RESULTS OF PHASE II INVESTIGATIONS AND RECOMMENDATIONS FOR PHASE III DATA RECOVERY AT 37 ARCHEOLOGICAL SITES IN SELECTED AREAS OF MANEUVER AREAS 1, 2, AND 8 FORT BLISS, TEXAS

by
Stephen K. Mbutu

for
U.S. Army Corps of Engineers,
Fort Worth District

MISCELLANEOUS REPORT OF INVESTIGATIONS
NUMBER 88



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US Army Corps
of Engineers
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This report presents the results of cultural resources testing investigations of selected sites located on the Hueco Bolson desert floor on Fort Bliss Military Reservation. These investigations were conducted by Geo-Marine, Inc., from November 1993 to February 1994. The primary focus of the testing investigations was to identify all sites that may be eligible for listing in the NRHP. The project encompassed the evaluation of 38 archeological sites within nine 1-km^2 noncontiguous quadrats, which are designated as Patrol Bases for training exercises for use by the 7th Ranger Training Battalion (7RTB). During the investigations, additional resurvey of specific Patrol Bases was undertaken so that more thorough coverage could identify any recorded sites. As a result of this resurvey, 15 previously unknown sites were recorded in five of the six resurveyed quadrats; three of the 15 newly recorded sites were tested, and 12 new sites remain to be tested.

Test excavations were conducted on 37 sites, and avoidance was followed for one site that was within a Fort Bliss protected area. Based on data recovered during the current investigations, NRHP evaluation of the 38 sites recommends that 19 are eligible for listing in the NRHP; 10 are ineligible for NRHP listing; and nine sites remain potentially eligible (eligibility unknown), for status could not be determined from the recently completed testing due to changes in site size or configuration resulting from dune movement/exposure on the desert floor.

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by
Stephen K. Mbutu

with contributions by
Mark Bentley
Brenda Buck
Carolyn J. Barnes
Victor Gibbs
H. Curtis Monger
Tom O'Laughlin

Principal Investigator
Duane E. Peter

for
U.S. Army Corps of Engineers
Fort Worth District

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550 East 15th Street
Plano, Tx 75074

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ABSTRACT

This report presents the results of cultural resources testing investigations of selected sites located on the Hueco Bolson desert floor on Fort Bliss Military Reservation. These investigations were conducted by Geo-Marine, Inc., from November 1993 to February 1994. The primary focus of the testing investigations was to identify all sites that may be eligible for listing in the National Register of Historic Places. The project encompassed the evaluation of 38 archeological sites within nine 1-km^2 noncontiguous quadrats, which are designated as Patrol Bases for training exercises for use by the 7th Ranger Training Battalion (7RTB). During the investigations, additional resurvey of specific Patrol Bases was undertaken so that more thorough coverage could identify any recorded sites. As a result of this resurvey, 15 previously unknown sites were recorded in five of the six resurveyed quadrats; three of the 15 newly recorded sites were tested, and 12 new sites remain to be tested.

Test excavations were conducted on 37 sites, and avoidance was followed for one site that was within a Fort Bliss protected area. Based on data recovered during the current investigations, NRHP evaluation of the 38 sites recommends that 16 are eligible for listing in the NRHP; 16 are ineligible for NRHP listing; and six sites remain potentially eligible (eligibility unknown), for status could not be determined from the recently completed testing due to changes in site size or configuration resulting from dune movement/exposure on the desert floor.

ACKNOWLEDGMENTS

The contributions of numerous people were essential to the completion of this project. Dr. Glen DeGarmo, Chief of the Historic Resources Management Program at Fort Bliss, and his staff kindly acquainted us with the Fort Bliss system. Of his laboratory staff, Jack Hedrick, lab director, as well as Martha Yduarte, Paul Lukowski, and later Jack Hedrick, met our every request for information and/or clarification concerning the Fort Bliss recording and curation system. Dr. DeGarmo generously shared his theoretical and regulatory knowledge. His help was particularly essential in processing the "dreaded" Form 88 in a timely fashion. Ken Faunce, Historic Archaeologist in the Archaeology Team, Conservation Division, helped with the acquisition of land status information at Fort Bliss. Valuable advice was provided by Mr. Timothy Dalbey of the U.S. Army Corps of Engineers, Fort Worth District.

Both our field and laboratory work benefitted greatly from the addition of Mark Bentley, Bruce Boeke, and Martha Sharp, all of whom had extensive prior experience with the Fort Bliss system. The GMI laboratory crew consisted of Victor Gibbs, who served as lab director and anchored data base creation solidly. Ms. Christine Reimer illustrated the artifacts and Mr. Mark Bentley drafted the majority of the maps. Ms. Sandy Carr and Ms. Kellie Krapf drafted the remaining figures.

Ms. Sharlene Allday edited the report and Ms. Denise Pemberton formatted the report.

Last, but certainly not least, the hospitality and cooperative attitude of the El Paso Archeological Society members has contributed greatly to our understanding of Hueco Bolson archeology.

CHAPTER 1
INTRODUCTION

by
Stephen K. Mbutu

This report presents the results of cultural resources testing investigations of selected sites on Fort Bliss Military Reservation. The project area is located on the Hueco Bolson desert floor east of U.S. Highway 54 in El Paso County, Texas, and Otero County, New Mexico, between longitude 31°56' and 32°3' North and latitude 16°10' and 16°20' West (UTM N3300000 to 4700000 and E750000 to 890000) (Figure 1). The areal coverage of the project comprises nine 1-km^2 noncontiguous quadrats, which are for use by the 7th Ranger Training Battalion (7RTB) as Patrol Bases for training exercises. This work was carried out in partial fulfillment of the responsibilities of Fort Bliss to provide evaluations and recommended treatments for cultural resources under the jurisdiction of the reservation as outlined in the National Historic Preservation Act of 1966, as amended (P.L. 89-665 et seq.); Executive Order 11593, "Protection and Enhancement of the Cultural Environment"; and Army Regulation 420-40.

Fort Bliss Project 94-07 involved Phase II test excavations of 37 sites. These investigations were conducted by Geo-Marine, Inc. (GMI), from November 1993 to February 1994. The primary focus of the testing investigations was to identify all sites that may be eligible for listing in the National Register of Historic Places (NRHP) that are located within the selected Patrol Bases chosen as training areas for use by the 7th RTB. Since the training exercises have the potential to affect archeological resources within those areas, selection of the quadrats/Patrol Bases was based on two primary considerations: (1) previous survey had demonstrated that the selected quadrats contained relatively lower site density than the surrounding area (Mbutu and Peter 1996), and (2) the distribution of the quadrats met the logistical requirements of the 7th RTB.

Because previous surveys of six Patrol Bases (1, 3, 4, 6, 8, and 9) were conducted at transect intervals of more than 30 m—which were not sufficiently thorough in inventorying all sites present in the majority of the quadrats—these six areas were resurveyed. Objectively, the resurvey should have been intensive (15-m transect intervals). The Scope of Work (SOW) and the budget, however, did not provide for resurvey at any level. Nonetheless, GMI personnel were able to resurvey the quadrats at 45-m transect intervals in a manner that offset the previous survey transects so that maximum coverage was achieved. As a result of this resurvey, 15 previously unknown sites were recorded in five of the six resurveyed quadrats; three of the 15 newly recorded sites were tested, and 12 new sites remain to be tested (Appendix A).

The Patrol Bases are different locales of the Hueco Bolson desert floor landscape that exhibit a human presence spanning much of the Holocene. How much of this human record has been left behind, and its state of preservation, is at the core of the current investigation. This report provides the resulting data from test

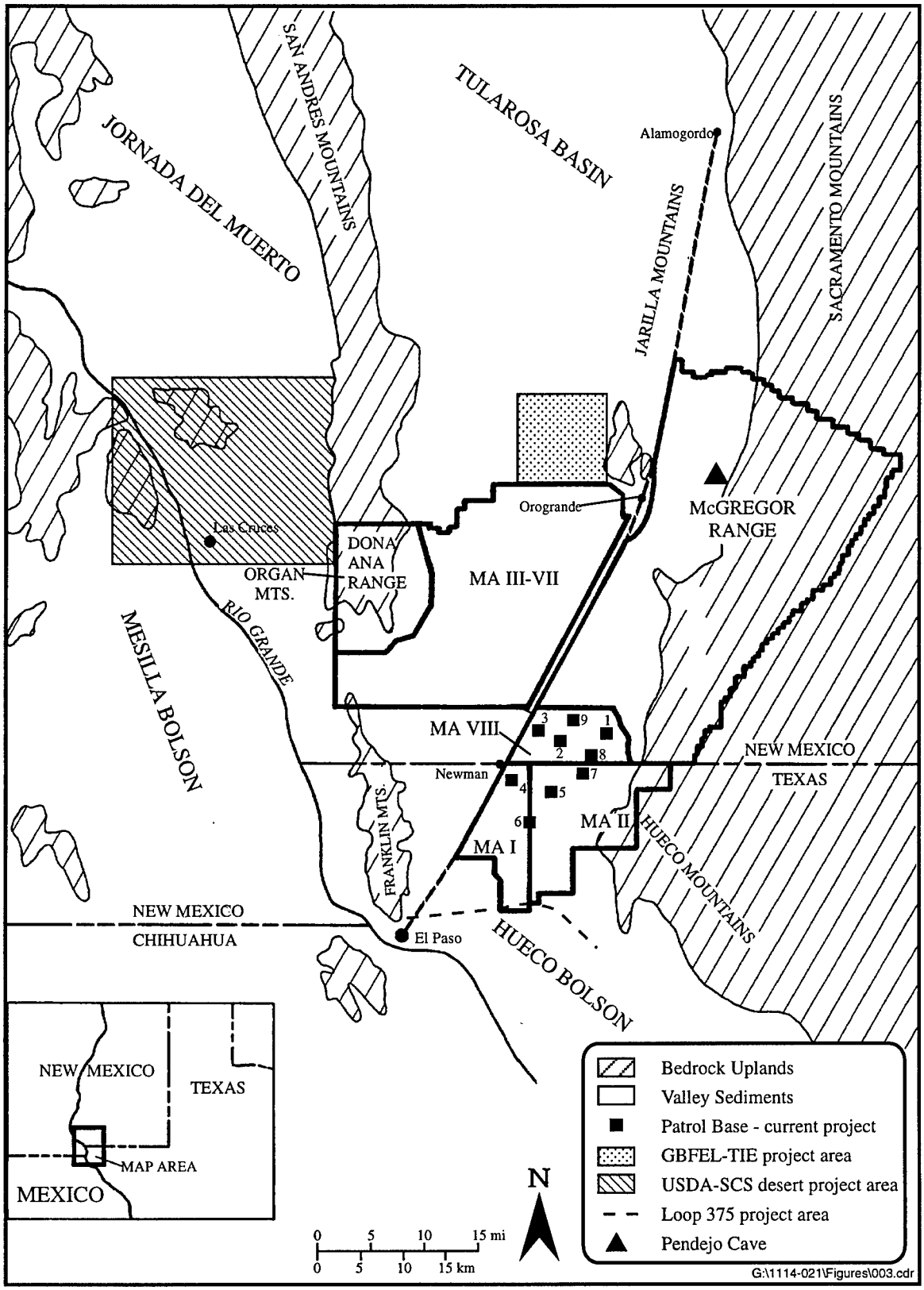


Figure 1. Fort Bliss Maneuver and Range Areas, and 7th Ranger Battalion Patrol Bases.

excavations and articulates the NRHP evaluation process by which the eligibility status for each site was determined. Such determinations must be as adequately documented as the research strategy and constraints allow. In addition to test excavation data, geomorphic data germane to elucidating site formation, preservation, and destruction processes were gathered. The geomorphic data underscore the problems inherent in the surface archeology of the Hueco Bolson desert floor. Both excavation and geomorphic data from this project have made it abundantly clear that cultural manifestations exposed on the surface constitute a very significant component of the archeology in the project area. Furthermore, correlations are beginning to emerge between particular geomorphic surfaces and surface site densities and states of preservation.

The following are project-specific eligibility criteria for listing a site in the NRHP:

- Eligible site:
  - * Mitigation by data recovery, is recommended if a site
    - is eligible for inclusion in the NRHP,
    - occupies a relatively small area where data recovery would be cost effective, or
    - location is not amenable to avoidance.
  - * Preservation by avoidance is recommended if a site
    - is eligible for inclusion in the NRHP,
    - is already in a protected district, or
    - is very large (costly to mitigate), and is located at/or close to the edge of the Patrol Base. In some cases part of the site is outside the Patrol Base, and therefore peripheral to projected Patrol Base activities.
  - * Archival research is recommended for a site that
    - has met eligibility criteria for inclusion in the NRHP and
    - is of recent (historic) origin.
- Potentially eligible (status unknown) site:
  - * Additional testing is recommended if
    - site size has expanded significantly from previous survey data, usually to include recently exposed features and/or artifact scatter, or
    - regardless of size, untested features still exist that have not been radiometrically dated.
  - * Initial testing is recommended for a site if
    - it was recorded for the first time on survey during the current project and
    - it has neither been tested nor evaluated for inclusion in the NRHP.
- Ineligible site:
  - * A site is considered ineligible if
    - it did not, on revisitation during the current project, meet Fort Bliss site criteria, and it is, therefore, either a locality or a nonsite. All sites in this category had been previously evaluated as lacking site status and, therefore, had retained Field Site (FS) instead of Fort Bliss (FB) numbers;
    - it has no subsurface deposits and/or features; and barely meets the minimum number of surface artifact criterion for site designation; and, judging from surface conditions, is severely eroded out of context; or
    - its research potential was exhausted during the current testing phase. This happened very rarely (only two sites) because such an action is essentially inconsistent with the purpose of site testing. Each of the two examples involved a site in which a single, small, isolated, and considerably eroded hearth constituted the entire site. After testing one of the sites, it was apparent that only a small segment of the hearth remained, and a decision was made to recover all data from the entire hearth, thus mitigating the site from adverse effects of projected use of the Patrol Base. In the second case, most of the hearth was excavated,

and flotation, radiocarbon, and archaeomagnetic samples were collected. Thus, the range of data collected is sufficient to mitigate adverse effects to the site. This action prevents unjustifiable expenditure for crews to return to the site during the next (mitigation) phase.

Thirty-eight sites were evaluated during the testing phase. Of these, 37 were tested, and avoidance was followed for site FB 4332 when it was determined to be within a Fort Bliss protected area. Based on data recovered during the current investigations, NRHP evaluations of the 38 sites are as follows:

- 16 are recommended as eligible for listing in the NRHP:
  * four sites should be preserved: FB 4332 (no LA number assigned; site located within the protected area); FB 7312 (41EP2219); FB 13147 (41EP4697); FB 14502 (LA 106715; newly recorded site);
  * 12 sites should be mitigated via data recovery: FBH 70 (LA 97697); FB 3929 (LA 94889); FB 6084 (LA 96937); FB 6085 (LA 96938); FB 6086 (LA 96939); FB 6940 (41EP2227); FB 10916 (41EP4702); FB 13145 (LA 106712); FB 13206 (41EP4695); FB 13346 (41EP4696); FB 13920 (41EP4699); FB 14501 (41EP4693; newly recorded site);
- six sites remain potentially eligible (eligibility unknown), for status could not be determined from the recently completed testing:
  * five require additional testing: FB 3389 (LA 94392); FB 3994 (LA 94953); FB 13139 (LA 106700); FB 13140 (LA 106701); FB 13921 (41EP4700);
  * one requires additional information in order to determine eligibility: as an alternative to an additional testing phase, a phased mitigation approach is recommended for site FBH 182 (41EP4690; newly recorded site); and
- 16 are ineligible for NRHP listing: FBH 98 (41EP2226); FB 3398 (LA 94361); FB 3996 (LA 94955); FB 4525 (LA 95481; mitigated); FB 6089 (LA 96942); FB 7820 (41EP2248; mitigated); FB 7823 (41EP2236); FB 10694 (41EP4691); FB 11616 (41EP4692); FB 11617 (no TARL number assigned); FB 13146 (LA 106713); FB 13155 (41EP4694); FB 13335 (41EP4698); FB 13338 (LA 106697); FB 13345 (no TARL number assigned); and FB 13908 (no TARL number assigned).

This report contains five chapters and 10 appendices. Chapter 2 provides overviews of the environmental setting and cultural background. Research goals and methodology are outlined in Chapter 3. Chapter 4 presents data concerning the test excavation results and individual site recommendations for eligibility to the NRHP. Data are presented through narrative site descriptions, maps, and summary tables, all of which are complementary. The summary tables present detailed data on variables and attributes pertinent to determining site integrity and include the extent of the tested sites, the types of feature tested, the depth of the cultural deposits, and the assemblage content for each site. Chapter 5 contains reports of analyses of features, radiocarbon dates, and lithic and ceramic assemblages; Chapter 5 also summarizes the NRHP eligibility status for the sites and makes recommendations for mitigation of adverse effects to cultural resources resulting from the federal undertaking (7RTB training).

References cited and the appendices follow the body of the report. Appendix A presents the reconnaissance survey results, and Appendix B provides data from the radiocarbon analyses. Appendices C and D provide, respectively, attributes of the lithic and ceramic assemblages. The backhoe trench data comprise Appendix E, and the historic artifact catalog is listed in Appendix F. The archaeomagnetic data are presented in Appendix G. Appendix H contains a discussion of the evolution of the eolian landscape in the central basin of Fort Bliss, and the results of the faunal and floral analyses are presented in Appendices I and J, respectively.

CHAPTER 2
ENVIRONMENTAL SETTING AND CULTURAL BACKGROUND

by
Stephen K. Mbutu and Mark Bentley

PHYSIOGRAPHY, GEOLOGY, AND SOILS

Physiographically, the project area is located on the valley floor of the central Hueco Bolson (Figure 2). The basin is a northeastern extension of the Chihuahua Desert, which is one of the highest North American desert regions, averaging 1200 m in elevation (Hubbard 1988). Much of the interior Hueco Bolson, including the project area, consists of a homogenous, low-rolling terrain capped by mesquite stabilized coppice dunes. The relative flatness is broken by discontinuous chains of north/south depressions or playas aligned with a series of underlying faults. Although the area is internally drained into nearby playas, there are no defined channels because soils are well-drained, with slow surface runoff and rapid permeability. Today the project area is devoid of surface water and the water table is considerably lower than it was earlier in the century (Bankston, personal communication 1994). The nearest perennial water sources are the Rio Grande, 20 km to the southwest, and small springs that exist in the Franklin and the Hueco mountains. Playas in the El Paso area are, however, historically known to hold water for several months, well into the winter in some years (O'Laughlin 1990). Playa sizes vary with of the extent of associated catchment.

The evolutionary history of the Hueco Bolson is well-summarized in Hubbard (1988:2):

> The Hueco Bolson is an asymmetrical graben complex at the intersection of two major fault systems; the more recent north-south Rio Grande Rift system and the much earlier northwest/southeast Texas lineament. It is bounded by the Franklin Mountains on the west and the Hueco Mountains on the east.
>
> A poorly defined arch, which is now buried by recent bolson fill, separates the Hueco Bolson from the Tularosa Basin to the north. The southern and southeastern limits of the bolson area are defined by a chain of low mountain ranges in Chihuahua, Mexico, and West Texas which drain directly into the Rio Grande. This basin formed during three major deformation events: uplifting during the late Pennsylvanian; thrusting and folding during the Laramide Orogeny; and Basin and Range block faulting during the Rio Grande Rift development. Within the basin, sediment fill is divided into three units, from the oldest to most recent; they include: the Fort Hancock and Camp Rice formations which comprise the Santa Fe Group (Strain 1966, 1969) and the channel deposits of recent Rio Grande alluvium which are found along the present river course to the south.

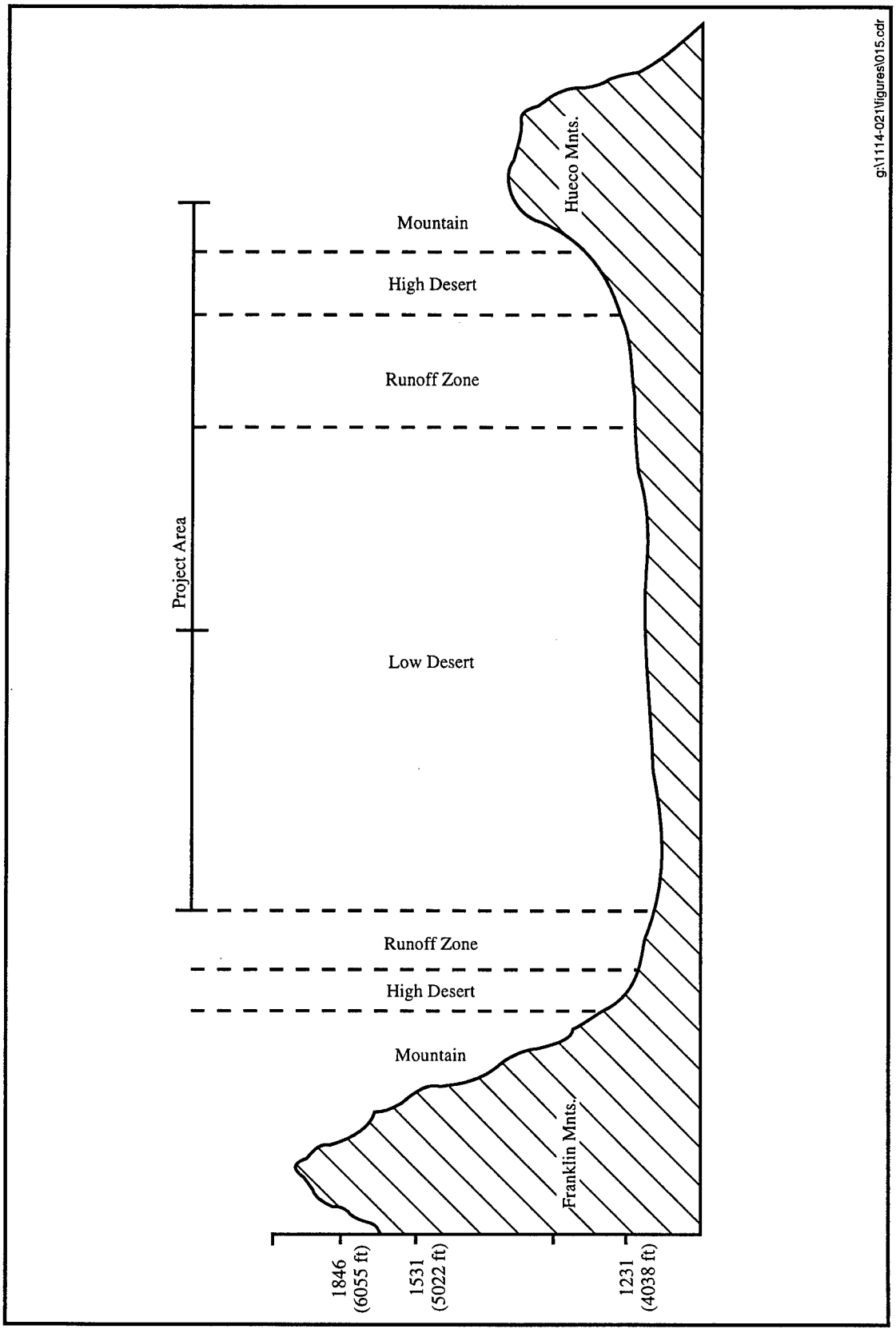


Figure 2. Schematic representation of the cross section through the Hueco Bolson (after Whalen 1980).

Within the project area, the oldest bolson fill is the Fort Hancock formation. The lower portions of Fort Hancock sediments are of lacustrine origin (Strain 1969) but the upper portions are derived from fluvial deposits (Hubbard 1988:2). The mid- to late-Pleistocene-age Camp Rice formation rests disconformably upon the Fort Hancock formation. Camp Rice sediments are composed primarily of sand, gravel, clay, and silt with minor lenses of caliche and volcanic ash that interdigitate with alluvial fan deposits around the periphery of the basin. The parent material of this deposit is dominated by rock types from the flanking mountain ranges, but gravels, including obsidian, cherts, and quartzites from more distant sources, are present (Ruhe 1967). The depth of the bolson fill is estimated at 2,745 m along the eastern slopes of the Franklin Mountains (Hubbard 1988:3).

In the project area, the Camp Rice formation is capped by an indurated calcic (caliche) horizon. The approximate 81-cm-thick indurated calcium carbonate horizon formed during the middle to late Pleistocene (>400 ka) age (Monger 1993:77). The caliche horizon is often penetrated by pipes or funnel-shaped columns of Pleistocene soils.

The Hueco-Wink association soils are typical of the nearly level to gently sloping topography of the Hueco Bolson, including the project area (U.S. Department of Agriculture [USDA] 1973:3, and sheets number 33 and 34). In Maneuver Area 1, the southwestern portion of the project area, the indurated caliche horizon is overlain by approximately 66 cm of aridsols of the Hueco-Wink association soils (Hubbard 1988; Pigott 1977). The top soil of the Hueco-Wink association is characterized by loamy fine sands overlying a brown and yellowish brown fine sandy loam subsoil. Pigott (1977) categorized calcareous Hueco-Wink soil as calciorthids, and those with higher clay content as paleargids. The Hueco-Wink soil association is markedly prone to eolian alteration unless protected by vegetation cover.

The Hueco-Wink association aridsols are disconformably overlain by a typically cross-bedded veneer of tan to very pale brown entisols (Pigott 1977) or eolian overburden, ranging in thickness from a few centimeters to 2.5 m. The term eolian overburden is used in this report, instead of blowsand to emphasize origin and stratigraphic position of the predominantly wind distributed sand mantle of recent (historic) derivation covering the Hueco Bolson desert floor and forming coppice dunes. Dune formation associated with the entisols are of a relatively recent (post-1895) origin as partially evidenced by military artifacts dating no earlier than 1940 located as deep as 2 m below the surface of the eolian overburden (Hubbard 1988).

Recent investigations around Las Cruces (Gile et al. 1981) approximately 70 km to the northwest of the project area, on the lower reaches of the Jarilla Mountains near in the Tularosa Basin (Blair et al. 1990a) approximately 30 km to the north of the project area, and on the Hueco Bolson valley floor (Monger et al. 1993) have added substantially to knowledge of the evolution of quaternary stratigraphy in the region. Monger has correlated the quaternary stratigraphic units in the Hueco Bolson desert floor area with stratigraphic units defined within the GBFEL-TIE project at the foothills of the Jarilla Mountains (Blair et al. 1990a), and those defined within the USDA-SCS desert project near Las Cruces (Gile et al. 1981). In the most recent scheme, based on the amount of pedogenic carbonates present in each soil horizon (Monger 1993; Monger, this volume) in the project area, the indurated caliche horizon (Q1) is overlain by the Isaacks' Ranch horizon paleosol (Q2), which is overlain by Organ Age horizon (Q3) which is overlain by the eolian overburden (Q4).

The La Mesa petrocalcic horizon (Q1) overlies the Camp Rice fluviatile deposits and was deposited during the middle to late Pleistocene (Monger 1993). The Isaacks' Ranch geomorphic surface (Q2) spans the Pleistocene/Holocene boundary between 8,000 and 15,000 B.P. (Monger 1993:77). Although not previously identified in the project area, Isaacks' Ranch-age deposits were encountered in backhoe trenches and

occasionally in test excavations during the current project (Appendix E). In the project area, Isaacks' Ranch deposits occur in the form of (1) a lag layer of calcium carbonate nodules and (2) an argillic paleosol.

The Organ sequence (Q3) has been documented in alluvial deposits of mountains flanking the Hueco Bolson to the west. In the project area, the term Organ is loosely applied to denote deposits comparable in age to those identified closer to the mountains. The Organ is the youngest (Holocene) depositional/pedogenic stratum dated between .1 and 7 ka (Monger 1993:77). It underlies the A-horizon; in most areas within the project boundaries, however, it underlies the eolian overburden. Three developmental stages of the Organ may be distinguishable in the project area (Monger, this volume).

The eolian overburden (Q4) is of relatively recent origin. The sand mantle covering the Organ-age paleosol in the project area postdates the introduction of cattle in the Hueco Bolson in the late nineteenth century (Campbell 1929; Gardner 1951; Melton 1940). A combination of overgrazing and droughts triggered the desertification process prevailing in the area. Today, the eolian overburden is continually undergoing alteration principally by wind creating areas of deflation and areas of sand accumulation. Eolian alteration patterns are of importance to archeologists because they affect visibility of archeological sites. The patterns provide base line data on which to build predictive models of where to expect sites in the coppice dune environment of the project area. The three major eolian alteration mapping units (Monger 1993) recognized in the project area include modern deflation surfaces, interdune sheet deposits, and deposition areas of sand sheet deposits (Figure 3). Mapping Unit 1 is characterized by lag layers of indurated caliche fragments occurring in patches. The deflational surfaces are most commonly found in association with fault scarps and areas where tank traffic has been extensive (Monger 1993). Mapping Unit 2 is composed of historic-age blowsand in the form of dunes with interdunal sheet deposits (Monger 1993). Mapping Unit 3 includes areas, mostly grasslands, buried by sheet deposits of historic-age eolian deposits. Buried under these deposits are deflated surfaces and areas that have intact soil stratigraphy (Monger 1993).

VEGETATION AND CLIMATE

The modern vegetation in the project area is an extension of the Chihuahuan high desert scrub. The plant community is dominated by honey mesquite (*Prosopis glandulosa*) and broom snakeweed (*Xanthocephalum sarothrae*). Other common plant species include four-wing saltbush (*Atriplex canescens*), Mormon tea (*Ephedra trifurca*), mesa dropseed (*Sporobolus flexuosus*), soap tree yucca (*Yucca elata*), sand sagebrush (*Artemisia filifolia*), and Russian thistle (*Salsola kali*). Broom snakeweed and soap tree yucca constitute the perennial interdune vegetation (O'Laughlin 1990). Grasses are localized in areas where the calciorthid soils are not completely covered by the eolian overburden. During the growing season from spring to early fall, nonperennial herbeceous plants form a dense understory in interdune areas. In playa environments, the montmorillonite in playa soils increases water retention capacity to support a luxuriant growth of broom snakeweed and soap tree yucca. Mesquite, four-wing saltbush, Mormon tea, and sand sage occur in playa environments, but less abundantly.

The modern vegetation is a product of the combined effects of drought and grass cover denudation by overgrazing in the late nineteenth and early twentieth centuries. Depletion of grass cover by cattle, and concomitant soil erosion, created a suitable environment for encroachment by desert shrubs, a process that is still prevalent in the area today. The post-1890 trend has been characterized by an increase, on the surface, of eolian overburden at the expense of grass-supporting calciorthids and a correlative increase in mesquite shrubs on the eolian overburden at the expense of grasses.

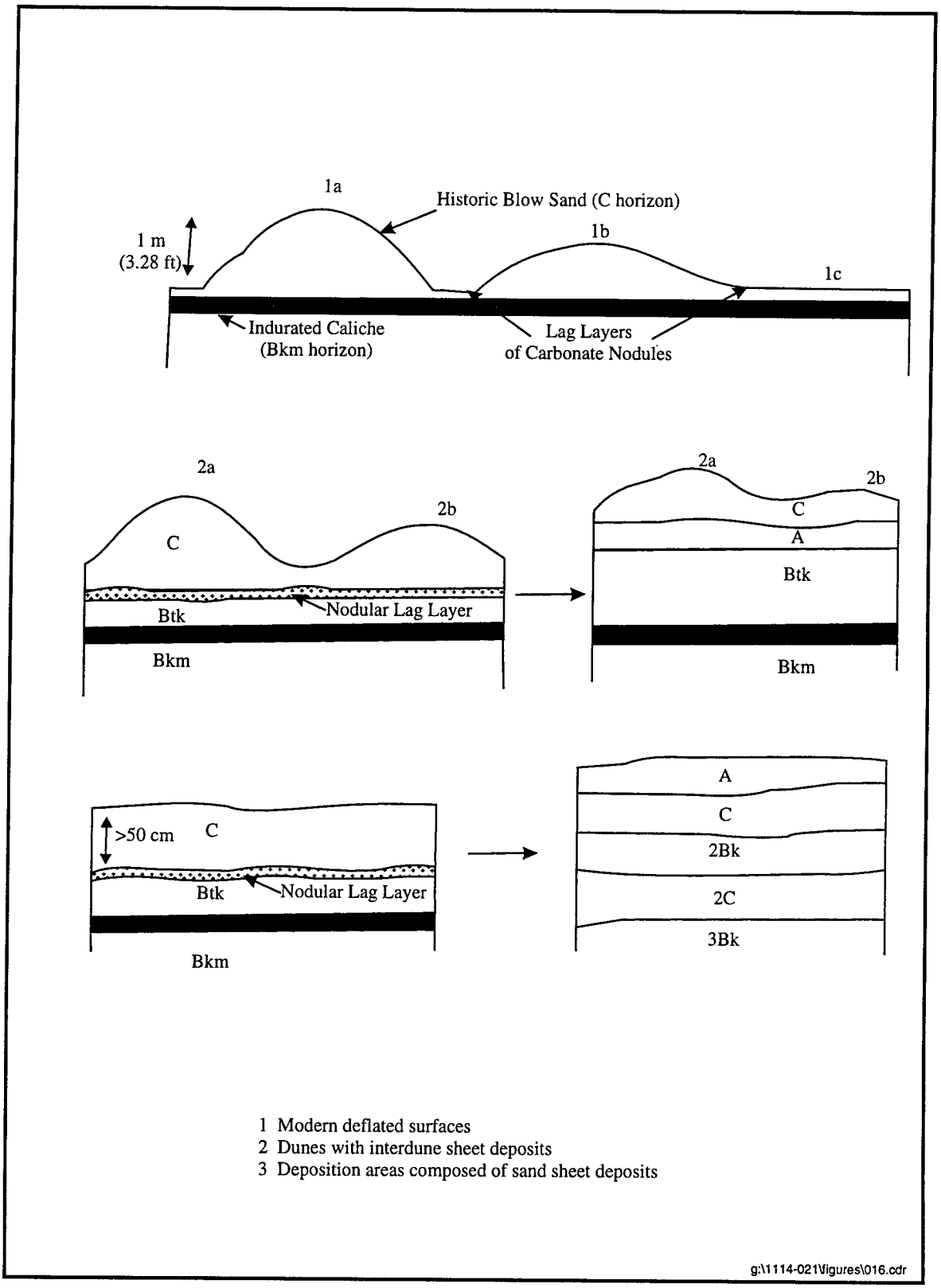


Figure 3. Eolian alterations mapping units (from Monger 1993).

Prior to the nineteenth century, a desert shrub/grassland complex preceded the modern vegetation. Pack rat midden remains have provided a window into the late Pleistocene and early Holocene climate and vegetation of the El Paso area. Pack rat midden remains from Bishop's Cap and the Hueco, Sacramento, and Guadalupe mountains in the El Paso area as well as elsewhere in the southwest (Van Devender and Everitt 1977; Van Devender and Riskind 1979; Van Devender and Spaulding 1979) have demonstrated that by 11,500 years ago a pinyon-juniper woodland extended to low elevations on the mountains flanking the project area. In addition, the presence of a mixture of forest and grassland species in the fauna assemblages from caves near El Paso suggests an equable climate during the late Pleistocene (Hubbard 1988). Winters were milder, summers cooler, and precipitation greater than the present. Recent studies of pack rat midden remains from Rough Canyon, in the vicinity of Pendejo Cave near Orogrande, suggest similar conclusions (McVickar 1992).

The climate became progressively less equable during the early Holocene. Winters became colder, summers warmer, and the range in annual rainfall became accentuated as winter precipitation decreased and the summer monsoon became more pronounced. On the lower elevations of mountains, juniper-oak woodlands replaced the pinyon-juniper community and grassland encroached (Van Devender and Spaulding 1979).

The appearance of desert species, including creosote bush, acacia, mesquite, agave, sotol, and ocotillo, in middle Holocene (ca. 8,000 B.P.) pack rat middens is suggestive of a dry climate similar to the present but with slightly greater rainfall. The juniper-oak woodlands disappeared from lower elevations and grass encroached on the intermontane basin and lower reaches of the mountains (Van Devender and Spaulding 1979). Between 6,500 and 5,500 B.P., the environmental conditions had become essentially the same as those of today (Irwin-Williams 1979), and, as their habitat was eliminated, all the Pleistocene megafauna had become extinct (Staley et al. 1993).

The transition from middle to late Holocene (ca. 5,000-4,000 years ago) was characterized by decreasing precipitation, shrinking playas, increased soil erosion, and an encroaching desert scrubland (Van Devender and Spaulding 1979). The drying trend continued during the late Holocene, punctuated by relatively minor oscillations with mesic peaks between 2,500-2,000 years ago and after 1,000 years ago (Carmichael 1986; O'Laughlin 1990).

Today the climate of the project area is semi-arid with a pronounced diurnal temperature range (hot days and cool nights) and low relative humidity. Fifty percent of the mean annual precipitation (20.1 cm [7.9 in]) falls between July and September. The annual range of temperatures spans 13.3° C (56°) in January to 35.2° (95°) in June (O'Laughlin 1980, 1990). Although the average frost-free period is 200 days, vegetation growth is controlled primarily by available water (Hennessey et al. 1983) rather than minimum temperatures (Staley et al. 1993).

FAUNA

Remains of a range of contemporary animals, including coyote, badger, snake, box turtle, mule deer, jack rabbit, cottontail rabbit, antelope, shrew, rat, and mouse, have been found in prehistoric and historic sites of the Hueco Bolson (O'Laughlin 1990; Whalen 1977). Many of the species (desert mule deer, coyote, black-tail jack rabbit, desert cottontail, mourning dove, white wing dove, scaled quail, Gamble's quail, and lizard) prefer mesquite-covered areas or marginal areas in which mesquite and grasslands are in close proximity (Germano et al. 1983). This implies that the range of animal species in prehistoric times has not changed greatly since the establishment of prevailing environmental parameters. Although jack rabbit and

cottontail rabbit account for most of the bone found in prehistoric sites on the desert floor, pronghorn antelope remains occur in smaller numbers in the assemblages (O'Laughlin 1990).

In summary, paleoenvironmental data suggest that the environment has not changed drastically since the middle Holocene. Consequently, it is expected that prehistoric activities during the Archaic and Formative periods are likely to reflect ephemeral and seasonal use of the project area (Hard 1983b; O'Laughlin et al. 1988; Whalen 1978, 1980). Sites are expected to have been occupied mostly during the peak periods of animal and plant productivity between spring and early fall. Available plant foods would have included the seeds of mesquite, grasses, and prairie sunflower; seeds and greens of amaranth, purslane, and other herbaceous plants; and the stalks, flowers, and hearts of soap tree yucca (O'Laughlin et al. 1988). The range of available animals would have included coyote, badger, snake, box turtle, mule deer, jack rabbit, cottontail rabbit, antelope, shrew, rat, and mouse (O'Laughlin 1990; Whalen 1977).

CULTURAL BACKGROUND

The degree and intensity of human occupation of the Hueco Bolson and the southern Tularosa Basin have varied through time. Although the area has been the focus of military-related cultural resources management assessments, extensive archeological surveys and excavations are still limited. Recent investigations (Mauldin et al. 1994) revealed that prehistoric sites within the bolson floor are generally low density, ephemeral, and seasonal. Large sites are commonly associated with ephemeral drainage-mouth ponds close to alluvial fans indicating a possibility that the alluvial fans along the periphery of the basin were the focus of agricultural activities (Whalen 1978). Diagnostic artifacts, sherd and lithic scatters, single features, and isolated artifacts provide evidence of continual occupation of the project area from the Paleo-Indian through the Historic periods.

Although some archeological investigations have been conducted in the area, the prehistoric human occupation of the Hueco Bolson, the McGregor Range (see Figure 1), and the rest of the Tularosa Basin region is far from being fully documented. Previous surveys have discovered some sites that have received preliminary documentation; however, large areas are still unexplored (Beckes et al. 1977; Browning et al. 1991; Carmichael 1986; Clifton et al. 1987, 1988; Hard 1983a, 1983b; Seaman et al. 1988; Skelton et al. 1981; Way 1979; Whalen 1977, 1978; Wimberly and Rogers 1977). Within the Hueco Bolson and the southern Tularosa Basin, several large-scale surveys (Beckes et al. 1977; Carmichael 1986; Whalen 1977, 1978) sponsored by Fort Bliss have provided an initial database concerning site distribution. More recently, the Loop 375 project (O'Laughlin 1990) and the Small Sites project (Mauldin et al. 1994) have added considerably to the prehistoric research of the Hueco Bolson.

Human occupation of the Hueco Bolson and Tularosa Basin can be divided effectively into eight cultural periods, both prehistoric and historic, with affiliated phases (Table 1) (Bentley 1992; Laumbach and Kirkpatrick 1985; Wimberly and Rogers 1977). Knowledge of the settlement and subsistence patterns of the preceramic Paleo-Indian and Archaic periods is limited in comparison to the Formative period. Although several predictive site location models have been formulated for the Hueco Bolson and Tularosa Basin environs, their usefulness is bound by the nature of settlement patterns and site preservation. These models remain overly generalized, but continuing research is contributing to their refinement (Hard 1983; Mauldin 1994). Recent research in the Mesilla Valley (Giese 1994:124) indicates the continuation of an Archaic-like mobility/resilient adaptive strategy throughout the Mesilla phase and perhaps into the El Paso phase of the Formative period. Evidence indicates the coexistence of both mobile and more sedentary adaptive strategies during the late Mesilla phase in the Mesilla Valley.

