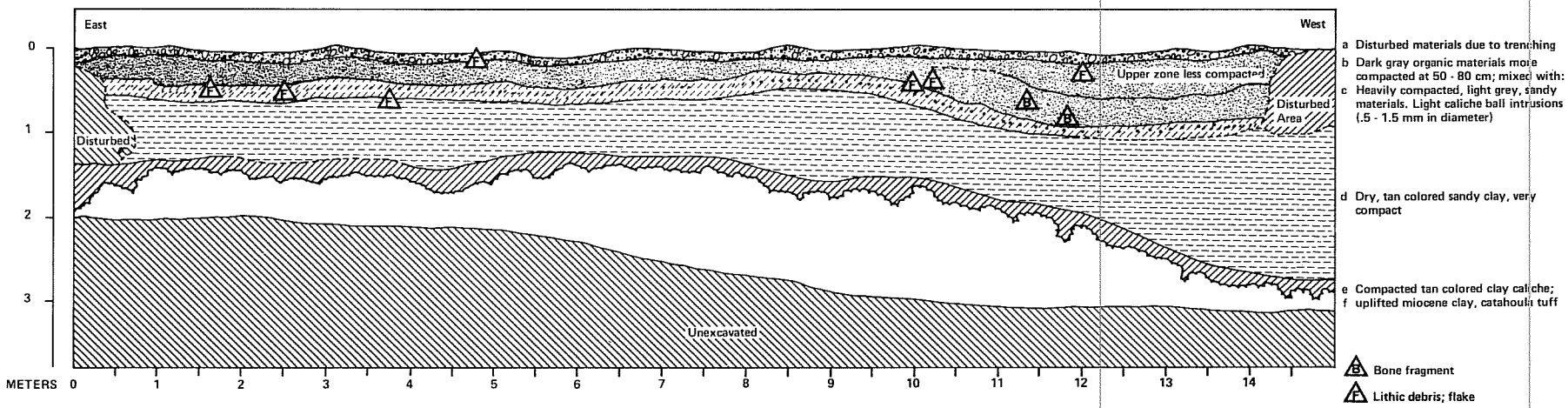
b

Figure 3. *Views of Site Area at 41 LK 106.* a, looking south toward bluff face; lithic debris is scattered along bluff margins; b, looking west along the upland areas of site.



Remarks: No cultural materials noted in this unit at any depth.
A noticeable decrease in top soil observed in the vicinity of Trench 7.

a



b

Figure 4. *Profiles of Soil Deposition at Site 41 LK 106.* a, north to south; b, east to west.

used to determine the need for additional archaeological excavation in the diversion area and to best preserve and manage the remaining sectors of the site. For this evaluation, the following elements of significance were used: (1) the vertical and horizontal extent of the cultural resources, (2) the antiquity and chronology of these occupations, (3) the physical nature of the occupations and (4) the potential of the site for yielding information on chronology, prehistoric environments, aboriginal diet and other data necessary for the reconstruction of southern Texas prehistory.

To recover the required data to be used in evaluation, on-site investigative procedures included accurate and detailed mapping, use of a backhoe to determine the extent of the remains, a series of six hand-excavated shovel tests and a series of 18 1-m^2 hand-excavated units. These were all plotted onto an existing contour map prepared by Exxon Company personnel (Fig. 5). Before any hand excavation, several backhoe trenches were dug in various parts of the site, and the walls of each one were examined for evidence of occupation. Profiles of selected portions of the trenches were prepared.

The six shovel tests (ST) were actually excavated with a trowel; the fill was not screened, except for that derived from ST#6. In general these tests were approximately 50 cm^2, with the depth varying between 30 and 40 cm; they were not dug by any arbitrary levels. The 1-m^2 units, however, were all excavated in 10-cm levels (Unit A dug in 5-cm levels) using trowels and shovels, and all the fill was passed through 1/4-inch mesh screen. A small amount of Unit A deposits was put through 1/8-inch screen, but the considerable difficulty and time expended, combined with the lack of increased yield over that of 1/4-inch mesh, resulted in exclusive use thereafter of 1/4-inch screen.

Other investigations included the collection from each level of every unit of soil samples for phytolith analysis. In addition, phytolith samples were taken from various other contexts, principally the hearth areas. Three charcoal samples were collected for radiocarbon dating.

Specific investigative procedures for each unit or group of units are presented below along with general discussions of context and content. Descriptions of the artifact categories mentioned in each excavation discussion follow in the succeeding section.

UNIT A (2 contiguous 1-m^2 units, 0.55 m^3)

This unit was excavated after a high density of occupational debris was noted in the west wall of Backhoe Trench (BHT) #11. In this area the soil was a fairly loose sand. Since this was the first unit to be excavated, 5-cm arbitrary levels were used, with the first two levels passed through 1/8-inch screen and the remainder through 1/4-inch screen. Though artifact density decreased substantially below 15 cm, one square was taken to 30 cm, the other to 25 cm. Cultural material occurred very infrequently in these lower levels.

Although no features were recognized, burned sandstone occurred occasionally throughout the fill, but was most frequent in the upper 20 cm. A few mussel shell fragments and 381 lithic artifacts (chert and silicified wood) were

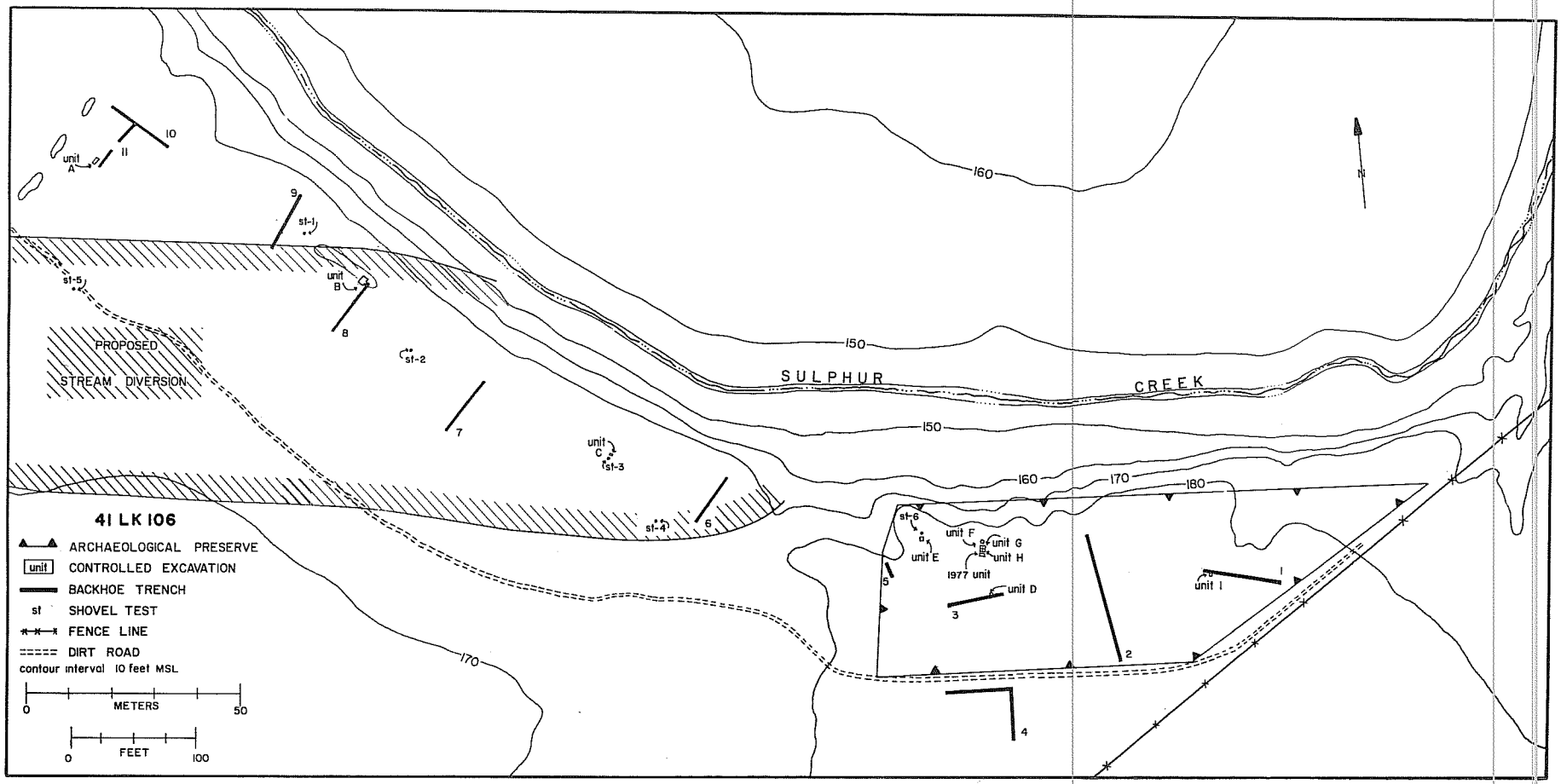


Figure 5. *41 LK 106: Locations of Excavated Areas.*

recovered; this total consists of 1 Group I biface, 1 Group II biface, 1 thermally fractured chert fragment, 3 cores and 375 items of debitage (see Table 1 for numbers in each debitage category). Less than one third of the total recovered lithic fragments possessed cortex and, of the flakes, only 149 had lipped platforms. Significantly, Unit A had the highest density of lithic debris per cubic meter of any unit tested (693 specimens).

UNIT B (ca. 4.75 m^2 contiguous, 1.70 m^3)

The relatively high frequency of debitage found in trowel tests in both walls of BHT#8 prompted excavation of a 1 m^2 in which a sandstone hearth was encountered in the third level. To further investigate the hearth, four contiguous units were excavated, the two westernmost to 30 cm and the others to 40 cm; this permitted exposure of the hearth (Figs. 6,7) and recovery of a large amount of cultural debris. Due to the absence of recognized evidence of more than one occupation and the presence of extensive root and rodent disturbance throughout the deposit, all cultural material is presumed to be associated with the hearth. Recovered were 41 undecorated, bone-tempered sherds; 2 small, thick triangular (*Matamoros*) points; 3 Group I biface fragments; 1 Group I utilized flake; 2 Group II utilized flakes; 16 thermally fractured chert fragments; 382 debitage items; mussel shell and freshwater drum (*Aplodinotus* sp.) otolith. Excluding the mussel shell, artifact density was 263/m^3. Approximately 40% of the debitage possesses cortex, and 23% of the flakes have lipped platforms.