Table 1
Cultural Sequence for the McGregor Range

Temporal Periods	Date
Paleo-Indian	10,000 B.C. - 6000 B.C.
Archaic	6000 B.C. - A.D. 200
Formative	A.D. 200 - A.D. 1450
Mesilla Phase	A.D. 200 - A.D. 1100
Doña Ana Phase	A.D. 1100 - A.D. 1200
El Paso Phase	A.D. 1200 - A.D. 1450
Protohistoric and Apache	A.D. 1450 - A.D. 1680
Spanish Colonial and Apache	A.D. 1680 - A.D. 1821
Mexican Colonial and Apache	A.D. 1821 - A.D. 1848
Anglo and Apache	A.D. 1848 - A.D. 1941
Military	A.D. 1941 - present

Paleo-Indian Period (10,000 - 6000 B.C.)

The earliest known cultural assemblages are characterized by the distinctive Clovis spear points. These lithic assemblages exhibit the finely flaked and fluted projectile points that are found on the high plains and in the greater Southwest and the Great Basin. The early Paleo-Indian Clovis culture may have developed in response to an increased effective moisture between 9500 and 9000 B.C. The occurrence of small Paleo-Indian camps near ephemeral playa formations on basin floors (Beckes et al. 1977; Carmichael 1986; HSR 1973; Mauldin 1994) suggests that human adaptation strategies, manifesting a technology similar to that which already existed on the high plains, may have been in response to changing climatic conditions and a redistribution of biotic communities.

The Tularosa Basin and the Hueco Bolson have likely been occupied by humans for at least 12,000 years. While access is limited in much of the Tularosa Basin and Hueco Bolson area, Clovis-related artifactual remains have been recovered near White Sands Missile Range (Carmichael 1986; Harkey 1981; Laumbach 1985). Clovis remains were recovered in southern New Mexico at Mockingbird Gap (Weber and Agogino 1968) approximately 150 km north of the project area and at Truth or Consequences (Clifton and Sanders 1991). Among several Clovis projectile points reported from Chihuahua, Mexico, is one from the Timmy site (Department of the Army 1991; Di Peso 1974).

Interestingly, data recovered by the Andover Foundation project at Pendejo Cave on McGregor Range, approximately 40 km north of the project area (R.S. MacNeish, personal communication 1991), indicate that McGregor Range may have been inhabited by humans during the late Pleistocene. A possible pre-Clovis occupation of Pendejo Cave on McGregor Range near Orogrande has been suggested (Cunar 1992). Lithic debris in the cave found in association with bones of extinct Pleistocene animals, including horse (Harris 1992), is believed to be the result of human activities (Cunar 1992) and to predate the Clovis period. These discoveries are being tested by the archeological community. If proven, the period of human occupation of McGregor Range may increase by 15,000 years (Department of the Army 1991).

The commonly documented Paleo-Indian cultural remains in the Hueco Bolson and the Tularosa Basin date to ca. 9,000 B.C. (Department of the Army 1991). Named Folsom, the normally fluted points indicative of this culture have been found in the desert lowland, often in relatively elevated areas near relic lakes or playas (Beckes et al. 1977; Carmichael 1986). In the Hueco Bolson, only limited artifactual evidence in the form of projectile points found near playas or natural depressions has been recorded (Brethauer 1977; Mbutu and Peter 1996). Although Whalen (1978) identified no Paleo-Indian campsites in the Hueco Bolson, distinctive isolated Folsom points were recorded. More recently, a possible Folsom site (FB 13115) was recorded in the eastern Hueco Bolson (Mbutu and Peter 1996).

In the surrounding areas, however, several documented occurrences of Folsom cultural remains have been reported. Approximately 10 km west of the project on the northeastern slopes of the Franklin Mountains, a stratified Folsom habitation site (FB 1613) was excavated. Because Folsom populations typically occupied small transient camps, this is the first documented site of its kind in the region (Department of the Army 1991). During the Doña Ana survey west of the project area (Skelton et al. 1981:13), numerous Folsom, Folsom-like, and other lanceolate projectile points were recorded. In the southern Tularosa Basin to the north of the project area, Carmichael (1986:208) identified 29 Paleo-Indian components. A total of eight Paleo-Indian sites was recorded by Beckes et al. (1977) within the McGregor Range adjacent to the project area. All were found on the lowland desert floor in eroded contexts near playas. Two of the sites are discrete, but the remaining occurrences are either isolated projectile points or specimens found mixed with younger cultural material (Beckes et al. 1977). Folsom points are often found in contexts dated to subsequent periods and may represent curation practices by later inhabitants of the area (Giese 1994:81-82).

Regionally, by 8,000 years ago, favored sitings for Paleo-Indian camps were situated in the vicinity of ponds (for example, the Holloman Cody site near Holloman Air force Base) and streams. Site distribution suggests a response to gradual desiccation (Eidenbach and Wimberly 1980; HSR 1973). The Cody complex represents the continuation of a plains-based big-game hunting tradition that lasted until about 6000 B.C. (Irwin-Williams 1979). The Holloman Cody site, which is approximately 120 km north of the project area, is the only known manifestation of this Paleo-Indian tradition in the area.

Despite the scarcity of data on the Paleo-Indian occupation, members of the El Paso Archaeological Society have reported a number of Paleo-Indian localities over the last several decades (Russell 1968). For example, Folsom campsites were reported 16 km northeast of Orogrande (Russel 1968). It is also known that Paleo-Indian projectile points collected from the area exist in private collections.

Data pertaining to post-6,000 B.P. occupation of the Hueco Bolson and the Tularosa Basin and the surrounding highland are limited. Apparently, the area was sporadically occupied by bands of hunter/foragers similar to Folsom populations who used lanceolate and often parallel-flaked projectile points. Although on the high plains the Cody culture is associated with the hunting of *Bison occidentals* (terminal Pleistocene) and modern bison using Scottsbluff and Eden points, in the Hueco Bolson and the Tularosa Basin faunal assemblages are marked by the absence of Pleistocene megafauna (Wimberly and Rogers 1977).

Archaic Period (6000 B.C. - A.D. 200)

Around 6000 B.C. a widespread adaptive change appears to have occurred throughout the Southwest, apparently in response to the post-Pleistocene gradual desiccation that triggered the current climatic regime. In response to the changing environment in which the Pleistocene megafauna became extinct, the Archaic peoples organized into small, highly mobile groups adapted to a broad-based, generalized subsistence pattern (Carmichael 1986; O'Laughlin and Martin 1989). The Archaic, generally, was a long period of migratory

rounds based on the availability of seasonal vegetal resources. This seasonally scheduled migratory pattern took advantage of different plant foods and animals from all physiographic zones. By the Late Archaic, the occurrence of maize, dated to 1600 B.C. at Fresnal Cave, may be an indication of the development of cultivation practices (Bandy 1980; Beckes et al. 1977; Gerald 1980; Mallouf 1985; Skelton et al. 1981).

Within the Hueco Bolson and Tularosa Basin region, a variety of site types (petroglyph and pictograph, rockshelters, agave roasting pits, quarry and lithic reduction sites, and open-air camp sites) assigned to the Archaic period have been reported from different environmental settings (Beckes et al. 1977; Whalen 1978; Wimberly 1972). Archaic camp sites have been found in mountain rockshelters and along the terraces of the Rio Grande (Beckes et al. 1977). Beckes et al. (1977) reported that 34 percent of the sites recorded during their survey of McGregor Range were Archaic. Site types included burned rock loci, lithic scatters, isolated hearths, rockshelters, complex quarry localities, and possible quarry/workshops. Possible Archaic period pithouses were identified at the Keystone Dam sites along the Rio Grande, approximately 25 km to the southwest of the project area (O'Laughlin 1980). Archaic sites are distributed throughout all physiographic zones, although on McGregor Range most are found in the Foothill Draw/Yucca Grassland association of the Otero Mesa escarpment, which is characterized by canyons and associated rockshelters (Beckes et al. 1977). Pendejo and Pintada caves are examples of area sites containing well-defined Archaic components (McFaul and Doering 1992). Recently, Archaic sites have been recorded on Otero Mesa on McGregor Range (Peter and Mbutu 1993).

The nature of the Archaic adaptation in the Hueco Bolson is similar to that of the rest of the southern Tularosa Basin and the greater Southwest, where it is referred to variously as the Desert Culture or Desert Archaic. The origin of the Archaic culture in southeastern New Mexico, including both the project area and that part of Texas west of the Pecos River, remains elusive. It has been suggested that the Archaic manifestation in the Hueco Bolson and the Tularosa Basin had its origins in the Cochise Desert Archaic (Lehmer 1948). However, Wheat (1955) argued for a stronger relationship to the Archaic cultures of the Big Bend region of Texas and disagreed with the concept of an ancestral Cochise base (Beckes et al. 1977). Beckes et al. (1977:21-22) stated that:

> Kelley (1966) believed that Lehmer's Hueco phase was related to, or part of, a poorly defined series of cultures ranging throughout the Sangre de Cristo, Sacramento, Franklin-Organ, and Guadalupe Mountain chains.

Absence of time-diagnostic projectile points or radiometric dates in many of the camp sites of various sizes has made it very difficult to define the Archaic vis-a-vis earlier Paleo-Indian camps and later ceramic period sites that lack a ceramic manifestation (Bandy 1980; Beckes et al. 1977; Carmichael 1986; Gerald 1980; Mallouf 1985; O'Laughlin 1990; Skelton et al. 1981). Carmichael's attempt to address the problem through the application of the Lithic Diversity Index (LDI) is still deficient in theoretical and methodological clarity. The validity of the LDI, as first formulated by Carmichael, has not been corroborated (Katz 1992).

In northeast El Paso County, Archaic assemblages have been recorded in cave sites (Cosgrove 1947). The intensively surveyed area of the eastern Hueco Bolson (Maneuver Area 2) has produced only limited Archaic sites (Mbutu and Peter 1996; Whalen 1978). A recent survey, however, recorded a concentration of Archaic assemblages on a low-lying ridge overlooking a playa between U.S. Highway 54 and McGregor Range Camp in the Hueco Bolson (Peter and Mbutu 1993). Whalen (1977:15; 1978:15) maintained that evidence of Archaic occupation in the project area was scarce, although in a study of small camps in the Hueco Bolson (Whalen 1980) 11 of 19 radiocarbon dates were from the Archaic period. Carmichael (1986:13) suggests the lack of Archaic data is due to a preoccupation with the ceramic period.

Although Archaic site data from the project area are from surface collections, site distribution patterns and artifact assemblage contents are not at variance with the general Archaic settlement model of the greater Southwest. In the greater Southwest the Early Archaic is dated to around 6000 B.C. A widespread adaptive change occurred throughout the region apparently in response to a post-Pleistocene gradual desiccation known as the altithermal (ca. 5500 - 2000 B.C.) that triggered the current climatic regimes (Carmichael 1986; Haynes 1964; Irwin-Williams 1970; Martin 1963; O'Laughlin 1990). The Archaic hunter/foragers, organized in small, highly mobile groups, adopted a broad-based or generalized subsistence pattern (Willey and Phillips 1958) seasonally scheduled to take advantage of a wide spectrum of plant foods and small animals from all the physiographic zones within their ranges (Wimberly and Rogers 1977).

By 5,000 years ago a resident group (or groups) had become well-adapted to the diverse resources distributed throughout the basin and ridge topography of the Tularosa Basin and the Hueco Bolson. Successful adaptation hinged on a cyclical pattern, following seasonal availability of wild plants and animals from the basin floor to the summits of the flanking mountains (HSR 1973). Limited maize and bean agriculture may have been practiced by ca. 2000 B.C., but it is likely that maize formed only a small part of the diet for the first 2,000 years that it was exploited. The occurrence of maize dated to 1600 B.C. at Fresnal Cave, located in the Sacramento Mountains near Alamogordo about 130 km north of the project area (Wimberly and Rogers 1977:3), may be indicative of the increasing importance of horticulture. As demonstrated by the data from Fresnal Cave, Archaic corn cultivation took hold along permanent streams near high altitude habitation sites. As a consequence of adaptation to cultivation, other seasonal and specialized camps continued in importance only in an auxiliary role. Archaic adaptation included an increased dependence on plant foods in general, supplemented by cultigens.

Overall, manifestations of the Archaic in the Hueco Bolson remain relatively scarce. The Late Archaic, however, remains the relatively best-known Archaic subperiod. Lehmer's (1948) Hueco phase, also known as the Basketmaker phase (Cosgrove 1947) of the Hueco Cave Dwellers (Sayles 1935), marks a late manifestation of the Cochise tradition and the earliest manifestation of the southern Jornada branch of the Mogollon (Lehmer 1948) in the Hueco Bolson and the southern Tularosa Basin (Cosgrove 1947; Lehmer 1948; Sayles 1935). The namesake caves are within an approximate 10 km radius of the project area. Large camps and small rockshelters, described by Cosgrove as Basketmaker, are comparable to other areas in the greater Southwest (Martin et al. 1952) and Mexico (MacNeish 1989). A limited number of Archaic period pithouses have also been discovered (Beckett 1973; O'Laughlin 1980).

Formative Period (A.D. 200 - 1450)

Mesilla Phase (A.D. 200 - 1100)

The transition of adaptive systems from the Late Archaic to the early pithouse period in the Hueco Bolson and southern Tularosa Basin is not clearly understood. The early Formative subperiod as defined by Willey (1966) signals the initiation of organized settled communities, engaged in horticulture and pottery production. The Mesilla phase in the southern Tularosa Basin and the Hueco Bolson represents little more than an Archaic adaptive strategy with the addition of ceramics. The Archaic period hunting pattern continued to supplement primitive horticulture. The difference between the Mesilla phase adaptation and that of the preceding Archaic period is, therefore, one of degree and not kind. Previous research (Carmichael 1986) concluded that Mesilla sites in the Tularosa Basin and the Hueco Bolson are of a temporary nature (see also Gerald 1986). Recent survey data from the Hueco Bolson, however, indicate the possibility of greater sedentism. In a playa and ridge association between U.S. Highway 54 and McGregor Range Camp, a

concentration of Mesilla phase sites containing significant cultural refuse and stain features apparently represents more than temporary occupation (Peter and Mbutu 1993). A similar situation was noted on the western foothills of the Sacramento Mountains near the Escondida Pueblo site (Hedrick 1967; Peter and Mbutu 1993). The extensive analysis of several thousand flakes and cores recovered from well-dated discrete contexts from recent excavations in the Mesilla Valley showed use of a lithic procurement and processing area for 2,000 years, to the late Mesilla phase, with little apparent change in adaptive strategies (Giese 1994).

The Mesilla phase marks the beginning of the Formative period in the Hueco Bolson, the Tularosa Basin, and the surrounding highlands (Lehmer 1948). It is characterized by pithouse architecture and the use of pottery. The presence of pithouses at Archaic sites (O'Laughlin 1980), however, makes the use of the pithouse as a temporal marker problematical (Carmichael 1986). Mesilla sites often include hearths and scattered refuse and may also include storage pits (Skelton et al. 1981). The Mesilla phase is also indicative of the earliest southern Jornada branch of the Mogollon culture (Wimberly and Rogers 1977), which was first described by Donald Lehmer (1948) after excavation of the Los Tules site in the Mesilla Valley. Site types include villages, agave processing camps, lithic procurement and reduction sites, and small hunting sites (Beckes et al. 1977; Giese 1994).

Ceramics dating throughout the Mesilla phase include local brownware of predominantly unpainted brown to reddish brown, with vessel forms of low-necked jars and hemispherical bowls. In the southern Tularosa Basin and the Hueco Bolson, the Mesilla phase is divided into early and late pithouse periods (Whalen 1980) or simply early and late Mesilla phases. The early Mesilla phase is currently dated to A.D. 200 to A.D. 600, but may actually have begun 200 years earlier (Department of the Army 1991; O'Laughlin 1990). The late Mesilla phase is dated between A.D. 600 and A.D. 1000 or 1100 (O'Laughlin 1990; Whalen 1980:30).

The early Mesilla is the less well-understood of the two pithouse phases. Brownware ceramics found dating to this phase do not allow precise temporal control. Ceramic vessel rim profiles, however, tend to thicken through time as demonstrated by the Rim Sherd Index (RSI) (Carmichael 1986; Katz 1992; Seaman et al. 1988; West 1981; Whalen 1980). Early occurrences of pithouses exhibit shallow structure and are widely dispersed (O'Laughlin 1990). Both circular and rectangular pithouse remains have been observed at Mesilla phase habitation sites (Skelton et al. 1981). Evidently early Mesilla pithouse villages were located on the broad alluvial fan along the eastern boundary of the basin in locations providing increased acreage for dry land agriculture (HSR 1973). Some villages had up to 15 structures (Brethauer 1977; Marshal 1973). Carmichael (1986) reported Mesilla sites in the western Hueco Bolson in the runoff zone east of the Franklin and the Organ Mountains.

On McGregor Range, adjacent to the project area, Beckes et al. (1977) reported that less than 10 percent of the Formative period single component sites date to the Mesilla phase. Site types include a small village, several complex camp sites, hamlet localities, a few small open sites, and small rockshelters. Larger sites are located on stream-side terraces or adjacent to alluvial fans where drainage was sufficient for primitive horticulture. A one-hectare site (M-411) is situated at the mouth of a major canyon on the McGregor Range (Beckes et al. 1977). Recent surveys (Mauldin 1994; Mbutu and Peter 1996; Peter and Mbutu 1993) have recorded Mesilla sites on the desert floor in the Hueco Bolson and the southern Tularosa Basin. During a recent survey a pithouse was reported in the Hueco Bolson adjacent to the project area (Mbutu and Peter 1996). The possibility of pithouses at some of the recorded sites exhibiting large stain features but lacking artifact concentrations, especially near McGregor Range Camp, cannot be ruled out prior to subsurface testing (Peter and Mbutu 1993).

Both the Tularosa Basin and the Hueco Bolson were not particularly densely populated during the Mesilla phase. The eastern Hueco Bolson, for example, averages 1.3 to 1.6 Mesilla sites per km^2 (Beckes et al. 1977;

Mbutu and Peter 1996; Whalen 1978). However, sites found in denser concentrations than those of the Archaic period suggest an increased population during the Mesilla. Like the Archaic, Mesilla sites are distributed among a variety of landforms in the study area. Most Mesilla sites have been found in upland localities within the Hueco Mountains or Sacramento foothills, and most residential sites are located within 300-600 m of basins or playas (Gerald 1978). The majority of the sites apparently are small villages. The ability of Mesilla phase people to adapt to different ecozones, including the floor of the Bolson away from surface water reservoirs, implies that either annual precipitation during the Mesilla phase was greater than today or that resources were more abundant (Gerald 1978).

Actual habitation sites may constitute less than one percent of Mesilla phase sites (Carmichael 1986; Giese 1994:14-15; Mauldin 1992; Upham 1984:244), but the Mesilla settlements manifest a greater degree of sedentism than those of the Archaic, based on the amount of accumulated trash. In the Hueco Bolson, Mesilla phase nuclear family residence sites are found scattered throughout the physiographic zones (Whalen 1978). Consequently, some of the Mesilla sites represent reoccupied Archaic sites. Sites range in size from small to large camps to hamlets and even villages. According to Whalen (1978), the mean size of Mesilla sites is 1.29 ha (3.18 ac) with a standard deviation of .70 ha (1.72 ac).

Mesilla phase sites occur in the Hueco Bolson and the southern Tularosa Basin in a pattern similar to that of the Archaic as demonstrated by a recent survey (Peter and Mbutu 1993). Although often larger, Mesilla sites continued to be playa-oriented as in the Late Archaic, and the Archaic subsistence strategy continued. Food procurement involved scheduled seasonal rounds (Hard 1983a), which determined site location and size as well as the social activities of a group. Residential sites were occupied in winter and spring. The fall and summer short term auxiliary logistical camps were used to exploit the abundant resources in the lower reaches of the Hueco Bolson. Data on Mesilla agriculture are still quite limited.

During the late Mesilla phase, the pithouses tended to cluster together (O'Laughlin 1990). Intrusive Mimbres Black-on-white ceramics are found in sites dated to around A.D. 750, and the rim profiles of the local brownware are much thicker than those from earlier in the Mesilla phase (Carmichael 1986; West 1981; Whalen 1977, 1978). Extra-regional contact with the Mimbres region of the Western Mogollon is evident by the presence of Mimbres Black-on-white ceramics. Other intrusive ceramics, including Mimbres Corrugated, San Francisco Red, and Alma Plain, were found in Mesilla assemblages (Skeleton et al. 1981), and small quantities of marine shell and turquoise were recovered from Mesilla sites (Carmichael 1986).

Doña Ana Phase (A.D. 1100 - 1200)

The pithouse-to-pueblo transition phase was initially defined by Lehmer (1948) based on ceramics. Painted, locally produced wares, including El Paso Bichrome and Polychrome, are common in the ceramic assemblages of the southern Jornada Mogollon culture area. An apparent increase in the intrusive ceramics inventory took place. Other intrusive wares, including Chupadero Black-on-white, Three Rivers Red-on-terra cotta, St. Andre Red-on-terra cotta, and St. Johns Polychrome, were added to the ceramic assemblages (Sale and Laumbach 1989; Skeleton et al. 1981; Smiley 1977:130). This is the most poorly defined phase of the southern Jornada Mogollon. Populations tended to cluster in areas ideal for large fields, close to alluvial fans, a trend that resulted in villages antecedent to the later Southwest pueblo style. Recent publications (Carmichael 1986; Clark 1985; Kegley 1980; O'Laughlin et al. 1988; Scarborough 1986), however, have contributed further knowledge of the Doña Ana phase. Carmichael (1986) was the first to identify Doña Ana sites in considerable numbers. According to Carmichael (1986), villages of widespread pithouses were replaced by settlements organized around relatively large unit structures. Transition in adaptive strategy from Mesilla to Doña Ana phase was gradual. Doña Ana phase sites generally are larger

and have more domestic refuse than Mesilla sites (Carmichael 1986). In addition, the phase is marked by significant technological and socio-cultural changes. According to Carmichael (1986), a substantial growth in population occurred compared to the Mesilla phase. Doña Ana sites are most common on the lower ends of alluvial fans where farming activities are assumed to have been concentrated (Beckes et al. 1977; Carmichael 1986).

The lack of adequate ceramic samples from single component sites has continued to plague any attempt at a statistical definition of the Doña Ana phase based on ceramic attributes (HSR 1989; Skelton et al. 1981; Whalen 1977, 1978), and the paucity of data has led some researchers to refrain from making a distinction between Doña Ana and El Paso phases (Sale and Laumbach 1989; Skelton et al. 1981; Way 1979; Whalen 1977, 1978, 1980). Although Beckes et al. (1977:72) state that "sites which can be tentatively assigned to the Doña Ana phase are more numerous in the study area than Mesilla sites," they did not disclose the number of sites recorded. Furthermore, they did not separate the different phases of the Formative period. The definition of the Doña Ana phase in Beckes et al. (1977) included Mexican ware generally considered indicative of a mixture of the Mesilla and El Paso phases. According to Beckes et al. (1977) and Carmichael (1986), probable Doña Ana sites included several possible villages, a number of complex camp localities, and possible seasonal hamlets. Beckes et al. (1977) report the occurrence of Doña Ana sites on McGregor Range close to the alluvial fans on the western front of Otero Mesa. Suspected Doña Ana components included isolated rockshelters and several special function resource procurement and processing auxiliary stations. According to Beckes et al. (1977), several Doña Ana phase sites occurred on draws and canyons of McGregor Range, and a few were recorded on the desert lowland. Site recognition criteria lack adequate documentation in Beckes et al. (1977), and, as a result, the presence or absence of Doña Ana assemblages is not easily verifiable, Carmichael (1986:227-229), however, recognizes a period of transition with evidence of various measurable differences between the earlier Mesilla phase and the later El Paso phase. Carmichael's (1986) study of the Tularosa Basin suggests a Doña Ana phase occupation as intense as the El Paso phase but with smaller, more numerous villages. No Doña Ana sites have been reported in the project area or on the Hueco Bolson desert floor.

El Paso Phase (A.D. 1200 - 1450)

The El Paso phase marks the period of perhaps the most intensive prehistoric human occupation of the Hueco Bolson and Tularosa Basin (see Carmichael 1986 for a contrary view). The El Paso phase also signifies the fluorescence of the Southern Jornada Mogollon culture in the Tularosa Basin, the Hueco Bolson, and the flanking uplands. This trend reflects a crystallization and intensification of the various socio-cultural and technological traits that became evident in the Doña Ana phase.

Two types of sites were common during the El Paso phase; habitation sites and temporary camps. Habitation sites included permanently occupied hamlets and villages where people lived and farmed, with Pueblos ranging in size from six rooms (Gerald 1988) to those with more than 50 rooms (Beckes et al. 1977) were built. El Paso phase architecture is generally typified by contiguous blocks of east-west aligned surface rooms, more elaborate food storage facilities, ceremonial structures, and evidence of increased social complexity (Brethauer 1977). Occasionally, the pueblos in the Tularosa Basin contained a central plaza (Marshall 1973). El Paso phase ceramics include Gila Polychrome, Tucson Polychrome, Ramos Polychrome, Los Lunas or Seco Smudged Corrugated, an occasional Glaze A, and Tonto Polychrome, as well as Chupadero Black-on-white and Lincoln Red-on-terra cotta. El Paso jar rims are extremely everted (Carmichael 1983:70-81; Whalen 1977, 1980). It is unclear whether the rim sherd eversion was a result of changes in function from cooking and gathering to increased storage use or due to an evolution in style (Sale and Laumbach 1989; Seaman and Mills 1988).

El Paso phase farming/residential sites are often found in the runoff zone of the Hueco Mountains (Whalen 1978), on the coalesced alluvial fans of the Sacramento Mountains, and in the desert lowland adjacent to the alluvial fans (Skeleton et al. 1981). The Hot Well Village, Escondida Pueblo, and McGregor (Department of the Army 1991) sites are situated on fairly flat land in or near the runoff zone. The alluvial fans provided arable land within close proximity to water sources as well as soils that supported horticulture based on runoff farming (Skelton 1981). Large roasting pits are absent from habitation sites but are found in special camps away from residential sites. Beckes et al. (1977) reported that 85 percent (n=260) of the sites recorded on McGregor Range had El Paso phase components, and that most of the large habitational sites occurred on the low gradient alluvial fans. Beckes et al. (1977) also reported that several El Paso phase farmsteads were found in upland locations near large intermittent stream courses. These areas provided well-drained, arable land with agricultural potential. Carmichael (1986) argued that El Paso phase sites are more playa oriented than Doña Ana phase sites, which are more closely associated with alluvial fans. On the western slopes of the San Andres Mountains, El Paso phase settlement patterns tended toward alluvial slopes (Sale and Laumbach 1989), where several El Paso phase sites occur alongside Mesilla sites. Special activity sites are located near the type of resource being exploited, regardless of the physiographic setting.

According to Beckes et al. (1977), most of the large habitational sites occurred on the lower desert basin, possibly indicating that the valley floor received greater precipitation than today. Beckes et al. (1977) also report that several El Paso phase farmsteads were found in upland locations near large intermittent river courses. In the Hueco Bolson, most residential sites have been recorded in the middle desert runoff zones (Mbutu and Peter 1996; Whalen 1977).

Anasazi-like pueblos are described on the upland areas to the north and to the east of the Tularosa Basin. Linear room blocks facing east toward a plaza, which contained a subterranean chamber, were present in the Sierra Blanca area of New Mexico (Kelly 1966; Wimberly and Rogers 1977). In the southern Tularosa Basin, pueblo unit structures were made of coursed adobe and lacked the distinctive Anasazi characteristics of those in the Chupadera Mesa and Sierra Blanca areas (Lehmer 1948; Wimberly and Rogers 1977).

In the Hueco Bolson, El Paso phase sites occur in nucleated settlements resulting in clusters of larger, more densely occupied, special purpose communities (Whalen 1978). The presence of large pueblos and single-room field houses indicates a population well-versed in slope agriculture. The large sizes of some of these villages and their distance from water suggest that occupants may have developed a sophisticated irrigation technology (Wimberly and Rogers 1977). No pueblo structural sites have been reported in the project area.

During the El Paso phase, foraging for food continued, resulting in temporary camps for food collecting/processing and transit, which played an auxiliary role to the habitation sites. The camps ranged in size from very small to large. Numerous hearths and roasting pits are found on camp sites but artifacts are sparse and scattered. Nonutilitarian objects (marine shells, beads, and any other ornaments) have not been found in temporary camps. The camps are function-specific and spatially discrete. Some of the camps catered to highly specialized activities such as large roasting pits located at the foot of the mountain zone, usually on a straight line from the main residence (Whalen 1977). Roasting pits are often surrounded by several campfire-sized hearths and a few artifacts, consisting predominantly of flakes used as cutting knives.

By A.D. 1400 much of the Tularosa Basin and the Hueco Bolson had been abandoned by sedentary agriculturalists (Kelly 1966; Lehmer 1948). A new radiocarbon date from the Hot Well Village site indicates, however, that the basin may not have been abandoned completely until after A.D. 1450 (Bentley 1992). The abandonment of the Tularosa Basin and its environs by about A.D. 1450 has been attributed to a combination of factors ranging from climatic stress to the arrival of the northern Athabascan Apache in the area to the collapse of Casas Grandes as a regional commercial center. Beckes et al. (1977) have reported

the occurrence of isolated Apache micaceous sherds at some sites on McGregor Range. The local population may have joined larger pueblos to the north, such as Gran Quivira on Chupadera Mesa, and/or Jumano villages to the south. Other hypotheses suggest that the indigenous groups may have continued to live in the region but reverted to a hunting/foraging way of life (Carmichael 1986; Kelley 1952).

Protohistoric Period, the Apache, and Initial Spanish Explorations (A.D. 1450 - A.D. 1659)

The Protohistoric period represents the temporal bridge between the prehistoric and historic occupation of the area. Obsidian hydration dates correlated with radiocarbon dates from excavations at Fort Bliss Maneuver Area 1 produced evidence of some occupation of the area during this time (Mauldin et al. 1994). The indicated time span suggests protohistoric use for one part of the desert floor between A.D. 1470 and 1550. Although it may indicate a limited, and differing, land use of the desert floor (Mauldin et al. 1994), the scarcity of diagnostic cultural remains from this time period and the similarity of the limited tool assemblages to those of the preceding Archaic period and the Mesilla phase of the Formative period preclude definitive assessment.

By the early fifteenth century, however, Athabascan-speaking hunter-gatherers, probably affiliated with the Navajo, had moved into the greater southwestern United States (Simmons et al. 1989). In 1582, Spanish explorers traveling upstream along the Rio Grande from Presidio, Texas, encountered a number of small Native American groups of hunter-gatherers along the river (Forbes 1957; Hodge et al. 1945). These groups were assigned the names Suma, Jumano, Quemandero, and Apache (Forbes 1957).

After Spanish contact in central New Mexico, the Apache quickly adopted the horse and became proficient mounted hunters of bison, as well as skilled raiders. From northern New Mexico, the Apache moved quickly down the Rio Grande valley and east into the Tularosa Basin. The Hueco Bolson and Tularosa Basin area are considered part of the traditional lands of the Athabascan-speaking Mescalero Apache. After repeated attacks beginning in the 1630s, the southern pueblos along the Rio Grande and Chupadera Mesa were finally abandoned in the 1670s (Hackett 1937; Scholes 1936; Schroeder 1973; Thomas 1941). By the middle to late 1600s, Mescalero Apache were attacking Spanish settlements in southeast New Mexico, El Paso, and along parts of the Camino Real. As a result of these depredations, the Spanish authorities commissioned military campaigns in an attempt to rout the marauding raiders.

The first Spanish explorers did not enter the Hueco Bolson and Tularosa Basin but traveled farther north along the banks of the Rio Grande. By 1647 the Spaniards skirted the range by traveling in a south-to-north direction west of McGregor Range via the Salt Road, which for the following three centuries was used to carry settlers and the U.S. military into the region. The Spanish route crossed immediately south of White Sands, and then east toward the Sacramento Mountains (Bentley 1991a). This route was preferred for two reasons: first, life sustaining water for humans and animals was present at Soledad (now Globe) Spring in the Organ Mountains, as well as at San Augustine and San Nicholas springs in the San Andres Mountains. Second, great quantities of salt were present at the San Andres salt lakes. The salt became a critical commodity for refining silver ore once the saline deposits were depleted near the Santa Barbara Mining District in northern Durango, Mexico (Bentley 1991a). Journals of the Spaniards making these early treks into the Hueco Bolson and Tularosa Basin mention Native American groups living in the vicinity, although in many cases they fail to mention them by name.

The only permanent source of water in the eastern Hueco Bolson and Tularosa Basin between Hueco Tanks and the Sacramento Mountains was in the Jarilla Mountains at Water Canyon. According to a nineteenth century Mescalero informant, this water source was not known to the regional Spanish, Mexican, or Anglo

settlers (Bentley 1990) and, therefore, this part of McGregor Range was not traversed by the early Spanish expeditions. The route to the Sacramento Mountains east of McGregor Range was similar to the Salt Road in that it also followed a trail that provided water. This route passed through Hueco Tanks, Alamo Spring, and the Cornudas Mountains before crossing Otero Mesa en route to the Sacramento Mountains and northward (Thomas 1974).

Spanish Colonial Period and the Apache (A.D. 1659 - 1821)

The Spanish Colonial period represented the efforts of the Spanish government to resettle the Indians and subsequently establish self-sustaining communities, such as the construction of Mission Nuestra Senora de Guadalupe de los Mansos in 1659. These settlers in turn paid material tribute to the crown and, secondarily, to the Catholic Church through taxation. In 1680, the Pueblo Revolt took place near Santa Fe. Spanish sympathizers and/or christianized Native Americans, mainly the Tigua, were forced to flee southward to resettle at El Paso del Norte.

Almost all Spanish colonial settlements in the El Paso region were established north and south along the Rio Grande, with the Mission Nuestra Senora de Guadalupe being the first to be founded in 1659 and others following by the early 1700s. So successful were these colonies that within seven leagues (approximately 21 miles) there were 5,000 people by the 1770s (Sonnichsen 1968). Settlements consisted of the mission-presidio system that promoted the conversion of local Native Americans such as the sedentary Suma who lived from El Paso southward downstream approximately 8 km, and the Manso who lived from the vicinity of El Paso northward to present-day Socorro, New Mexico (Bentley 1992). The Spanish presidios and missions also provided a support base for newly arrived settlers, many of whom were Mestizo or Indian. The Spaniards' primary occupations in the mission colonies were ranching and farming.

Outside the Rio Grande valley near El Paso, the early Spanish settlers avoided the northern Hueco Bolson and Tularosa Basin due to fear of the Apache. After 1730 the Kiowa and Commanche also inhabited the region between the Pecos River and the Rio Grande (Schroeder 1974). Therefore, if treks were attempted into the desert region, large numbers of well-armed members were a prerequisite. Regardless of the danger from the marauding Apaches, it was recognized quite early that the lush grasslands of the Hueco Bolson and Tularosa Basin were excellent for grazing livestock (Freeman 1977). Military campaigns, such as those carried out through the 1770s and early 1780s, had limited success against the Apache in the region between the Rio Grande and the Pecos River (Hackett 1937; Thomas 1941). The Spaniards were only partially successful in settling a few Apache families at San Elizario in 1779, with other Mescaleros joining them in 1781 (Schroeder 1973; Sonnichsen 1968).

The Spanish also used captured Apaches for use as slave labor in the Spanish gold mines in northern Mexico. Evidence of eighteenth century Spanish mining is found at the Padre Silver Mine, which was functional between 1789 and 1821. Here, a two-room defensive stone fortress was constructed on a hilltop in the eastern Hueco Bolson south of the Hueco Mountains (Bentley 1991b). This is the only known Spanish Colonial period structure in the El Paso region that was built away from the Rio Grande and lies within the Hueco Bolson and Tularosa Basin.

Mexican Colonial Period and the Apache (A.D. 1821 - 1848)

By the time of Mexican Independence in 1821, the Hueco Bolson and southern Tularosa Basin, in what is now McGregor Range, were used as communal grazing lands by the Tigua Indians living at Ysleta pueblo

(Bowden 1971). These communal lands, however, remained largely uninhabited by the riverine settlers due to the lack of permanent water coupled with the looming threat of Apache raids.

Archeological surveys conducted in Maneuver Areas 1 and 2, and in the McGregor Range at Fort Bliss subsequent to the late 1970s have not documented any structures or definitive sites dating to this time period. However, meager evidence suggesting use of this region exists in the form of isolated finds from either Spanish Colonial and/or Mexican Colonial period ceramics near two of the Hueco Bolson playa locations.

American Colonization and the Apache (A.D. 1848 - 1941)

When lands north of the Rio Grande were ceded to the United States in 1848 after the Mexican-American War, the U.S. Congress commissioned general land surveys of the Hueco Bolson and Tularosa Basin north of El Paso. The purpose of the surveys was to enable construction across the region of the proposed military routes from Fort Smith to New Mexico and then on to California (Freeman 1977). In 1849, Captain Randolph Marcy made an official survey of the southern Tularosa Basin in the vicinity of McGregor Range. Marcy encountered difficulty hiring a guide for the expedition because the area between Doña Ana and the Pecos River was still in the hands of the Mescalero Apache (Freeman 1977). It is worthy of note that these U.S. Topographical Engineers had an underlying purpose in assessing the regional resources and surveying feasible wagon routes. This information was put to use decades later when railroad routes were devised that, upon completion, directly influenced population growth in the region.

From the late 1840s to the 1880s, the vicinity of McGregor Range continued to be devoid of settlements due to the lack of surface water and the fear of Apache attacks. Early settlers circumvented what is now McGregor Range and chose to settle in the major canyons on the slopes of Sierra Blanca in the Sacramento Mountains (Sanders 1990). Mountain streams in these locations provided ample water for irrigation of fields of corn, chilies, and beans. During this time, the surrounding communities of Mesilla, Tularosa, La Luz, and Lincoln were established. These communities were protected by Fort Bliss, Fort Fillmore, and Fort Stanton. The Mescalero Apache were still the principal inhabitants of the territory and were frequently encountered by the U.S. Army from these forts. These encounters always resulted in skirmishes between the two groups because the Army was initiating a policy of constant pursuit and final removal. In a single period between March 11, 1868, and December 26, 1869, six skirmishes took place in the Tularosa Basin (Freeman 1977). The scene of one of the last major engagements was not far from McGregor Range. In the spring of 1880, a detachment of 60 soldiers from the Ninth Cavalry chased a group of Mescaleros Apache along an Indian trail into nearby Dog Canyon, which had been an Apache stronghold for some time (Tinsley 1956). Once inside the canyon, the Mescalero Apache ambushed the cavalrymen, hurling boulders from above, killing or wounding all members of the detachment. This victory was short-lived, however, for within several years nearly all the Apache had been removed from the Tularosa Basin and placed on a reservation in the northern Sacramento Mountains (Sonnichsen 1968).

After Indian removal in the 1880s, more substantial American settlement of the Hueco Bolson and Tularosa Basin was possible. Ranching provided the greatest impetus for settlement as a result of the westward expansion of the cattle market and the development of deep-well drilling technology that made it possible to obtain water in an otherwise barren landscape (Freeman 1977). Railroads associated with the Southern Pacific system passed through the El Paso area and greatly facilitated the movement of goods, especially cattle, in and out of the Hueco Bolson and southern Tularosa Basin. By the 1890s, several large cattle ranches extended into the present-day boundaries of McGregor Range. One of these, Wildy's ranch, was organized in 1884 (Freeman 1977). About 10 years later, another ranch, the Fleck ranch, extended into the southern part of the range. Several outbuildings, stock tanks, and various deep water wells still exist from

the Fleck homestead. The earliest structure associated with the Fleck ranch was a stone dugout or "chosey" (called Cambell Tanks) dated to 1907 (Freeman 1977). By 1905, most of the northern section of McGregor Range was under the ownership of another rancher, Oliver Lee (Freeman 1977). Later, William McNew situated his ranch from the Jarilla Mountains eastward to the ranch of John Prather, who had settled on Otero Mesa in 1898 (Freeman 1977; McNew 1985; Otero County Court Deed Book 5:170). Remnants of the Lee homestead (south of Grapevine Canyon) and the Prather homestead also exist on the range.

Between 1897 and 1899, the El Paso and Northeastern Railroad built an important spur from the city of El Paso north into the Tularosa Basin to obtain coal and timber from the White Oaks area (Freeman 1977). As a result, the area between Alamogordo and White Oaks prospered significantly. Gold was discovered in the Jarilla Mountains in 1905 and initiated a local boom in mining that centered around the town of Orogrande, "Great Gold." The mining boom in the area lasted less than a decade, from 1900 to 1908.

After the mining boom, an influx of homesteaders resulted in the surveying of 18 townships within the present boundaries of McGregor Range between 1915 and 1917 (Freeman 1977). Most of the population was concentrated around the Hueco Mountains and east of the town of Turquoise. By the 1920s, the number of homesteads increased dramatically, and by 1939 most of the land patents within the present McGregor Range had been obtained (Freeman 1977). The majority of historic sites on the range date to this period and consist of small single-family farmsteads.