Unfortunately, no charcoal was present in the hearth or in the adjacent area; thus there is no direct dating of this occupation, although its age can be roughly estimated by cross-dating of pottery fragments and projectile point types (see Interpretations).

UNIT C and ST#3 (for Unit C only, 1 m^2, 0.20 m^3)

These two excavations are situated in a low area in the central part of the site along the Sulphur Creek bluff. ST#3 was excavated first since it contained a Group II biface; Unit C was laid out immediately northeast and excavated to a depth of 20 cm. The fill from both ST#3 and Unit C was a dark, clayey sand.

Cultural debris was relatively scarce: eight fragments of debitage were recovered in Unit C, giving a density of 40/m^3. Only 1 biface and 3 fragments of debitage were removed from ST#3. Cortex was present on 50% of debris in Unit C and 67% in ST#3. One flake in ST#3 was lipped.

UNITS D, E, F, G, G-2, H, H-2, 1977 Units 1 and 2, and ST#6

As can be seen in Figure 6, these excavations are all in relatively close proximity to one another, with F, G, G-2, H, H-2 and the 1977 units forming a particularly tight group. These latter units constitute one analytical subgroup, Unit E and ST#6 another and Unit D a third.

Figure 6. *View of Exposed Hearth in Unit B.*

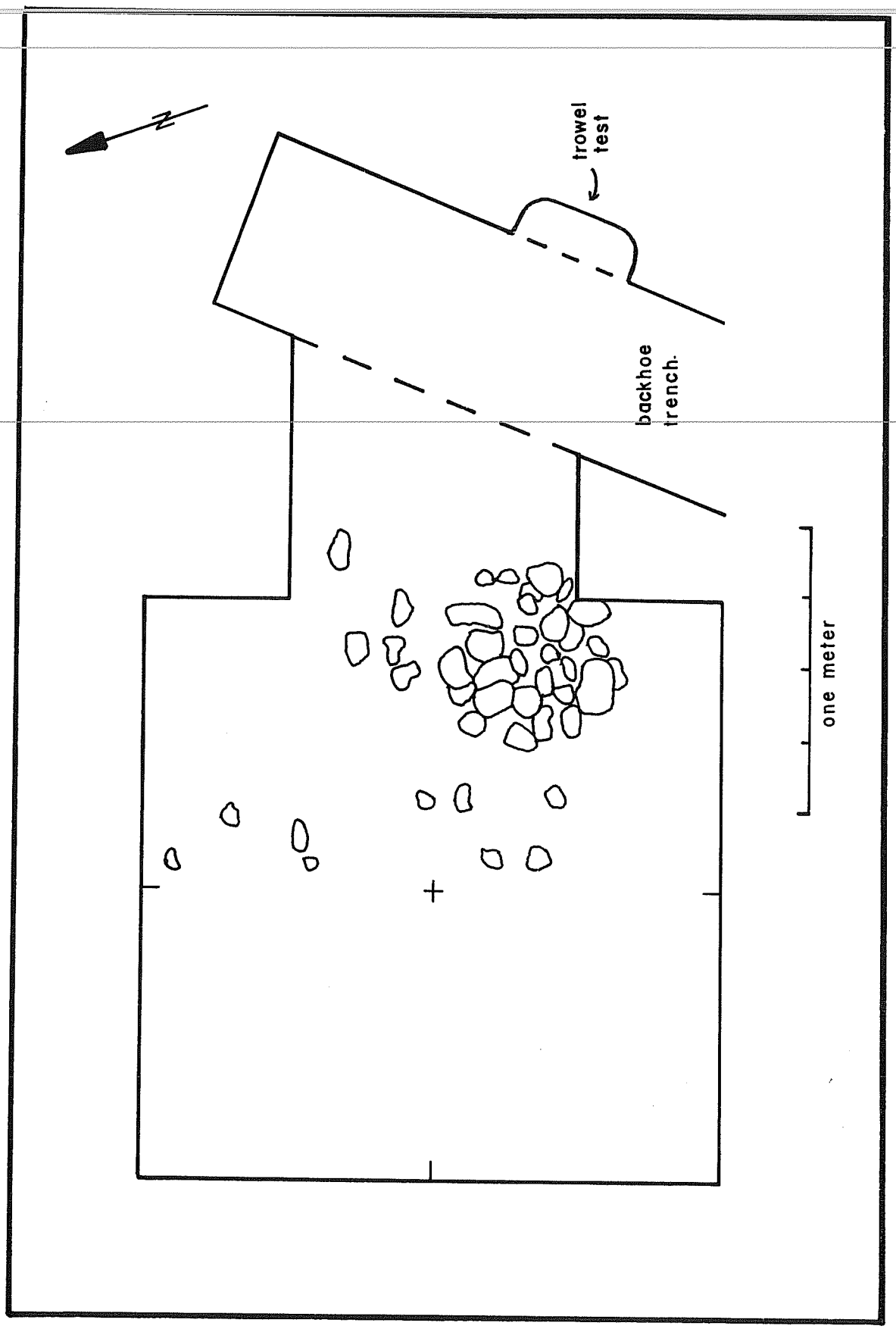


Figure 7. *Hearth Feature in Unit B.* Plan map of Unit B showing hearth location.

UNITS F through H-2 and the 1977 Units (7 m^2, 3.15 m^3)

Since one hearth was found in 1977 Unit 2 and another was visible in the eroding bluff a few meters away, Units F through H-2 were excavated to further investigate this area (Fig. 8). Units F, G and H were taken down to 40 cm; the 1977 units to 45 cm; and Units G-2 and H-2 to 50 cm (one-quarter of Unit G-2 was taken to 60 cm). The upper 40 cm of fill was a light sand which became increasingly compact with depth; at about 40-45 cm, the soil changed rather abruptly to a very compact clayey sand.

Excavations revealed indications of two occupational levels, perhaps somewhat disturbed living surfaces, though this cannot be substantiated with the present sample area.

(1) The lower occupation is tentatively defined on the basis of the hearth/burned sandstone scatter in Units G-2, H, H-2 and its presumed extension into Unit F (Fig. 9). Although most of these hearthstones were on top of or in the upper few centimeters of the compact clayey sand at about 40-45 cm, some were as deep as 50 cm and others as high as 35 cm. It is this vertical dispersal that forms the basis for assuming that the bulk of the cultural material in the 30-60 cm levels is associated with the burned sandstone scatter. Discounting the 1977 Unit 1 material which lacks vertical provenience, 487 artifacts, all lithic, were recovered from below 30 cm (0.875 m^3). Based on 1-m^2 units, density ranges from 916/m^3 in G-2 to 247/m^3 in 77-2.

The artifact assemblage consists of a *Bulverde* dart point, a Group I biface, a Group III utilized flake, 5 thermally fractured chert fragments, 8 cores and 462 debitage items; in addition, a quartzite hammerstone is reported from this level in Unit 77-2. Of the debitage, 32% possesses cortex; of the flakes, 18% are lipped. Mussel shell was present throughout the fill.

(2) The 30 cm depth for separating occupation levels is somewhat arbitrary and convenient, yet it is the most practical given the excavation techniques and the data base. Additionally, because of extensive root and rodent disturbance in these levels, it is expected that some displacement of cultural debris has occurred; this is substantiated somewhat by the fact that numerous flakes and chips were on edge when found.

Again discounting the Unit 77-1 material with no vertical provenience, the artifacts total 511 in 1.80 m^3 for an overall density of 284/m^3, but with the density per 1 m^2 varying from 480/m^3 in F to 137/m^3 in H-2. The artifact total of 511 items breaks down into 2 Group I bifaces, 1 Group II biface, 2 Group I utilized flakes, 1 Group I utilized flake, 1 hammerstone, 21 thermally fractured chert fragments, 1 core and 482 debitage items. Of the debitage, 36% possesses cortex and 19% of the flakes have lipped platforms.