Military (A.D. 1941 - Present)

At the beginning of the American involvement in World War II in 1941, the U.S. military developed an anti-aircraft training program in the Hueco Bolson and Tularosa Basin. Half a century later, with advanced technologies, air defense training in this region still plays a national military role at Fort Bliss. In the Texas sector of the project area, ranchers have actively grazed cattle since before the turn of the century. Between 1938 and 1980, the U.S. Army established co-use agreements with the ranchers to conduct military training on these holdings.

With the explosion of the first atomic bomb at White Sands Missile Range (Trinity Site—National Historic Landmark), the demography and economic base of the region changed significantly. After World War II and the subsequent development of the military's missile program, the flat, relatively vacant lands north of Fort Bliss became attractive for the testing of missiles. The Research and Development Division of the Ordnance Department established Sub-office Rocket at Fort Bliss in December 1946. Along with several German scientists who had come over during Operation Paperclip (a post-war shuttle of equipment from Germany to the United States), American scientists worked on the development of the Hermes II missile, the precurser of the Redstone missile (Gaither 1996). In 1947, the Army combined its Bumper Program, another missile development program, with the Hermes project, resulting in the first real advances in missile flight, setting distance, altitude, and velocity (Gaither 1996).

In 1954, the approximately 682,000 acres of private and public lands in the Hueco Bolson and Tularosa Basin was established as the present-day McGregor Range. The co-use agreements ended in 1980 when the federal government bought the ranches. Today this area is all military domain.

CHAPTER 3
RESEARCH GOALS AND METHODOLOGY

by
Stephen K. Mbutu and Victor Gibbs

FIELD METHODS

The purpose of this project was to conduct Phase II investigations at 37 sites, most of which were documented during previous investigations. These sites were recorded during various Phase I surveys conducted by Whalen (1977) in Maneuver Areas 1 and 2, by Carmichael (1986) in Maneuver Area 8, and by Mbutu and Peter (1996) in Maneuver Areas 2 and 8. Three of the 37 tested sites were initially recorded during resurvey of Maneuver Areas 1, 2, and 8 during the current investigations. No recommendations were made concerning the eligibility of sites for inclusion in the NRHP during Phase I survey. The objective of the Phase II test excavation program is to recommend sites for listing in the NRHP based on each site's integrity, the intactness of subsurface deposits, and site uniqueness. Unlike the pedestrian Phase I surveys at Fort Bliss, Phase II test excavations projects are designed so that sufficient data can be collected and observations can be made to allow well-founded assessments regarding site integrity and intactness. One of the purposes of test excavations is to determine whether intact, subsurface deposits are present on the site. Site integrity is considered good, for example, if a feature, such as a hearth, contains undisturbed remnants of past activities that might yield important research potential. The site location, its limits, and the integrity of the deposits in regard to the research potential were assessed for each site in order to determine the site eligibility for inclusion in the NRHP. Sites are designated by both the Fort Bliss field number (FB numbers) and state site numbers (Laboratory of Anthropology site numbers [LA numbers] in New Mexico and Smithsonian Institute site numbers [trinomials] in Texas). Several sites did not qualify as sites at all, but rather, upon relocation consisted of insubstantial artifact scatters or isolates, or were occasionally based on erroneous field observations and locational information; under these circumstances, no state site numbers were assigned.

The test excavation strategy is predicated on the nature, distribution, and state of preservation of the cultural deposits in the project area. Many of the artifacts and features that comprise a site occur in deflated areas that are the result of natural erosional processes over time, such as wind which has caused deflation of the original surface and rains which have redistributed artifacts over the surface. Deflation alters the original horizonal distribution of artifacts deposited on the surface of single component sites and vertically mixes together artifacts from different periods and phases in deflated interdunal areas. It is suspected, however, that intact remnants of original occupation surfaces may be preserved within the coppice dunes. Therefore, by excavating the base of dunes adjacent to the nearest feature (stain or artifact cluster), an original occupational surface may be documented, and the remnants of occupation may retain some integrity through artifact and feature patterning.

The Scope of Work for Phase II test excavation specified the 37 sites to be tested and provided an estimated number of test units to be placed at each site. The majority of the sites are defined by the occurrence of features, thus facilitating the placement of test units. Although no statistical design was used, the number of test units depended on the site area and the feature density. The strategy was to place test units on features or artifact scatters that occurred at the base of dunes where the preservation of cultural deposits was expected to be better than that in deflated areas. Four criteria were used to determine the placement of a test unit:

1. the presence of various artifact types and a relatively high density of artifacts;
2. the presence of features;
3. a remnant of the original occupation (paleosol) surface adjacent to a feature; and
4. an area of eolian overburden accumulation adjacent to a feature, potentially masking a paleosurface.

Not all sites, however, have features, buried deposits, or occupational surfaces with in situ deposits buried within the dunes. Therefore, the criterion for determining the areas to test in those sites with no obvious features was the presence of diagnostic artifacts—such as projectile points, blades, and cores—and lithic debitage in finite concentration(s). The occurrence of artifacts associated with the Archaic or older cultural periods found in close proximity to the base of a dune was considered to be a possible indication of a buried paleosurface under the dune. Even though the artifact density might be low, the area would be investigated further to establish its integrity.

The presence of structures such as pithouses or adobe walls automatically establish the site as eligible for inclusion in the NRHP and the site was not subjected to Phase II test excavation. A recommendation would be made for the site to be excavated during the data recovery phase (Phase III). As with all other sites under investigation during the current project, a state site form would be completed for those sites falling within this category.

The size of test units was specified in the scope of work as 4 m^2, either a 1-x-4-m or 2-x-2-m area, depending on site requirement. Within the project area where artifact density is typically low, the exposure of a minimum area of 4 m^2 is necessary to recover sufficient data to assess the eligibility of the site for NRHP listing. Strategically, test units were located over features. The units were oriented so that each unit would transect one-half of an onsite feature and would extend to the nearest dune so that any preserved occupational surfaces in the dune would be detected. Only features with a potential to yield significant information or areas of artifact clusters were excavated. Extremely deflated features were avoided.

Surface artifacts situated within 2 m of each side of the 4-m^2 test area were mapped prior to the beginning of excavation and before any surface disturbance was caused by the excavation crew. Excavation was conducted by shovel and trowel, as appropriate, in arbitrary 10-cm level increments, but natural stratigraphy was also documented. Test units were excavated to the culturally sterile level but not exceeding a meter below surface. An auger was used to assess the nature of deposits between the lowest extent of cultural deposits and the indurated caliche layer. All dirt from the excavation was screened through $^1/_8$ inch (3.715 mm) mesh. The fire-cracked rock and burned caliche were weighed in the field and all fire-cracked rock raw materials were identified before being discarded as test units were backfilled.

Profiles and plan views of all tested units were drawn. A plan view of the test excavation unit included the position and distribution of identified artifacts, feature limits, and the portion of feature or features that were excavated. UTM coordinates of the SW corner of each test unit were noted. Photographic documentation, in both color and black-and-white, was taken of the feature profile(s), the plan view, and artifacts within the test units.

In order to assist in the mapping of site features, site data were generally established in areas of increased elevation; therefore, some site data may be located outside the actual site boundaries.

Site contour maps were made using a Total Data System (TDS). The TDS site maps include salient geomorphological features and elevations of features on the site, dunes within the site, deflated and nondeflated surface areas, and any areas of disturbance. The site limits, including the basal circumference of the dunes, are shown. The excavation unit and the dune nearest to the unit are included as are the backhoe trenches and selected surface cultural features. The maps were produced using the SURFER graphics program.

To aid in the establishment of prehistoric site integrity, a backhoe trench was excavated through dunes, some on the sites but for the most part along the periphery of sites. This strategy called for profile maps that would elucidate the complex stratigraphy, the formation of the deposits, and the taphonomy of the site, yielding information about the integrity of the site, any paleosurfaces present, the extent of intact deposits, and the stratigraphy. As in the case of test units, the number of backhoe trenches to be excavated was specified in the scope of work. A rubber tire backhoe with a 1-m-wide blade bucket was used. The trenches were situated so that the excavation would include the apex of the dune down to .5 m below the base of the dune. Of concern was the stability and age of the dunes, the changing geomorphology of the dune field through time, and the dune stratigraphy. The geomorphology has changed several times, burying occupational surfaces, redistributing sites, and exposing some sites. GMI retained a consulting pedologist, Dr. H. Curtis Monger of the Department of Agronomy and Horticulture at the New Mexico State University, to interpret the stratigraphy at the tested sites.

Paleo-environmental data samples were collected from the test excavations and backhoe trenches. These samples included those for flotation, pollen, and faunal remains, as well as for radiocarbon, archaeomagnetic, and stable isotope analysis and dating.

LABORATORY METHODS

The Fort Bliss system of data curation through a data base was followed. All data recorded on the test excavation unit forms were entered in the computer using d-Base III+, by level, within one meter resolution. The data base contained locational categories for Patrol Base, the UTM quadrat corner, the state in which the site was located, the site number, the excavation block number, the size and shape of the excavation block, the one-meter block within the unit (TU), and the UTM grid coordinates. In addition, the data base contained provenience information including the soil zone, the excavation level, and the top and bottom elevations of each level (cm). Information pertaining to artifacts was entered, including collection number (assigned by field personnel), a provenience letter (G for grid, N for nongrid), a bag number (assigned by lab personnel), a three-digit artifact code (AC), the quantity of artifacts in the bag (usually one), an extension number that delineates the same code number artifact in the same provenience but in separate bags, the original artifact code that was recorded on the bag in the field, the field supervisor's initials, and an area for comments.

Prehistoric Artifact Analysis

The final artifact analysis was undertaken at the GMI laboratory in Plano, Texas. For analysis, the lithic artifacts were initially sorted into ground stone and chipped stone categories. Ground stone specimens were

subdivided into manos, metates, and multiuse specimens. Manos were analyzed on the basis of being one-handed or two-handed and the number of ground surfaces. Metates were classified as slab or basin type.

Chipped stones artifacts were further classified as modified tools, cores, and debitage. The modified tools from the test-recovered assemblages fall into three typological classes: unifaces, bifaces, and projectile points. Due to the possibility of identifying projectile point types, and thus temporal associations, all projectile points found at each site, including those from the untested general site surface, were collected. Cores are defined as cobbles or nodules of lithic material exhibiting one or more scars that result from the systematic or purposeful removal of flakes by human activity. Debitage is defined as all chipped stone artifacts resulting from lithic reduction practices that show no evidence of retouch and/or utilization. Debitage usually takes the form of potentially diagnostic flakes with a platform and bulb of percussion, and of nondiagnostic shatter or debris. Flakes were initially classified by percentage of cortex: primary (75 -100 percent), secondary (less than 75 percent), and tertiary (no cortex). The length, width, and thickness of each whole flake was measured except where breakage prevented complete measurements. Measures of central tendency including range, mean, and standard deviations were computed for whole flakes. In addition to artifact type, the raw material of each lithic artifact was also identified.

Historic Artifact Analysis

During the current project, archeological investigations included four sites dating to the Historic period: FBH 70 is located in Patrol Base 2, FBH 98 and FBH 182 are both located in Patrol Base 6, and FB 13140 is located in Patrol Base 8. Prior to this study neither testing nor other excavation work on historic sites had been conducted on Fort Bliss. Previously, the Fort Bliss coding form used only two codes for civilian artifacts during survey efforts (401 for historic glass, and 479 for historic other). Because no coding form for historic artifacts was in existence at Fort Bliss, Victor Gibbs, the laboratory director for GMI in El Paso, in consultation with the Fort Bliss Director of Cultural Resources Management, drafted a coding form that was later adopted with some modifications by Fort Bliss HRMP staff (Appendix F). The coding form was used to create a data base for artifact assemblages from historic sites.

Artifacts were bagged in the field using the old coding system. During the analysis phase, the artifacts were examined and rebagged using the new codes following standard Fort Bliss methodology. Diagnostic artifacts were further studied to determine their potential dating capabilities. Glass bottle necks were examined for seam marks to determine whether the seams covered the crowns. (Bottle-making technology changed in 1903 when the Owens glass company developed a machine allowing a whole bottle to be constructed at once, rather than having to apply a lip after machining the halves together.) Bases as well as body fragments were examined for a maker's mark and design elements. Bullet cartridges were examined by caliber and maker's mark to determine possible associated manufacture dates. Ceramics were analyzed by vessel type and temper. Metal cans were divided into diagnostic and nondiagnostic categories. Diagnostic can materials were examined for quantities of cans and types of construction. Window glass was counted and used as one factor in determining the potential for a structure being located on a site. Nails were examined by length (inches) to determine possible function in structure construction and also used as one criterion in determination of structure presence. Miscellaneous artifacts were examined by function only.

Samples for Dating

Archaeomagnetic samples were collected and analyzed by staff from the Museum of New Mexico in Santa Fe under the direction of the late Dr. Dan Wolfman (Appendix G). The radiocarbon samples were analyzed

by Beta Analytic, Inc.(Appendix B), and the stable isotope samples were collected and analyzed by Dr. H. Curtis Monger and Ms. Brenda Buck of the New Mexico State University in Las Cruces. Flotation samples were processed by GMI staff using the Shellmound Archeological Project (SMAP) style machine, and the floated samples and the faunal collection were analyzed by Mr. Tom O'Laughlin of the Jornada Anthropological Research in El Paso (Appendices I and J).

ARCHIVAL RESEARCH

Information pertaining to land status was obtained through Ken Faunce, Historic Archaeologist in the Archaeology Team, Conservation Division, Fort Bliss. Many of the records prior to the 1930s are scattered or no longer exist, making documentation difficult (Ken Faunce, personal communication 1994). Informational data bases at Fort Bliss were searched for items pertaining to areas containing historic sites excavated on this project. Data gathered from these data bases were examined in context with the assemblage recovered through testing during this project.

CHAPTER 4
TEST EXCAVATION RESULTS

by
Stephen K. Mbutu and Carolyn J. Barnes

The results of the test excavations are discussed in this chapter. Although the scope of work originally specified 38 sites for testing, only 37 sites were actually tested when testing of site FB 4332 was determined to be unnecessary because of is location within a protected area. Of these 37 tested sites, one site dates entirely to the historic period; three sites were found to exhibit components that date to both the prehistoric and historic periods; and the remaining 33 sites are of prehistoric age.

The discussion of the sites is organized by patrol base and by individual sites. The general topography of the patrol base and site area is described with an emphasis on the variability of the eolian alteration surfaces (Monger 1993) primarily responsible for exposing cultural deposits and increasing site visibility. In addition, each site description includes the number of test units, area and volume excavated, radiocarbon dates (where available), and the number of backhoe trenches excavated. A Total Data System-based (TDS) contour map for each site is provided. Data on artifacts, faunal remains, and features associated with each site are provided in tables appended to each site description. Each site's eligibility for listing in the NRHP is assessed and recommendations made.

PATROL BASE 1, MANEUVER AREA 8
SITES FB 4332, FB 14502

Patrol Base 1 is located in Otero County, New Mexico (Desert SW Quadrangle, New Mexico, Otero County, and Texas, El Paso County), 19 km northeast of Newman and 3 km south of McGregor Camp at a general elevation of 1255 m above mean sea level (amsl). The grassy central area has been identified as geomorphic surface Mapping Unit 3 and the dune land to the west and southeast identified as Mapping Unit 2a (Monger 1993:102). Soils belong to the Hueco-Wink association. Broom snakeweed, sand sage, small-sized mesquites, grass, and yucca constitute the dominant vegetation. The low-lying central and northeastern part of the Patrol Base is mostly flat and, dominated by grass and snakeweed, supports a scarce growth of mesquite bushes with few coppice dunes. Although it would appear to have potential for sheet deposits, the soils are very shallow. No sites have been recorded here previously and, similarly, none were identified through a pedestrian survey during the current project.

From the center of the quadrat the land rises gently westward and mesquite-stabilized coppice dunes dominate the landscape. Site FB 4332 is located in a deflated interdunal area on the northwestern edge of the quadrat (Figure 4). This area marks the eastern boundary of an archeological district (No. 27) that extends

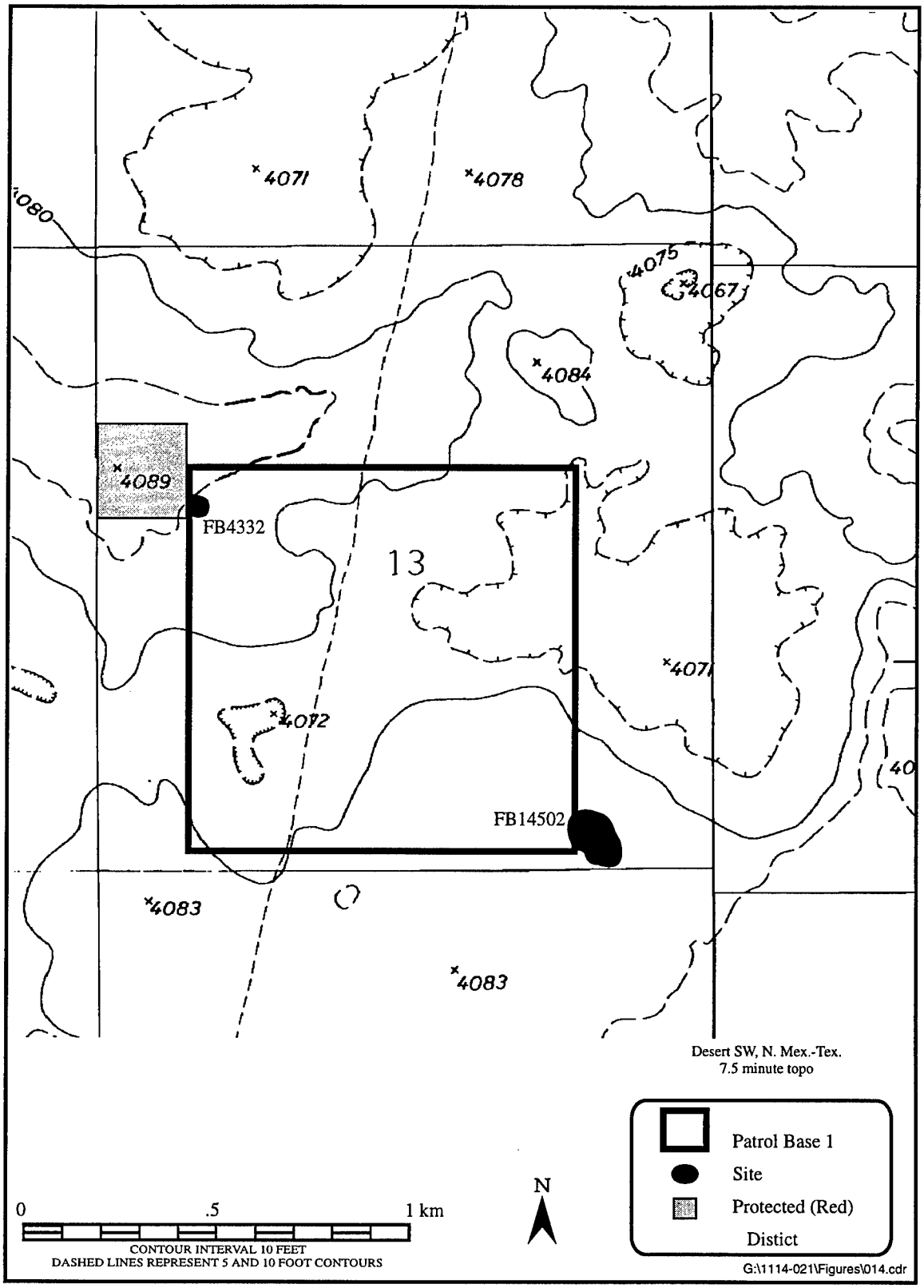


Figure 4. Site locations within Patrol Base 1.

westward. The district is one among several tracts of land on Fort Bliss nongarrison installation protected under the NHPA.

The area to the southeast of the Patrol Base is slightly elevated above the flat central part and, as on the west, coppice dunes dominate the landscape. Site FB 14502 is located in a deflated interdune area on the southeastern corner of the quadrat (see Figure 4). A small depression is located in the southwest area of the quadrat. In the northeast, approximately one-fifth of the quadrat lies in a western finger of a depression (playa) that juts into the quadrat from the east.

A north-south dirt tank road (not shown on map) runs through the eastern one-third of the quadrat and through site FB 14502. The southeastern corner has been considerably impacted by military activities, mainly trenches. A light scatter of military hardware debris occurs on the southern one-third of the quadrat.

FB 4332 (No LA number assigned)

Site FB 4332 is located on the northwestern edge of the Patrol Base (see Figure 4). Although it was included in the scope of work to be tested, it was realized after inspection that the site now falls within the boundaries of an archeological district (No. 27) that is protected under the NHPA. Off-limit signs are prominently displayed on the site's eastern edge and should suffice to prevent military ground traffic from impacting the site. Preservation of site FB 4332 is recommended.

FB 14502 (LA 106715)

Eligibility Status:	Eligible
Radiocarbon Date:	4,645 ± 70 B.P. (3625-3305 B.C. and 3235-3115 B.C.)
Elevation (meters above mean sea level):	1,244 (408 ft)
Size (square meters)	
Previously Recorded:	0
Current:	868
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units:	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	.66
Artifact Density (n/m^3):	10.61
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	2.45
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	8.0
Extent of Erosion (%):	35
Extent of Modern Disturbance (%):	30

The newly recorded site FB 14502 lies on the southeastern corner of the Patrol Base (see Figure 4). If the Patrol Base were to be shifted eastward to avoid site FB 4332 and the archeological district on the western edge of the Patrol Base, this site would be impacted. This is the reason for testing the site. Although the Patrol Base is predominantly within Mapping Unit 2a/2b (Monger 1993:102), the site area is in Mapping Unit 1a/1b at the edge of a rise that slopes eastward. Mesquite, broom snakeweed, sand sage, four-wing saltbush, scanty grass, and occasional yucca constitute the dominant vegetation and allow for 70 percent ground surface visibility.

Overall, 11 features were identified on the site surface. Several of the charcoal stains had fire-cracked rock and/or burned caliche in association. A thin scatter of unspecified brownware and chipped and ground stone occur in, as yet, no discernible pattern on the eastern two-thirds of the site area. Two test units were excavated (Figure 5). Seven artifacts, consisting of one chipped stone and six ground stones, were recovered from the unit excavations. One fragment of El Paso brownware was collected from the surface of the site. In addition, 1.01 kg of fire-cracked rock and .5 kg of burned caliche were recovered; no bone was identified in the test excavations. A single backhoe trench was also excavated at the site (Appendix E).

Test Unit (TU) #1, a 2-x-2-m block, was placed over a burned caliche/fire-cracked rock scatter. Four ground stone fragments, one of which was identified as a mano fragment, fire-cracked rock (.17 kg), and burned caliche (.11 kg) were recovered from the eolian overburden between 0-6 cm below surface. The unit was excavated to a depth of 16 cm below surface (Table 2); the subsurface was sterile of any cultural deposits.

TU #2 was a 2-x-2-m block with a .5-meter extension on the southeast quadrangle. The unit, located to the west of TU #1 across a tank road (see Figure 5), was placed over a burned caliche/fire-cracked rock and charcoal stain feature (F1; Figure 6). A single piece of chert debitage, two mano fragments, fire-cracked rocks (.54 kg), and burned caliche (.25 kg) were recovered from the eolian overburden between 0-5 cm below surface. Fire-cracked rocks (.30 kg) and burned caliche (.25 kg) comprised the entire collection of material recovered from the subsurface deposits (see Table 2). The bottom of the charcoal stain was reached at 33 cm below surface and excavation of the unit was terminated at 37 cm below surface. A charcoal sample was collected for radiocarbon dating analysis resulting in a date of 4,645 $\pm$ 70 B.P. (3625-3305 B.C. and 3235-3115 B.C.) (Appendix B). Analysis of the flotation sample collected from TU #2 identified grass stems in addition to a single unidentifiable burned seed fragment; abundant root contamination was also identified.

At least nine features remain untested and substantial surface artifacts including ceramics and both chipped and ground stone exist at site FB 14502. Although no diagnostic artifacts were recovered from the site during testing, the radiocarbon date places the charcoal stain in TU #2 in the Archaic period (Chapter 2). The site is eligible for listing in the NRHP under Criterion D, but more work is recommended to provide additional quantitative site integrity data before a final determination of eligibility is made. Alternatively, because most of the surface features and artifact scatters were observed on the eastern half of the site outside the Patrol Base limits and the area to be impacted, the adverse impact from military activity on the cultural resources can be mitigated by site avoidance. Off-limit signs should be posted along the western edge of the site where military "foxholes" exist well within the site boundary. The preservation of site FB 14502 is recommended.

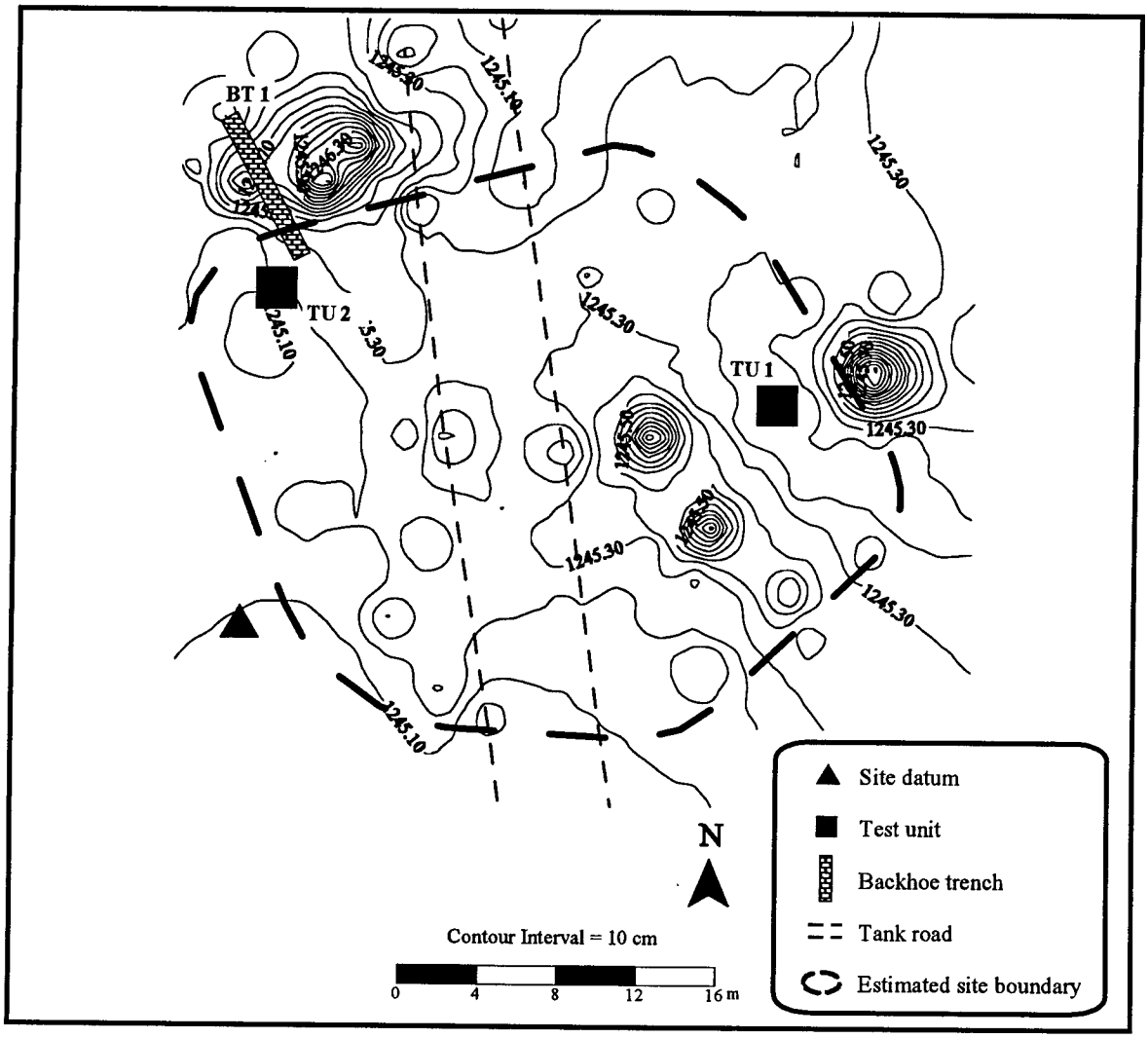


Figure 5. Contour map of site FB 14502.

Table 2
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 14502 (LA 106715)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4	.16			Q4	0-6			4		4			.17	.11	
		.21			Q3	2-16										
Total TU #1	*4*	*.37*							*4*		*4*	*10.89*		*.17*	*.11*	*.76*
2	4	.08	1	BC/FCR /Stain	Q4	0-5		1	2		3			.54	.25	
		.02			Q4	2-13								.30	.25	
		.04			Q4/Q3	0-23										
		.15			Q4/Q3	5-37										
Total TU #2	*4*	*.29*	*1*					*1*	*2*		*3*	*10.34*		*.84*	*.50*	*4.62*
Total	*8*	*.66*	*1*					*1*	*6*		*7*	*10.61*		*1.01*	*.61*	*2.45*
Surface Recovery							1				1					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

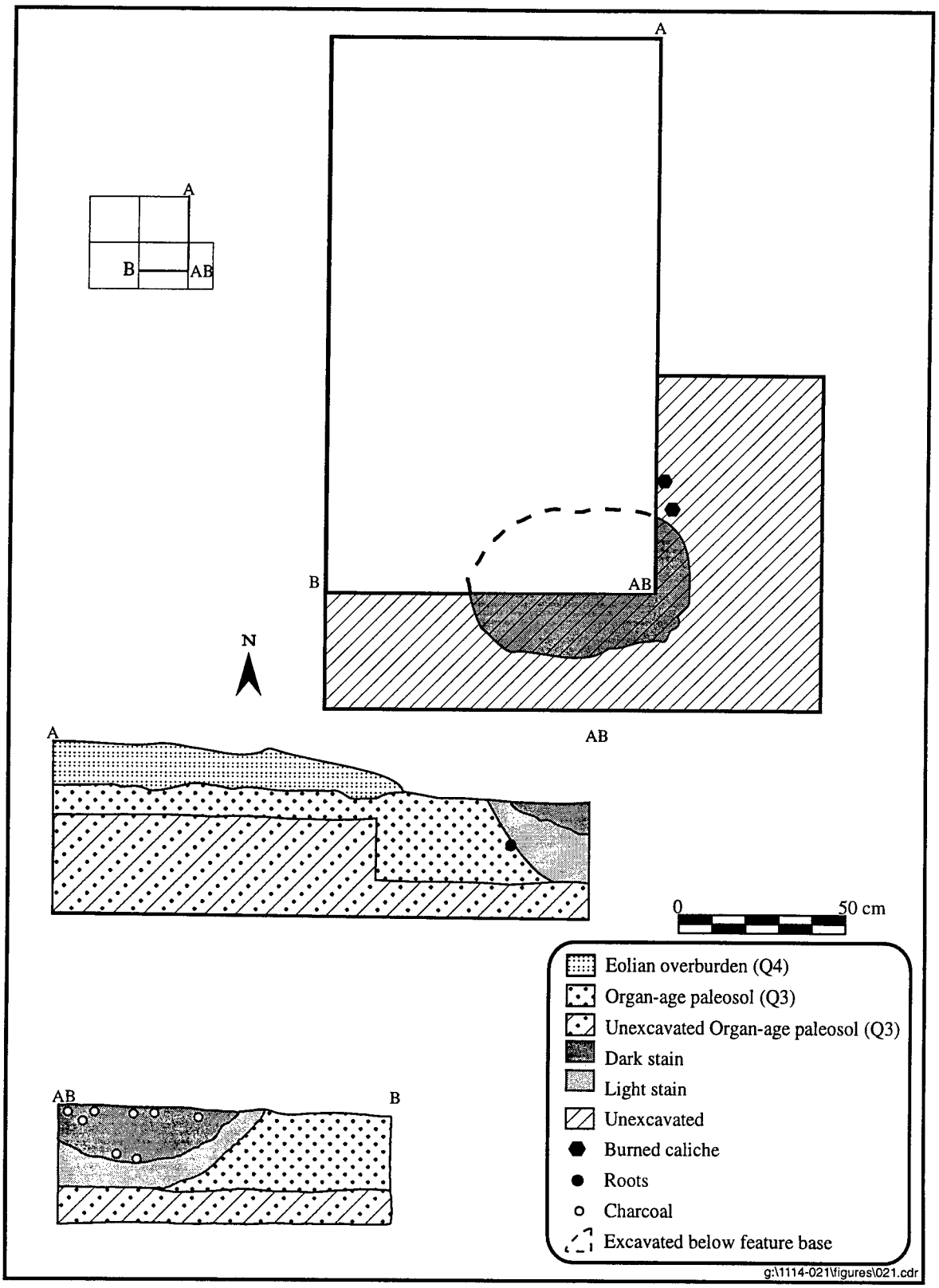


Figure 6. Plan view and profile of TU #2, F1, site FB 14502.

PATROL BASE 2, MANEUVER AREA 8
SITES FBH 70, FB 3929, FB 13145, FB 13146, FB 13338

The quadrat is approximately 13 km northeast of Newman, Texas (Desert SW Quadrangle, New Mexico, Otero County, and Texas, El Paso County), and a kilometer south of Meyer Range road at an elevation of 1,251 m amsl. The landscape slopes gently to the southeast. The southeast corner is in Mapping Unit 3, the northwest and middle areas are in Mapping Unit 2b/1b, and the northeast portion in Mapping Unit 2a (Monger 1993:102). Soils are of the Hueco-Wink association overlying a La Mesa indurated caliche horizon. Most of the quadrat is dominated by low-lying coppice dunes separated by relatively broad interdune grassy areas. Narrow interdune areas are mostly deflated but the broader areas mark patches of sand accumulation sparsely covered by grass and broom snakeweed.

Archeological sites FB 3929, FB 13146, FB 13145, FB 13338 and FBH 70 are concentrated in the northern one-half of the quadrat in an east-west distribution (Figure 7). Sites are approximately .5 km southwest of a playa. A much smaller playa lies .7 km to the southwest. Currently, the eastern edge of the quadrat is being considerably impacted by military "foxholes."

FBH 70 (LA 97697)

Eligibility Status:	Eligible
Radiocarbon Date:	1,230 ± 70 B.P.
	A.D. 665-980
Elevation (meters above mean sea level):	1,240 (4,067 ft)
Size (square meters)	
Previously Recorded:	64
Current:	9,300
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	3
Total Area Tested (m^2):	12
Total Volume Excavated (m^3):	3.16
Artifact Density (n/m3):	6.01
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	9.8
Extent of Erosion (%):	20
Extent of Modern Disturbance (%):	< 10

FBH 70 is a multicomponent site with both prehistoric and historic materials located in Patrol Base 2 (see Figure 7). It is situated in a mesquite dune environment approximately 1.8 km south-southwest of the Newman Ranch site (FBH 56). The site occupies geomorphic Mapping Unit 2a/1b (Monger 1993:102). The site was originally discovered in 1979, and later recorded by Geo-Marine, Inc. (GMI), in 1992. Broom snakeweed, yucca, mesquite, four-wing saltbush, and grass constitute the dominant vegetation and reduce ground surface visibility to 65 percent.

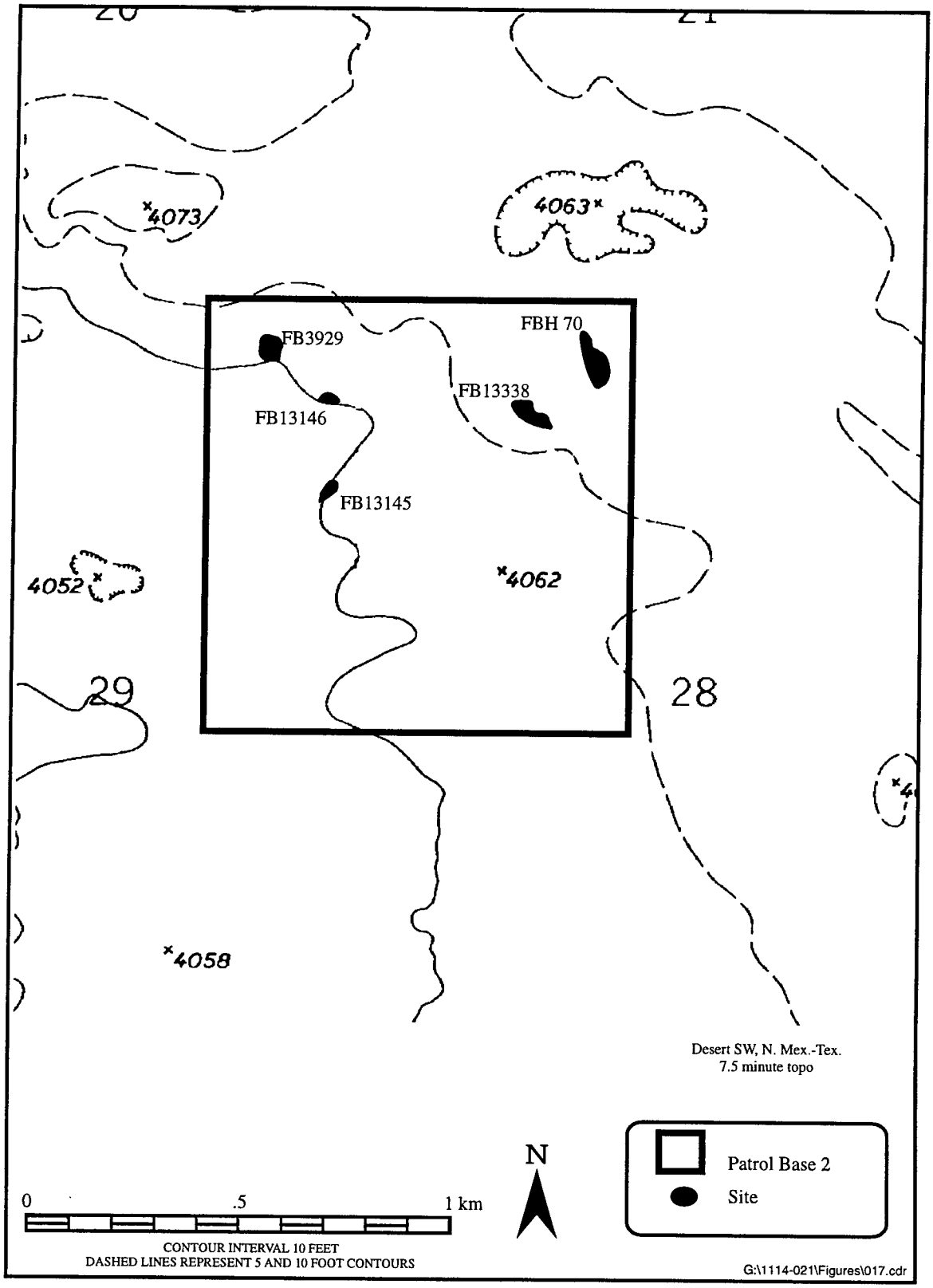


Figure 7. Site locations within Patrol Base 2.

The boundary of this multicomponent site was determined largely on the surface distribution of historic artifacts. Both prehistoric and historic artifacts occur in interdune deflated areas or in tank trails.

On the surface, prehistoric artifact scatters were found in two clusters on the southern part of the site. The recovered prehistoric assemblage consists of 12 artifacts from the test unit excavations and two artifacts from the surface; the collection includes six brownware sherds, five chipped stones (one unifacially modified flake and four pieces of debitage), and three ground stones (two basin metate fragments and one mano). A very light scatter of burned caliche and an occasional unspecified brownware sherd occur in areas between the prehistoric artifact clusters.

Historic artifacts occur in two clusters on the central and northern part of the site. The historic assemblage includes two metal axe heads (Figures 8 and 9), two shell buttons, one bottle cap, one crimped can fragment, one nondiagnostic can fragment, and several nails. In addition, a large iron bed frame buried in a coppice dune was observed and photographed (Figures 10 and 11). Although no window glass or wood were recovered that might indicate the presence of a structure, nails were noted on the surface. Based on the assemblage collected, the historic component of this site probably represents a secondary trash dump or a small work camp, possibly dating between 1910 and 1940.

Three test units and two backhoe trenches were excavated on site FBH 70 (Figure 12). TU #1, a 2-x-2-m block, was excavated near the central western edge of the site (see Figure 11) where a large basin metate fragment was lying on the surface. The subsurface excavation of the unit was sterile of cultural deposits and excavation was terminated at 47 cm below surface (Table 3); an auger core was taken between 47-71 cm below surface. The auger core sediments were sterile of any cultural material.

TU #2, a 2-x-2-m block, was placed on a charcoal stain partially exposed in eolian overburden (Figure 13). Faunal remains (including burned bones) were recovered from both the eolian overburden and the subsurface deposits. Unspecified brownware sherds were collected from the surface and the eolian overburden, and chipped stones (four debitage and one unifacially modified flake) were recovered from the subsurface (see Table 3). The feature bottom was encountered at 10 cm into the subsurface. Sixty-one nonhuman bones were recovered during testing (Appendix I). The faunal assemblage included elements of jackrabbit, cottontail, lagomorphs, and unidentified small to medium-sized mammals, probably jackrabbit or cottontail; a high percentage of the bone is either burned or calcined, suggesting the bone is from a prehistoric occupation (Appendix I). A single charcoal sample was collected from TU #2 for radiocarbon analysis and a date of 1,230 $\pm$ 70 B.P. (A.D. 665-980) was obtained (Appendix B).

Historic artifacts were recovered from the subsurface in TU #3 (see Table 3), situated on the northern edge of the site, down to 30 cm below surface. Excavation of TU #3, also a 2-x-2-m block, was terminated at 40 cm below surface (see Figure 13).

Site History

Based on data gathered at the Fort Bliss Historical Archeology Laboratory, the northwest portion of the northeast quarter of section 28 in which FBH 70 is located was sold by Edward E. Hutchinson on October 21, 1919, to F.E. Morton as a trust deed. On January 20, 1920, the northwest quarter of section 28 was sold by J.T. Hughes, H.A. Walker, F.J. Bailey, and others to J.W. McAndrews and C.T. Vandeveer as part of Hughes Oil and Gas mining claim. On June 2, 1922, the commissioner of public lands sold the southwest quarter of the northwest quarter of section 28 to the Newman Investment Company. On July 29, 1922, the

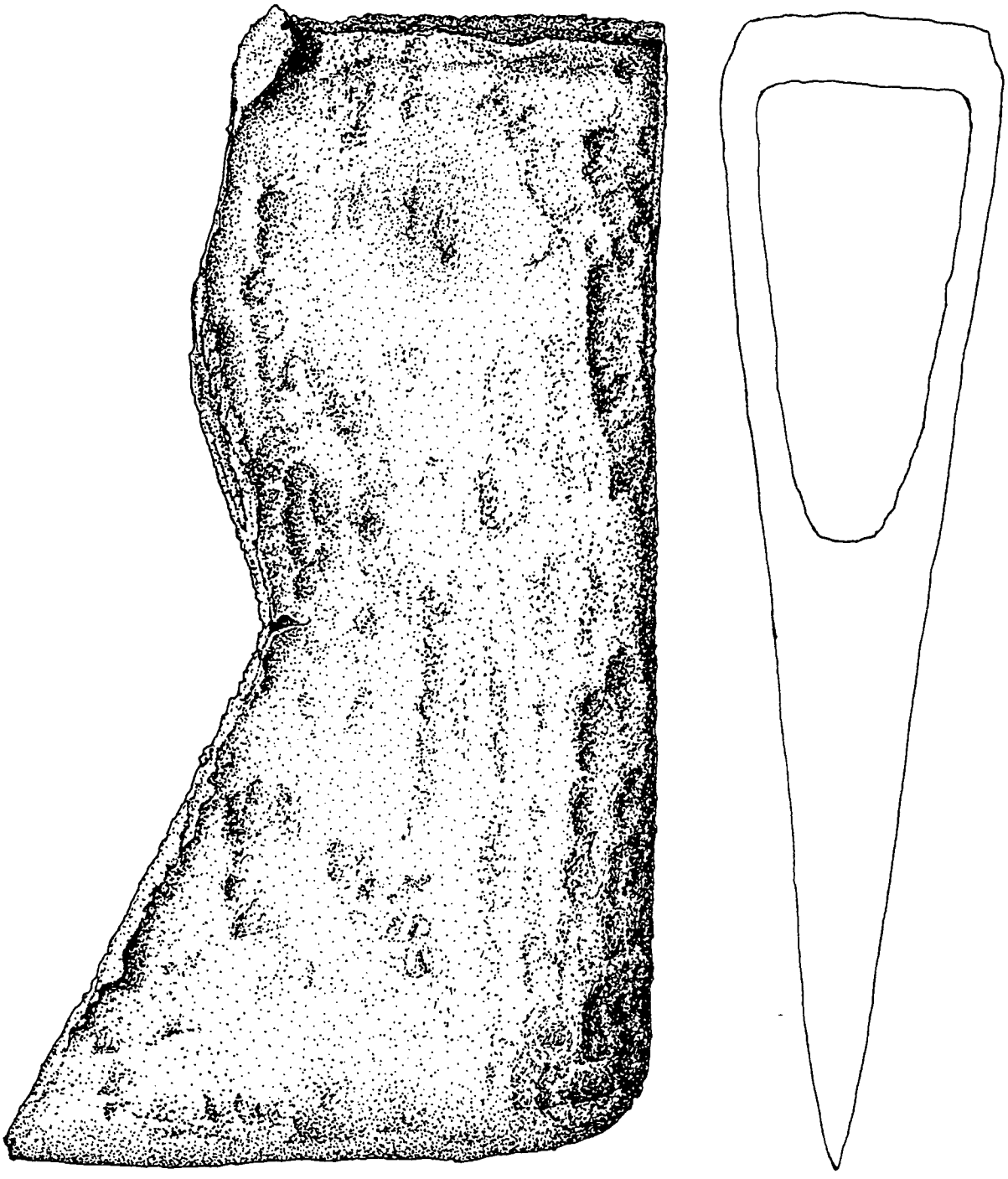


Figure 8. Metal axe from site FBH 70. (Scale 1:1)

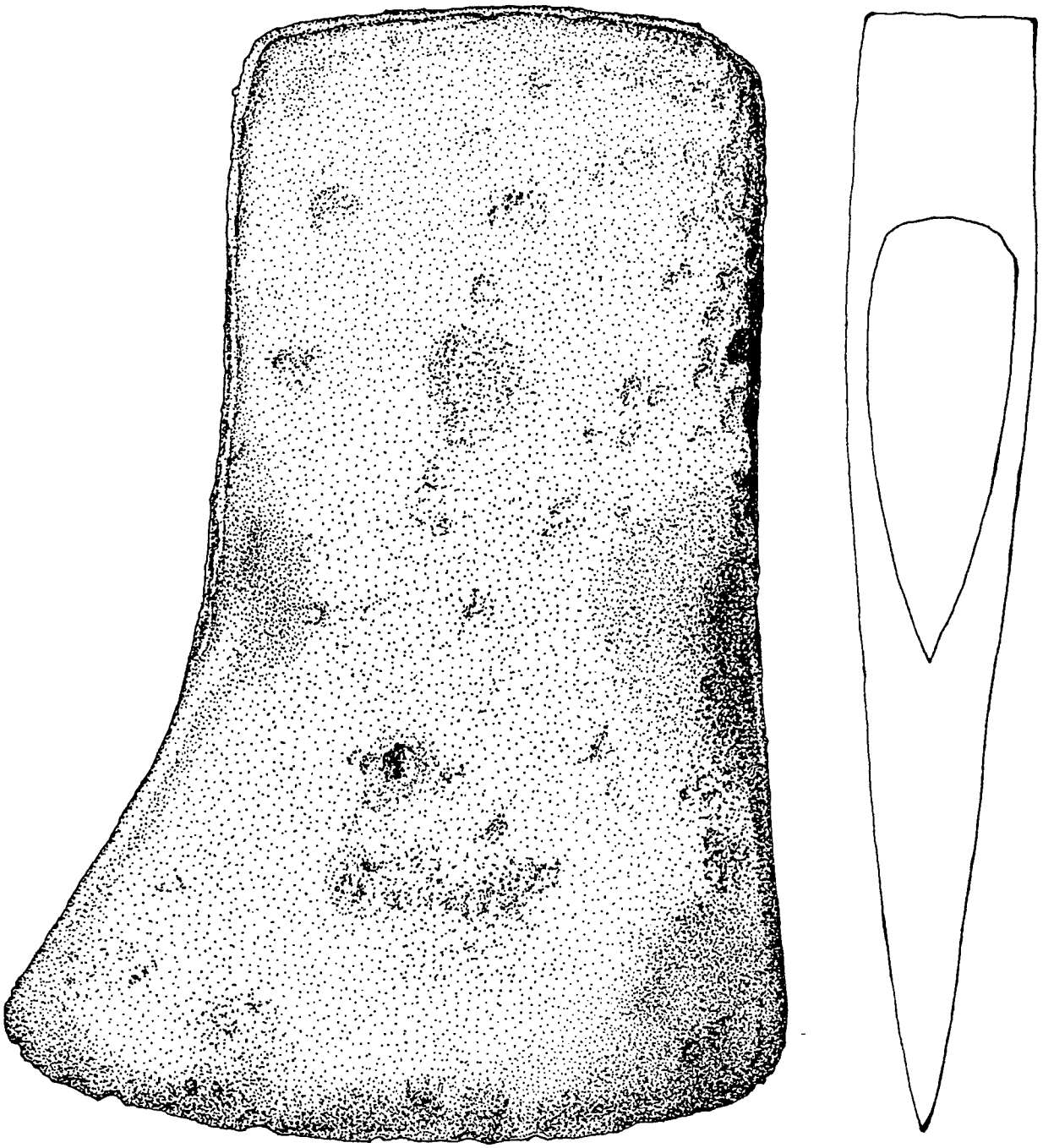


Figure 9. Metal axe from site FBH 70. (Scale 1:1)

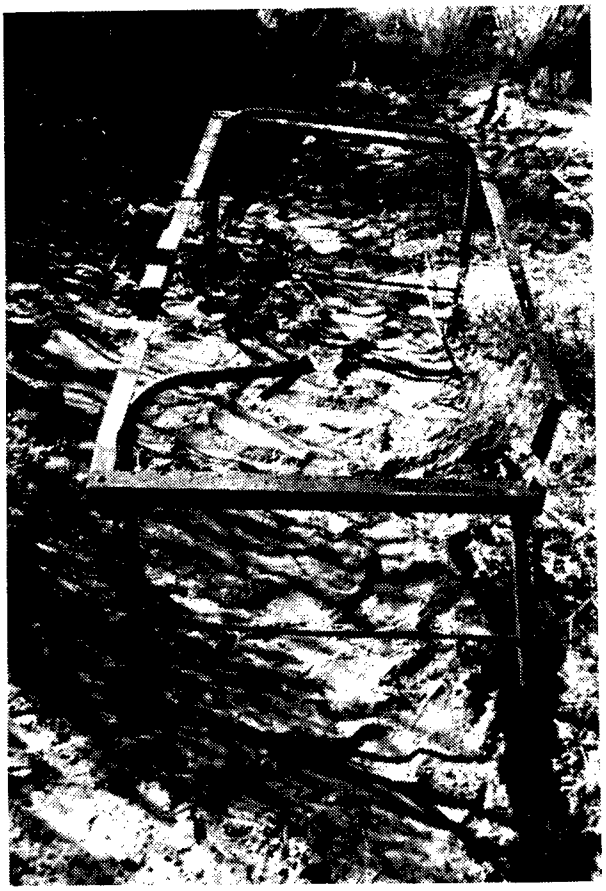


Figure 10. Metal bed frame from site FBH 70.

southwest quarter of the northwest quarter was sold by C.V. Nafe to Henry R. Murray. On August 4, 1922, the northern half of section 28 was sold by H.F. and Cornelia McKenney to Phil Eickman. On March 14, 1928, the southwest quarter of the northwest quarter was sold by Henry R. Murray to John B. Pitman. On March 15, 1929, that same section was sold to Ranch Realty Company. Lands surrounding FBH 70 were taken over by the U.S. government between 1948 and 1950, and land ownership has not changed to the present day.

Summary

The existence of both prehistoric and historic components at site FBH 70 requires a determination of the site's eligibility for inclusion in the NRHP under both Criteria B and D. Radiocarbon dating places the prehistoric component of the site within the Mesilla phase of the Formative period (see Chapter 3). Preliminary archival research indicates that the historic occupation may be related to the pre-1920 Newman Ranch (site FBH 56) approximately 1.8 km to the north-northwest. Although no structure was observed, the presence of a bed, nails, and axeheads in the artifact assemblage indicates that one could exist in subsurface

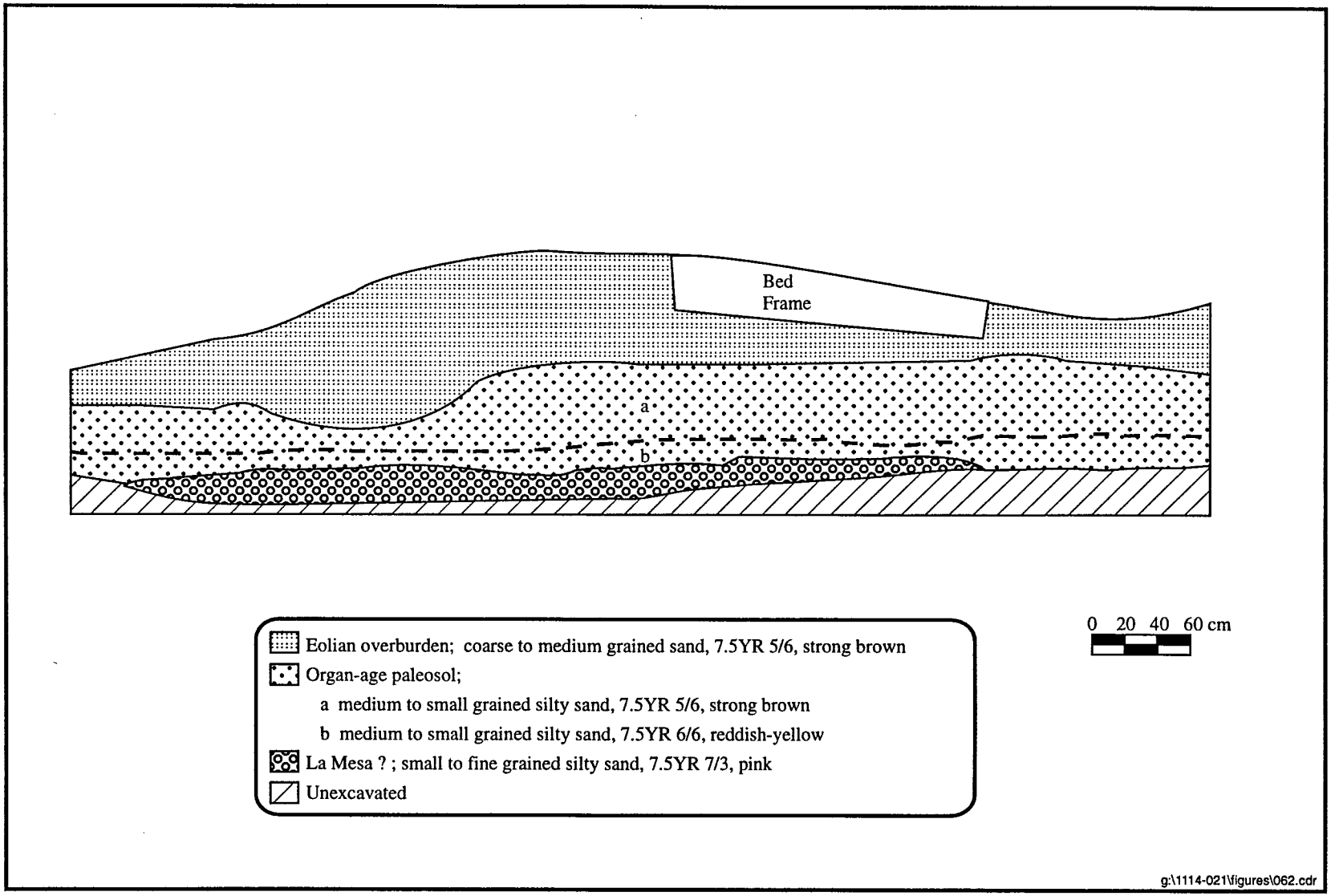


Figure 11. Backhoe Trench 1, profile of west wall, site FBH 70.

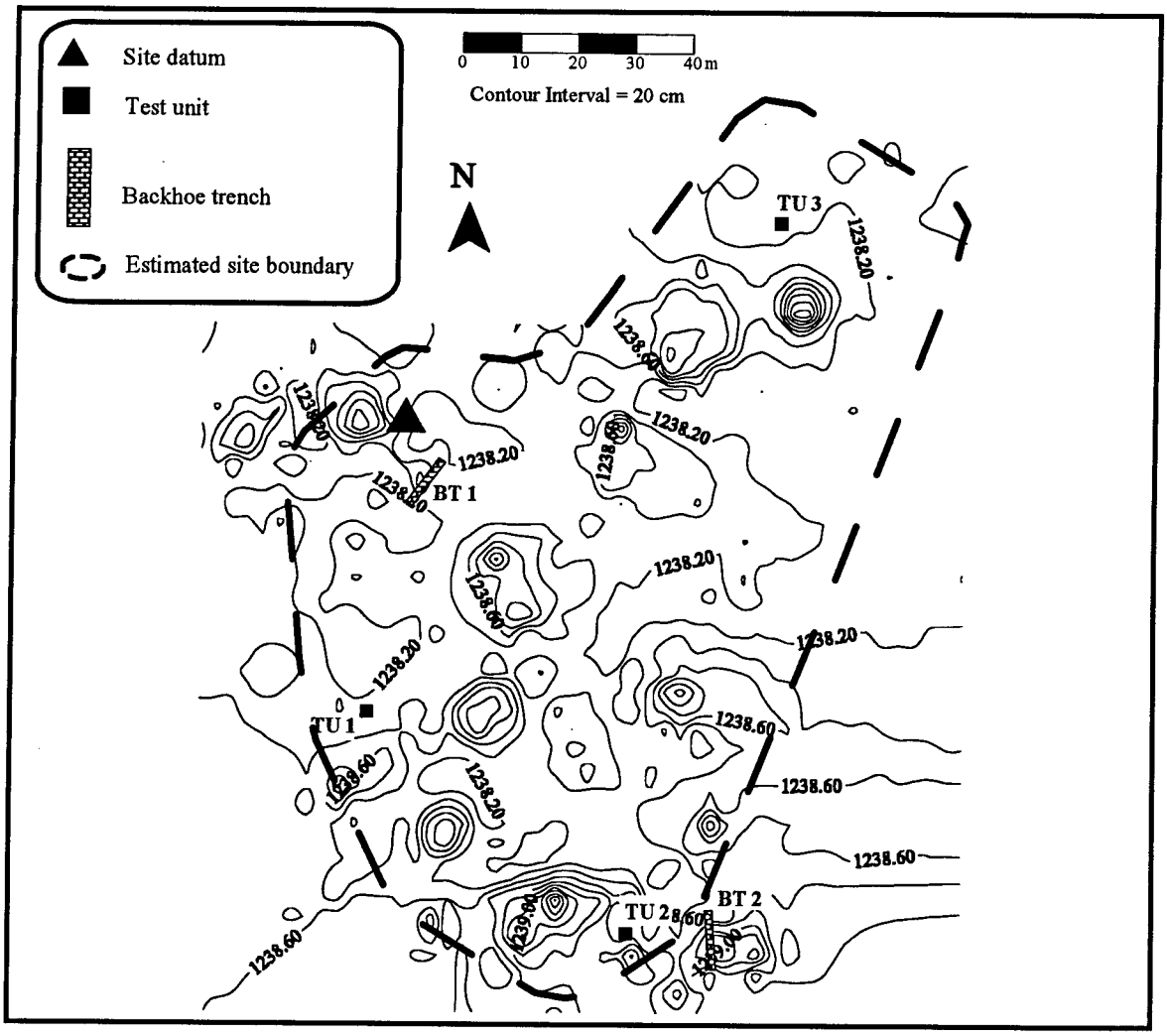


Figure 12. Contour map of site FBH 70.

context. Thus, site FBH 70 is considered to be eligible for inclusion in the NRHP. Any future archeological work should include excavation of backhoe trenches within site limits in search of a foundation or structural remains. Surface historic artifacts should be mapped and diagnostic materials collected.

Excavation of site FBH 70 should proceed according to the site excavation plan that is described in Chapter 6. A block excavation should be centered on TU #2 to maximize recovery of faunal remains identified in that unit. All prehistoric surface artifacts should be mapped and collected. Thus, data recovery is recommended so that the adverse effects to the cultural resources at this site by the projected use of the Patrol Base will have been mitigated.

Table 3
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FBH 70 (LA 97697)

TU#	Area m^2	m^3 Exca	Fea #/ Type	Strat Zone*	cm bs	botlglas	windglas	othr glas	can dia	metl n/diag	nail	cartrdg	other metl dia	other metl n/diag	cer	misc	prehst art	TTL Arti	Art /m^3	bone
1	4			S	S												1	1		
		1.14		Q4/Q3	0-47															
Total TU #1	*4*	*1.14*															*1*	*1*	*.88*	
2	4			S	S												1	1		
		.36		Q4	0-23												6	7		34
		.32	1/stain	Q3	2-56												4	4		26
		.10		Q3	17-43															1
				Q3	43-47															
Total TU #2	*4*	*.78*															*11*	*11*	*14.10*	*61*
3	4			S	S				1	1			1					3		
		.12		Q4	0-5															
		.32		Q4	1-20								2					2		
		.40		Q3	7-30										2			2		
Total TU #3	*4*	*1.24*							*1*	*1*			*3*		*2*			*7*	*8.33*	
Total	*12*	*3.16*							*1*	*1*			*3*		*2*		*12*	*19*	*6.01*	*61*
Surface Recovery																	2	2		

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

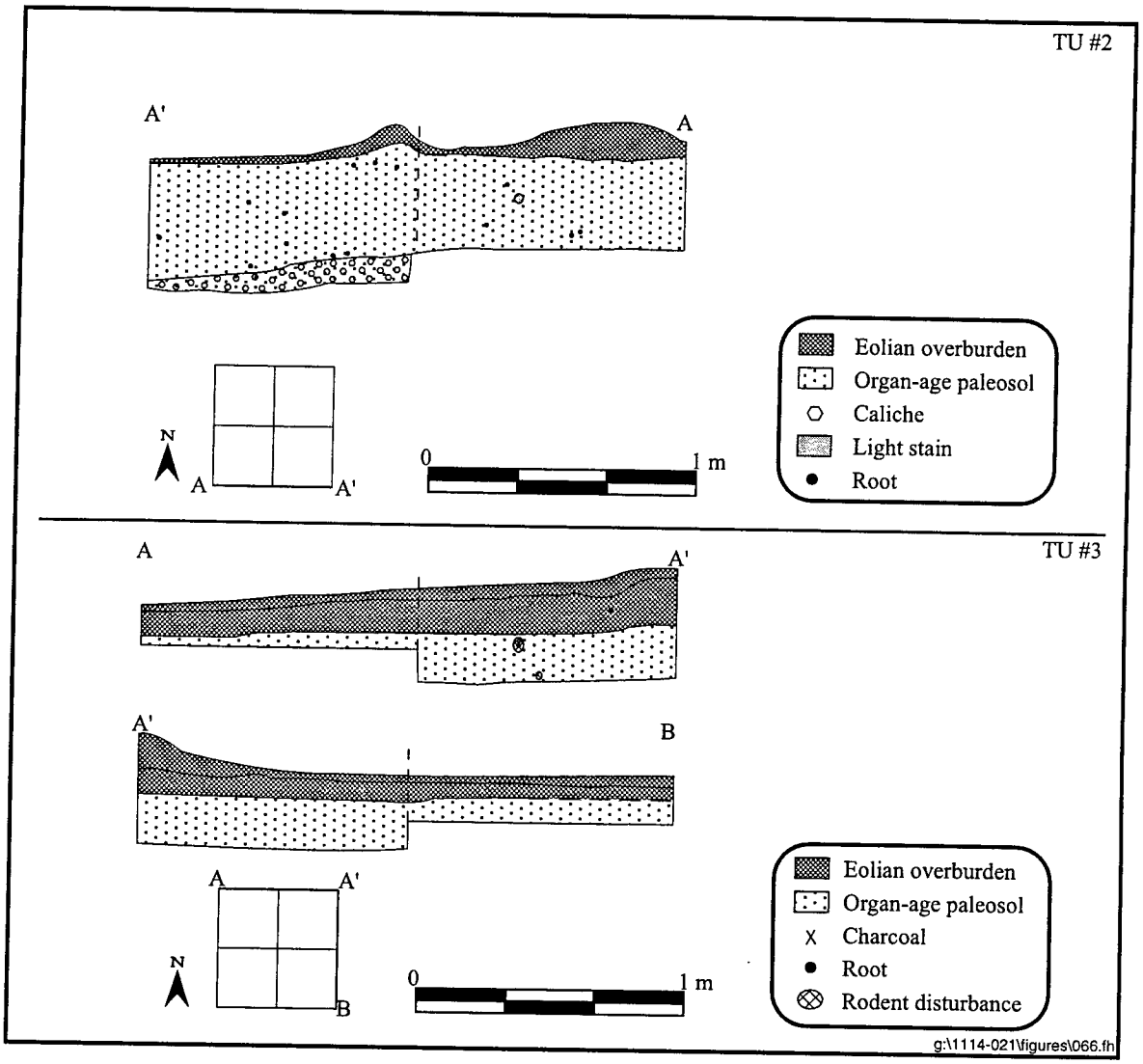


Figure 13. Profiles of TU #2 and TU #3, site FBH 70.

FB 3929 (LA 94889)

Eligibility Status:	Eligible
Radiocarbon Date:	1,020 ± 80 B.P. (A.D. 880-1205) 970 ± 80 B.P. (A.D. 905-920 and A.D. 950-1245)
Elevation (meters above mean sea level):	1,265 (4,149 ft)
Size (square meters)	
Previously Recorded:	225
Current:	208
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	++
Number of (4 m^2) Test Units	1.25
Total Area Tested (m^2):	5
Total Volume Excavated (m^3):	.44
Artifact Density (n/m^3):	56.82
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.36
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	8.1
Extent of Erosion (%):	20
Extent of Modern Disturbance (%):	15

Site FB 3929 is characterized by a Mapping Unit 2b/1b geomorphic surface (Monger 1993:102) and is situated in an area of interdune sand accumulation in the northwest corner of Patrol Base 2 (see Figure 7). The vegetation, consisting of mesquite, grasses, snakeweed and yucca, restricts ground surface visibility to approximately 70 percent.

The site consists of a low density scatter of unspecified brownware, chipped and ground stones, and fire-cracked rock in association with a .5-x-.5-m charcoal stain. Most of the cultural debris observed on the site surface was localized within 5 m of the charcoal stain. A few pieces of burned caliche were located about 8 m east-northeast of the stain. Fire-cracked rock materials included limestone and granite fragments. The excavated cultural assemblage includes 25 artifacts: a metate slab fragment, a mano fragment, two hammerstones (Figure 14), 13 debitage (10 flakes and three debris fragments), three cores, and five unspecified brownware sherds.

A single test excavation unit and two backhoe trenches were excavated (Figure 15). TU #1, a 2-x-2-m block, was placed so as to bisect the stain feature. Surface artifacts included one brownware sherd and two debitage. Excavation exposed a ring of charcoal and ash around the stain approximately 2 m in diameter just below the eolian overburden (Figure 16). It contained rich charcoal deposits down to 23 cm below surface where oxidized soils (core of the hearth) were encountered. Totally reduced ash localized around the oxidized hearth is reminiscent of pithouse ash fill. Subsurface artifacts include ground stone fragments (one mano fragment and one metate fragment), four ceramics sherds, 11 debitage, three cores, two hammerstones, and fire-cracked rock found in association with carbon stain, charcoal, and burned bone (Table 4). The metate fragment and a mano fragment were recovered from the feature fill and may have been used as hearth stones.



Figure 14. Hammerstones from site FB 3929. (Scale 1:1)

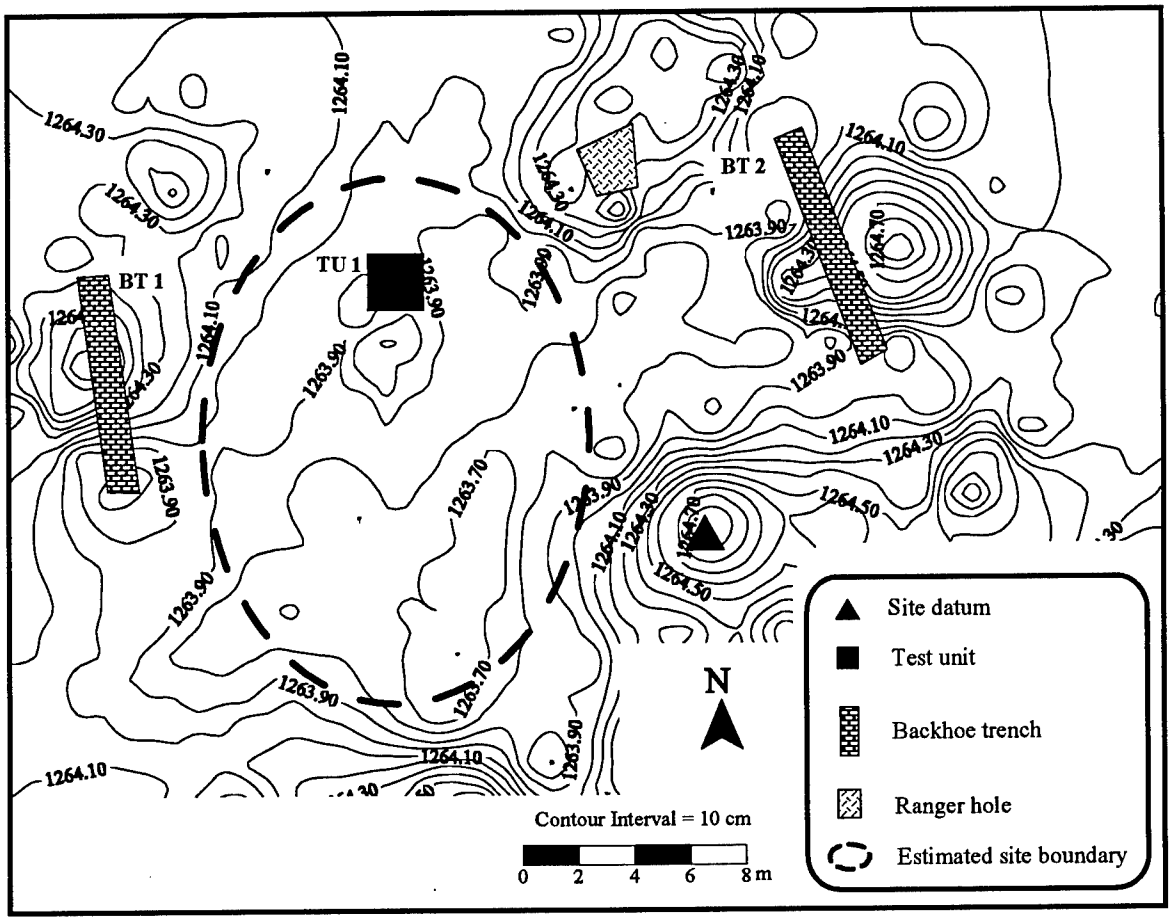


Figure 15. Contour map of site FB 3929.

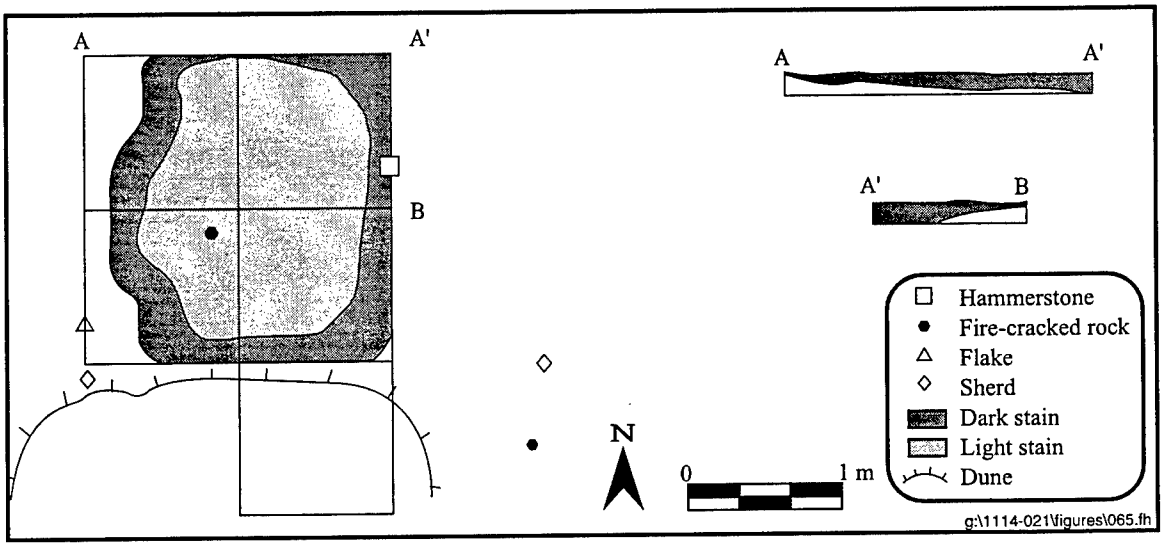


Figure 16. Plan view and profile of TU #1, F1, site FB 3929.

Table 4
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 3929 (LA 94889)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	5		1	Stain	S	S	1	2			3					
		.01			Q4	0-10										
		.11			Q4	0-6	1	8			10					
		.13			Q3	3-12	1	6	2		9		12	.07		
		.14			Q3	12-19	2	1			3		42	.09		
		.01			Q3	19-23							1			
		.01			Q4	0-1										
		.01			Q4/Q3	1-11		1			1		20			
		.02			Q3	11-23							21			
Total TU #1	*5*	*.44*	*1*				*5*	*18*	*2*		*25*	*56.82*	*96*	*.16*		*.36*
Total	*5*	*.44*	*1*				*5*	*18*	*2*		*25*	*56.82*	*96*	*.16*		*.36*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

Small animal bones, some of which were burned, were recovered from the contact zone between the eolian overburden and the subsurface (n=32) and from the subsurface (n=64). Faunal remains identified include jackrabbit, lagomorphs, and small to medium-sized mammals (Appendix I). Flotation, archaeomagnetic, and radiocarbon dating samples were collected from the feature fill. The archaeomagnetic sample which was collected from the oxidized hearth did not exhibit sufficient magnetization to obtain a date, perhaps due to the sandy soil from which the sample was taken (Appendix G). However, the radiocarbon analysis on two charcoal samples resulted in dates of 1,020 ± 80 B.P. (A.D. 880-1205) and 970 ± 80 B.P. (A.D. 905-920 and 950-1245) (Appendix B), placing the date of the feature within the Formative period. Analysis of the three flotation samples extracted from TU #1 resulted in the identification of purslane and dropseed grass remains, with smaller quantities of amaranthus, sunflower family, mustard, spurge, mesquite, and miscellaneous unidentifiable plant remains (Appendix J).

In comparison to other sites in the project area, fire-cracked rocks are scarce, and burned caliche nodules are absent from the hearth (see Table 4). This is an example of a hearth in which fire-cracked rocks appear to have played an insignificant role, a current issue not only in the Hueco Bolson, but also in Jornada Mogollon archeology. The stain feature surrounding the hearth appears to be a small burned brush structure still in primary context, but further excavation is required for clarity. The density of faunal remains from this site is substantially higher than average for the project area (Appendix I). As part of the backhoe trenching strategy, a small dune adjacent to the feature on the south side was trenched (BT 1), exposing patches of more charcoal stains (Appendix E, Table E-1). A second backhoe trench (BT 2) to the east revealed no cultural indicators (Figure 17). Most of the area around the feature displays considerable sand accumulation, potentially masking more cultural deposits. Site FB 3929 contains faunal, artifactual, structural, and environmental data that would add significantly to knowledge of the area prehistory and is, therefore, recommended as eligible for inclusion in the NRHP under Criterion D. The site is located, however, in an area of the Patrol Base regularly used by the military. Therefore, it is recommended that the current and projected adverse impacts on cultural resources be mitigated through data recovery. Any future archeological work should include block-excavation around the prehistoric burned brush structure.

FB 13145 (LA 106712)

Eligibility Status:	Eligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,237 (4,057 ft)
Size (square meters)	
Previously Recorded:	1
Current:	377
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	.51
Artifact Density (n/m^3):	5.88
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	6.90
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	10.4
Extent of Erosion (%):	35
Extent of Modern Disturbance (%):	< 10

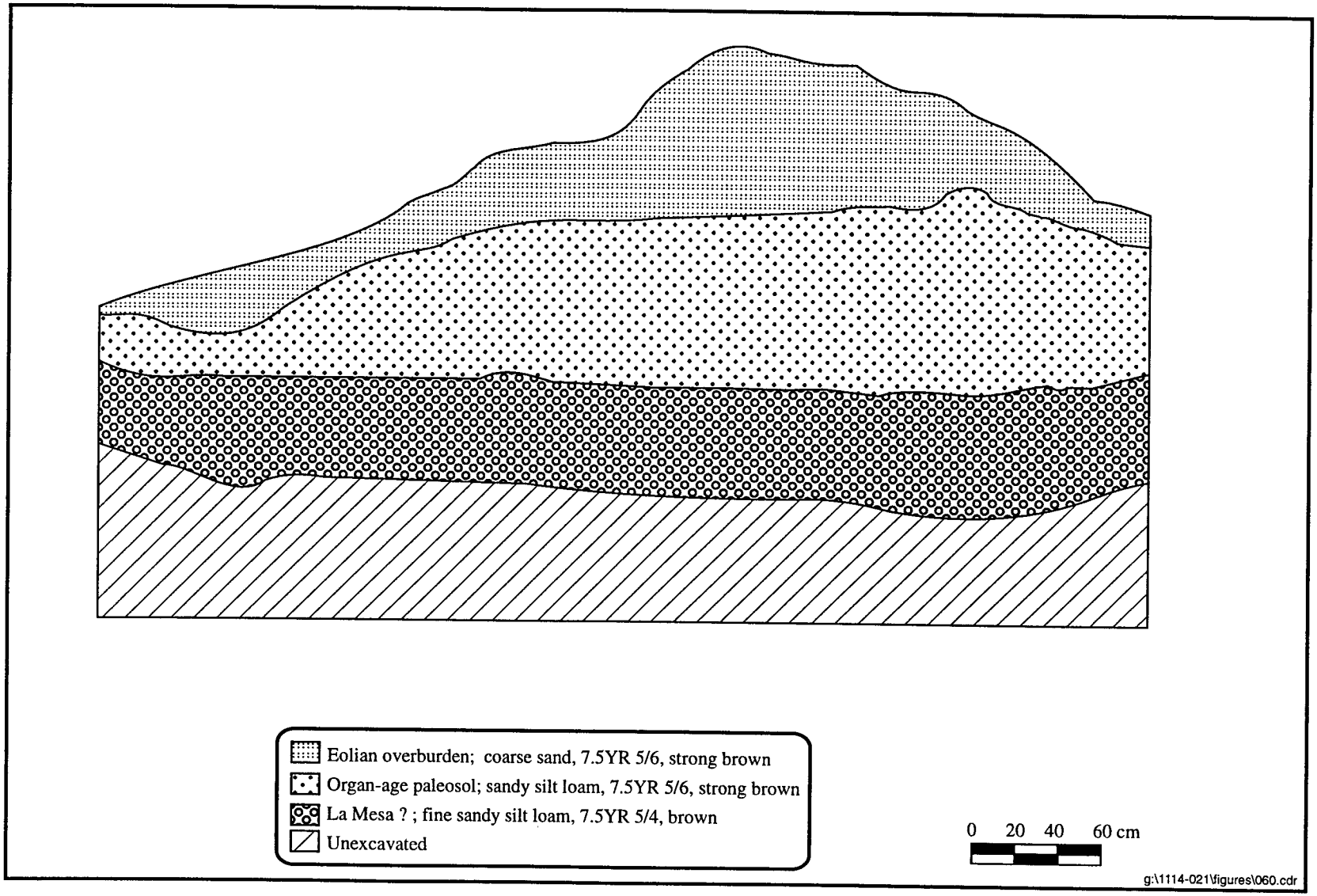


Figure 17. Backhoe Trench 2, profile of northeast wall, site FB 3929.

Site FB 13145 is located west of the center of Patrol Base 2 (see Figure 7) and within geomorphic surface Mapping Unit 2b/1b. The surrounding area rises slightly away from the site except in the west and south (Figure 18). Mesquite, mormon tea, yucca, mesa dropseed grass, and broom snakeweed constitute the dominant vegetation, which allows approximately 70 percent ground surface visibility.