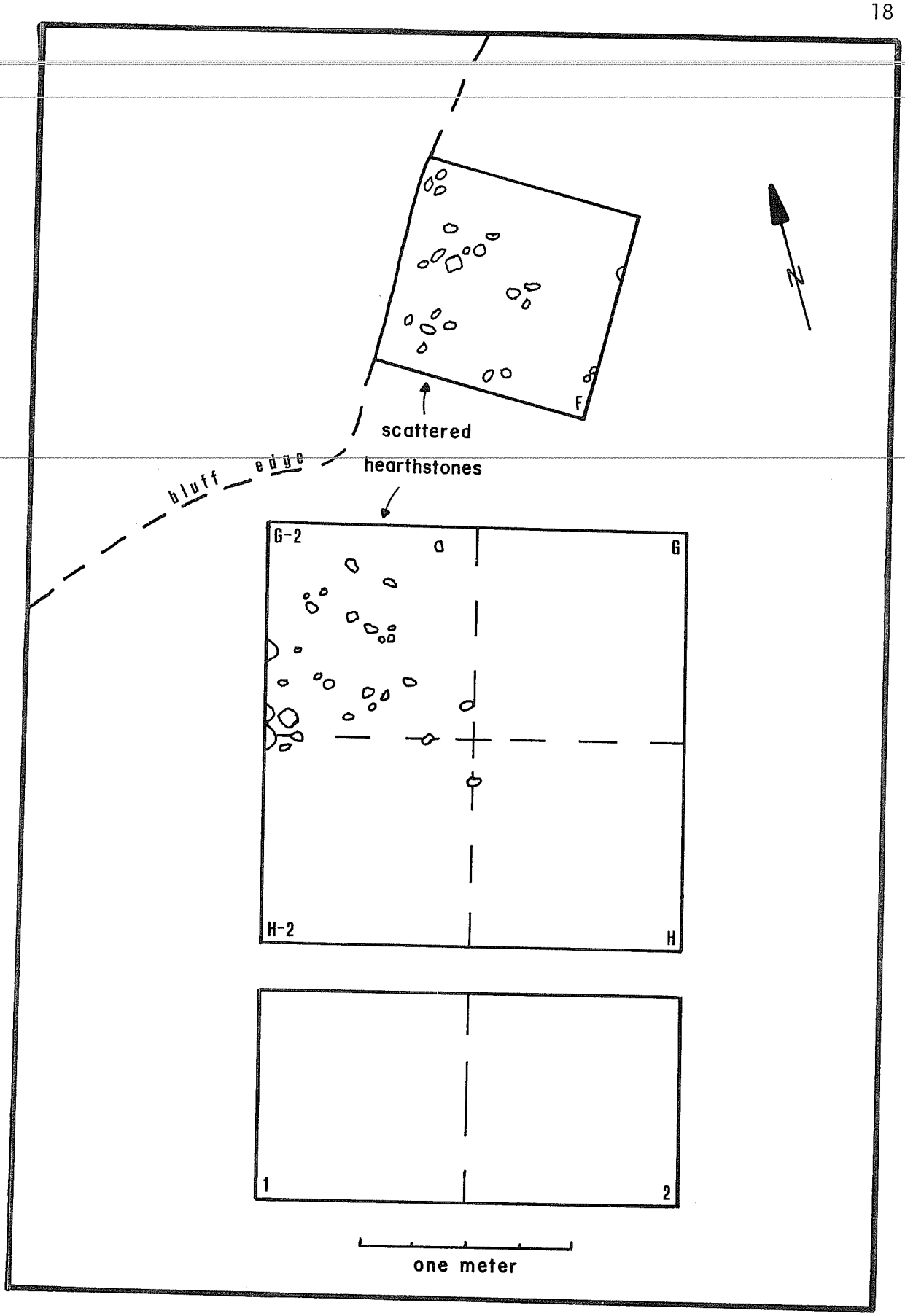
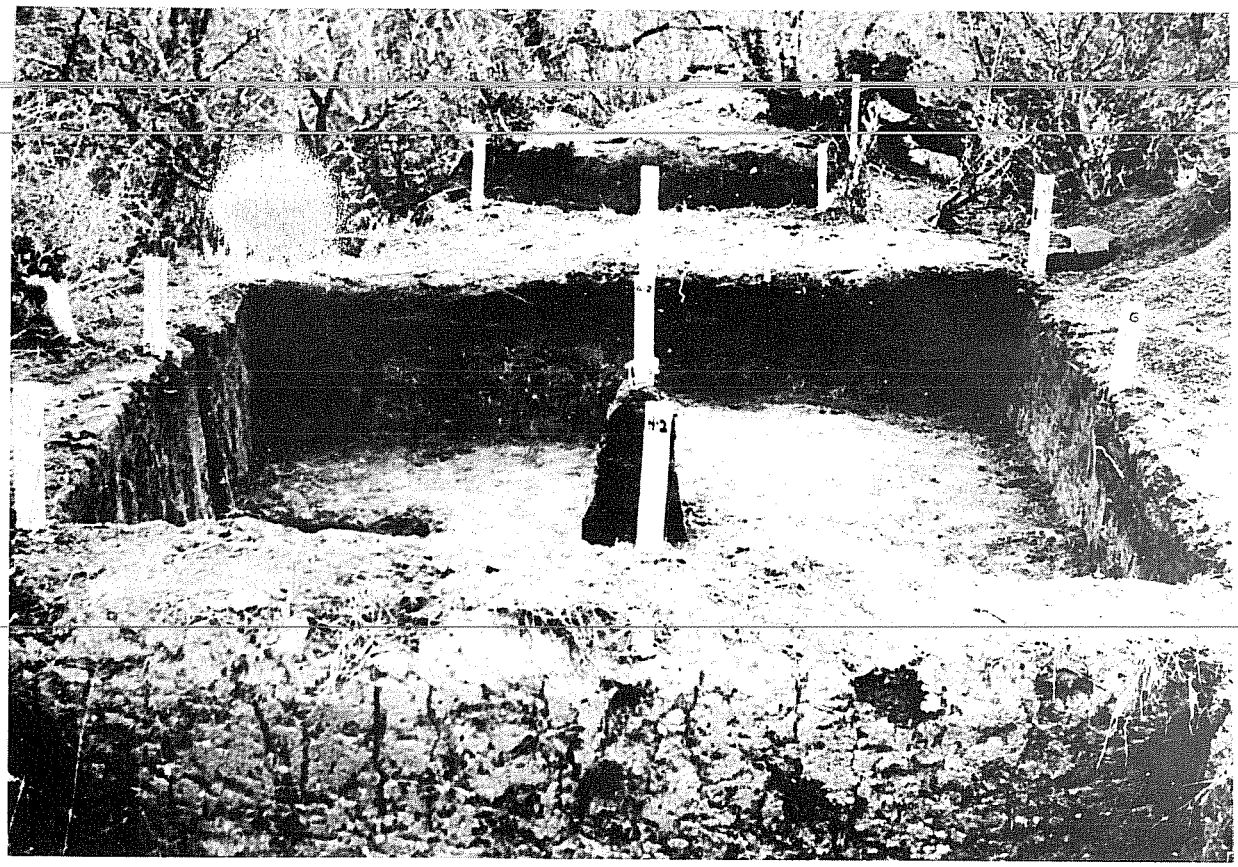
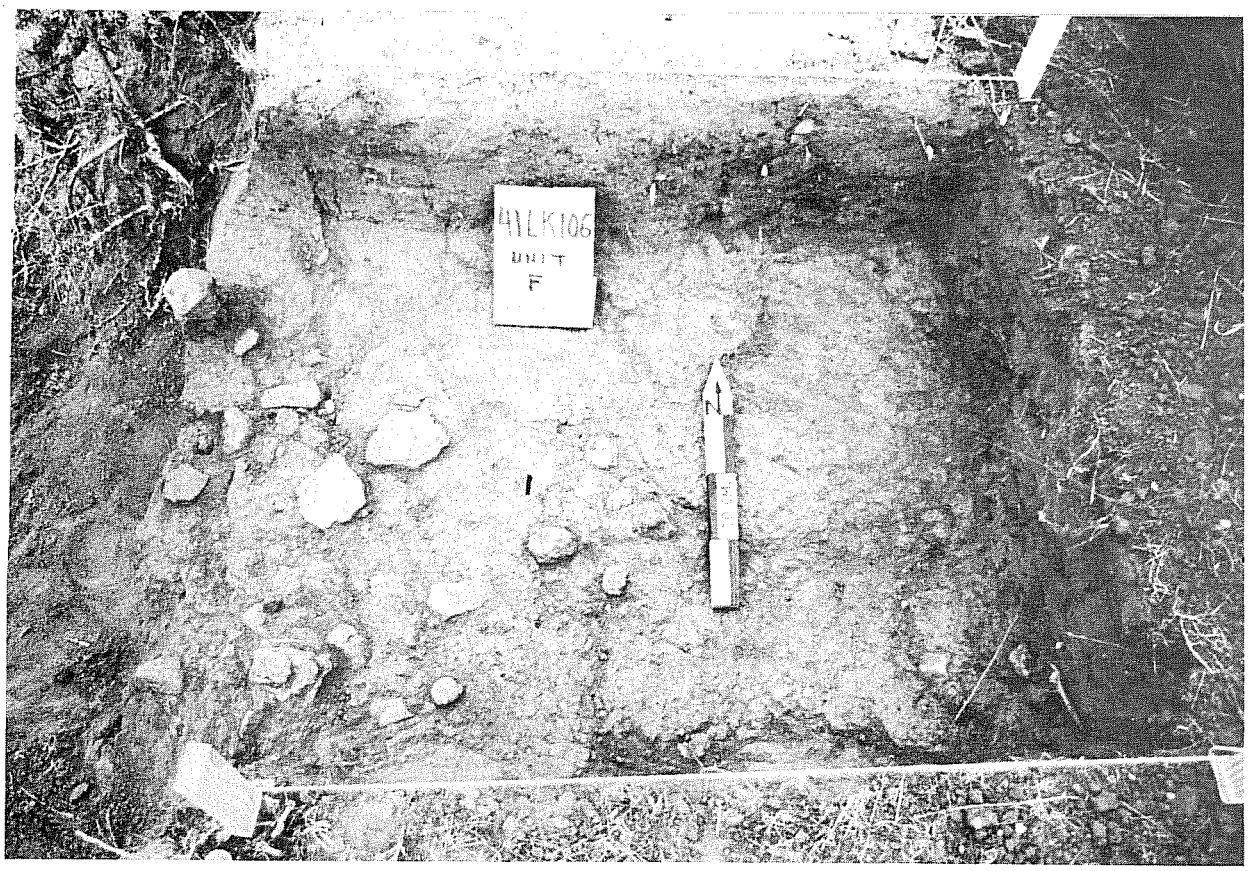


Figure 8. *41 LK 106: Plan of Excavation Units.* Shown are the locations of Units F through H-2 and previously excavated (1977) Units 1 and 2. The feature uncovered at the 30-40 cm level is shown in Units G-2 and F.



a



b

Figure 9. *41 LK 106: Units F and G during Excavation.* a, view of Unit G area at a depth of 30 cm; b, view of scattered hearthstones at 30-40 cm in Unit F.

Two charcoal samples from level 3 in Units G-2 and H-2 were submitted for radiocarbon analysis (see Appendix II for details). A radiocarbon date of 720 ± 50 B.P. (A.D.1230) was obtained from a charcoal sample collected at 28 to 32 cm in Unit G-2. Soil discoloration, fibrous materials and small pebbles in a concentrated area suggested the charcoal fragments may have been part of an abandoned rodent burrow. The charcoal sample is presumed to have been part of the upper occupational component of Unit G, reflected on the surface and in the upper 20 cm of soil.

The charcoal sample from Unit H-2 yielded a date of 840 ± 50 B.P. (A.D. 1110); the date was obtained from a charcoal sample taken from Unit H-2 at a depth of 26 cm. Associated with lithic debris and mussel shell fragments, the sample is believed to reflect the approximate age of the upper cultural component of the unit (see Appendix II).