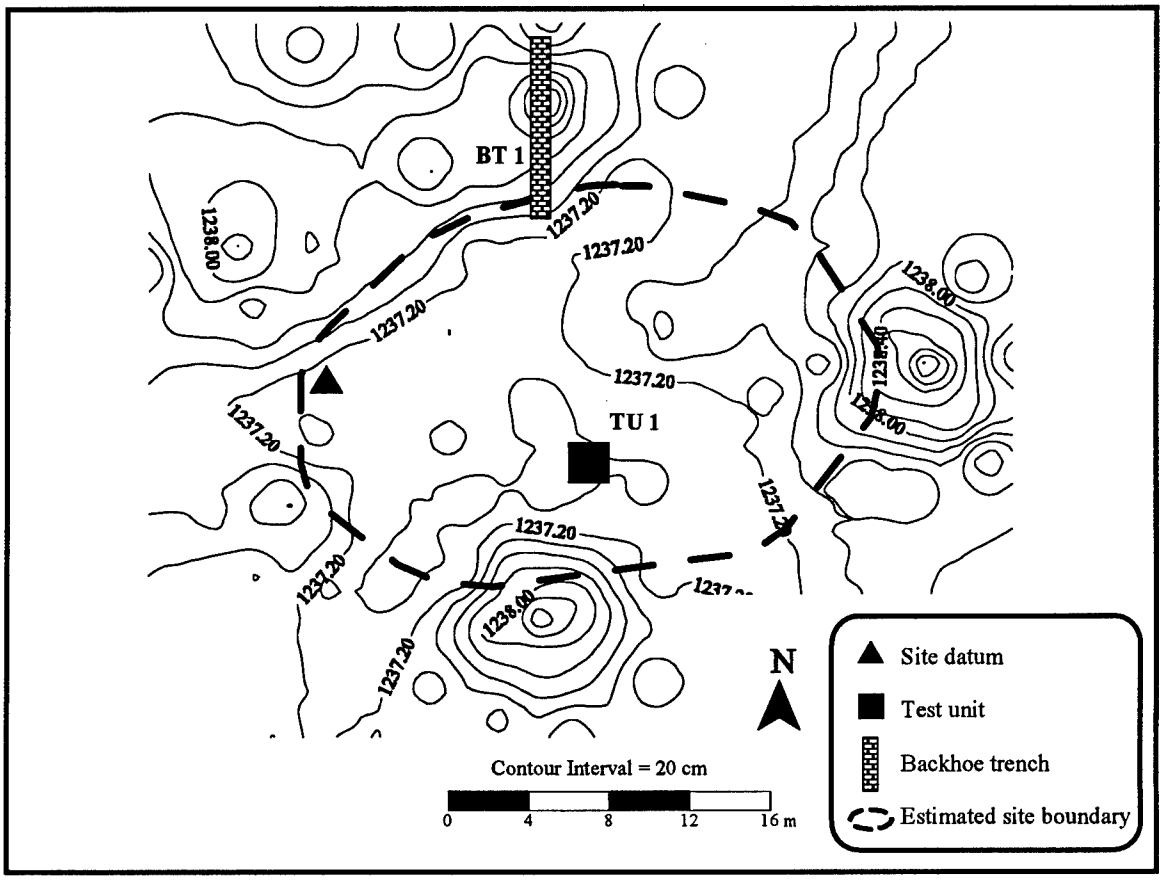


Figure 18. Contour map of site FB 13145.

The previous site designation was based on the presence of an isolated hearth in a deflated interdune area, but the discovery of a light scatter of chipped stone and ground stone on the surface has expanded the site to 377 m^2. The hearth (F1) consists of a 1-x-1-m partially disarticulated concentration of fire-cracked rock and burned caliche with slight subsurface staining (Figure 19). The test excavation exposed a diffuse charcoal stain in the lower portion of the eolian overburden. The staining was observed to a depth of 10 cm below the eolian overburden. The feature appears to have been extensively eroded with only minor evidence of stain remaining.

One 2-x-2-m test unit (TU #1) was excavated at site FB 13145. Recovered from the excavation of TU #1 were a single chert flake, one mano fragment, one metate fragment, 1.97 kg of fire-cracked rock, and 1.55 kg of burned caliche, all from the top 19 cm vertical depth of the eolian overburden (Table 5). Excavation was terminated at 29 cm below surface. No dating or flotation samples were recovered. A single backhoe trench (BT 1) excavated in the northern portion of the site exposed no cultural deposits (Figure 20; Appendix E).

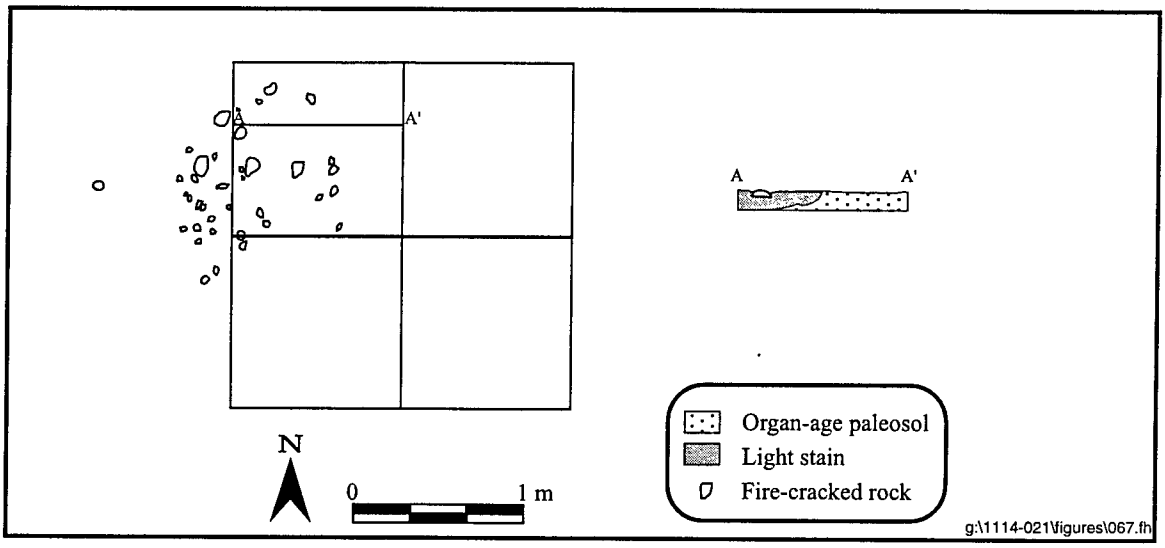


Figure 19. Plan view and profile of TU #1, F1, site FB 13145.

The recovery of burned caliche and fire-cracked rock from a subsurface context indicates that the research potential for site FB 13145 is not exhausted. The test unit should be expanded to a block-excavation to allow data recovery, including a radiocarbon dating sample, from the unexcavated half of the feature. The 100-percent mapping and collection of surface artifacts is recommended to assure that potential adverse effects on cultural resources from intended use of the Patrol Base have been effectively mitigated.

FB 13146 (LA 106713)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	?
Size (square meters)	
Previously Recorded:	?
Current:	Unmapped
Feature (+ = present; 0 = absent):	0
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	.74
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	9.2
Extent of Erosion (%):	25
Extent of Modern Disturbance (%):	8

Table 5
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13145 (LA 106712)

	TU#	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
	1	4		1	BC/FCR/ Stain	S	S			2		2			1.47	.28	
			.01			Q4	0-10		1			1			.44	.60	
			.40			Q4/Q3	0-19								.06	.67	
			.10			Q3	13-29										
Total TU #1		*4*	*.51*	*1*					*1*	*2*		*3*	*5.88*		*1.97*	*1.55*	*6.90*
Total	*1*	*4*	*.51*	*1*					*1*	*2*		*3*	*5.88*		*1.97*	*1.55*	*6.90*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

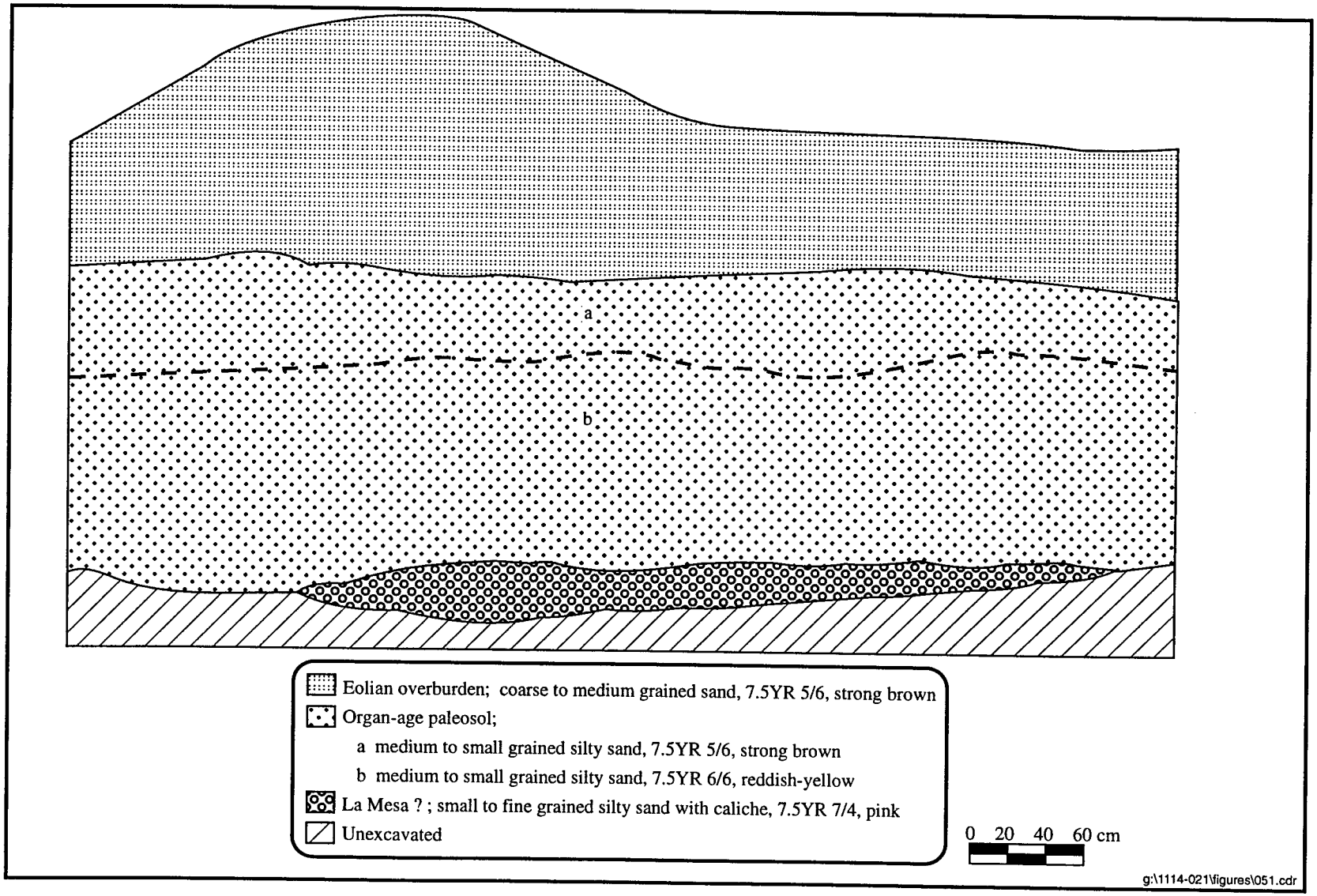


Figure 20. Backhoe Trench 1, profile of east wall, site FB 13145.

Site FB 13146 is located in the northwest portion of Patrol Base 2 (see Figure 7) and occupies geomorphic surface Mapping Unit 2b/1b (Monger 1993:102). The vegetation is composed of grass, snakeweed, four-wing saltbush, mesquite, and yucca, which allows approximately 70 percent ground surface visibility.

The site was previously identified (Brown 1991) as an isolated hearth containing limited amounts of brownware and Mimbres Black-on-white sherds, core fragments, and a burned caliche/charcoal stain feature. Although the previously identified location was inspected, only one flake and five caliche nodules, whose burned status was very tenuous, were observed in a 5-x-3-m area. An area of approximately 300 m x 150 m around the location plotted on the aerial photograph was resurveyed. The resurvey located four brownware sherds north of the site location but neither the locality nor the artifact assemblage corresponds to the original description of the site. It is possible that the location of this site was previously misplotted on the aerial photograph by previous survey crews.

A 2-x-2-m test unit was excavated to a maximum depth of 35 cm below surface along the edge of a dune at the spot depicted on the aerial photograph (Table 6). The test unit was sterile of cultural material. A backhoe trench dug to a depth of 1.8 m, close to the test unit, did not expose any subsurface deposits. There are not enough cultural materials at locality FB 13146, surface or subsurface, to meet site criteria and, therefore, no further work is recommended.

FB 13338 (LA 106697)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,239 (4,063 ft)
Size (square meters)	
Previously Recorded:	800
Current:	522
Feature (+ = present; 0 = absent):	0
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	.86
Artifact Density (n/m^3):	12.79
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.01
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	11.5
Extent of Erosion (%):	70
Extent of Modern Disturbance (%):	10

Site FB 13338 is located in the northeast portion of Patrol Base 2 (see Figure 7). The land surrounding site FB 13338 rises gently northward but remains relatively level to the east, while sloping gently to the south (Figure 21). The site area is characteristic of geomorphic surface Mapping Unit 1a/1b (Monger 1993:102) where caliche gravels occur in low frequencies in interdune deflated areas. The vegetation, consisting of mesquite, yucca, mormon tea, broom snakeweed, and dropseed grass, allows 65 percent ground surface visibility. Over 70 percent of the site is eroded, and moderate tank disturbance is evident over most of the site.

Table 6
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13146 (LA 106713)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	Hist Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4	.74			Q4/Q3	0-35										
Total	*4*	*.74*														

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

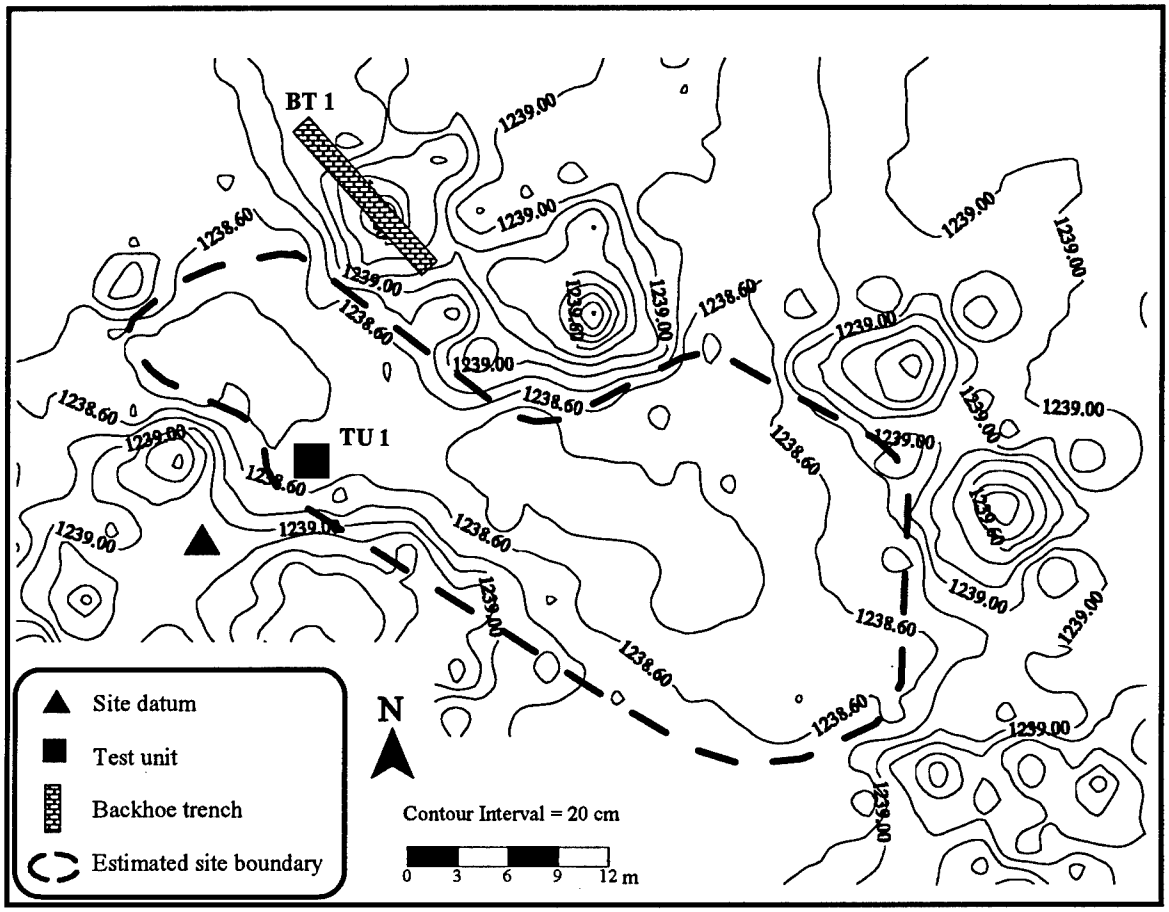


Figure 21. Contour map of site FB 13338.

Site FB 13338 consists of low density amounts of lithics, ceramics, burned caliche, and fire-cracked rock in a deflated interdune area; no features were observed on the site. The artifact assemblage from FB 13338 consists of 11 artifacts (all chipped stone) from the test unit excavation and one from the surface (ceramic rim sherd). Most (95 percent) of the chipped stone assemblage, including a hammerstone, were localized in a 4-m^2 area along the edge of a linear dune. Most ceramics present on the surface were localized about 15 m east of the chipped stone scatter locus; one sherd was observed about 8 m northwest of the lithic scatter locus. An El Paso Polychrome rim sherd was collected from the surface (ca. post A.D. 1100) (Figure 22). A few burned caliche nodules and fragments were found in association with the chipped stone, and one piece was observed along the lower slopes of the dune, suggesting an original elevation of about 30 cm above the deflated area. An isolated, large granitic fire-cracked rock was located 7 m east of the chipped stone scatter, and a few burned caliche nodules within close proximity to the ceramics were 10 m farther east.

TU #1 (2-x-2 m) was placed south of and adjacent to the chipped stone scatter along the edge of a dune to test for subsurface cultural deposits at, and above, the highest observed burned caliche nodule elevation (see Figure 21). Eleven pieces of chipped stone (nine flakes, two debitage, and one core) and .01 kg of burned caliche were recovered from eolian overburden at a depth of 0-9 cm below surface (Table 7); no subsurface cultural deposits were encountered. No staining or other evidence of subsurface cultural deposits was

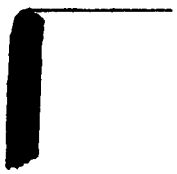


Figure 22. El Paso Polychrome rim sherd from site FB 13338. (Scale 1:1)

observed, and no radiocarbon or flotation samples were collected. The test unit was excavated to 30 cm below surface and the 1-x-1-m northeast quadrant was excavated down to 43 cm below surface.

Overall, the assemblage consists of a few chert flakes, one rhyolite hammerstone, a few pieces of angular debris, and ceramics (see Table 7) not closely associated with the chipped stone locus. Site FB 13338 has no surface features and lacks evidence for intact deposits. A single backhoe trench was made through a dune (see Figure 21) flanking the lithic scatter but no cultural deposits were exposed (Appendix E). Based on the lack of subsurface artifacts and features (surface or subsurface), the potential for cultural resource data from site FB 13338 is considered low. Therefore, it is recommended that site FB 13338 be considered ineligible for inclusion in the NRHP. The projected use of the Patrol Base will not adversely affect the cultural resources at this site. No further work is recommended.

Table 7
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13338 (LA 106697)

	TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
	1	4	.17			Q4	0-9		11			11				.01	
			.69			Q4/Q3	2-43										
Total TU #1		*4*	*.86*						*11*			*11*	*12.79*			*.01*	*.01*
Total	*1*	*4*	*.86*						*11*			*11*	*12.79*			*.01*	*.01*
Surface Recovery								1				1					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

PATROL BASE 3, MANEUVER AREA 8
SITES FB 3389, FB 3398

The quadrat lies 5.5 km northeast of Newman, 1.5 km off Meyer Range road to the north, and 1.25 km east of U.S. Highway 54 (Newman Quadrangle, New Mexico, Otero County) at an elevation of 1,239 m amsl. The topography is relatively level but a slight downslope is noted in the northern half of the patrol base. A slight depression occupies one-seventh of the northern portion of the quadrat. The southern half of the quadrat marks the beginning of a northward anticline of a denuded ridge top where Pleistocene-age La Mesa petrocalcic bedrock is visible on the Meyer Range roadbed to the southwest of the quadrat. Much of the southeastern part of the quadrat lies within the western rim of a playa ridge (Figure 23).

Three geomorphic surface Mapping Units (Monger 1993:102) are represented: Mapping Unit 2a/1b dominates the southwestern corner; the northwestern corner is characterized by a Mapping Unit 1c surface; and the rest of the quadrat occupies a Mapping Unit 2b/1b surface. The range of geomorphic surfaces signifies marked interdune erosion and deflation. Two tested sites are located in the northern half of the quadrat in association with Mapping Unit 2b/1b. An additional four sites (given temporary field numbers of FS 012, FS 013, FS 014, and FS 015) located during survey are characterized by geomorphic surfaces Mapping Units 2a/1a (Appendix A). The Patrol Base is in considerable use by the military, with military traffic from both wheeled and tracked vehicles evident over most of the quadrat, especially on the northern half.

FB 3389 (LA 94392)

Eligibility Status:	Unknown
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,242 (4,073 ft)
Size (square meters)	
Previously Recorded:	300
Current:	1,568
Feature (+ = present; 0 = absent):	++
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	3
Total Area Tested (m^2):	12
Total Volume Excavated (m^3):	2.09
Artifact Density (n/m^3):	6.22
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.35
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	10.6
Extent of Erosion (%):	50
Extent of Modern Disturbance (%):	20

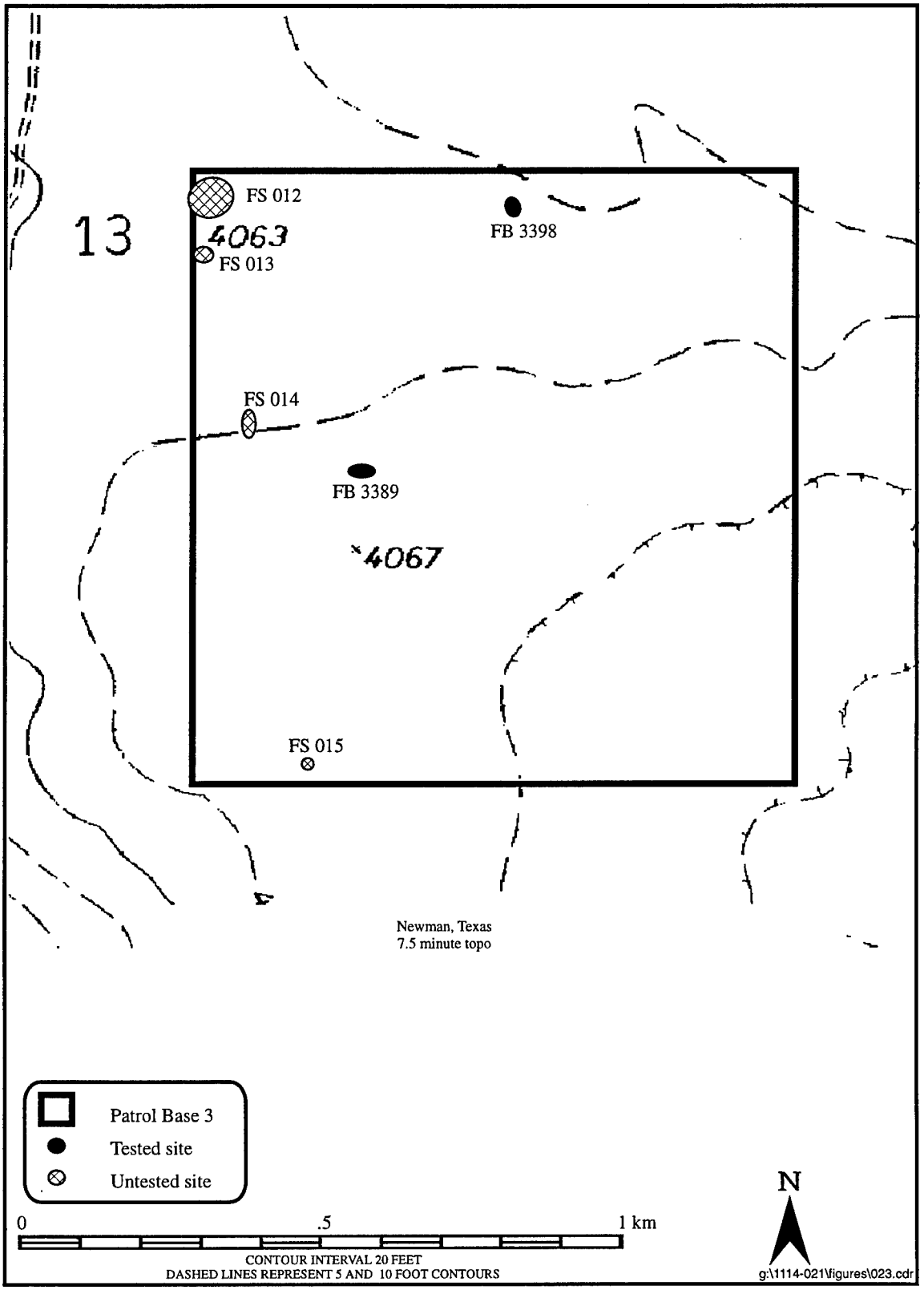


Figure 23. Site locations within Patrol Base 3 (see Appendix A for information on untested sites).

Site FB 3389 is located west of the center of Patrol Base 3 (see Figure 23). Although most of the quadrat is dominated by a Mapping Unit 2b/1b geomorphic surface (Monger 1993:102) site FB 3389 exhibits Mapping Unit 1a characteristics. Approximately 50 percent of the site displays surface caliche nodules. The vegetation, consisting of mesquite (>50 percent), four-wing saltbush, yucca, broom snakeweed, forbes and sparse grass, allows 60 percent ground surface visibility.

As previously recorded (Carmichael 1979), the site consists of a ceramic concentration (90+ pieces) including both El Paso Polychrome and unspecified brownware, a low density scatter of chipped and ground stone, two small areas of staining, and one 2-x-2-m concentration of burned caliche and fire-cracked rock. Two charcoal stains about 10 m apart were located on the west side of the site. Both charcoal stains were found to include few associated brownware sherds. Four El Paso Polychrome rim sherds observed in association with the more southerly of the two stains were recovered from the site (Figure 24). The burned caliche feature/fire-cracked rock is situated in a similar interdune area about 30 m east of the charcoal stains/ceramic concentration, and contains approximately 400 pieces in a 2-x-2-m area. Three test excavation units and two backhoe trenches were dug (Figure 25).

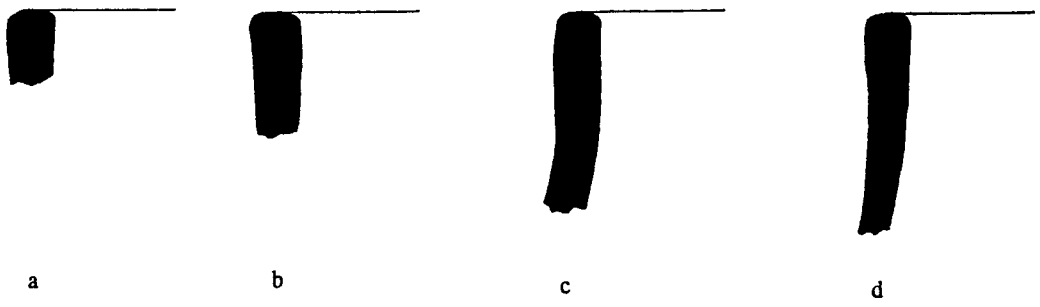


Figure 24. (a-d) El Paso Polychrome rim sherds from site FB 3389. (Scale 1:1)

TU #1, a 2-x-2-m block (see Figure 25) placed over a ceramic concentration and charcoal stain (F1), was excavated to a depth of 30 cm below surface (Table 8). Three unspecified brownware sherds were recovered from eolian overburden between 0-13 cm below surface.

TU #2, a 2-x-2-m block, was placed over the burned caliche/fire-cracked rock feature (F2, Figure 26). Scanty amounts of fire-cracked rocks (.33 kg) and burned caliche (.40 kg) were collected from the surface. A much smaller quantity (.01 kg) of burned caliche was recovered from the eolian overburden between 0-7 cm below surface (see Table 8). The test unit was excavated to a maximum depth of 17 cm below surface; no artifacts were recovered from TU #2.

TU #3, a 1-x-4-m block, was placed over a charcoal stain (F3). One sherd was recovered from the eolian overburden; nine sherds were recovered from the subsurface in primary context, between 2-29 cm below surface (see Table 8). Deeper testing (down to 50 cm below surface) proved to be sterile of cultural deposits.

No features or buried cultural deposits were revealed by the two backhoe trenches excavated at FB 3389 (Appendix E).

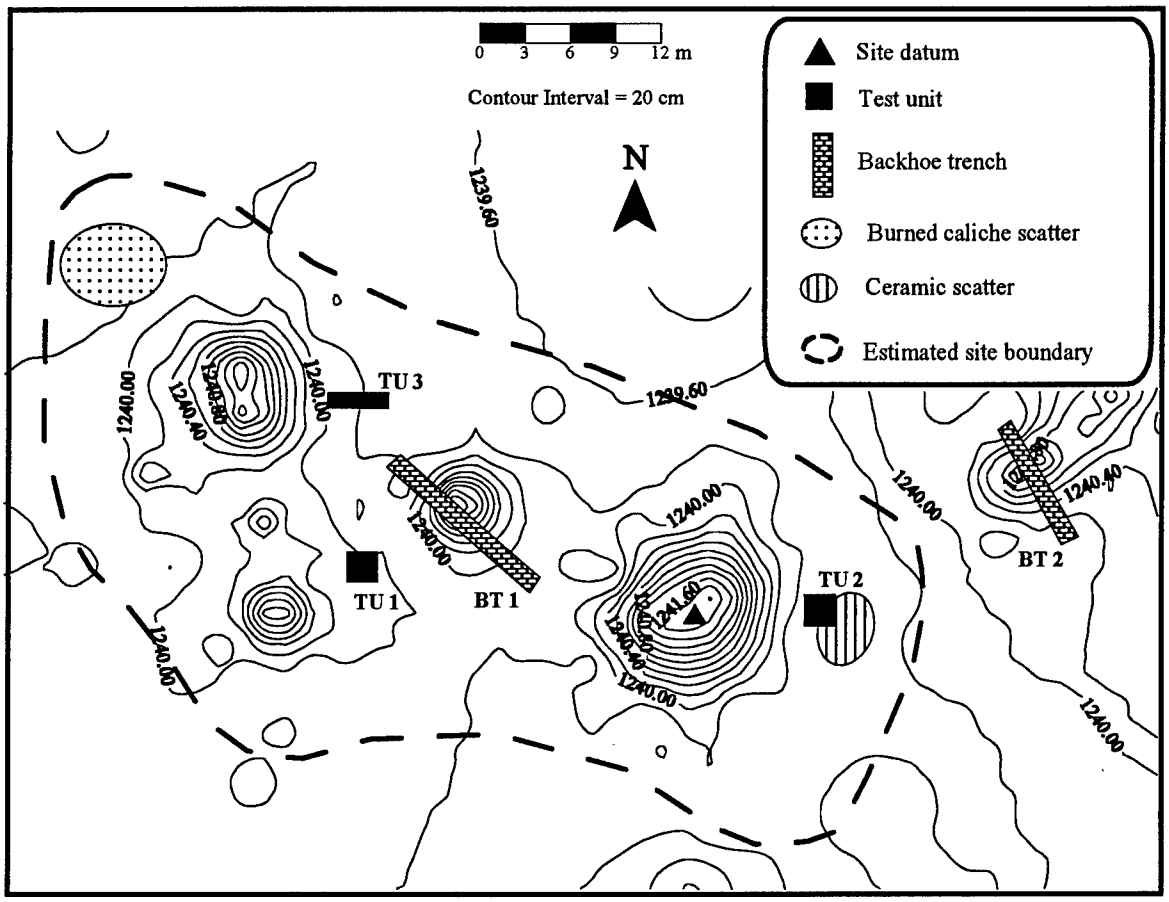


Figure 25. Contour map of site FB 3389.

The presence of El Paso Polychrome on sites became more prevalent after A.D. 1100. Therefore the El Paso Polychrome sherds found on site FB 3389 could indicate a component/occupation within the Middle to Late Formative period (see Chapter 5).

The area of site FB 3389, one of the few sites tested containing polychrome pottery, has expanded significantly. Considering that all features identified on the site were exposed in tank trails, the probability of unexposed features, albeit low, still exists, and the eligibility of site FB 3389 for inclusion in the NRHP is at the present unknown. Before NRHP eligibility can be justifiably assessed, additional testing is recommended to (1) increase the area tested to be statistically representative of the expanded site area, and (2) recover samples for radiocarbon dating.

Table 8
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 3389 (LA 94392)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC/ m^3
1	4	.13	1	Ceramic Conc/ Stain	Q4	0-13	3				3					
		.46			Q4/Q3	1-30										
Total TU #1	*4*	*.59*	*1*				*3*				*3*	*5.08*				
2	4		2	BC/FCR	S	S								.33	.40	
		.12			Q4	0-7									.01	
		.23			Q3	1-17										
Total TU #2	*4*	*.35*	*1*											*.33*	*.41*	*2.11*
3	4	.28			Q4	0-20										
		.09	3	Stain	Q4	0-5	1				1					
		.14			Q3	4-30										
		.12			Q3	2-29	9				9					
		.52			Q3	2-50										
Total TU #3	*4*	*1.15*	*1*				*10*				*10*	*8.70*				
Total	*12*	*2.09*	*3*				*13*				*13*	*6.22*		*.33*	*.41*	*.35*
Surface Recovery							4				4					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

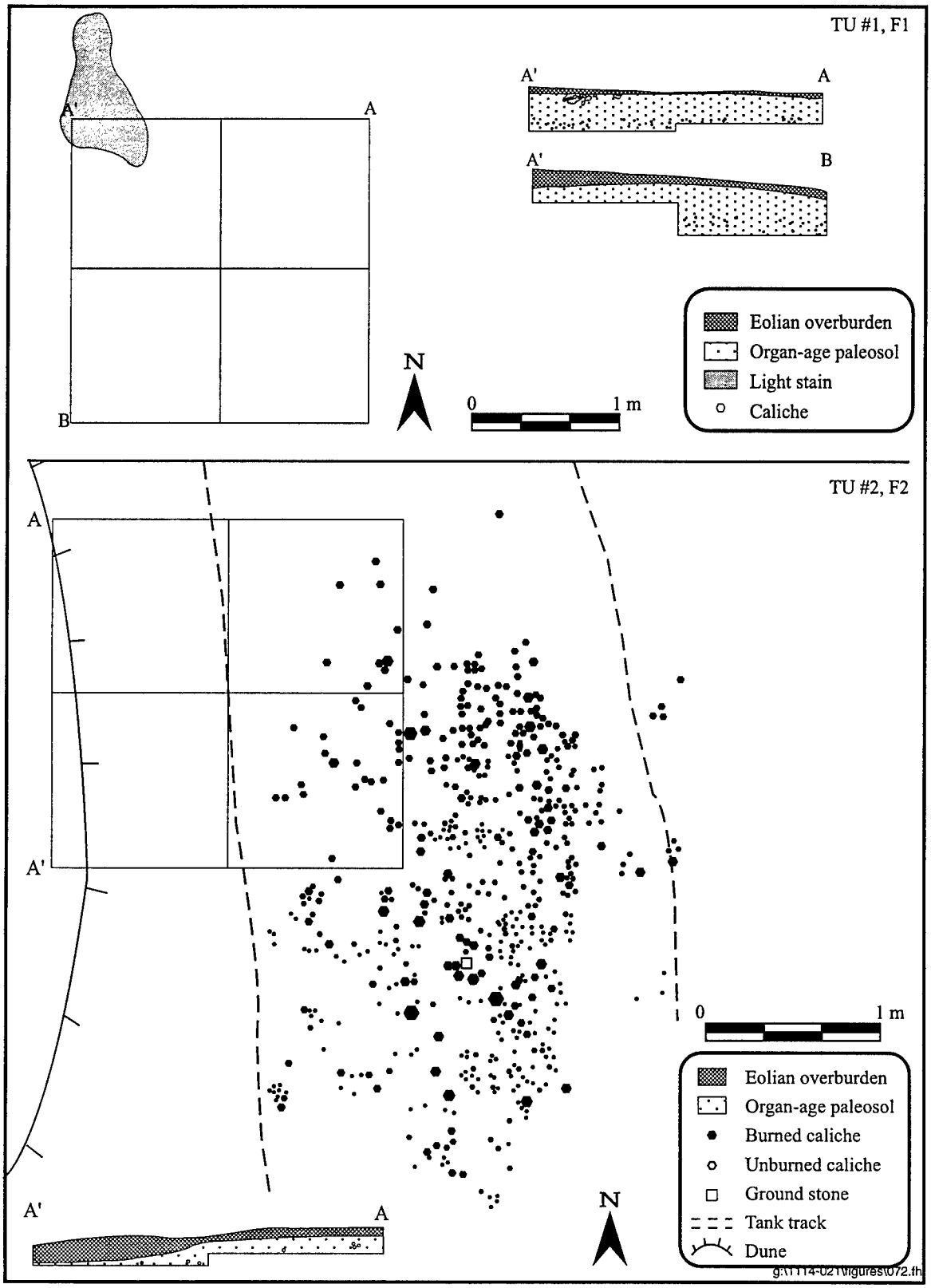


Figure 26. Plan views and profiles of TU #1, F1, and TU #2, F2, site FB 3389.

FB 3398 (LA 94361)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,241 (4,070 ft)
Size (square meters)	
Previously Recorded:	100
Current:	224
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units:	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	.35
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.03
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	8
Extent of Erosion (%):	75
Extent of Modern Disturbance (%):	45

Site FB 3398, located near the northern boundary of Patrol Base 3 (see Figure 23), occupies geomorphic surface Mapping Unit 2b/1b (Monger 1993:102), where the interdune deflations are markedly scoured. Mesquite, yucca, broom snakeweed, and a sparse growth of four-wing saltbush constitute the vegetation, allowing 80 percent ground surface visibility.

The site is located between low dunes overlooking a slight depression to the north. The entire site consists of a burned caliche concentration, extending along 7 m of tank road. Most of the surface surrounding the site is extensively eroded, exposing caliche nodules in high frequency (about 100 pieces per m^2) on approximately 75 percent of the site surface. Although the burned caliche feature is spread over a 7-m length of tank trail and exhibits two concentration loci, the overall scatter distribution suggests a direct relationship between both concentrations. Hence a single feature is presumed. The burned caliche predominantly consists of small (1-2-cm diameter) gravels (approximately 100 pieces) but a few larger pieces (n=4) were present in the western concentration. No other artifacts or cultural debris were observed on the site surface (Figure 27).

TU #1 (2-x-2 m) was excavated south of, and adjacent to, the eastern concentration where a dune edge indicated potential for soil depth (see Figure 27). The unit was excavated higher up the slope of exposed cultural debris. The only cultural debris recovered was a very small quantity of burned caliche (Table 9) from 0-11 cm below surface. No intact subsurface deposits were observed from the excavation, which was terminated at 18 cm below surface. A backhoe trench (1-m deep) dug close to the burned caliche scatter exposed no subsurface cultural deposit (Appendix E).

Based on the lack of artifacts and intact features (surface and/or subsurface), the potential for cultural resource data from site FB 3398 is considered low. Therefore, it is recommended that site FB 3398 be considered ineligible for inclusion in the NRHP. The projected use of the Patrol Base will not adversely affect the cultural resources at this location. No further work other than annual monitoring for cultural features that may become exposed in the future is recommended.

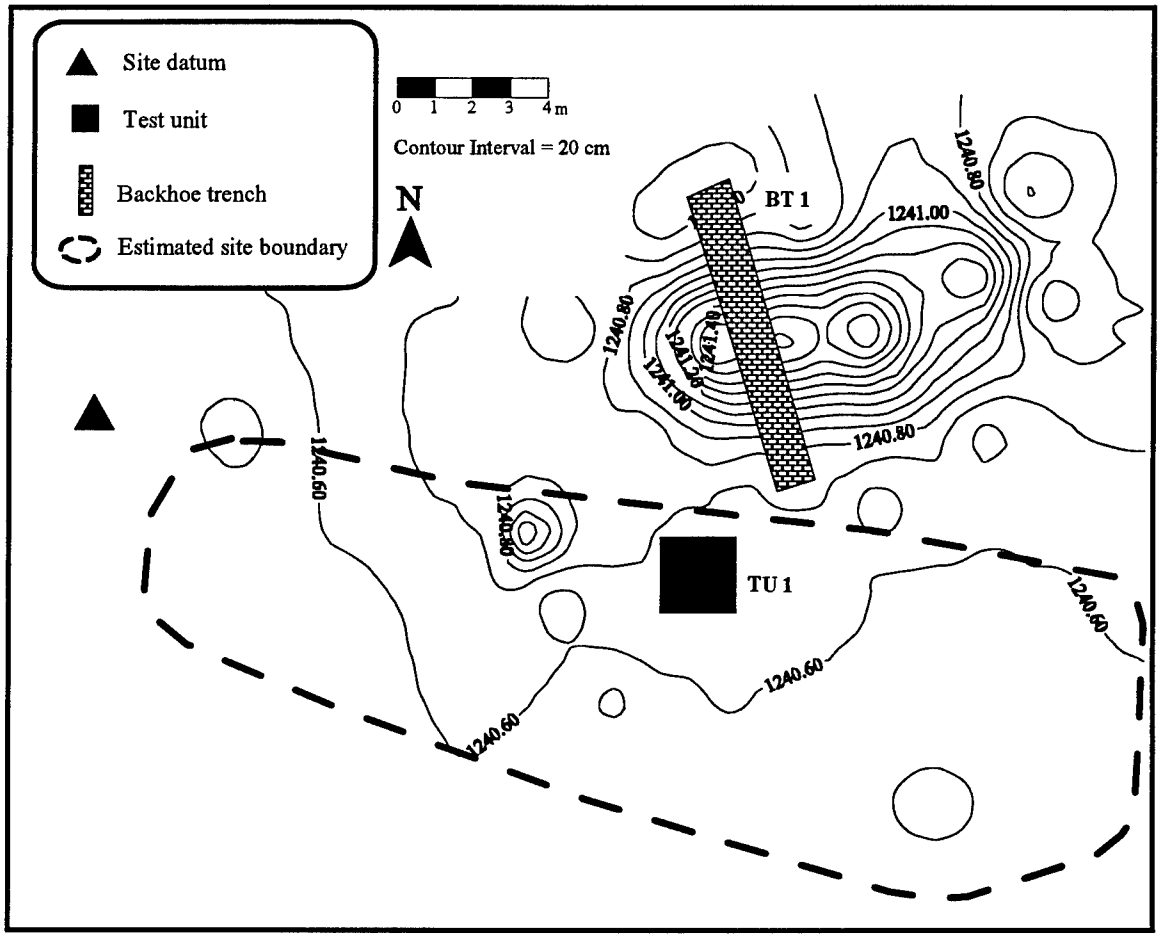


Figure 27. Contour map of site FB 3398.

Table 9
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 3398 (LA 94361)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4	.18	1	BC	Q4	0-11									.01	
		.17			Q3	2-18										
Total TU #1	*4*	*.35*	*1*												*.01*	*.03*
Total	*4*	*.35*	*1*												*.01*	*.03*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

PATROL BASE 4, MANEUVER AREA 1a
SITES FB 7820, FB 7823

Patrol Base 4 lies 2 km south-southeast of Newman, Texas and .75 km east of U.S. Highway 54 (Fort Bliss NE Quadrangle, Texas, El Paso County) at 1,218 m amsl (Figure 28). Most of the quadrat is in a strikingly open and flat area overgrown with grasses. The southwest half of the quadrat occupies a Mapping Unit 3 geomorphic surface, and the northwest half is on a Mapping Unit 2b surface (Monger 1993: 36). Grass predominates but broom snakeweed, yucca, and limited amounts of four-wing saltbush are also present. Ground visibility is 30-40 percent. Shallow Hueco-Wink association soils overlie a La Mesa indurated caliche horizon. A single hearth (Site FB 7820) is the only cultural manifestation previously recorded (Whalen 1976) on the open flat area of the quadrat. A pedestrian survey found no other sites.

The northeast quarter of the quadrat is characterized by a Mapping Unit 2b geomorphic surface. It is dominated by coppice dunes, separated by narrow interdune areas which give the topography a slightly elevated appearance. Site FB 7823 occupies several deflated interdune areas.

FB 7820 (41EP2248)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,218 (3,995 ft)
Size (square meters)	
Previously Recorded:	400
Current:	960
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1 (+four 1 x 1 m)
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.42
Artifact Density (n/m^3):	2.11
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.76
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	12.3
Extent of Erosion (%):	30
Extent of Modern Disturbance (%):	10

Site FB 7820 is located on the open grassy and relatively flat plain (Mapping Unit 3) on the southern part of the quadrat. Vegetation consisting of various grasses and forbes, broom snakeweed, mesquite, yucca and ephedra allows 30-40 percent ground surface visibility during the winter.

The site contains a single slightly deflated isolated hearth in association with burned caliche and fire-cracked rocks on the surface. Fire-cracked rocks, three of which are mano fragments, and burned caliche were found in association with the hearth but no artifacts were identified outside the less than 1-m diameter feature (Figure 29).

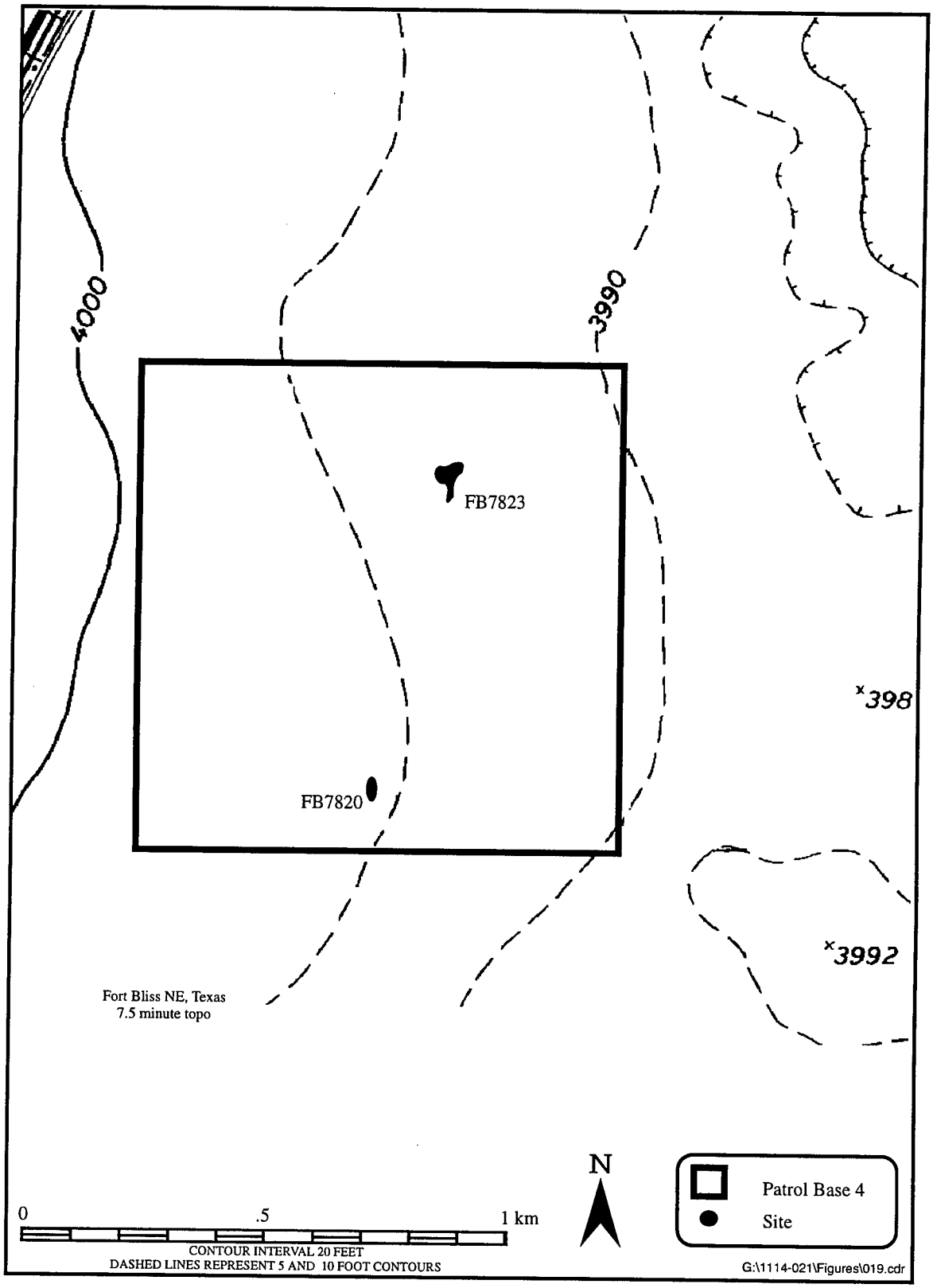


Figure 28. Site locations within Patrol Base 4.

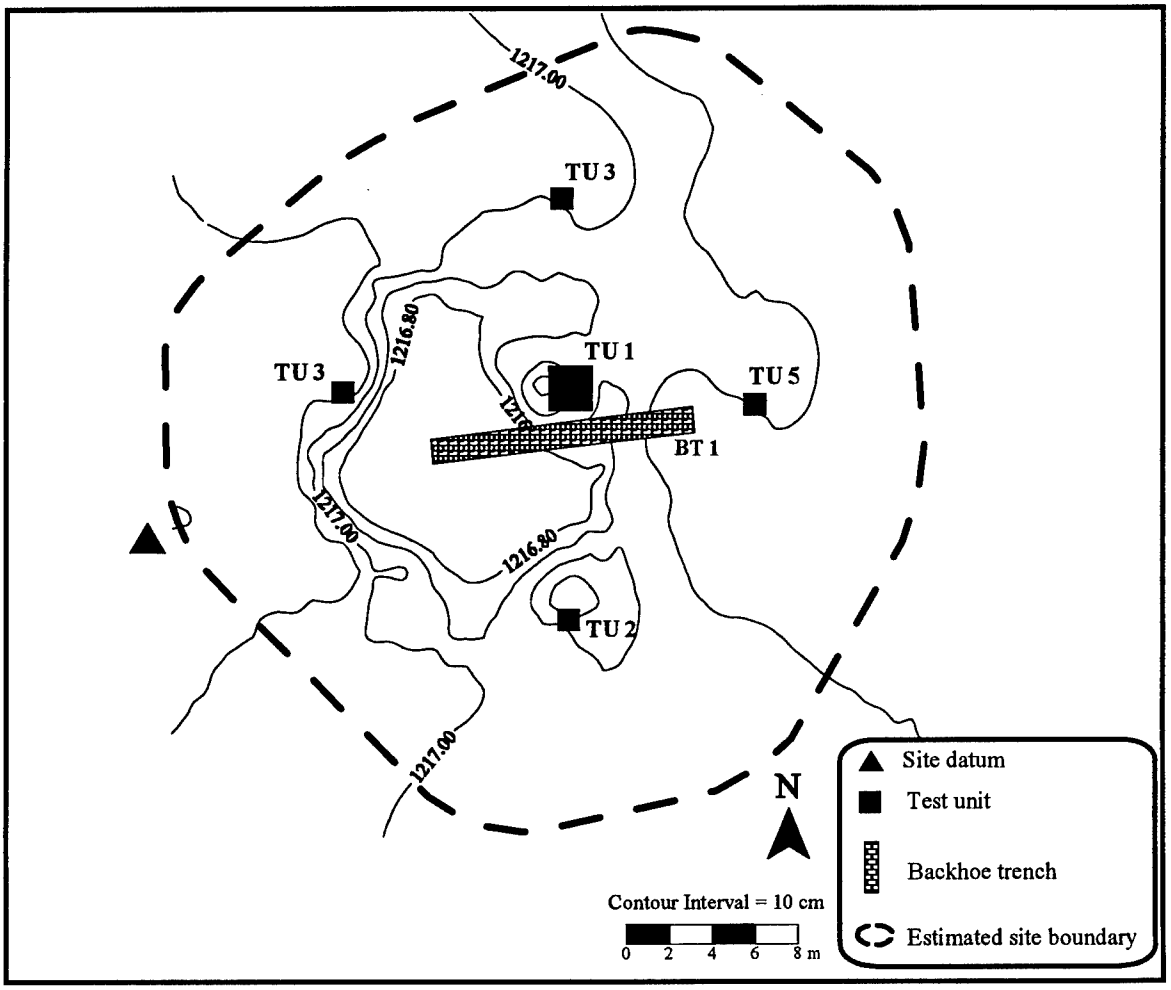


Figure 29. Contour map of site FB 7820.

TU #1 (2-x-2 m) was placed over the hearth feature (F1). Excavation in the northwest quad exposed a small stain below the fire-cracked rock and burned caliche in the eolian overburden (Figure 30). Artifacts recovered from the excavation include three mano fragments, two recovered from the surface of the feature and one from the eolian overburden between 0-10 cm below surface. Two flotation samples were collected between 1-13 cm below surface. Plant remains identified in the samples include trailing four o'clock, amaranthus, desert marigold, sunflower family, spurge, grasses, purslane, mesquite, and unidentifiable seeds; abundant root contamination was evident in one of the samples (Appendix J). Excavation was terminated at 25 cm below surface (Table 10). An auger core taken from 25-39 cm below surface showed no evidence of buried cultural deposits.

Four additional noncontiguous 1-x-1-m test units distributed in all cardinal points within a 10-m radius of TU #1 were excavated. TU #2 (see Figure 29) was excavated down to 39 cm below surface and augered to 42 cm below surface. TU #3 was terminated at 25 cm and augered to 42 cm below surface. TU #4 was excavated to 19 cm below surface and augered to 47 cm below surface, and TU #5 was terminated at 18 cm

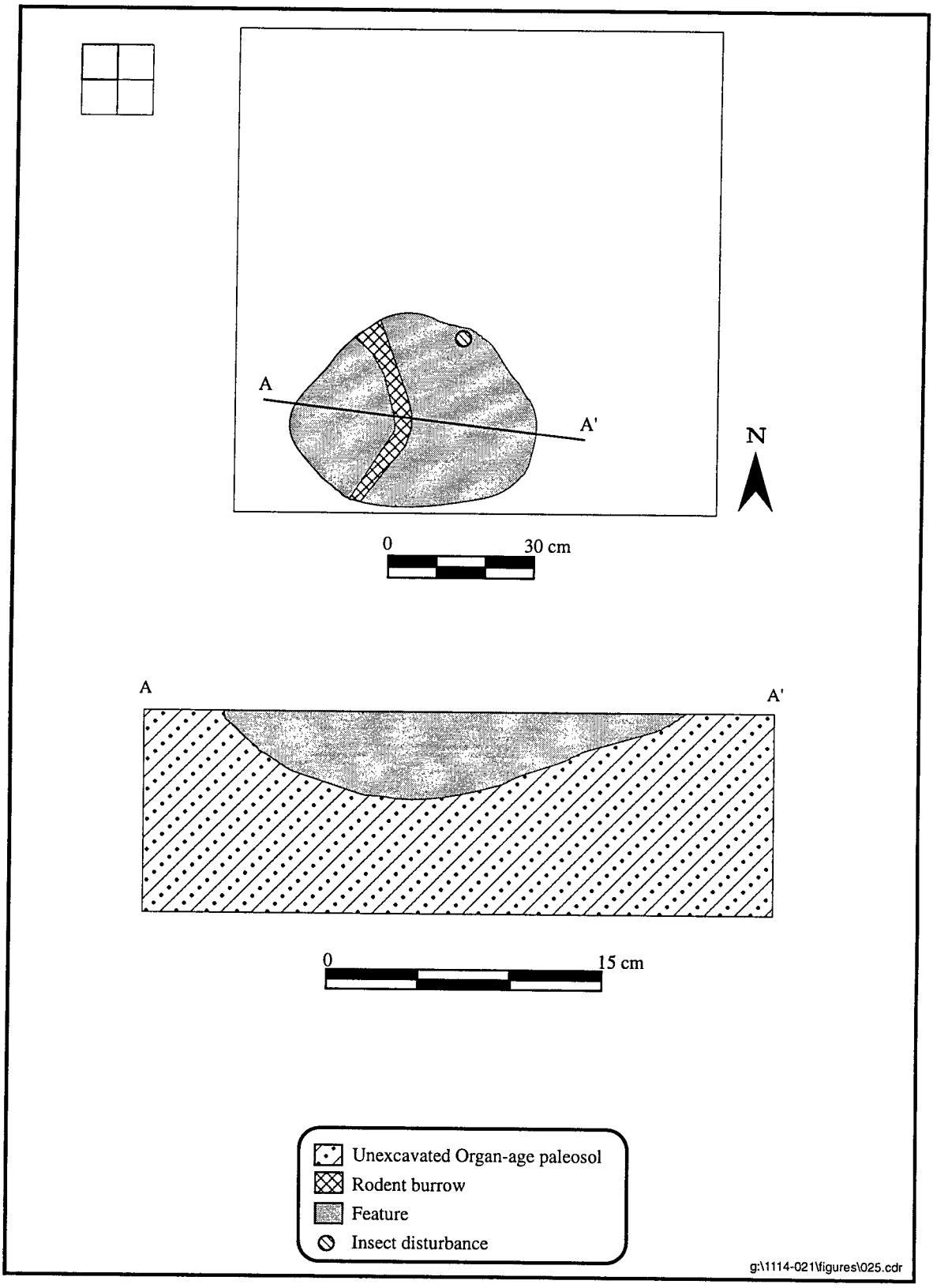


Figure 30. Plan view and profile of TU #1, F1, site FB 7820.

Table 10
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 7820 (41EP2248)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4		1	BC/FCR/ Stain	S	S			2		2					
		.02			Q4	0-10			1		1			.46	.62	
		.37			Q3	3-25										
Total TU #1	*4*	*.39*	*1*						*3*		*3*	*7.70*		*.46*	*.62*	*2.77*
2	1	.45			Q4/Q3	0-39										
3	1	.23			Q4/Q3	0-25										
4	1	.18			Q4/Q3	0-19										
5	1	.17			Q4/Q3	0-18										
Total	*8*	*1.42*	*1*						*3*		*3*	*2.11*		*.46*	*.62*	*.76*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

below surface and augered to 38 cm below surface. All four test units were sterile of any cultural material. A deep trench (3.1 m) close to TU #1 exposed no cultural deposits.

The entire hearth within TU #1 was sufficiently excavated to a depth of 25 cm below surface. A single backhoe trench (BT 1) was excavated but no subsurface cultural material was exposed. The research potential of site FB 7820 is considered to be exhausted and therefore ineligible for inclusion in the NRHP. The projected use of the Patrol Base will not adversely affect cultural resources at this site. No further work is recommended.

FB 7823 (41EP2236)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,216 (3,988 ft)
Size (square meters)	
Previously Recorded:	200
Current:	3,120
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	2.26
Artifact Density (n/m^3):	.88
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.06
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	8
Extent of Erosion (%):	40
Extent of Modern Disturbance (%):	10

Site FB 7823 is located on a Mapping Unit 2b geomorphic surface (Monger 1993:102), but Mapping Unit 1b characteristics (caliche gravel in interdune areas) were also observed on the site surface. The landscape slopes slightly to the west. Mesquite, grasses and snakeweed, yucca, and four-wing saltbush dominate the plant community and have reduced ground surface visibility to 50 percent.

Artifacts are found in very low densities in interdune deflated areas. The current site boundary is defined by the occurrences of burned caliche, fire-cracked rock, occasional chipped and ground stones, and limited amounts of unspecified brownware. Scatters of burned caliche and fire-cracked rock were observed in interdune deflated areas on the southern part of the site. A total of two test units and two backhoe trenches was excavated (Figure 31). Both test units were 1 x 4 m with each 1 x 1 m quad within these excavated independently.

TU #1 was placed on a dune flank identified on the aerial photograph as the location of a previously identified hearth. The unit was excavated down to 45 cm, and augered to 92 cm below surface. A single ceramic sherd was recovered at the contact zone between eolian overburden and the Organ-age geomorphic surface.

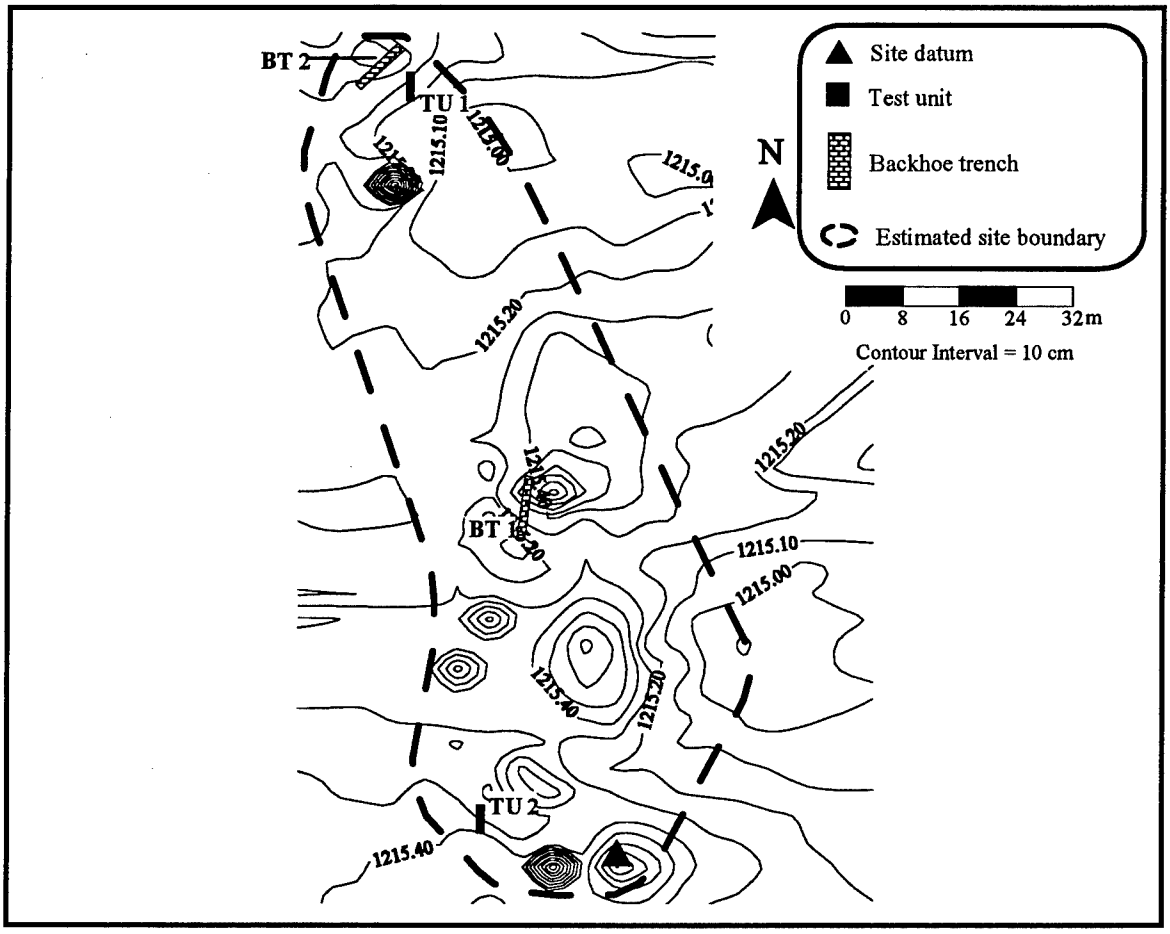


Figure 31. Contour map of site FB 7823.

TU #2 was placed on a fire-cracked/burned caliche concentration (F1) in the southern part of the site (Figure 32). Limited amounts of fire-cracked rock (.09 kg) and burned caliche (.04 kg) were recovered from the eolian overburden at 0-36 cm below surface (Table 11). A single piece of debitage was recovered from the eolian overburden and the Organ-age surface contact zone. Excavation was terminated at 62 cm, but an auger core was taken down to 97 cm below surface. Neither radiocarbon date nor flotation samples were recovered from either test unit.

Subsequent to the previous survey (Whalen 1976), site FB 7823 has expanded significantly through a series of deflated areas, mostly to the south. Two backhoe trenches placed within site FB 7823, one on the northern boundary and one in the center of the site, failed to expose additional cultural material. Most of the site is eroded and deflated; the surface expression of site FB 7823 is sparsely scattered and only one artifact was recovered from each of the two test unit excavations. The research potential of the site is considered low. Therefore, site FB 7823 is considered to be ineligible for inclusion in the NRHP. The projected use of the Patrol Base will not adversely affect the site and no further work is recommended.

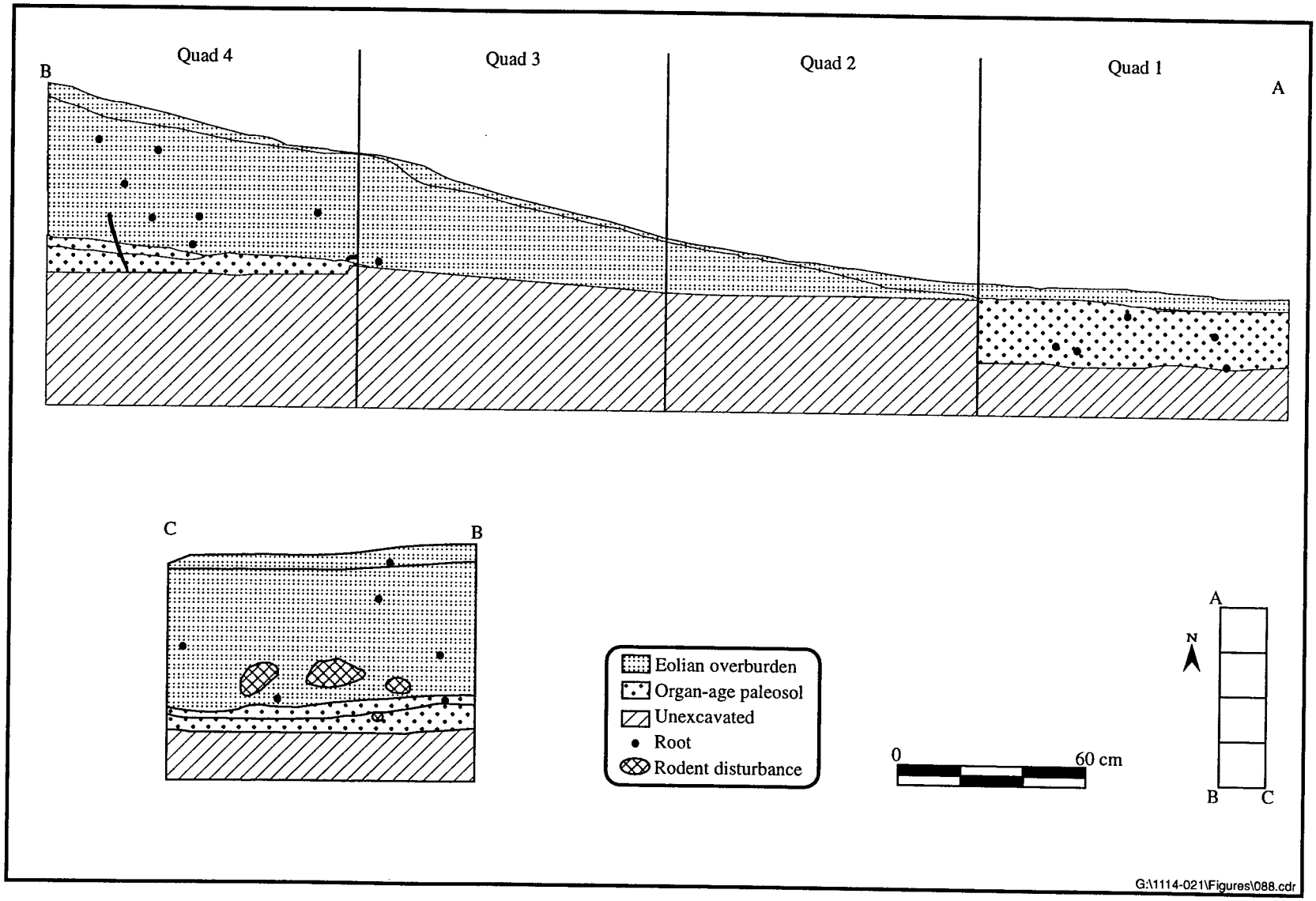


Figure 32. Profiles of TU #2, F2, site FB 7823.

Table 11
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 7823 (41EP2236)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4	.38			Q4	0-21										
		.40			Q4/Q3	0-26										
		.30			Q4/Q3	9-35	1				1					
		.20			Q3	22-45										
Total TU #1	*4*	*1.28*					*1*				*1*	*.78*				
2	4	.55	1	BC/FCR	Q4	0-36								.09	.04	
		.33			Q4/Q3	1-53		1			1					
		.10			Q3	13-27										
Total TU #2	*4*	*.98*	*1*					*1*			*1*	*1.02*		*.09*	*.04*	*.13*
Total	*8*	*2.26*	*1*				*1*	*1*			*2*	*0.88*		*.09*	*.04*	*.06*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

PATROL BASE 5, MANEUVER AREA 2a
SITES FB 13155, FB 13206, FB 13345, FB 13346, FB 13908

The quadrat is located 2 km northeast of Newman Radio Beacon Tower and 4 km west of Joint Well (Fort Bliss NE/Nations East Well quadrangles, Texas, El Paso County) at 1,237 m amsl (Figure 33). The quadrat occupies geomorphic surface Mapping Unit 2b (Monger 1993:102). The landscape rises 10.7 m in 1.4 km eastward. Relatively high coppice dunes (Mapping Unit 2b) give the topography a slightly undulating appearance. The Hueco-Wink association soils overlying the La Mesa indurated caliche horizon are moderately deep. The vegetation consists of mesquite, yucca, broom snakeweed, four-wing saltbush, and grass that allows approximately 65 percent ground surface visibility during the winter.

Two major dirt roads, east-west and north-south (only one of which is shown on Figure 33), intersect close to the northern edge of the quadrat. A "drop zone" exists just 200 m off the western boundary of the quadrat, and prominent embankments have been built next to the large intersection within the quadrat in close proximity to two archeological sites (FB 13155 and FB 13346). Currently the area around the embankment is being used for exercises by the military. Most of the quadrant is considerably eroded and deflated especially on the northern two-thirds. Site FB 13206, located near the center, was tested in addition to sites FB 13155 and FB 13346.

FB 13155 (41EP4694)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,238 (4,060 ft)
Size (square meters)	
Previously Recorded:	625
Current:	432
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.79
Artifact Density (n/m^3):	6.15
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.18
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	8.9
Extent of Erosion (%):	50
Extent of Modern Disturbance (%):	30

Site FB 13155 occupies geomorphic surface Mapping Unit 2b (Monger 1993:102). The vegetation consists of yucca, broom snakeweed, four-wing saltbush, mesquite, and grass. Winter ground surface visibility is approximately 90 percent. Surface manifestations included a burned caliche/fire-cracked rock/low density chipped and ground stone scatter. The lithic scatter is localized in a linearly deflated interdune area, impacted by tank traffic. Artifacts occur predominantly adjacent to, and south of, a small dune. Gravels, exposed on all sides of and surrounding the dune, suggest that the site is mostly exposed. Most of the area surrounding the site, however, is covered with eolian overburden.

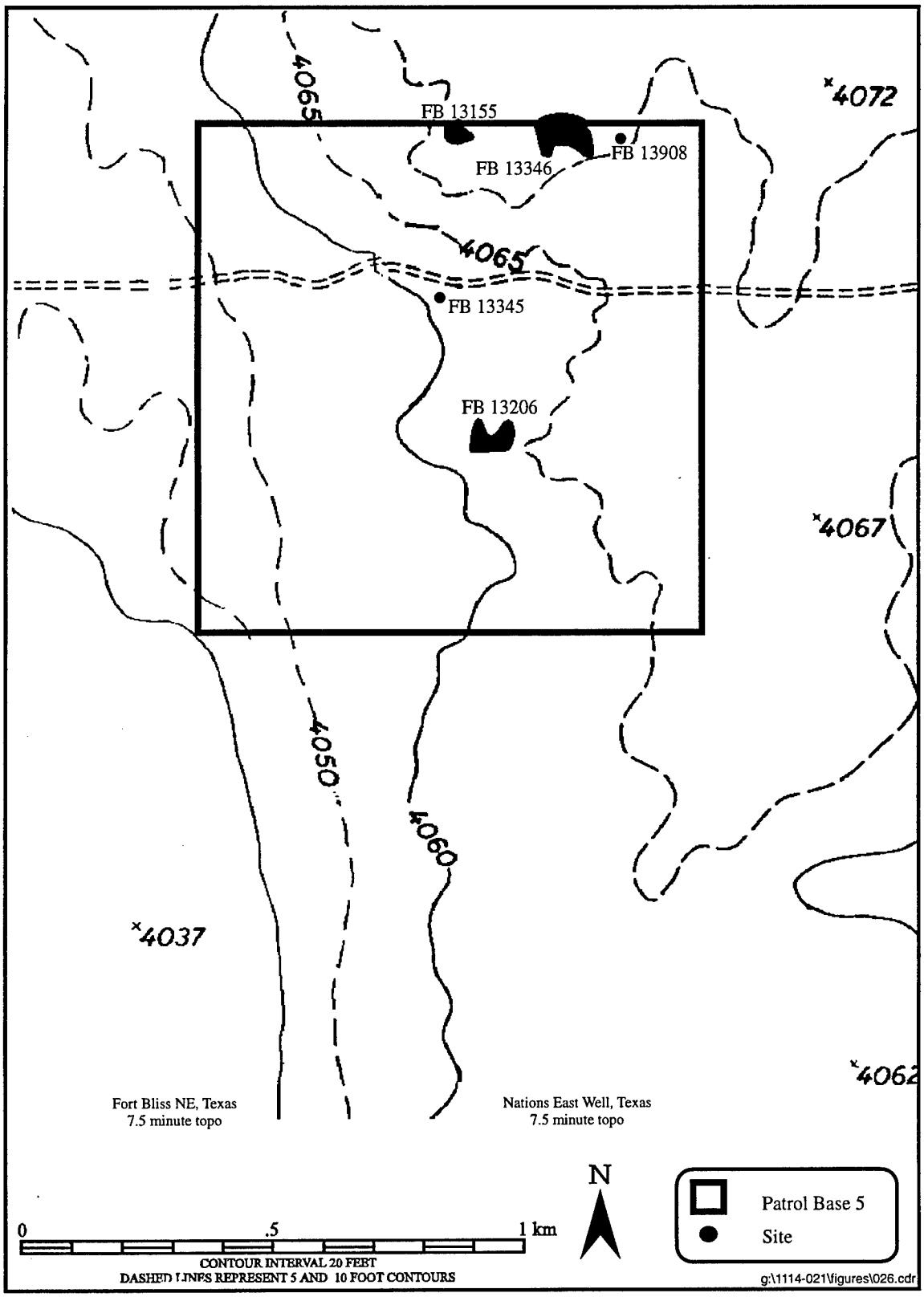


Figure 33. Site locations within Patrol Base 5.

The only feature observed consists of a 1-x-3-m scatter of predominantly tiny pieces of burned caliche (n=70) and fire-cracked rock along the eastern edge of a dune. Two test units (2-x-2 m and 1-x-4 m) were excavated in the area of the feature and the artifact scatter, respectively (Figure 34).

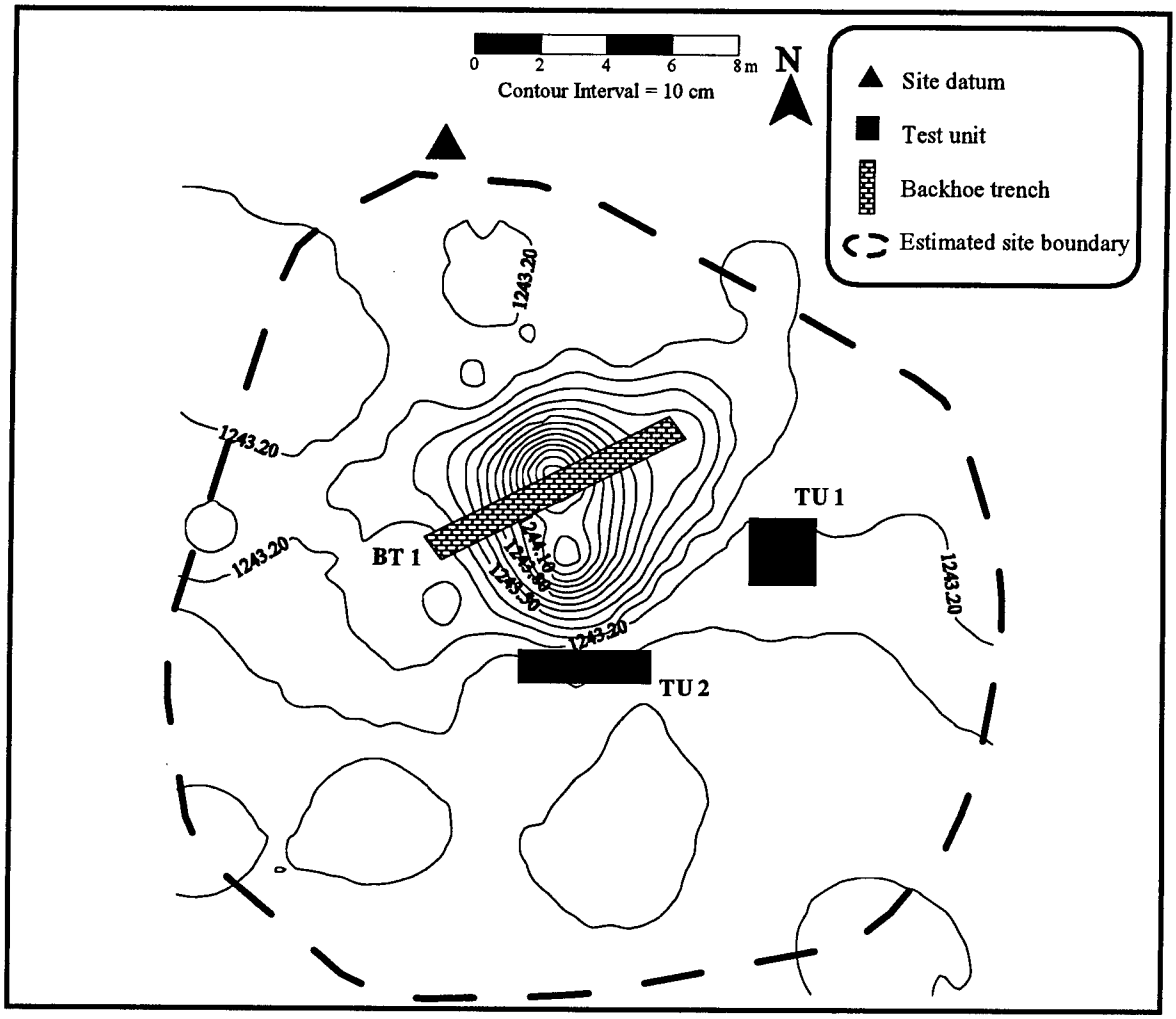


Figure 34. Contour map of site FB 13155.

TU #1 (2-x-2 m) was excavated in the area of the burned caliche/fire-cracked rock feature (F1). One piece of debitage came from the eolian overburden; seven debitage and two metate fragments were recovered from the contact zone between the eolian overburden and the Organ-age surface between 24-34 cm below surface. Small amounts of fire-cracked rock (.02 kg) and burned caliche (.11 kg) came from the same provenience. The feature is eroded and remnants lie scattered within the contact zone between the eolian overburden and the present Organ-age surface. Excavation was terminated at 51 cm below surface (Table 12).

In TU #2 (1-x-4 m), a flake, an indeterminate ground stone artifact, and .11 kg of burned caliche were recovered from 30-40 cm below surface at the contact zone between the eolian overburden and the Organ-age geomorphic surface. Excavation was terminated at 40 cm below surface.

Table 12
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13155 (41EP4694)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4	.04	1	BC/FCR	Q4	0-4		1			1					
		.22			Q4/Q3	0-24									.03	
		.33			Q4/Q3	1-34		6	2		8			.02	.11	
		.58			Q4/Q3	1-51										
Total TU #1	*4*	*1.17*	*1*					*7*	*2*		*9*	*7.69*		*.02*	*.14*	*.14*
2	4	.34			Q4/Q3	0-30									.06	
		.28			Q4/Q3	0-40		1	1		2				.11	
Total TU #2	*4*	*.62*						*1*	*1*		*2*	*3.23*			*.17*	*.27*
Total	*8*	*1.79*	*1*					*8*	*3*		*11*	*6.15*		*.02*	*.31*	*.18*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

Given that all artifacts found were recovered from the eolian overburden/erosional surface contact zone, it is highly likely that the cultural deposits have been eroded out of context and redeposited. A backhoe trench (2.4 m in depth) through the small dune adjacent to the test excavation units exposed no cultural debris (Figure 35).

Evidence indicates this aceramic (possibly Archaic) site is highly localized and heavily eroded. Test excavations revealed no intact deposits and further indicate that the cultural deposits may have been eroded out of context and redeposited. The research potential of the site is considered to be exhausted and, therefore, it is recommended that site FB 13155 be considered ineligible for inclusion in the NRHP. The projected use of the Patrol Base will have no adverse effects on the site. No further work is recommended.

FB 13206 (41EP4695)

Eligibility Status:	Eligible
Radiocarbon Date:	A.D. 655-890
Elevation (meters above mean sea level):	1,238 (4,060 ft)
Size (square meters)	
Previously Recorded:	1,600
Current:	3,460
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.20
Artifact Density (n/m^3):	32.50
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.23
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	11.3
Extent of Erosion (%):	30
Extent of Modern Disturbance (%):	20

Site FB 13206 is in geomorphic surface Mapping Unit 2b (Monger 1993:102), characterized by medium-sized coppice dunes and wide interdunal areas where Pleistocene Rio Grande gravels are exposed. Mesquite, yucca, snakeweed, four-wing saltbush, and an occasional ephedra constitute the dominant vegetation and allow 55 percent winter ground surface visibility.

The site boundary is defined by a low density scatter of unspecified brownware, chipped stone, surface features including fire-cracked rock/burned caliche concentrations and a charcoal stain. Ceramics and chipped stone are associated with both feature types. As at site FB 13155 which is located approximately .6 km to the north, a wide variety of raw materials were observed at site FB 13206.