UNIT E and ST#6 (for Unit E only, 1 m^2, 0.40 m^3)

These two excavations are located very near the bluff edge where the soil is a loose sand. Because of the large amount of material exposed by erosion along the bluff, ST#6 was dug in an effort to better assess the subsurface remains. Its relatively high yield of a core and 17 debitage items resulted in the excavation of Unit E.

Neither features nor evidence of stratigraphically separate occupations were found, but lithics and mussel shell were relatively abundant throughout the 40-cm deep unit. Two cores, 117 debitage items and 1 thermally altered chert fragment were collected (120 total), giving a density of 300/m^3; 43% of the debitage possesses cortex and 22% of the flakes are lipped.

UNIT D (1 m^2, 0.43 m^3)

Unit D was excavated in order to investigate an unusually large amount of charcoal about 25 cm below the surface in the north wall of BHT#3. Although excavation did not result in definitive identification, the irregularity and size of the disturbance when recognizable (it was not detected in the upper 40 cm) suggest that it may have been an animal burrow. A small amount of debitage and a Group I biface fragment were found in the disturbance along with 12 bone fragments: 3 fragments of deer (*Odocoileus virginianus*, at least 1 individual), 1 of coyote (*Canis latrans*) and 8 unidentifiable.

A Group I biface fragment, 2 Group I utilized flakes, 3 cores and 180 debitage items were recovered (186 total) for a density of 372/m^3. Cortex was present on 42% of the debitage, and 20% of the flakes were lipped.

A charcoal sample dated at 1140 ± 50 B.P. (A.D. 810) was obtained on an intact carbonized stick excavated at 21 to 27 cm below the surface. While no diagnostic artifacts were in direct association with the sample, a scattering of lithic debris was observed above and below the sample. Cultural distributions from nearby units suggest at least two separate assemblages within 45 cm below

the surface. A medial arrow point fragment with serrated edges was found above the charcoal sample at a depth of seven cm (see also Appendix II).

In the road at the east end of BHT#1, a single bone-tempered sherd like those from other areas of the site was noted but not collected. Additionally, in the road just a few meters south of this sherd, a small marine pelecypod shell (*Chione cancellata*) was collected.

ARTIFACT DESCRIPTIONS

Based on type of material, artifacts from the site investigations can be divided into two major groups, ceramics and lithics. The lithics are further separated into categories reflecting one or all of the following: morphology, method of production and presumed function.

Ceramics (42 specimens)

All of the ceramics are undecorated, bone-tempered potsherds, with 41 coming from Unit B where they are associated with the hearth and *Matamoros* projectile points. The other sherd was collected from a disturbed area along the road just south of Unit D. In addition, bone-tempered sherds were observed in the road at the east end of BHT#1 and in the road at ST#5.

The 41 sherds from Unit B appear to be from the same vessel, with both interior and exterior surface colors varying from black to gray to reddish-brown; exterior surfaces are smoothed. All of these sherds fit the description of *Leon Plain* pottery (Suhm and Jelks 1962) and Group A bone-tempered pottery from south Texas as described by Hester and Hill (1971).

Lithics

The lithics were separated into two general groups according to method of production, morphology and presumed function: (1) tools and (2) chipping debris. Separation within these general groups is further explained in the description of each.

TOOLS

Arrow Points (2 specimens)

Though both specimens have serrated blade edges, one is basically triangular with a concave base (Fig. 10,g) and the other is stemmed (Fig. 10,h). However, the stem of the second specimen is broken; thus the complete shape is unknown. The triangular specimen is a surface find, while the stemmed specimen is from Unit D, level 1. Dimensions of complete point: L, 36; W, 12; T, 3.

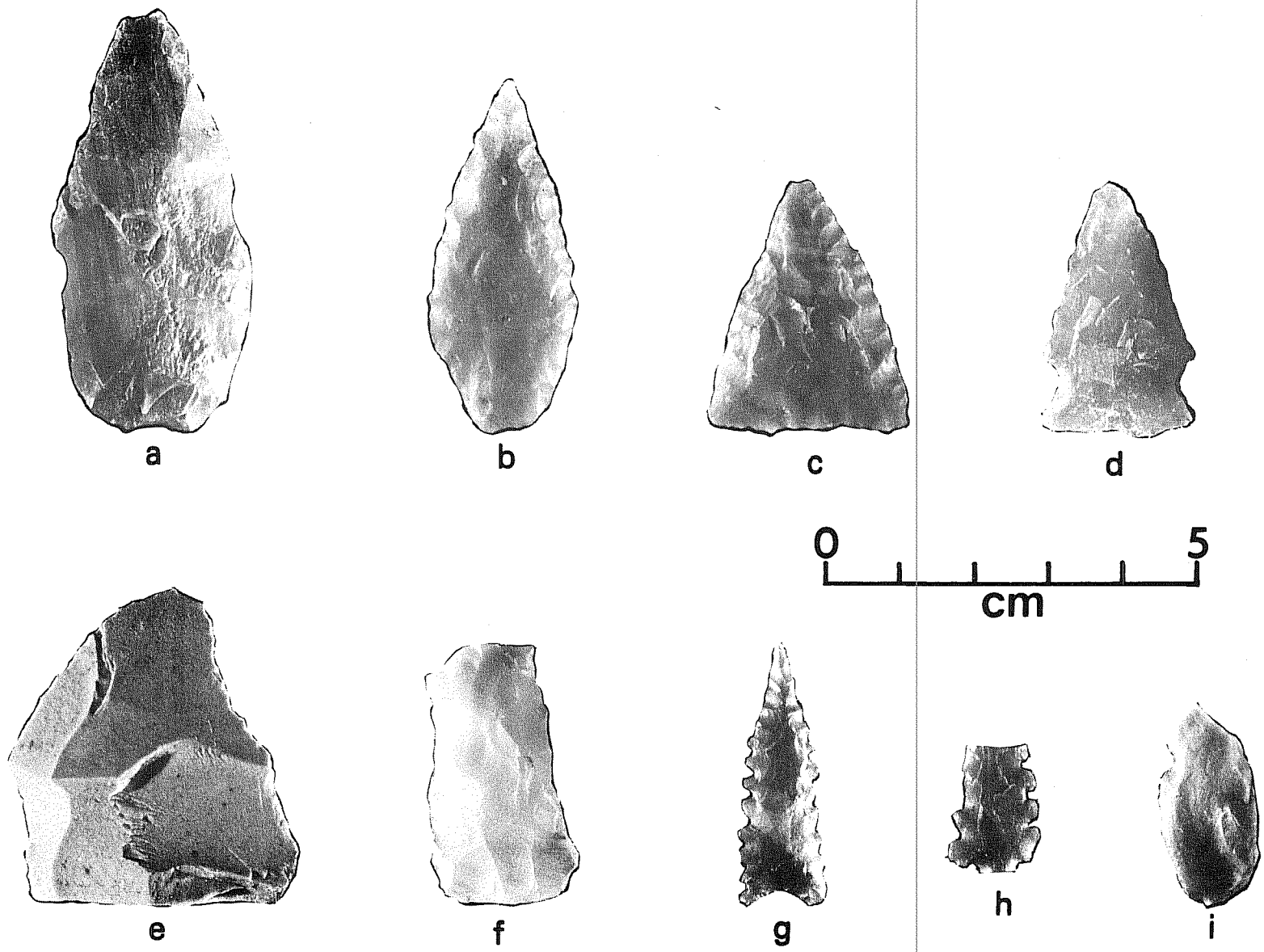


Figure 10. *Selected Artifacts from 41 LK 106.* a, Group I biface; b, *Desmuke*; c, *Matamoros*; d, *Ensor*; e, Group II utilized flakes; f, Group I biface; g,h, serrated arrow points; i, Group I utilized flake.

Dart Points (6 specimens)

Bulverde (1 specimen; Fig. 11,a). This specimen has a triangular blade, prominent shoulders and a straight stem with a slightly concave base. It is from Unit H-2, level 5, and is probably associated with scattered hearthstones in the lower occupation level. L, 55; W, 30; T, 8.

Desmuke (1 specimen; Fig. 10,b). Essentially leaf-shaped, this point has weakly defined shoulders and a contracting stem. It is a surface find. L, 48; W, 21; T, 7.

Ensor (1 specimen; Fig. 10,d). This specimen is side-notched and has a straight base. Surface find. L, 35; W, 21; T, 6.

Matamoros (3 specimens; Figs. 10,c; 11,b,c). These are small, broad triangular points. One is a surface find and the other two are from Unit B, level 2, where they are associated with a hearth and bone-tempered pottery. L, 30-34; W, 22-28; T, 5-6.

Bifaces (16 specimens)

The bifaces are separated into three main groups which emphasize primarily the extent of reduction and secondarily, shape.

Group I (12 specimens). These bifaces have been thinned, presumably by billet flaking, and may be either preforms or finished tools. Of the three complete or nearly complete specimens, two have rounded bases (Fig. 10,a,f) and one has a concave base (Fig. 11,d). The other nine are so fragmentary that their form cannot be determined.

Of the three complete specimens, the one with the concave base is from Unit H-2, level 4, and the ones with rounded bases are from Unit A, level 4 and surface (Figs. 11,d and 10,a,f respectively). The fragments are from Units A, B(2), D(2), F, G-2 and 1, and ST#5.

Group II (3 specimens). Since these bifaces presumably have not been thinned by billet flaking, they are considerably thicker and cruder than those in Group I. The one nearly complete specimen (Fig. 11,h) is triangular and came from ST#3. The two fragments are from Units H, level 2, and A, level 2.

Group III (1 specimen; Fig. 11,e). This rectangular-shaped biface appears to be a failure because of several places where thinning attempts resulted in step fractures.

Utilized Flakes (10 specimens)

Three subgroups are recognized.

Group I (6 specimens; Figs. 10,i; 11,g). These artifacts have a unifacially continuous series of tiny flake scars along one edge, presumably wear resulting

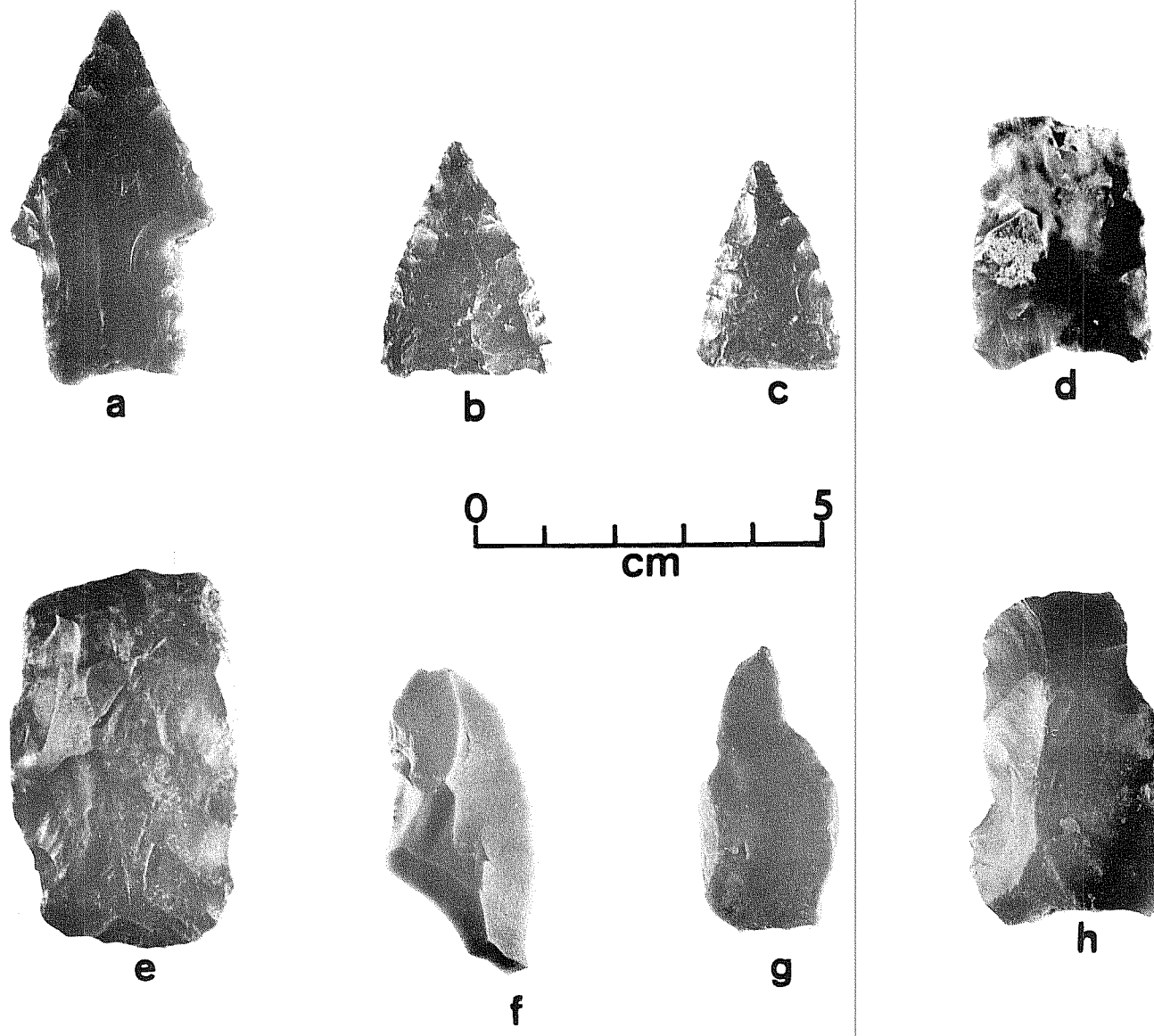


Figure 11. *Selected Artifacts from 41 LK 106.* a, *Bulverde*; b,c, *Matamoros*; d, Group I biface; e, Group III biface; f, Group II utilized flake; g, Group I utilized flake; h, Group II biface.

from use. Provenience: B, level 2; D, level 3; 2 in H-2, level 3; and 2 in 1, levels 1 and 3.

Group II (2 specimens: Figs. 10,e; 11,f). These have bifacial, continuous series of tiny flake scars and nicking along one or more edges; like those in Group I, these artifacts presumably were modified by use rather than by intentional flaking. Significantly, both are from Unit B, one each in levels 1 and 3.

Group III (2 specimens; not illustrated). These artifacts are fragmentary but show retouching along one edge. Both are from Unit H-2, levels 2 and 4.

Hammerstones (2 specimens: not illustrated)

Both are small quartzite cobbles with battering on the ends. One is a surface find and the other is from Unit F, level 1. In addition, one quartzite hammerstone came from Unit 77-2.

CHIPPING DEBRIS

Analysis of these materials followed a procedure of separation which was expected to indicate the extent of reduction at the site, with specific attention directed toward differences and/or similarities between the various sampling areas. To accomplish this, the separation scheme was designed to reflect degree of similarity between samples both within specific categories and within larger, more inclusive groups.

As with any classification scheme, the one used here is somewhat arbitrary; however, the following descriptions clearly define the categories in terms of particular attributes. Initially, the cores were separated from what is here termed "debitage," that is, waste material from reduction.

Cores (20 specimens). These are cobbles from which one or more flakes have been removed, with both single and multiple prepared platform cores represented. Except for two petrified wood cores, all are of chert similar to that naturally occurring in and along Sulphur Creek.

Debitage (2354 specimens). Two classification schemes were combined in this analysis to provide a basic, usable set of debitage categories. The first scheme initially separated pieces possessing striking platforms. In turn, pieces lacking platforms were divided between chips, which rather clearly are flake fragments, and chunks, which are non-flake shatter fragments. On a somewhat different level, the flakes were separated into two groups according to whether or not the platform has a pronounced lip on the ventral side; flakes possessing such a lip are assumed generally, but not always, to result from bifacial thinning and usually have a diffuse bulb of percussion. Thus, in the first classification, there are four categories: lipped flakes, non-lipped flakes, chips and chunks.

The second classification scheme considers only the amount of nodular cortex, if any, remaining on a particular piece of material. In the case of flakes and chips, cortex is restricted to the dorsal side; since chunks, however, have many not so readily identified sides, it is merely the presence of cortex anywhere on them that is important. Material, then, may have cortex over the whole dorsal face (primary), or over only a portion of the dorsal or other face (secondary), or cortex may be completely lacking (interior). Except perhaps in the case of ledge flint, chunks are by definition either secondary or interior.

As illustrated by the key in Table 1, a combination of the two schemes creates 11 possible debitage categories; for future research, the count per category is provided for each excavation or excavation area. In the preceding discussion of the excavation units, debitage was mentioned only in terms of the percentage possessing cortex and the percentage of the flakes that have lipped striking platforms. For the material from this site, these two measures are the ones considered most indicative of the manufacturing activities which occurred. The percentage of debitage possessing cortex compared to that without reflects to a certain extent the amount of on-site cobble decortication, while lipped flakes are assumed to result generally from bifacial thinning. Thus, the percentage of lipped flakes may suggest the extent of bifacing activity, especially when considered along with the types of bifaces present or absent.

MOLLUSCAN REMAINS

Molluscan remains, both of land snails and of fresh-water mussels, occurred frequently and consistently in all excavations at the site. The mussel shell fragments all appear to be of one species, tentatively identified as *Uniomerus tetralasmus*, which probably were gathered from Sulphur Creek. Five genera of snail shells were recovered, and in the descending order of their relative abuncance are: *Rabdotus*, *Mesodon*, *Polygyra*, *Practicolella* and *Succinea*. As a rule, all mussel shells were collected. Recovery of snail shells varied considerably; usually only complete shells kept, though in some cases not even all of these were saved. As a result, use of these materials in analysis is somewhat limited.

Field observation revealed that *Rabdotus* shells occurred in a variety of sizes including immature ones. Although this observed age/size spread cannot be quantified and thus compared to a natural population, one suspects from the relatively limited sample recovered that most, if not all, of these snails were naturally occurring and were not food items of the site inhabitants. It may well be that these snails were simply attracted to the unusually large amounts of organic matter from human habitation; however, this too cannot be demonstrated given the biased sample and the lack of off-site control data.

SUMMARY AND INTERPRETATIONS

Archaeological investigations at site 41 LK 106 have revealed horizontally extensive cultural remains generally restricted to the upper 50 cm of soil. More specifically, the greatest amounts of materials were found to occur in the areas of highest elevation within the site, while the lower areas had

TABLE 1. LITHIC DEBRIS AT 41 LK 106

(Numbers of specimens per excavation unit)

	UNITS								
	A	B	C	D	E	I	G Upper	G Lower	Total
Chunks									
Secondary	13	18	1	15	7	10	19	25	108
Interior	15	2	--	4	7	3	11	11	53
Total	28	20	1	19	14	13	30	36	161
Chips									
Primary	21	5	--	6	2	2	8	6	50
Secondary	46	47	3	45	15	19	52	43	270
Interior	189	124	2	77	35	48	135	151	761
Total	256	176	5	138	52	69	195	200	1,091
Non-Lipped Flakes									
Primary	--	13	--	1	2	1	10	2	29
Secondary	23	61	--	25	24	37	95	90	355
Interior	55	65	2	33	14	36	104	99	408
Total	78	139	2	59	40	74	209	191	792
Lipped Flakes									
Primary	--	5	--	2	--	--	--	--	7
Secondary	2	7	--	5	--	3	5	2	24
Interior	11	29	--	28	11	15	43	41	178
Total	13	41	--	35	11	18	48	43	209
Total Artifacts/Unit	375	376	8	251	117	174	482	470	2,253

comparatively fewer materials. It is assumed, but not demonstrated, that these elevation differences existed throughout the occupational history of the site; if so, the variable artifact densities from excavations suggest that the inhabitants intentionally confined most of their on-site activity to the higher areas.