A total of two test units and two backhoe trenches was excavated at FB 13206 (Figure 36). TU #1 (1-x-4 m) was placed in an area where two small stains, ceramics, ground stone fragments, and chipped stones were exposed on the surface (Figures 37 and 38). Eight unspecified brownware sherds and two fragments of debitage were collected from the surface. Fourteen more sherds, eight debitage, and two pieces of bone were recovered from the eolian overburden between 0-3 cm below surface (Table 13). Burned caliche (.05 kg)

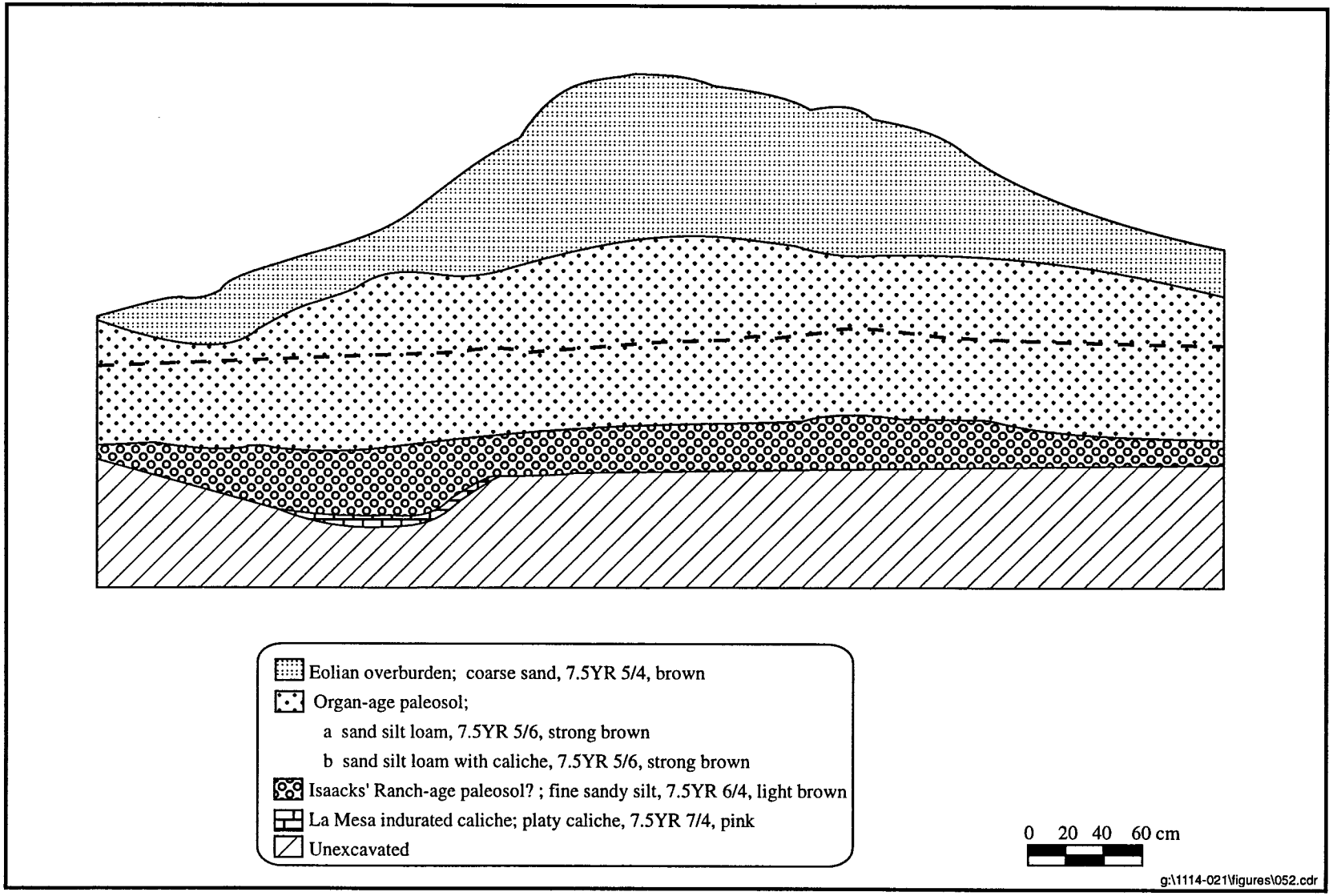


Figure 35. Backhoe Trench 1, profile of northwest wall, site FB 13155.

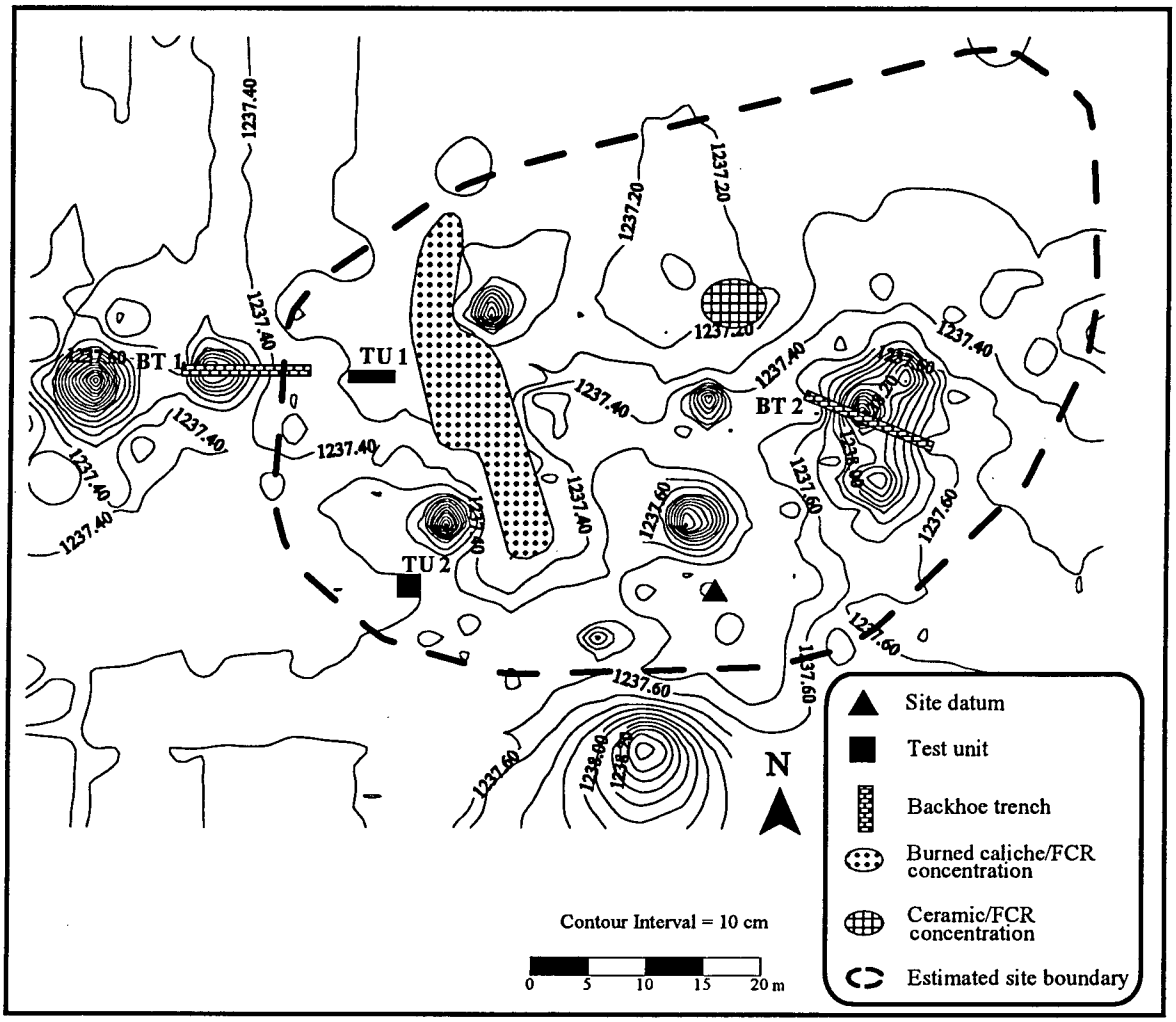


Figure 36. Contour map of site FB 13206.

was recovered from the same level. Three unspecified brownware sherds and three fragments of debitage were recovered from the contact zone of the eolian overburden and the Organ-age surface, 3-15 cm below the surface. Burned caliche (.02 kg) and seven tiny unworked shell fragments were recovered from the same provenience. Upon excavation, the two stains were actually determined to be one large connected stain (F1) spanning Quads 1 and 2 of TU #1 (see Figure 37). The smaller, northeastern part of the stain did not extend into the subsurface. The larger part of the feature, however, extended into the subsurface where it was very well-preserved. In subsurface context, the feature fill was a predominantly charcoal-enriched, powdery, ashy matrix, constituting possibly the floor of a structure or fill from a burned brush structure (see Figure 37). A charcoal sample was collected for radiocarbon analysis and yielded a date of 1,270 $\pm$ 60 B.P. (A.D. 655-890), placing the feature in the Early Formative period (Appendix B). Two flotation samples from feature fill were collected; identified plant remains include trailing four o'clock, spurge, purslane, and burned seeds of dropseed grass, a plant remain often found in thermal features (Appendix J). Excavation was terminated at 22 cm below surface.

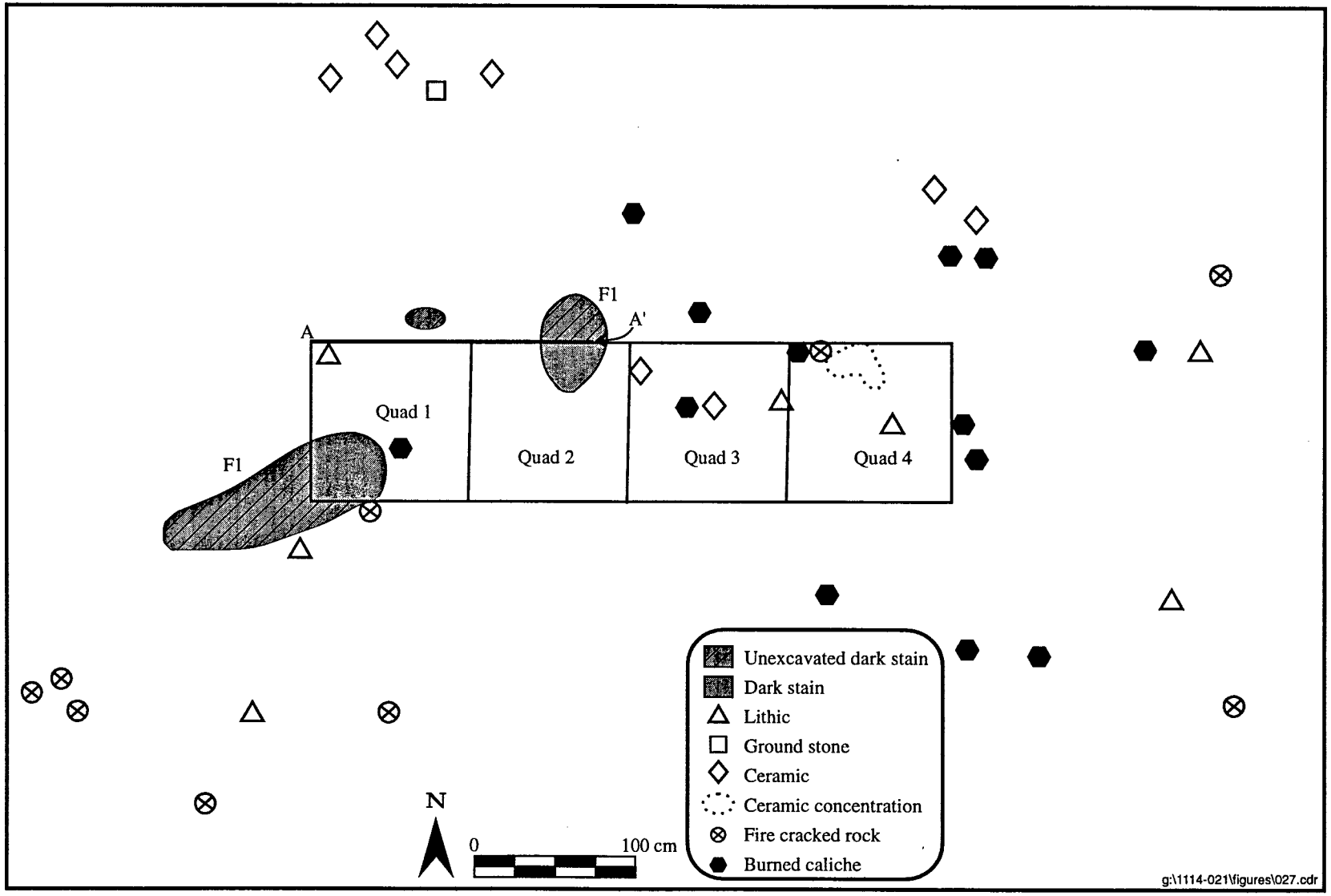


Figure 37. Surface artifact and feature distribution within and around TU #1, F1, site FB 13206.

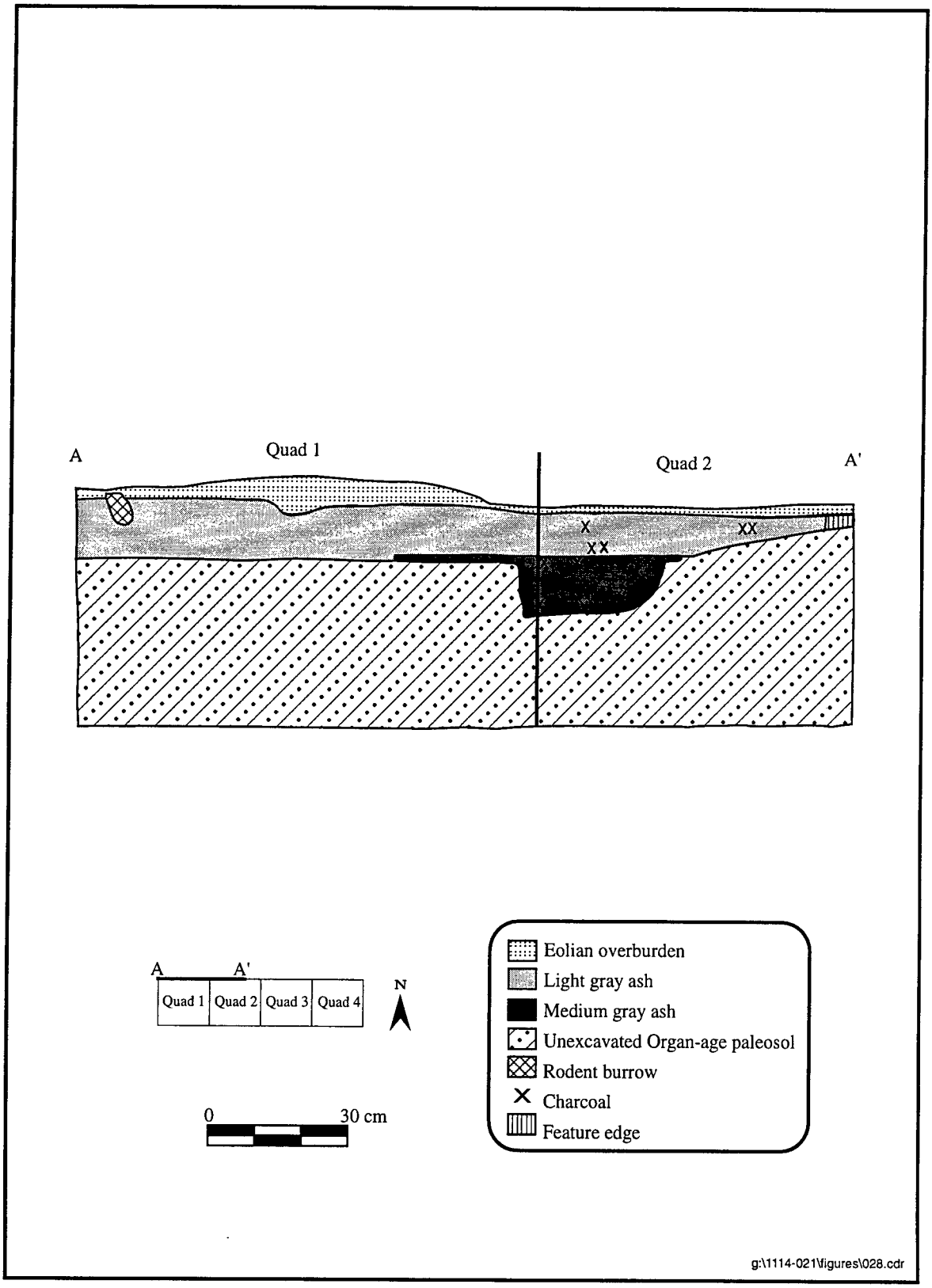


Figure 38. Profile of north wall of TU #1, F1, site FB 13206.

Table 13
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13206 (41EP4695)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone/ Shell	FCR (kg)	BC (kg)	FCR/BC /m^3
1	4		1	BC/FCR/ Stain	S	S	8	2			11					
		.07			Q4	0-3	14	8			22		2		.05	
		.32			Q4/Q3	0-15	3	3			6		0/7		.02	
					Q4/Q3	1-22										
Total TU #1	*4*	*.39*	*1*				*25*	*13*			*38*	*97.44*	*2*		*.07*	*.18*
2	4	.18			Q4	0-10									.18	.18
		.45			Q3	2-22		1			1				.03	.03
		.18			Q3	13-28										
Total TU #2	*4*	*.81*						*1*			*1*	*1.24*			*.21*	*.26*
Total	*8*	*1.20*	*1*				*25*	*14*			*39*	*32.50*	*2/7*		*.28*	*.23*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

TU #2 (2-x-2 m; see Table 13), placed over a burned caliche scatter, was excavated to a maximum depth of 28 cm below surface. A single piece of debitage was recovered from 2-22 cm below surface. Burned caliche (.18 kg) was recovered from the upper 10 cm below surface, and an additional .03 kg was recovered from 2-22 cm below surface. No other artifacts were recorded and excavation was terminated at 28 cm below surface.

The two backhoe trenches (Appendix E), one close to TU #1 (BT 1) and the other in the eastern part of the site (BT 2), failed to expose additional cultural deposits (Figure 39).

An untested burned caliche concentration, in association with unspecified brownware, is located approximately 30 m northeast of TU #1. A second untested feature, a large burned caliche/fire-cracked rock scatter, is exposed less than 5 m east of TU #1 and extends roughly north-south for 30 m. Both concentrations are exposed in periodically used tank trails. Impacts to the concentrations should be mitigated through data recovery. The feature preserved in TU #1 has the potential for documenting a prehistoric structure and making a significant contribution to our knowledge of the nature of prehistoric brush structures on the Hueco Bolson desert floor. Therefore, site FB 13206 is considered eligible for inclusion in the NRHP. Both untested concentrations and the feature exposed in TU #1 should be block-excavated for maximum data recovery. Mapping and collection of surface artifacts are recommended to provide data on the ceramics and the variety of lithic raw materials found on the site.

FB 13345 (No TARL number assigned)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,239 (4,064 ft)
Size (square meters)	
Previously Recorded:	200
Current:	Non-site
Features (+ = present; 0 = absent):	0
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	0
Total Area Tested (m^2):	0
Total Volume Excavated (m^3):	0
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	3
Mean Length of Trench (meters):	4.20
Extent of Erosion (%):	40
Extent of Modern Disturbance (%):	10

This "site" was recorded during two previous surveys (Brown 1991; Mayberry 1991) in a Mapping Unit 2b (Monger 1993:102) geomorphic surface. The vegetation, sand sage, snakeweed, yucca, and four-wing saltbush, allows for 80 percent ground surface visibility.

Although the previous site determination was based on the presence of a few pieces of chipped stone on the surface, during the current project, in spite of good ground visibility in the winter, neither artifacts nor features were observed on the surface of the area identified as site FB 13345 on the aerial photograph

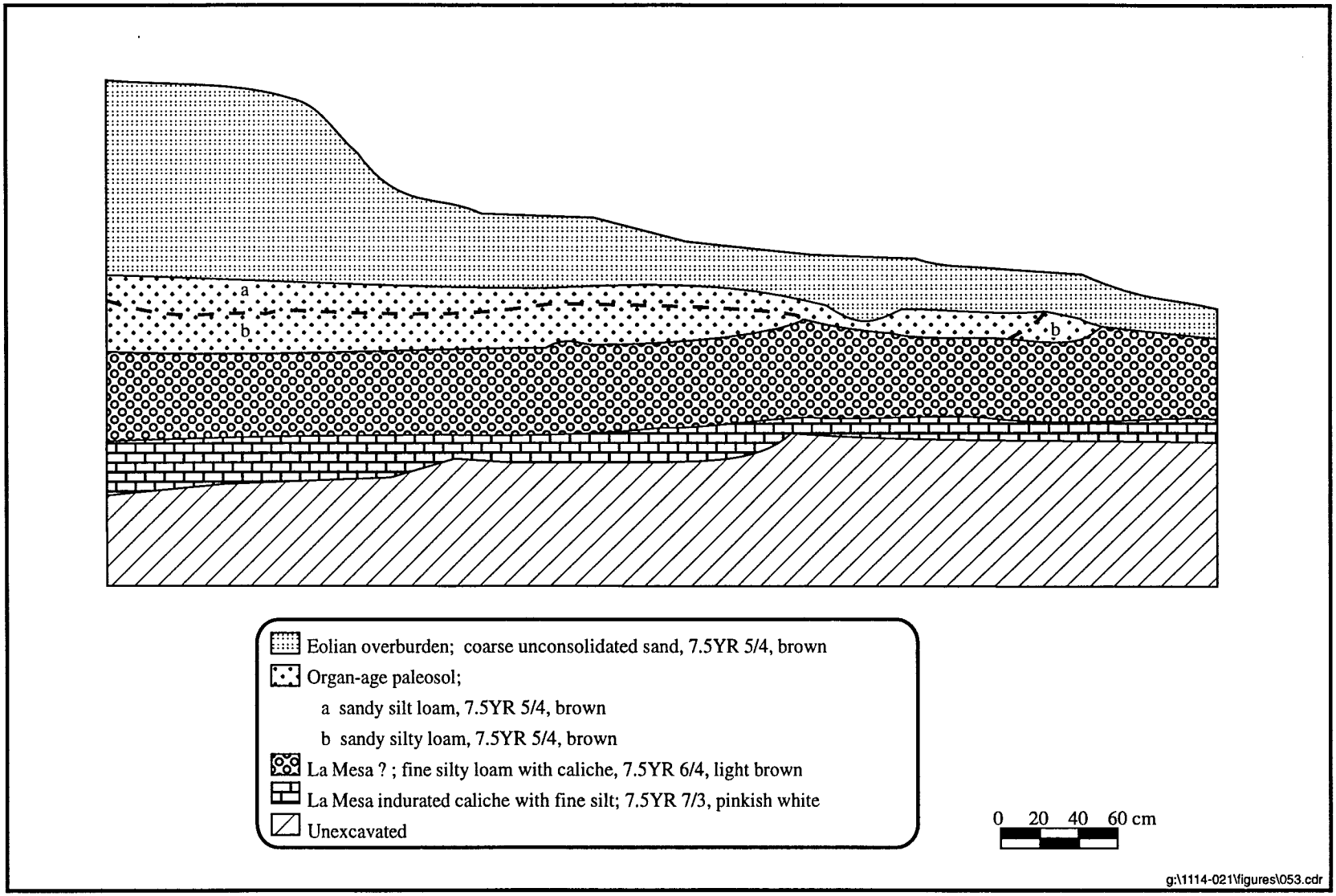


Figure 39. Backhoe Trench 1, profile of north wall, site FB 13206.

provided by previous survey crews. Three backhoe trenches (Appendix E) were excavated in the area, but none exposed any subsurface cultural deposits. The site location as previously reported was on the edge of a heavily traveled military road. The reported location does not meet the criteria for a site or a locality. No further work is recommended.

FB 13346 (41EP4696)

Eligibility Status:	Eligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,246 (4,086 ft)
Size (square meters)	
Previously Recorded:	900
Current:	2,700
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	4
Total Area Tested (m^2):	16
Total Volume Excavated (m^3):	3.66
Artifact Density (n/m^3):	19.7
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.10
Backhoe Trenches	
Number of Trenches:	4
Mean Length of Trench (meters):	13.9
Extent of Erosion (%):	50
Extent of Modern Disturbance (%):	15

Although the quadrat is in Mapping Unit 2b (Monger 1993:102), the site area occupies Mapping Unit 2a/1a geomorphic surfaces. Approximately 30 percent of site FB 13346 is under coppice dunes that are greater than 2 m in height. Large interdunal saddles, with accumulated historic eolian overburden, and scoured interdunal areas were observed within the site area boundary. Considerable amounts of Pleistocene Rio Grande gravels remain in deflated areas. The vegetation includes yucca, snakeweed, mesquite, four-wing saltbush, and an occasional ephedra that allow approximately 70 percent winter ground surface visibility.

The site boundary is defined by a low density scatter of chipped stone, unspecified brownware, and limited amounts of ground stone. Artifacts and features occur in wide interdunal deflated areas and saddles. Four 4-m^2 test units and four backhoe trenches were excavated (Figure 40). TU #1 (2-x-2 m) was placed on a light concentration of chipped stone and fire-cracked rock/burned caliche in a deflated area adjacent to the north side of a dune on the west side of the site. One indeterminate ground stone fragment, a core, and fire-cracked rocks (.37 kg) were recovered from 0-19 cm below surface but within the eolian overburden. Based on the scarcity of artifacts and lack of a "feature" outline, the locus appears to be an activity area rather than a feature.

TU #2 (2-x-2 m) was excavated in an area with moderate concentrations of burned caliche, ceramics, and lithics in the southeastern portion of the site (F2). All recovered artifacts (eight sherds and three debitage) were either on the surface or in the eolian overburden between 0-4 cm below surface (Table 14). Excavation was terminated at 26 cm below surface.

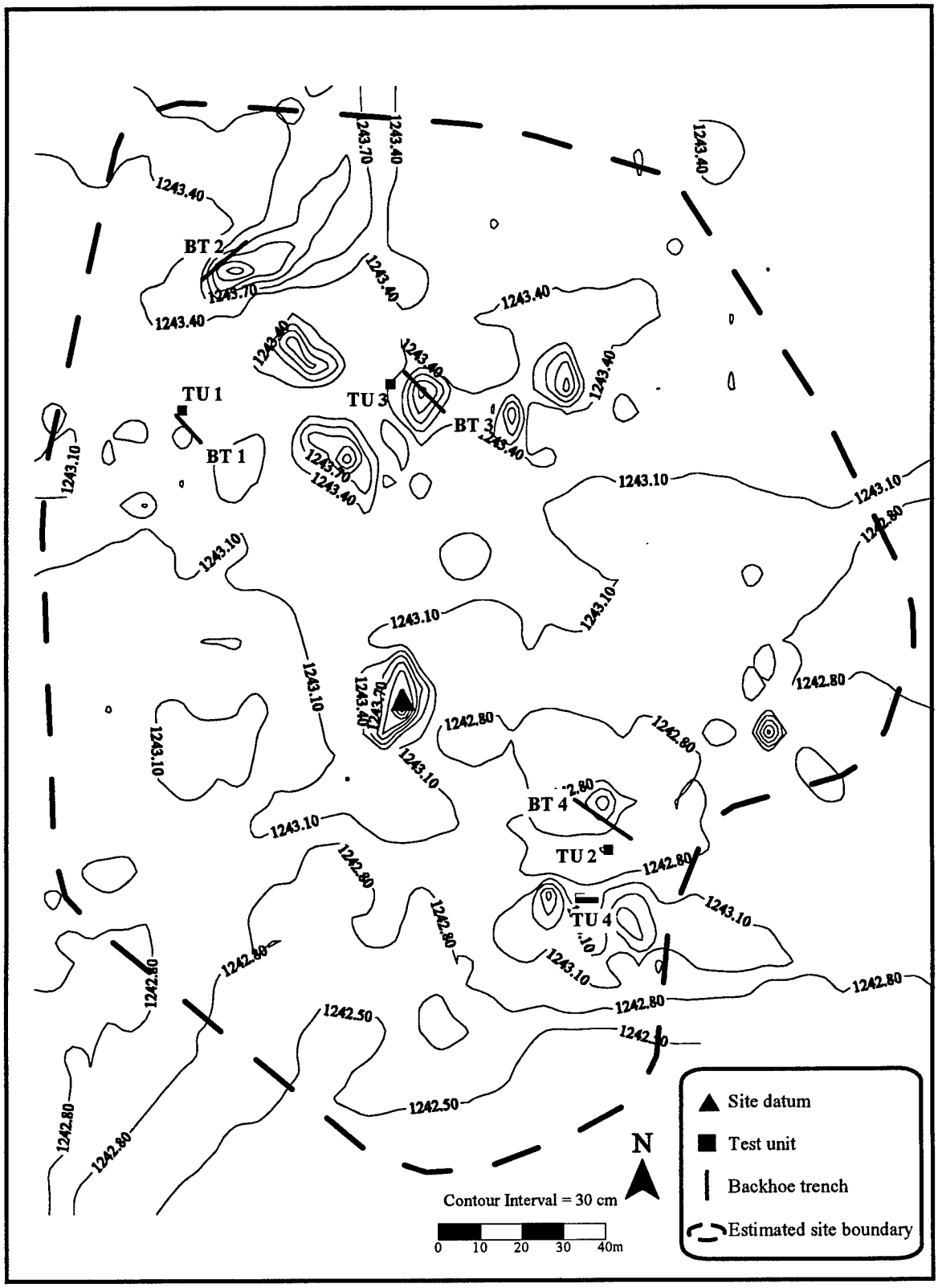


Figure 40. Contour map of site FB 13346.

Table 14
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13346 (41EP4696)

TU #	Area m^2	m^3 Exca.	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4				S	S					1					
		.13			Q4	0-19			1		2			.37	?	
		.46			Q3	0-45		1	2		6					
		.21			Q4/Q3	1-53										
Total TU #1	*4*	*.80*						*1*	*3*		*4*	*5.00*		*.37*	*?*	*.46*
2	4		2	BC/Cer/ Lithic	S	S	1				1					
		.09			Q4	0-4	7	3			10					
		.22			Q4/Q3	4-26										
Total TU #2	*4*	*.31*	*1*				*8*	*3*			*11*	*35.48*				
3	4	.84			Q4/Q3	0-40										
Total TU #3	*4*	*.84*														
4	4				S	S	3	1			3					
		.20			Q4	0-20	4				4					
		.21			Q4/Q3	0-30	16	7			23					
		.40			Q4/Q3	0-40	16		1		18					
		.40			Q4/Q3	9-50	1	1			2					
		.50			Q3	19-60										
Total TU #4	*4*	*1.71*					*40*	*9*	*1*		*50*	*29.24*				
Total	*16*	*3.66*	*1*				*48*	*13*	*4*		*65*	*17.76*		*.37*		*.10*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

TU #3 (2-x-2 m) was placed on the western flank of a high dune in the north-central area of the site, upslope from a low density scatter of chipped stone artifacts where a preserved paleosurface was suspected. The unit was excavated down to 40 cm below surface. No artifacts were recovered from either surface or subsurface.

TU #4 (1-x-4 m) was placed over a scatter of unspecified brownware eroding out of an interdunal saddle up the slope and south of TU #2. Of the 51 artifacts (40 ceramic sherds, nine chipped stone including eight debitage and one unifacially retouched flake, and one mano fragment) recovered, three are from the surface, five from the eolian overburden (0-20 cm below surface), and 43 from the contact zone between eolian overburden and the Organ-age surface (see Table 14). Two El Paso Brownware rim sherds are illustrated in cross section in Figure 41. These rimsherds indicate an occupation during the Formative period, specifically the Mesilla phase, which spanned A.D. 200-1100 (O'Laughlin 1990; Whalen 1980:30). Excavation of TU #4 was terminated at 60 cm below surface. Four backhoe trenches did not expose any buried features (Figure 42). The site has expanded significantly from the previously recorded size.



Figure 41. El Paso Plain brownware rimsherds from site FB 13346. (Scale 1:1)

Site FB 13346 is considered eligible for inclusion in the NRHP under Criterion D. Adverse impacts on cultural resources from projected military use in the Patrol Base should, however, be mitigated via data recovery. This is important because of the proximity (approximately 150-200 m) of the site to an embankment around which extensive military activity takes place. TU #4 should be expanded horizontally to at least a 10-x-10-m excavation block and the dune adjacent to the test unit on the western side should be trenched and hand excavated. Any features should be block-excavated to maximize data recovery and increase the probability of recovering radiocarbon dating samples which, currently, are lacking from this site.

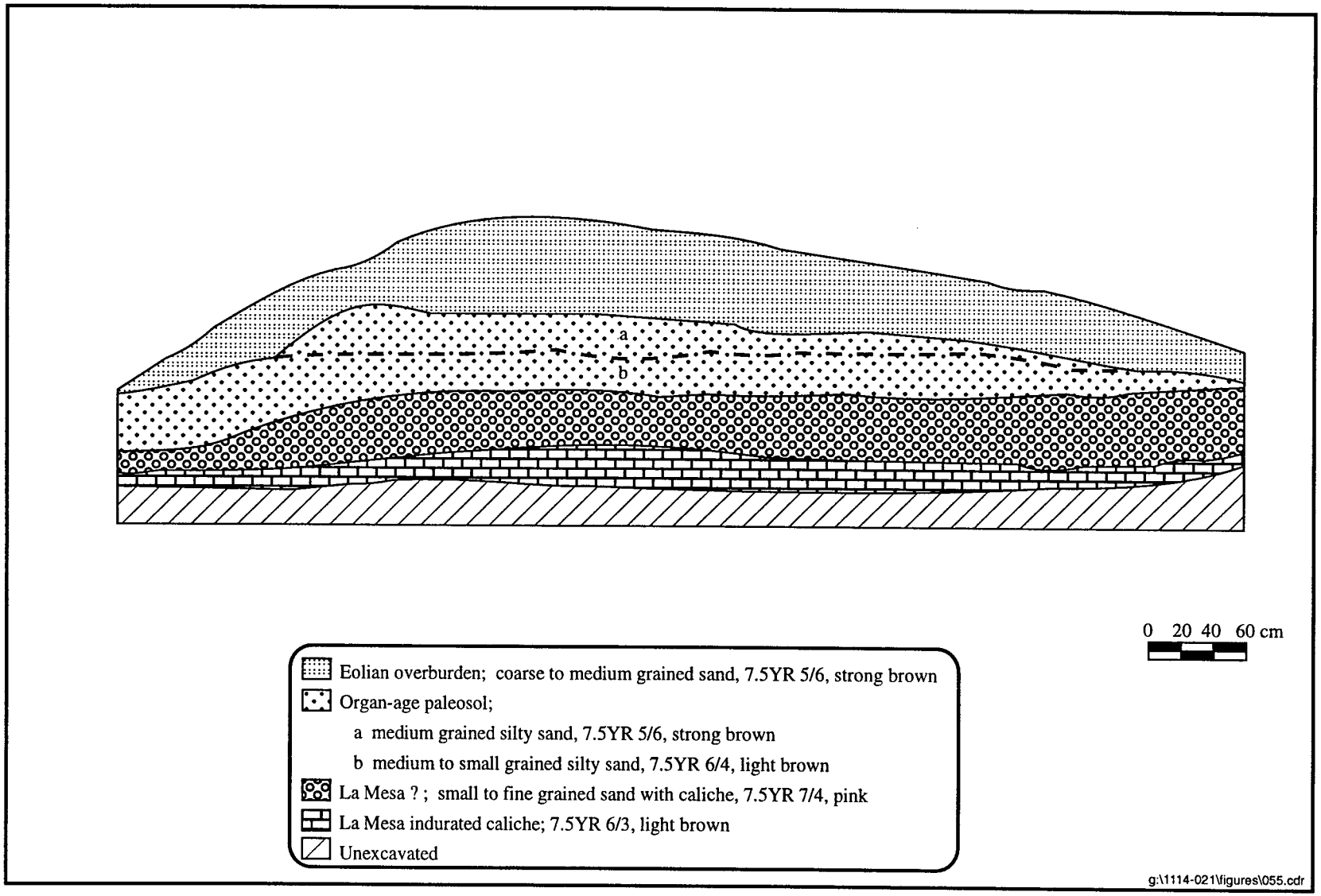


Figure 42. Backhoe Trench 1, profile of north wall, site FB 13346.

FB 13908 (No TARL number assigned)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,245 (4,083 ft)
Size (square meters)	
Previously Recorded:	200
Current:	Unmapped
Features (+ = present; 0 = absent):	0
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	0
Total Area Tested (m^2):	0
Total Volume Excavated (m^3):	0
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	8
Extent of Erosion (%):	10
Extent of Modern Disturbance (%):	5

The general area occupies geomorphic surface Mapping Unit 2b (Monger 1993:102), but the site area of FB 13908 is characterized by a Mapping Unit 2a/1a geomorphic surface. Yucca, broom snakeweed, and mesquite constitute the plant community and allow approximately 75 percent ground surface visibility.

A burned caliche hearth recorded during a previous survey (Hill 1993) could not be relocated. A trench dug through the spot where the hearth was recorded by previous survey crews on the aerial photograph recovered only two small pieces of caliche at 40 cm below surface. FB 13908 does not meet site criteria and no further work is recommended.

PATROL BASE 6, MANEUVER AREAS 1a/2c
SITES FBH 98, FBH 182, FB 6940, FB 7312, FB 10694, FB 11616, FB 11617, FB 14501

The Patrol Base 6 quadrat is located 9 km southeast of Newman, Texas, and 3 km south of the Newman Radio Beacon Tower (Fort Bliss NE quadrangle, Texas, El Paso County) at 1224 m amsl. Most of the quadrat is in the Mapping Unit 2b geomorphic surface (Monger 1992:102) with the exception of a depression on the east-central part that is in Mapping Unit 3. The local relief rises gradually to the northeast. Most of the southeastern portion of the quadrat is in a shallow depression (playa), which extends outside the limits of the Patrol Base to the southeast (Figure 43).

Pleistocene Rio Grande gravels are common on the surface on the southern part of the quadrat, indicating a fault fissure within close proximity to the quadrat (Monger 1993). The Hueco-Wink association soils on this portion of the quadrat are deeper in the less eroded areas. The vegetation, dominated by grass, four-wing saltbush, yucca, mesquite, and snakeweed, allows more than 60 percent ground surface visibility. Sites occur along the ridge partially ringing the depression to the west, north, and northeast. An abandoned well is located .4 km south of the quadrat along a northwest-southeast dirt road.

FBH 98 (41EP2226)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,224 (4,014 ft)
Size (square meters)	
Previously Recorded:	3,900
Current:	12,600
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	4
Total Area Tested (m^2):	16
Total Volume Excavated (m^3):	2.62
Artifact Density (n/m^3):	97.71
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	0
Mean Length of Trench (meters):	0
Extent of Erosion (%):	40
Extent of Modern Disturbance (%):	10

Site FBH 98 is a single component historic site located in Patrol Base 6 (see Figure 43). It is situated in a mesquite dune environment approximately 500 m to the north of FBH 182. This site occupies geomorphic surface Mapping Unit 2b (Monger 1993:102). It is on a relatively flat area overlooking the playa to the southeast. The site boundary is defined by a light scatter of historic artifacts, including cans, glass fragments, metal barrel hoops, Mexican glazeware, medicine bottles, and occasional purple glass fragments. Although a chert core was collected from the surface of TU #4 and a San Pedro obsidian projectile point was collected from the general surface, this site yielded no other prehistoric materials. A total of four (4-x-4 m) excavation units and one auger core was dug (Figure 44).

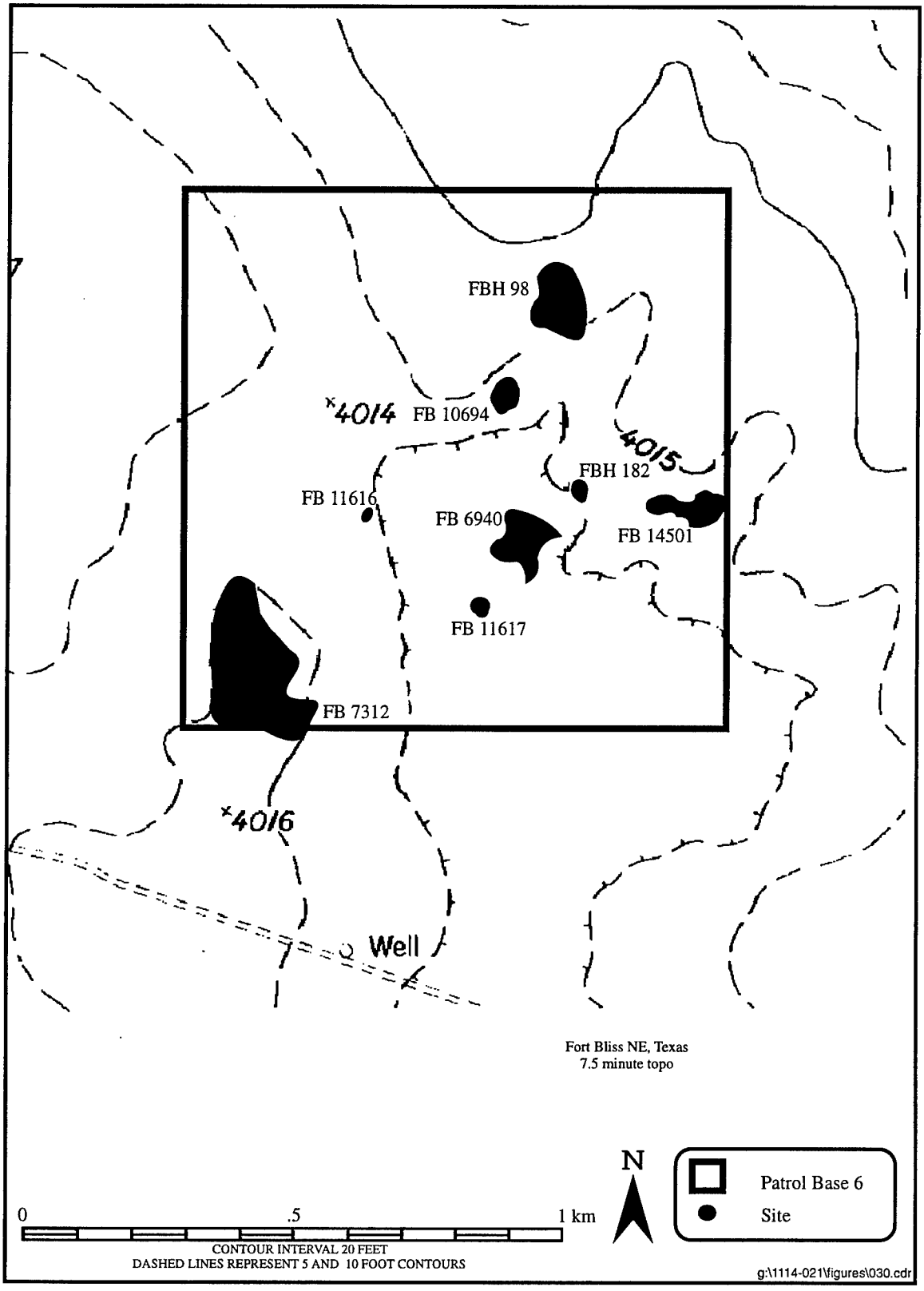


Figure 43. Site locations within Patrol Base 6.