From the surface and subsurface samples from the site, three components are recognized: one in Unit B and two vertically separate ones in the Units F through G-2 area. Remains elsewhere may or may not be related to these three, although it seems likely that they are related to components (or occupations) present but unrecognizable from the present data. In terms of chronology, the three components can be only generally separated. Clearly, the components are chronologically distinct, yet only the upper one has been radiocarbon dated (at ca. A.D. 1230, see Appendix II). A general age of 1650-2650 B.C. for the lower component is indicated by tentative cross-dating of the *Bulverde* dart point from central Texas (Weir 1976). Similarly, the age of the Unit B component may also be roughly dated to the Late Prehistoric period, primarily by cross-dating of the pottery (Hester and Hill 1971, 1977). In Choke Canyon Reservoir a few miles to the west, one of two sites having assemblages containing triangular dart points and bone-tempered pottery, similar to that from Unit B, has been radiocarbon dated at A.D. 1250-1260 (Grant Hall, personal communication). This date agrees rather well with others from south Texas pottery sites (cf. Hester *et al.* 1977; Hester and Hill 1977). Since no diagnostic artifacts were recovered from the later Unit G area component, its chronological position relative to that of the Unit B component remains unknown; however, the presence of arrow points and bone-tempered pottery in the general vicinity of Units G and D (surface and upper 10 cm of soil) indicates the presence of one or more Late Prehistoric or Protohistoric components which may be associated with the later one in the Unit G area.

Several diagnostic projectile points found at 41 LK 106 have been chronometrically dated at sites in nearby regions. *Bulverde* dart points in the Trans-Pecos area have been radiocarbon dated to 2130 B.C., and *Ensor* points are associated with cultural materials at the Loeve-Fox Site in central Texas which date to 40 B.C. *Scallorn* arrow points are thought to range a span of A.D. 557-971 (Hester and Hill 1977; Hester 1971). *Matamoros* and *Desmuke* projectile points cannot presently be dated in south Texas. Two of the three *Matamoros* points collected were associated with a hearth and bone-tempered pottery. Suhm and Jelks (1962) suggest *Matamoros* points may have existed from the Late Prehistoric period into Historic times.

Perhaps the most important observation on the three recognized components as they are presently known is that their assemblages are remarkably similar both qualitatively and quantitatively; this consistency is, in fact, observable in all unit assemblages. Typically found are hearths or burned sandstone scatters, occasional bifaces in varying stages of reduction, occasional utilized flakes, large amounts of chipping debris, snail shells and mussel shells. Much less common are finished projectile points and other types of faunal remains. In terms of site function, it is this consistently occurring assemblage that is most revealing. Realizing, of course, that the data are restricted almost entirely to lithics, one is struck immediately by the lack of artifact diversity compared to assemblages from occupation sites elsewhere in southern Texas

(Hester and Hill 1977; Hester 1975:219); the rather broad array of artifacts, including specifically unifacially flaked artifacts common in these other sites, was not found at 41 LK 106. This suggests that a narrower range of activities occurred here.

Evidence from the excavations indicates that the inhabitants--most probably in small groups--camped on the higher areas along the creek, consumed small amounts of aquatic food sources (mussels and fish) and procured lithic raw materials from the creek bed and bluff for reduction and manufacture of tools (bifaces) at the bluff-top campsites. Presumably, hunting, gathering and other maintenance activities were also carried out. The overall lack of more varied tools in the lithic assemblage and the small area of prehistoric site activity suggest a limited scope of interests distinct from the tasks usually associated with larger base camps. Such a base camp, now completely destroyed, may have existed ca. 500 meters upstream, according to oral reports of local relic collectors. As a satellite area of temporary or intermittent limited activity, 41 LK 106 would attract mobile aboriginal peoples at specific times and for specific reasons, presumably related to subsistence patterns and the lifeways associated with hunting and gathering systems. It should be noted, however, that such a perspective must encompass a large temporal span and, as the variety of diagnostic projectile points indicates, several distinct aboriginal socio-cultural groups. The presence of such groups may have resulted in hunting or gathering patterns which spatially overlap within the archaeological zone at 41 LK 106. Unfortunately, the exact nature of the resources that once repeatedly attracted prehistoric Indian groups to a similar location for hundreds of years is left to speculation. It may have been the use of the elevated site area as a hunting overlook from which to watch for game on the opposite, and lower, side of the creek.

The primary reason for occupation, whether it be procurement, processing and consumption of food or of lithic materials or both, is unknown; clearly though, both occurred during each occupation. The lithic resources along the creek are by no means unique in this region of south Texas (Lynn, Fox and O'Malley 1977; Shafer and Baxter 1975) and thus would probably not have been the primary attraction. On the other hand, perhaps as a result of generally poor preservation, perishable evidence of subsistence remains was not found, nor, as noted above, were artifacts such as utilized flakes or unifaces that are assumed to indicate food collecting (Shafer and Holloway 1977). However, given the data base and our understanding of it, the absence of such evidence does not necessarily imply that the food resources locally available, in combination with a water supply, were not the principal attraction. The recovered data indicate that a few activities regularly and consistently occurred during each occupation.

On the basis of recovered materials, extensive laboratory analysis and cultural interpretations, no further work is recommended at 41 LK 106. While the site retains a potential for additional data recovery within the diversion area, it is the understanding of the researchers that no further damage will occur in the more important areas of the site. The Exxon Minerals Company, U.S.A. has erected a barbed wire fence around the important portions of sites 41 LK 105 and 106 to prevent accidental or vandal-induced damage and to thus insure preservation of a significant portion of the cultural deposits from this prehistoric south Texas site.

APPENDIX I

Results of Fieldwork at Site 41 LK 105

While in the field for the 41 LK 106 testing, the crew visited nearby site 41 LK 105 and discovered a small cache of mussel shells eroding from the terrace edge near a test unit (A) excavated during the 1977 survey. Further investigations were deemed necessary, and thus a second test pit (B) was excavated near both the cache and Unit A. The cache itself and the adjacent area (Unit C) were carefully exposed by troweling (Fig. 12).

For Units A and B, excavation methodology was the same as that used at 41 LK 106; both were excavated by hand in 10-cm levels with the fill being passed through 1/4-inch screen. The fill from Unit C, however, was not screened. Analysis of this material follows that of 41 LK 106.

UNIT A (1 m^2, 0.25 m^3)

Material recovered from this initial test consists of a few burned sandstone chunks, snail shells (*Rabdotus* sp.) and 117 lithics, with an overall density (of the lithics only) of 486/m^3. Of the 117 total lithics, 81 are debitage and 36 are products of thermal fracturing, but it should be noted that several pieces of the debitage have also been burned. Cortex occurs on 59% of the debitage, and 8% of the flakes have lipped striking platforms.

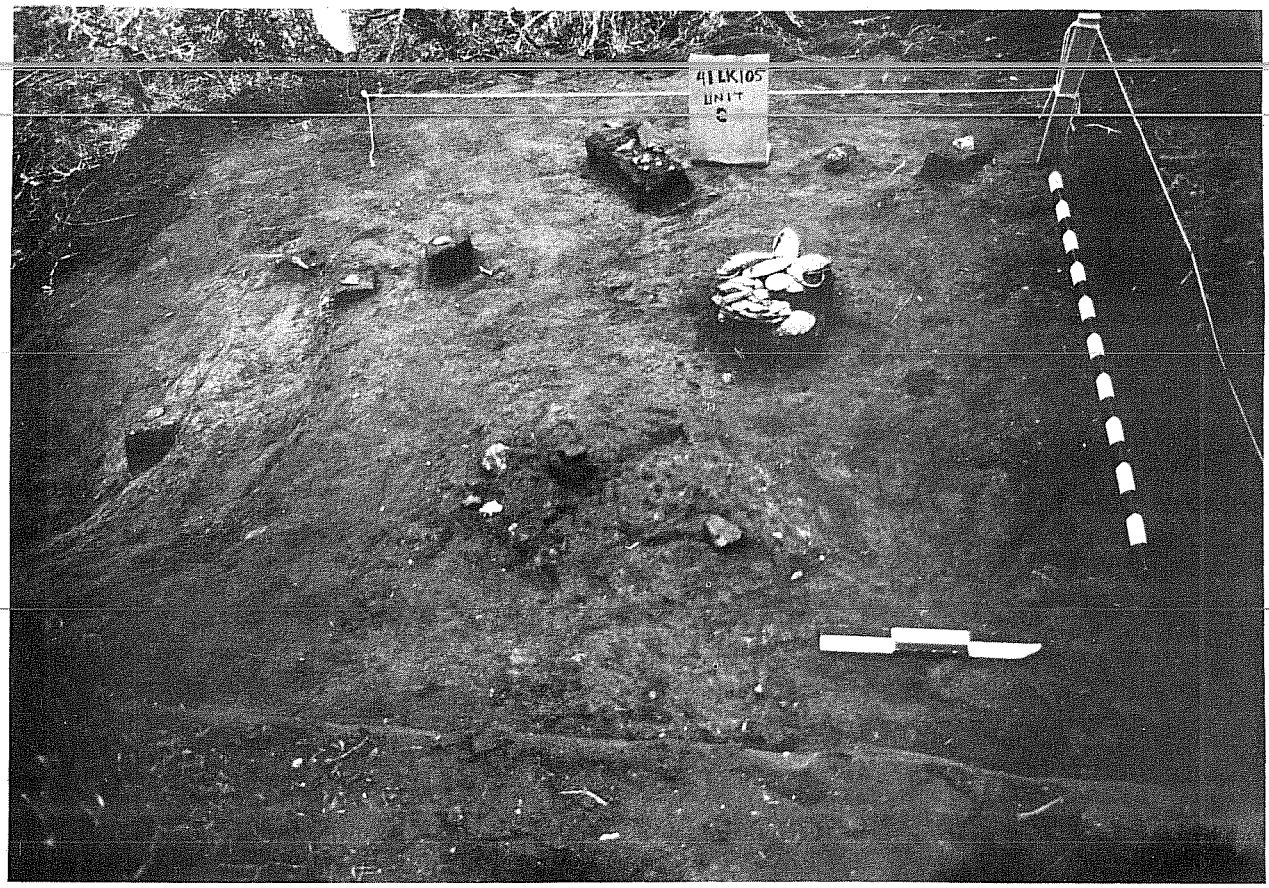
UNIT B (1 m^2, 0.50 m^3)

Although located within two meters of Unit A, which had a relatively high lithic density, Unit B produced comparatively few remains. Recovered were *Rabdotus* sp. snail shells, mussel shell fragments and 46 lithics; the density of 92/m^3 is less than one-fifth that in Unit A. Only one recognized tool, a Group III utilized flake (Fig. 13,f), was found; the remaining 45 lithics consist of 4 thermally fractured chert fragments and 41 debitage items. Of these, 51% possess cortex, and 28% of the flakes are lipped.

UNIT C

This unit consists of an area of 3-4 m^2 surrounding the mussel shell feature on the eroding slope. In troweling the area, a small scatter of possibly burned stones, a concentration of *Rabdotus* sp. snail shells, a *Bulverde* dart point (Fig. 13,b), a Group I biface (Fig. 13,c), 3 cores, a hammerstone, 3 thermally fractured chert fragments and debitage (55 specimens) were exposed, along with the mussel shell cache (see Fig. 12,b for a diagram of part of the unit). Because of the eroded nature of the area, the relationships between these various features and artifacts are not known.

The mussel shell cache contained 36 mostly complete valves and many shell fragments, as well as one *Rabdotus* snail shell and three small interior chips. Since



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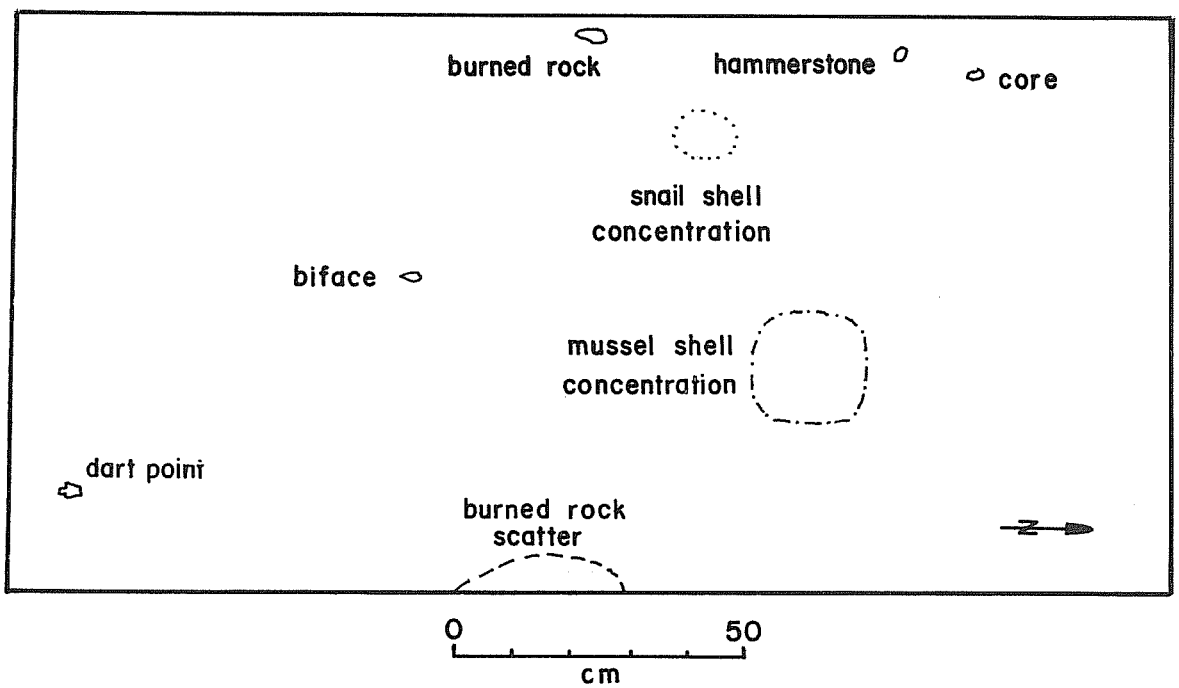
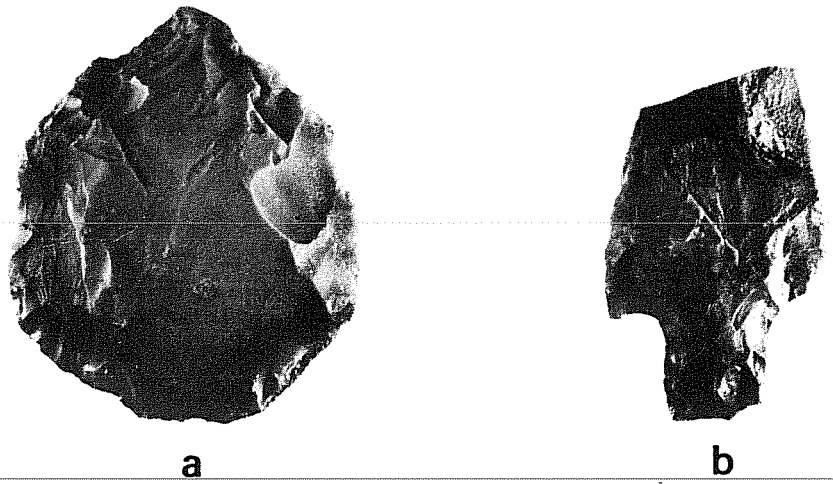


b

Figure 12. *41 LK 105, Unit C.* a, view of Unit C excavations; b, plan of a portion of Unit C.



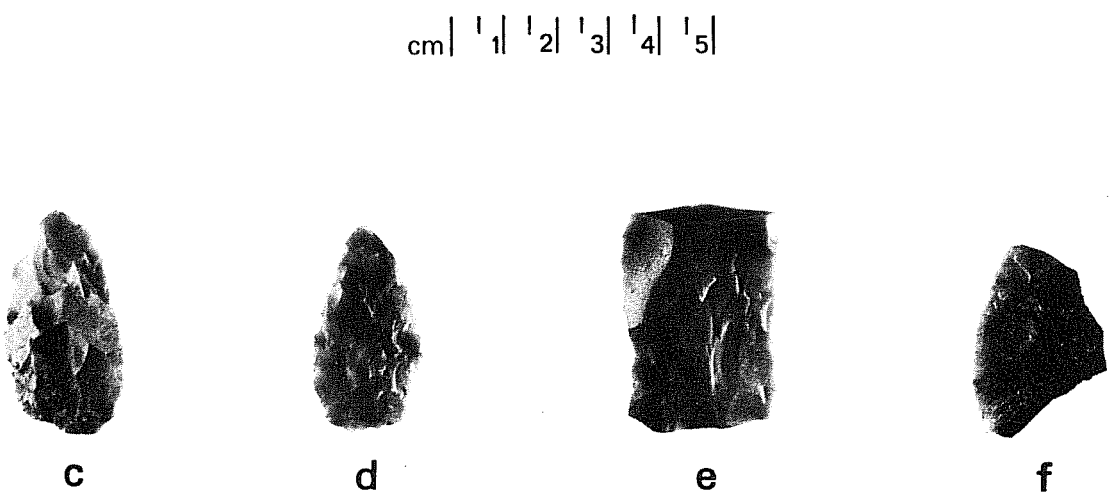


Figure 13. *Selected Artifacts from 41 LK 105.* a,d,e, surface collected bifaces; b, *Bulverde*; c, Group I biface; f, Group III utilized flake.

there was an equal number of valves for both sides, at least 18 individual mussels are represented; these are tentatively identified as *Uniomerus tetralasmus*.

Of the debitage recovered at large in the unit, 71% possesses cortex; of the flakes, 4% have lipped platforms. Perhaps a function of the recovery techniques, the percentage of debitage with cortex is relatively large; however, the small percentage of lipped flakes is not so readily explained.

Surface Material

Several artifacts have been randomly collected from the site surface; most are debitage and are not considered here. Four are discussed below.

Arrow Point (1 fragment). This fragment apparently is from a deeply corner-notched point having a widely flaring stem with a concave base. Similar specimens, termed *Edwards* points, have been described by Sollberger (1967), Hester (1971) and Graves and Highley (1978), and have been found in Choke Canyon Reservoir (Lynn, Fox and O'Malley 1977).

Bifaces (3 specimens). The first specimen (Fig. 13,d) has a round base, is relatively thin and may be an arrow point preform. The second biface (Fig. 13,e) is larger, thicker and has a straight base. It appears to have been broken during manufacture. The third specimen (Fig. 13,a) is a partially shaped and thinned primary flake, with approximately half of the cortex removed from the dorsal surface.

Discussion

The investigations reported here have provided a sample of the material remains of a small part of the site. Though less well known, this site is in some ways similar to 41 LK 106, but in some ways different. Like 41 LK 106, there is little diversity in the recovered assemblage, with the absence of unifacial artifacts again being rather noticeable; in fact, recognizable tools of any sort occur only infrequently. The assemblage here essentially duplicates the one consistently found in the various excavations at 41 LK 106; this includes the presence of snail and mussel shells as well as of burned sandstone. The exceptions to this similarity lie with the higher percentages of debitage possessing cortex and perhaps in the lower percentages of lipped flakes. These differences, however, are not considered significant; it is believed the same lithic cobble reduction activities occurred at both sites and the differences are more of degree than of kind. A breakdown of lithic debris materials from excavated units is presented in Table 2.

TABLE 2. LITHIC DEBRIS FROM EXCAVATIONS AT 41 LK 105

(Number of specimens per excavation unit)

Artifacts	Units A	B	C	Total
Chunks - Secondary	5	3	12	20
Interior	2	1	1	4
Total	7	4	13	24
Chips - Primary	3	1	1	5
Secondary	16	7	6	29
Interior	15	9	11	35
Total	34	17	18	69
Non-Lipped Flakes -				
Primary	1	--	--	1
Secondary	23	9	20	52
Interior	13	4	3	20
Total	37	13	23	73
Lipped Flakes -				
Interior	3	5	1	9
Total	3	5	1	9
TOTAL ARTIFACTS	81	39	55	175

APPENDIX II

Radiocarbon Dates

Three radiocarbon assays were obtained from site 41 LK 106. All three samples were of wood charcoal. They were analyzed by the Radiocarbon Laboratory, The University of Texas at Austin. All samples processed by the Austin laboratory are numbered and bear the prefix "Tx." In parentheses beside the radiocarbon assays, we have indicated the "corrected dates" based on the calibration studies of Ralph, Michael and Han (1973).

Tx-2928. 720 ± 50 B.P.*; A.D. 1230 (Corrected date: A.D. 1250)

This date was obtained from a wood charcoal sample found at 28 to 32 cm below the surface in excavation Unit G-2. It occurred in an apparent disturbed area, possibly a filled rodent burrow. Since no soil from lower zones was noted, the charcoal is assumed to be derived from the upper occupational component recognized in Unit G, primarily in the top 20 cm of deposits. No diagnostic artifacts occurred in the upper component in Unit G-2, but the date reported here suggests Late Prehistoric affiliation.

Tx-2929. 1140 ± 50 B.P.; A.D. 810 (Corrected date: A.D. 880-860)

This assay was obtained from a sample derived from an intact, heavily carbonized wood fragment found at 21 to 27 cm below the surface in Unit D. A moderate scattering of lithic debris was noted above and below the sample, but no diagnostic materials were present. No distinctive cultural assemblages could be discerned in Unit D, although the distribution of cultural materials in nearby units suggest at least two separate components within 40 to 45 cm of the surface. These are thought to be transitional Late Archaic and/or early Late Prehistoric, and the date reported here appears relevant to that time frame.

Tx-2930. 840 ± 60 B.P.; A.D. 1110 (Corrected date: A.D. 1180)

A charcoal sample collected at a depth of 26 cm below the surface in Unit H-2 yielded this radiocarbon date. This sample is associated with the upper cultural component noted in the unit, linked to transitional Late Archaic and/or early Late Prehistoric occupations. Unfortunately, no diagnostics were in association with the sample. However, the date compares favorably with Tx-2929 found at a similar depth in adjacent Unit G-2, but the date was considerably later; however, the apparent disturbed context of that sample has already been noted.

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*B.P.: before present; A.D. 1950 is generally used by radiocarbon laboratories in making the conversion to A.D./B.C. dates.

APPENDIX III

Soil Sample Analysis

Soil sample analysis can provide a variety of data for archaeological interpretation. The study of soil samples is itself only part of a much more complex system of archaeological constant volume sampling which can include flotation studies and various specifically oriented micro-flora and faunal studies. Only a portion of these studies, the chemical soil analyses and phytolith investigations, will be presented in this report. While a series of constant volume samples was taken from each level of each excavated unit, a more detailed investigation of this material lies beyond the scope of this report and has not been done. The constant volume samples are presently on file at the UTSA Archaeology Laboratory for further research. The results of soil analyses information is presented here, while a description of phytolith studies is included in Appendix IV.

A total of 33 soil samples was taken from archaeological sites 41 LK 106 and 41 LK 105 in areas of prehistoric activity. The Soil Testing Laboratory of The Agricultural Extension Service, Texas A&M University, College Station, processed the materials, and a simplified collection of data is presented in Table 3. Research included analysis to determine pH factor and the varying amounts of calcium, magnesium, nitrogen, phosphorous, potassium and organic matter. Further information on soil analysis may be found in Gerstle, Kelly and Assad (1978) and Cornwall (1958). A brief description of some of the more significant chemical elements of the analysis follows.

1. High alkaline pH levels are usually associated with a calcareous environment, and high acidic pH content causes extensive plant and bone material decomposition.

   The pH factor directly controls the various soil processes which take place under the influences of weathering. The amount and types of acidic or basic (metallic compounds) materials determine the rates of chemical deterioration within a soil matrix, and this affects the frequency and composition of recoverable artifacts. The analysis of pH is complex and the reader is referred to Cornwall (1958) for a further discussion. It should be noted that, for the purposes of this report, a pH factor of less than 5.6 is usually related to little phosphate content and poor to negligible bone preservation.

2. Calcium and magnesium are supplied from lime or lime-related sources (Buckman and Brady 1969).

3. Nitrates are derived from plant matter (Cornwall 1958), and nitrogen, organic phosphorous and potassium are supplied to the soil from fecal matter or other organic matter (Buckman and Brady 1969).

4. Potassium is usually added to the soil in the same manner as the preceding materials; however, potassium, as contrasted to phosphorous, is usually plentiful except in sandy soils (Buckman and Brady 1969).

5. Organic matter is deposited by decomposing organisms and is directly related to the above materials.

As noted in Table 3, calcium and potassium readings are omitted because both were above maximum instrument sensitivity. In all but one case at 41 LK 106 (Unit C, level 1; 0-10 cm), all magnesium levels were above 500 lbs per acre. High correlations between the three most variable elements, magnesium, phosphorous and organic matter, occurred in Units D (levels 1, 2, 3), E (levels 1 and 2), G (levels 1, 2, 3), the lower levels of Unit K and the charcoal lens of Test Pit D-1.

Since large amounts of both calcium and magnesium are present, this research tentatively concludes the vertical distribution of phosphates has not greatly altered with time and chemical weathering, thus reflecting a general measure of former animal matter in various samples. Excluding other unknown factors, a general chemical analysis indicates the lack of bone in site activity areas may reflect a cultural rather than an environmental phenomenon. The high levels of potassium and magnesium suggest a base-rich sediment that has not yet been exposed to weathering and leaching with loss of soluble bases. This implies a geologically "recent" topsoil that is still actively forming. Soil samples are tentatively interpreted to indicate a recent terrestrial topsoil deposition less than ca. 40,000 years old over much older, eroded and uplifted calcareous materials. Chemical conditions of the site soils suggest an alkaline soil with apparent base-rich (potassium, magnesium and calcium) sediments in a comparatively undeteriorated state, suggesting a possibility for further micro-flora or faunal studies due to the potential chemical preservation of organic compounds.

TABLE 3. RESULTS OF SOILS ANALYSIS**

Site	Unit	Level†	pH	Magnesium*		Phosphorous*		Organic Matter
41 LK 105	B	20-30	8.6	410	H	328	VH	0.2
	B	30-40	8.7	430	H	234	VH	0.2
	B	40-50	8.3	465	H	132	H	0.2
41 LK 106	A	0-5	8.8	500+	H	42	M	0.2
	A	5-10	8.8	500+	H	16	VL	0.2
	A	10-15	8.4	500+	H	5	VL	0.3
	B-1	0-10	8.7	500+	H	60	M	0.5
	B-1	10-20	8.5	500+	H	74	M	0.4
	B-1	20-30	8.7	500+	H	60	M	0.3
	C	0-10	8.6	495	H	156	H	0.4
	C	10-20	8.7	500+	H	132	H	0.3
	D	0-10	8.7	500+	H	216	VH	1.0
	D	10-20	8.6	500+	H	210	VH	0.7
	D	20-30	8.5	500+	H	167	H	0.8
	D	30-40	8.7	500+	H	69	M	0.7
	D	40-50	8.8	500+	H	16	VL	0.3
	E	0-10	8.6	500+	H	156	H	0.6
	E	10-20	8.7	500+	H	143	H	0.5
	E	20-30	8.7	500+	H	150	H	0.4
	G-2	0-10	8.6	500+	H	181	H	0.5
	G-2	10-20	8.7	500+	H	194	H	0.4
	G-2	20-30	8.7	500+	H	172	H	0.4
	G-2	30-40	8.8	500+	H	150	H	0.4
	G-2	40-50	9.0	500+	H	83	H	0.3
	G-2	50-60	9.1	500+	H	31	L	0.3

TABLE 3. (continued)

Site	Unit	Level†	pH	Magnesium*	Phosphorous*		Organic Matter
41 LK 106	K	0-10	8.5	500+ H	74	M	0.8
	K	10-20	8.5	500+ H	60	M	0.7
	K	20-30	8.5	500+ H	83	H	0.7
	K	30-40	8.6	500+ H	138	H	0.5
	K	40-50	8.6	500+ H	181	H	0.3
	K	50-60	8.7	500+ H	161	H	0.3
	K	60-70	8.0	500+ H	201	VH	0.5
	Trench 7	0-10	8.5	500+ H	87	H	0.4
		10-20	8.5	500+ H	69	M	0.4
		20-30	7.7	500+ H	51	M	0.3
	T.P. D-1 (Charcoal lens)	26-30	8.2	500+ H	310	VH	2.4

† All measurements are in centimeters below surface
* Indicates pounds per acre
** Calcium and potassium readings are omitted since both were above maximum instrument sensitivity; 6000 and 1000 lbs per acre, respectively.

VH Very high level
H High
M Medium
L Low
VL Very low level

APPENDIX IV

Opal Phytoliths as an Indicator of the Paleoenvironment at 41 LK 106

Ralph L. Robinson

The subtropical climate of southern Texas quickly destroys pollen and other organic evidence of the paleoenvironment. This has greatly limited previous attempts of paleoenvironmental reconstruction in the area being studied.

An alternative approach is the study of opal phytoliths. Opal phytoliths are formed when plants take monosilicic acid from the soil and deposit opaline silica in epidermal and other tissues. Opal phytoliths are important microfossils because they are very resistant to decomposition and are taxonomically distinctive. They are found in great abundance in soils.

Soil samples from 41 LK 106 are being processed by the following simple, but time-consuming, method:

1. Two gram soil samples are dispersed with a solution of sodium hexametaphosphate.

2. The samples are then treated with acids to remove calcium carbonate and organic materials.

3. The greater than 10 micron fraction of the sample is isolated by sedimentation.

4. To extract the phytoliths the isolate is then subjected to flotation in a 2.3 specific gravity solution of heavy liquid.

5. The phytoliths are then mounted on slides and are microscopically examined and compared with phytoliths separated from living plants collected from a variety of environments. Counts are made of identified types and the results are compiled in the form of phytolith diagrams which reflect the local history of vegetational change.

To reconstruct regional environments, comparisons must be made of many local environments. Therefore the interpretation of 41 LK 106 will be greatly enhanced by comparisons with samples now being analyzed from the Choke Canyon reservoir at sites 41 LK 67 and 41 LK 31-32, and from Goliad County at sites 41 GD 21 and 41 GD 21A. The final results will be sent to Exxon as soon as they are available.

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