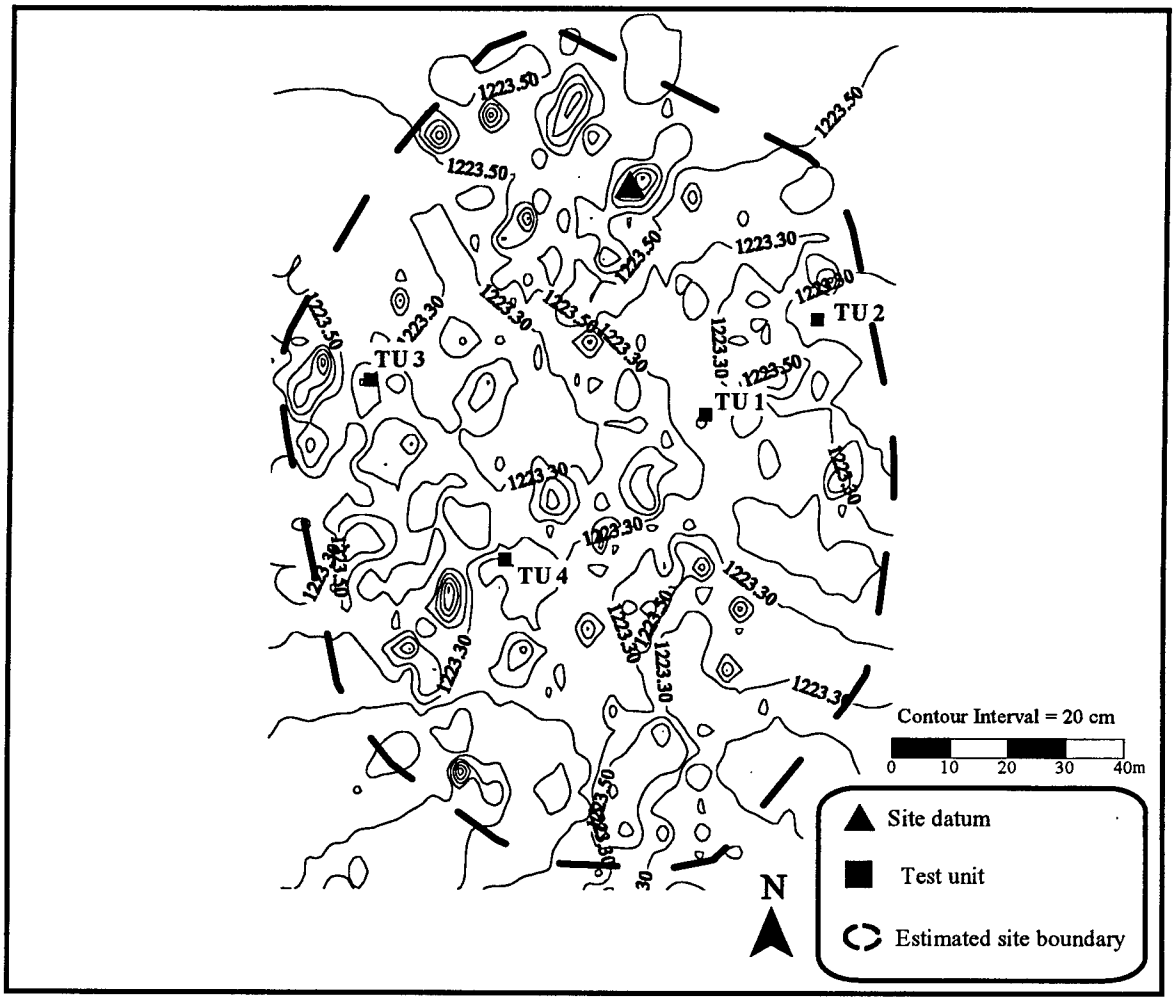


Figure 44. Contour map of site FBH 98.

TU #1, a 2-x-2-m block, was excavated down to 38 cm below surface. All artifacts are either from the surface (n=5) or the eolian overburden (n=4) between 0-5 cm below surface. One bone fragment (identified as gopher and interpreted as intrusive [Appendix I]) was recovered from the contact zone between the eolian overburden and the Organ-age surface between 2-18 cm below surface (Table 15). In addition, an ash/charcoal stain (F1) was observed on the surface; excavation revealed a shallow hearth feature measuring 40 by 50 cm in diameter. The association of historic glass and metal artifacts, and the lack of prehistoric artifacts, suggest the hearth dates to the historic period.

TU #2, a 2-x-2-m block, was excavated northeast of TU #1, over an ash feature (F2). Of the 178 historic artifacts recovered from TU #2, 172 (166 metal fragments, primarily can fragments, and six historic ceramics) were recovered from the surface or the eolian overburden (Figure 45). Six more historic artifacts were recovered from the contact zone between the eolian overburden and the Organ-age surface. No artifacts were recovered from the subsurface. The ash feature measured approximately 50 cm in diameter and extended to a depth of approximately 10 cm. Two flotation samples were recovered from feature fill between 3-6 cm below surface. Plant remains identified in the flotation samples included goosefoot, sunflower

Table 15
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FBH 98 (41EP2226)

TU #	Area m^2	m^3 Exca	Strat Zone*	cm bs	Glass			Metal					Cer	Misc	Preh Arti	Bone	TTL Arti	Art /m^3
					botl	wind	othr	can dia	can n/dia	nail	cartridg	othr dia	othr n/dia						
1	4		S	S	1		1	1				2						5	
		.14	Q4	0-5	1			1				2						4	
		.46	Q4/Q3	2-18												1			
		.50	Q4/Q3	13-38															
Total TU #1	*4*	*1.10*			*2*		*1*	*2*				*4*				*1*	*9*	*8.18*	
2	4		S	S									4				4		
		.13	Q4	0-6					166				2				168		
		.08	Q4/Q3	2-10					3					3			6		
		.10	Q4/Q3	2-30															
Total TU #2	*4*	*.31*							*169*				*6*	*3*			*178*	*574.19*	
3	4		S	S				14									14		
		.13	Q4	0-8	5			15									20		
		.60	Q4/Q3	0-33	4												4		
Total TU #3	*4*	*.73*			*9*			*29*									*38*	*52.05*	
4	4		S	S											1		1		
		.18	Q4	0-9					30								30		
		.30	Q4/Q3	5-20															
Total TU #4	*4*	*.48*							*30*						*1*		*31*	*64.58*	
Total	*16*	*2.62*			*11*		*1*	*31*	*199*			*4*	*6*	*3*	*1*	*1*	*256*	*97.71*	
Surface Recovery															1		1		

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

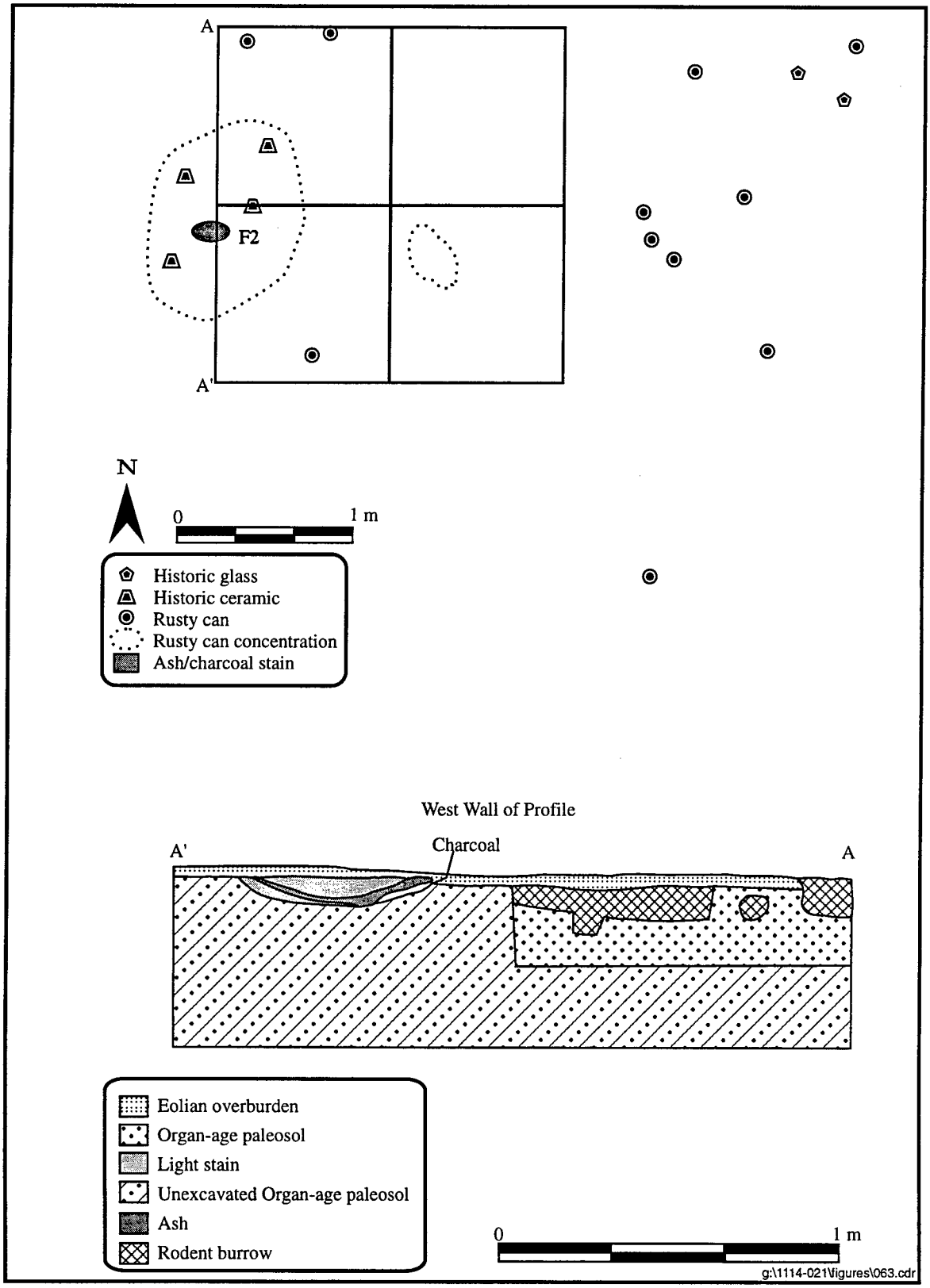


Figure 45. Surface artifact distribution within and around TU #2; profile of west wall showing hearth (F2), site FBH 98.

family, croton, purslane, unidentifiable seed fragments, and charred remains of pitaya cactus, lovegrass, miscellaneous grasses, cylindro-opuntia type, domesticated bean, and dropseed grass. The variety of grass seeds recovered suggest that grass had been used as tender or a fuel (Appendix J). The presence of cactus seeds suggests the consumption of fruits which are usually available during the summer months; similarly, the beans are interpreted as food remains. The results of the flotation analysis, association of historic artifacts, and lack of prehistoric elements suggest the feature is a historic hearth. Excavation was terminated at 30 cm below surface.

In TU #3, a 2-x-2-m block, historic artifacts (n=38) were recovered from the surface and the contact zone between the eolian overburden and the Organ-age surface (Figure 46). Both rodent and root disturbance were observed in the unit.

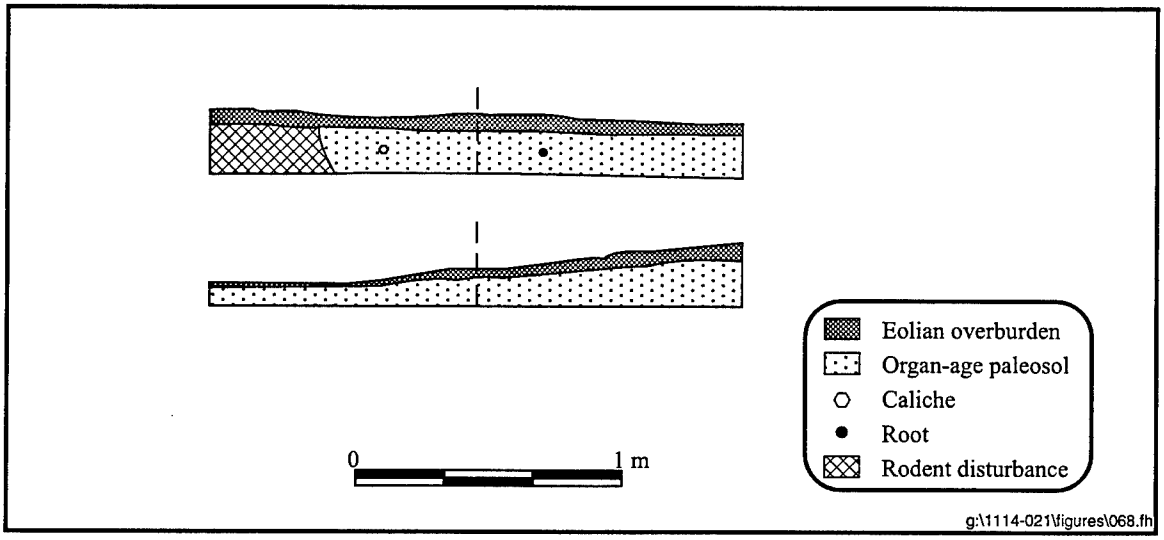


Figure 46. Profile of TU #3, site FBH 98.

The 31 artifacts recovered from TU #4, another 2-x-2-m block, consisted of a chert core from the surface and 30 historic artifacts from the eolian overburden between 0-9 cm below surface (see Table 15). Excavation was terminated at 20 cm but an auger core was taken between 20-31 cm below surface. No cultural material was recovered from the coring. In addition to the chert core recovered from TU #4, an obsidian San Pedro-type projectile point was collected from the surface of site FBH 98. This projectile point type is attributed to the Late Archaic/ Early Formative period, and is one of only two of this type recovered in the 37 sites tested.

The collected historic artifact assemblage (n=256) from FBH 98 consists of:

Bottle Glass (n=11)
- 1 clear crown-top bottle neck (post-1903)
- 1 purple body fragment (pre-1925)
- 9 clear body fragments

Other Glass
- 1 headlight fragment (post-1900)

Ceramic
- 6 brown glazeware bowl fragments

Cans (n=230)
- 1 one-hinge tobacco tin lid
- 4 one hinge tobacco tins
- 3 solder seal cans
- 23 crimped can fragments
- 199 nondiagnostic can fragments

Other Metal
- 4 barrel band fragments

Bone
- 1

Other
- 1 historic charcoal

This assemblage probably represents a single or multiple episode secondary domestic dumping area. Based on the post-1903 bottle neck, purple glass, and diagnostic can fragments, this refuse area was probably used between 1903 and 1930. Preliminary archival research at the Fort Bliss Historical Archeology Laboratory indicates that the historic artifacts at FBH 98 may be related to the McLeary cow camp which was probably occupied in the 1920s. Artifacts typically associated with historic structures (i.e., building materials such as nails and window glass) are lacking from the artifact assemblage from site FBH 98 and there are few indicators of site function. The lack of dense trash dumps, however, appears to indicate a temporary occupation that may not have been related to a permanent structure.

Although two prehistoric artifacts were collected from the site, no intact prehistoric deposits or features were identified; the two features identified appear to represent historic activity. Of the 256 historic artifacts recovered from site FBH 98, approximately 90 percent (n=230) of the assemblage is comprised of can fragments; these and the remaining artifacts are nondiagnostic, giving no indication of site function. Based on the lack of historic structural evidence, diagnostic historic artifacts, or intact prehistoric deposits or features, the historic and prehistoric research potentials of the site are considered exhausted. Therefore, it is recommended that site FBH 98 be considered ineligible for inclusion in the NRHP. The projected use of the Patrol Base will have no adverse effects on the site and no further work is recommended.

FBH 182 (41EP4690)

Eligibility Status:	Unknown
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,223 (4,011 ft)
Size (square meters)	
Previously Recorded:	0
Current:	960
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.37
Artifact Density (n/m^3):	162.77
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	0
Mean Length of Trench (meters):	0
Extent of Erosion (%):	20
Extent of Modern Disturbance (%):	30

The newly recorded site FBH 182 is on the western edge of a north-south military dirt road approximately 500 m to the south of FBH 98 (see Figure 43) and consists of a historic trash scatter. The site is in a geomorphic surface Mapping Unit 2b. The vegetation consists of snakeweed, grass, yucca, four-wing saltbush, and mesquite, allowing 70 percent ground surface visibility. The site is small and may have been the location of a structure. Bottle and window glass fragments, numerous nails, barrel hoops, and a skeleton key are scattered on the site surface. No prehistoric artifacts were observed at the site.

A total of two test excavation units were excavated at site FBH 182 (Figure 47). TU #1 (4-x-4 m) was placed on a concentration of historic artifacts. Artifacts were recovered from both the surface and the eolian overburden (Table 16). Excavation was discontinued at 21 cm below surface when no artifacts were found in subsurface context.

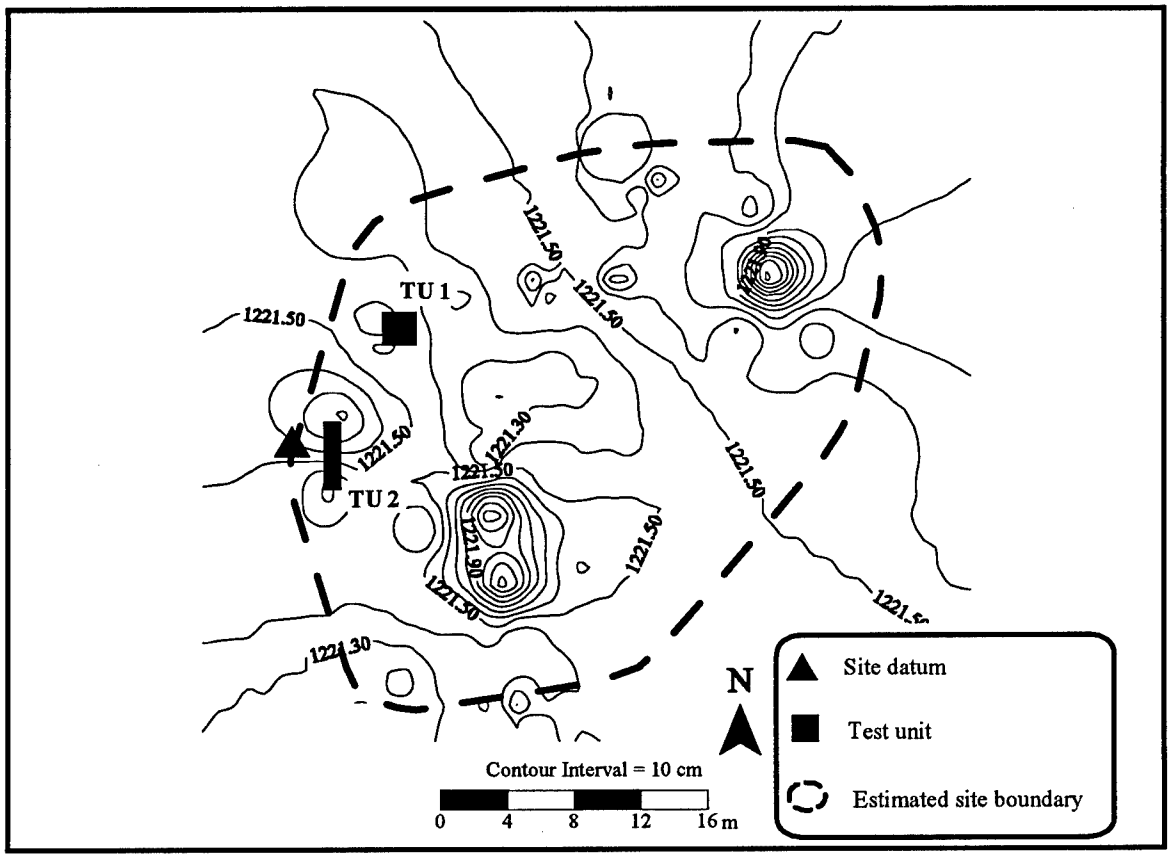


Figure 47. Contour map of site FBH 182.

TU #2 (1 x 4 m; Figure 48) was excavated over an area of historic glass concentration. Artifacts were recovered from the surface (n=27), the eolian overburden (n=64), the contact zone between the eolian overburden and the Organ-age surface (n=45), and the subsurface (n=4). A flotation sample was collected between 9-30 cm below surface. None of the remains recovered from the flotation samples exhibited evidence of burning. Identified plant remains include spurge, purslane, and smaller quantities of amaranthus, goosefoot, sunflower family, mustard, mesquite, and dropseed grass; the samples also exhibited abundant root and rodent contamination (Appendix J). Nine tiny unidentified organic shell fragments were recovered from the subsurface (see Table 16). Excavation was terminated at 40 cm below surface.

Table 16
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FBH 182 (41EP4690)

TU#	Area m^2	m^3 Exca	Strat Zone*	cm bs	botlglas	windglas	othr glas	can met dia	can met n/dia	nail	cartridg	oth met dia	oth met n/dia	cer	misc	prehst art	bone/ shell	TTL Arti	Art /m3
1	4		S	S		6				12	2	3						23	
		.38	Q4	0-16	1	24		1	6	14	1	3	10					60	
		.02	Q4/Q3	6-21															
Total TU #1	*4*	*.40*			*1*	*30*		*1*	*6*	*26*	*3*	*6*	*10*					*83*	*207.5*
2	4		S	S	27													27	
		.19	Q4	0-9	50			1	8		1		4					64	
		.60	Q3	2-32	45												0/9	45	
		.18	Q3	9-40	4													4	
Total TU #2	*4*	*.97*			*126*			*1*	*8*		*1*		*4*					*140*	*144.33*
Total	*8*	*1.37*			*127*	*30*		*2*	*14*	*26*	*4*	*6*	*14*				*0/9*	*223*	*162.77*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

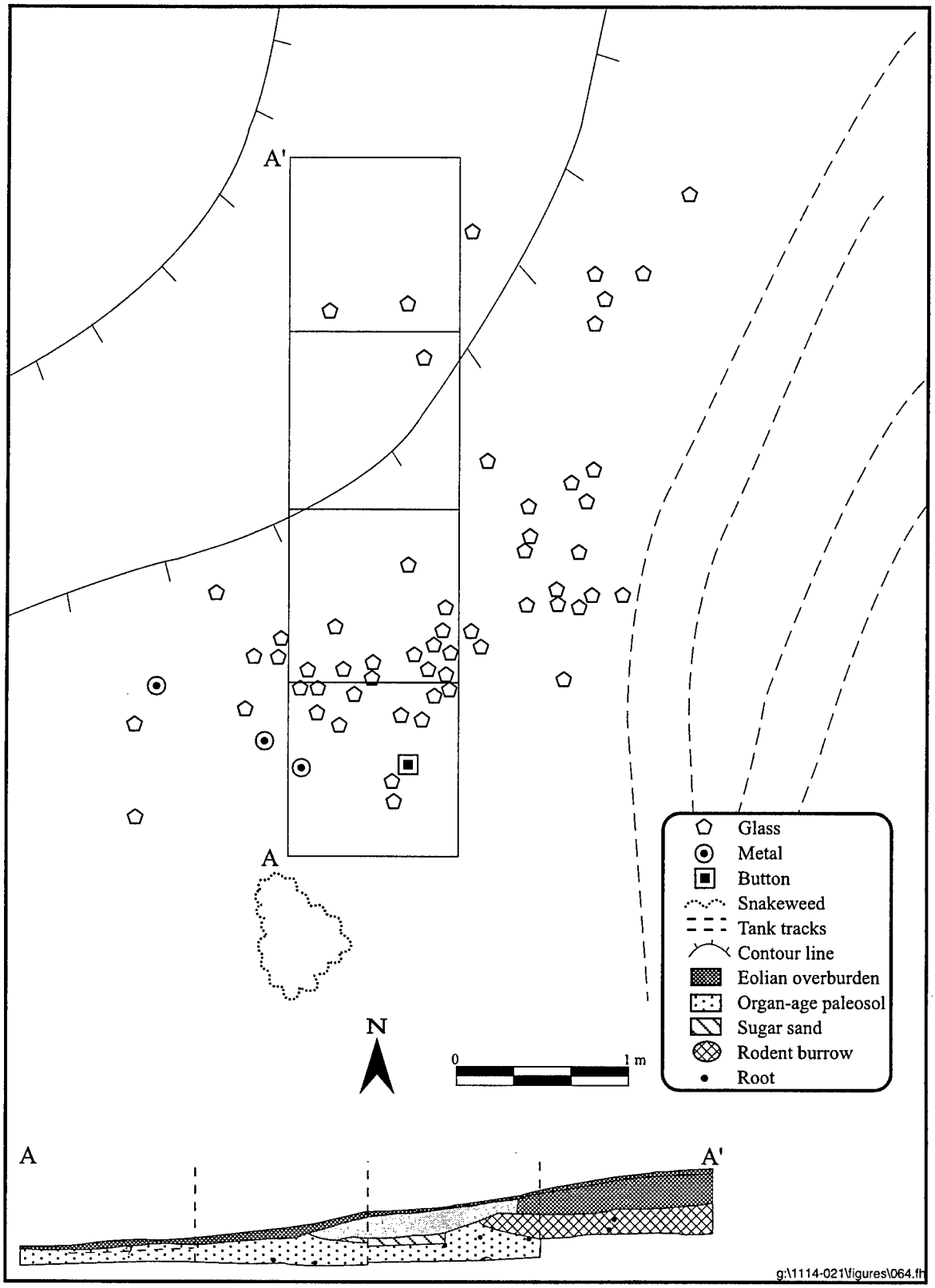


Figure 48. Plan view and profile of TU #2, F2, in Area B, site FBH 182.

Since this site lies approximately 500 m south of FBH 98, both sites may be related to the 1920s McLeary cow camp located about 4 km to the east. The collected artifact assemblage (n=223) from FBH 182 consists of:

Bottle Glass (n=127)
- 1 amber body
- 40 coke body
- 6 clear body
- 70 purple body
- 4 clear body " . . . epsi" (Pepsi)
- 5 clear body "Dr Pepper"
- 1 aqua base "971"

Window Glass (n=30)
- 30

Miscellaneous (n=20)
- 1 skeleton key
- 6 wire scraps
- 1 opener?
- 12 nondiagnostic other metal

Nails (Length in inches; n=26)
- 1 galvanized tack (.5)
- 2 roof tacks (.8)
- 8 wire nails (1.5)
- 1 wire nail (2.0)
- 10 wire nails (2.5)
- 1 wire nail (3.5)
- 3 wire nails (4.0+)

Cartridges (n=4)
- 2 .22 "U" unknown date
- 1 .32-20 UMC post 1882
- 1 .32 UMC S&W post-1878

Metal Can (n=16)
- 1 solder seal can
- 1 crimped base
- 14 non diagnostic can metal

Site Histories FBH 98 and FBH 182

Based on land status data gathered at the Fort Bliss Historical Archeology Laboratory, the section of land (section 28) in which FBH 98 and FBH 182 are located was transferred from R.D. Manchester to Grace E. Manchester on July 1, 1935. Sometime after 1935 the Army took over this section and leased the land to John Helms on June 24, 1942. In 1965, 1968, 1976, 1978, and 1979, El Paso Natural Gas Company obtained easements through the section. Between 1972 and 1980, Hotwells Cattle Company (the Navar family) was grazing cattle on this section. Between 1975 and 1978, the United States government was in the process of purchasing portions of the section for purposes of military use.

Summary

Based on the artifact assemblage, FBH 182 probably dates between 1910 and 1940 and consists of primary domestic refuse typical of structure-related occupations. Thirty fragments of window glass (13 percent) and 26 nails (11 percent) recovered from the site may indicate the presence of structural remains. Forty-nine pieces (39 percent) of the total bottle glass assemblage consisted of soda bottle fragments. The designs on these bottles indicate a later date (1930s) than the rest of the glass in the assemblage would suggest.

The eligibility of site FBH 182 is considered to be of unknown status because of the possibility of extant buried structural remains. The research potential for the site is not exhausted, and planned Patrol Base activities may produce an adverse impact on historic resources at this site. As an alternative to an additional testing phase at site FBH 182, a phased mitigation approach is recommended. A limited amount of additional subsurface investigation should be conducted to determine whether structural foundations or remnants are present. In this way, an assessment of NRHP eligibility could be made in a cost-effective manner.

FB 6940 (41EP2227)

Eligibility Status:	Eligible
Radiocarbon Date:	2,680 ± 55 B.P. (980-790 B.C.)
	2,870 ± 100 B.P. (1270-800 B.C.)
Elevation (meters above mean sea level):	1,222 (4,008 ft)
Size (square meters)	
Previously Recorded:	300
Current:	4,200
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	5
Total Area Tested (m^2):	19
Total Volume Excavated (m^3):	1.95
Artifact Density (n/m^3):	3.59
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.14
Backhoe Trenches	
Number of Trenches:	4
Mean Length of Trench (meters):	7.8
Extent of Erosion (%):	40
Extent of Modern Disturbance (%):	20

Site FB 6940 is on the northeast edge of the playa in the south-central part of the quadrat. The topography is characterized by low to high coppice dunes interspersed with deflated interdunal areas (Mapping Unit 2b). The landscape slopes gently to the southwest. The vegetation consists of mesquite, four-wing saltbush, snakeweed, various grasses and forbes, yucca, ephedra, and an occasional sand sage. Ground surface visibility is approximately 60 percent.

The site boundary is defined by a very low density scatter of chipped stone, ground stone artifacts, burned caliche, fire-cracked rock, and surface charcoal stain features. A chert Toyah projectile point (late Formative period; Figure 49) was collected from the surface of the site. Features are in scoured broad interdunal areas. Three surface stains (exposed in TU #1, TU #2, and TU #5) were recorded and a previously recorded hearth was relocated (TU #4). Five test units and four backhoe trenches were excavated at FB 6940 (Figures 50 and 51).



Figure 49. Toyah projectile point recovered from site FB 6940. (Scale 1:1)

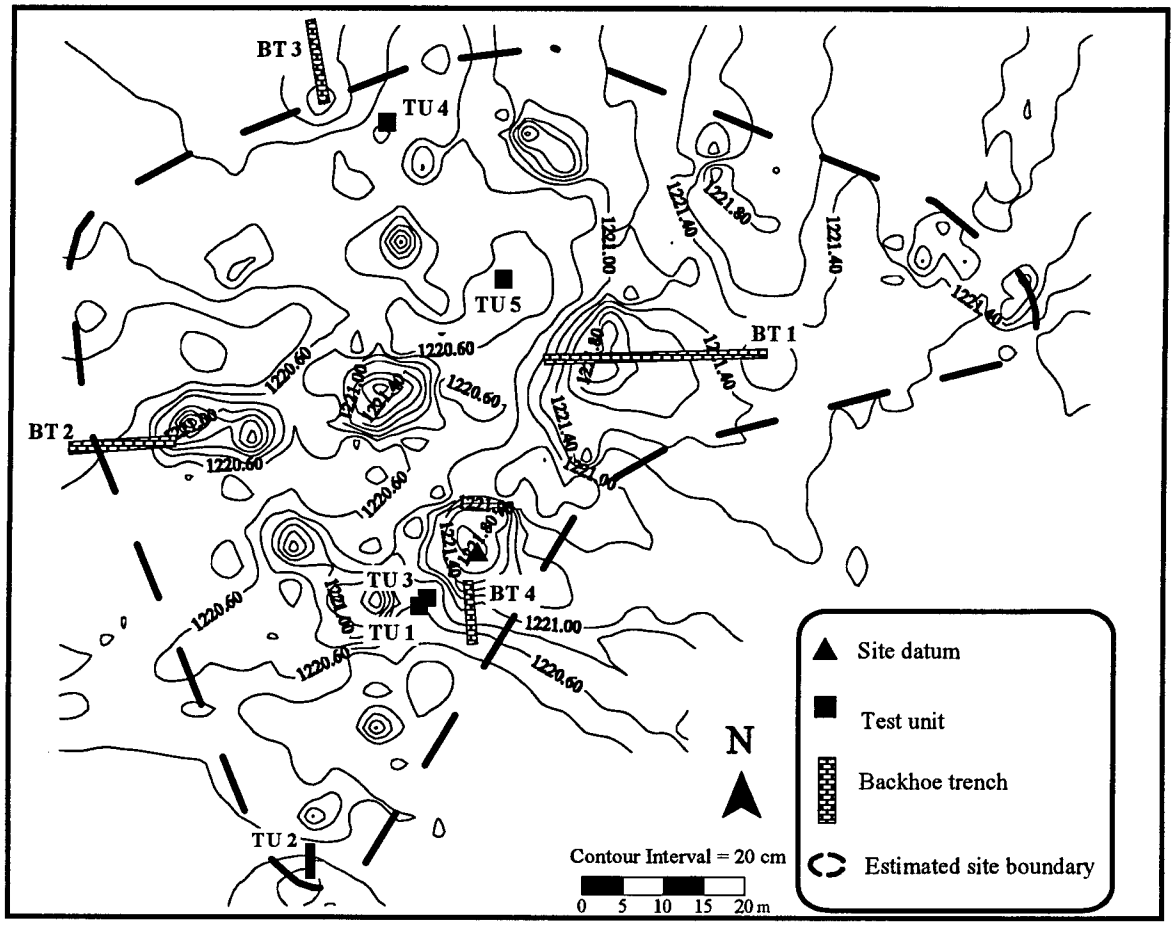


Figure 50. Contour map of site FB 6940.

TU #1, a 2-x-2-m block, was placed over a large charcoal stain (see Figure 50). A single chert flake was recovered from the surface. The feature bottom was reached at 12 cm below surface. No artifacts were recovered from subsurface context (Table 17). Excavation was taken down to 21 cm below surface and an auger core was taken between 21-62 cm below surface. A segment of the large circular charcoal stain feature (thought to be a possible brush structure) was exposed adjacent to the northeast corner of TU #1. Thus, TU #3 (3 m²) was opened contiguous to TU #1 (with the southwest quadrant of TU #3 overlapping the northeast quadrant of TU #1 [Figure 52]) to better define the entire feature outline. Excavation of TU #3 involved trowel scraping and sweeping off the eolian overburden for screening. The feature appears to be circular in outline (Figure 53). The extent of charcoal enrichment of the fill, however, became progressively impoverished away from the center of the circle in a manner characteristic of a blown-out hearth. Approximately half of the feature is still unexcavated. Two flotation samples were collected from F1. Identified plant remains include amaranthus, sunflower family, purslane (Appendix J); none of these remains exhibited evidence of burning. In addition, four shell fragments were recovered from the flotation sample collected from 1-12 cm below surface.

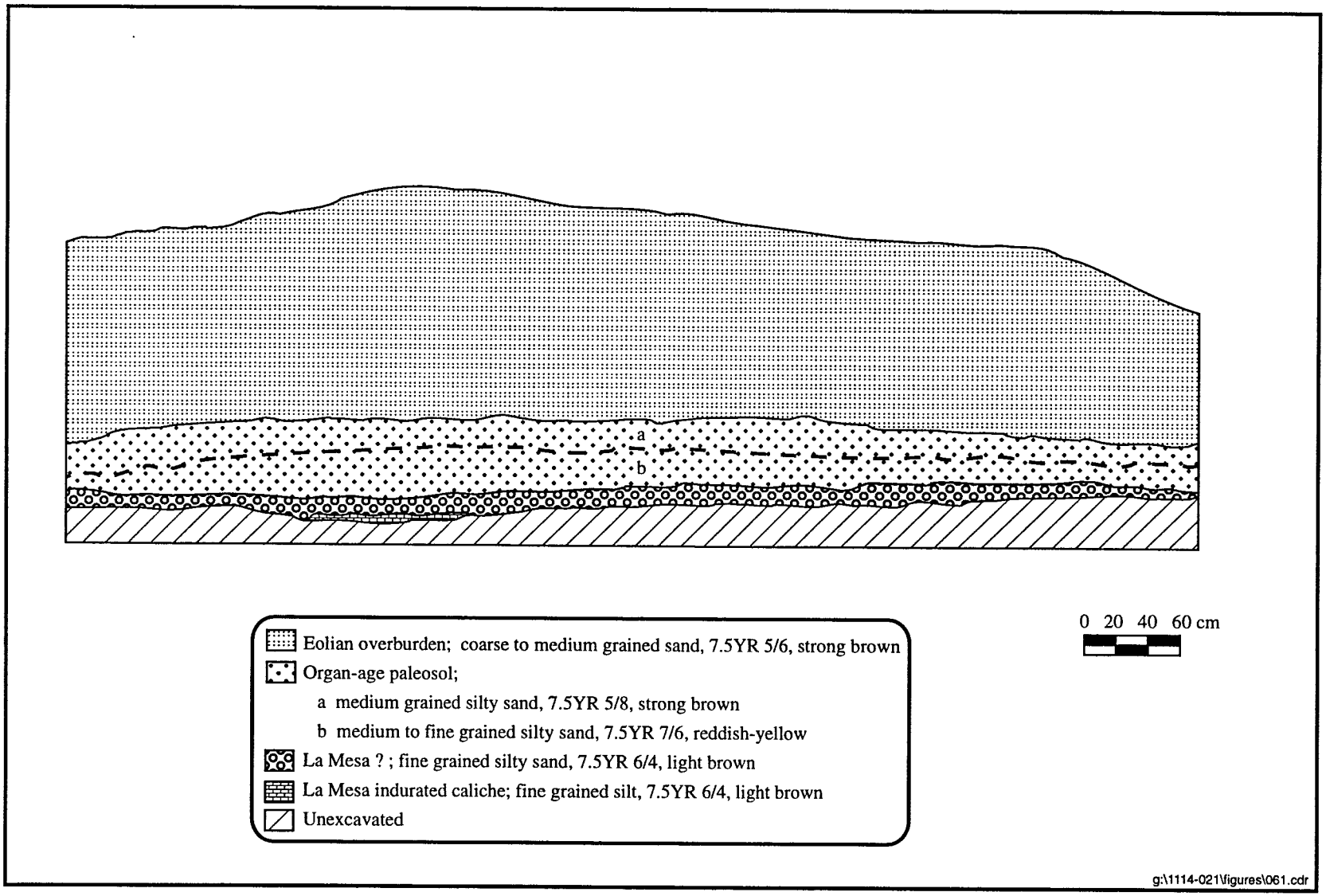


Figure 51. Backhoe Trench 1, profile of southeast wall, site FB 6940.

Table 17
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 6940 (41EP2227)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone/ Shell	FCR (kg)	BC (kg)	FCR-BC /m^3
1&3	7		1	Stain	S	S		1			1					
		.57			Q4/Q3	0-21							0/4			
Total TU #1&3	*7*	*.57*	*1*					*1*			*1*	*1.75*				
2	4	.16	2&3	Stains	Q3	0-13										
		.52			Q3	0-31										
Total TU #2	*4*	*.68*	*2*													
4	4	.52			Q4/Q3	0-23								.28		
Total TU #4	*4*	*.52*												*.28*		*.54*
5	4		4	Stain	S	S			1		1					
		.04			Q4	0-7		5			5					
		.14			Q4/Q3	0-17										
Total TU #5	*4*	*.18*	*1*					*5*	*1*		*6*	*33.33*				
Total	*19*	*1.95*	*4*					*6*	*1*		*7*	*3.59*	*0/4*	*.28*		*.14*
Surface Recovery								1			1					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
- S Surface
- Q4 (Quaternary 4) Historic eolian overburden
- Q3 (Quaternary 3) Organ-age paleosol
- Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
- Q1 (Quaternary 1) La Mesa indurated caliche

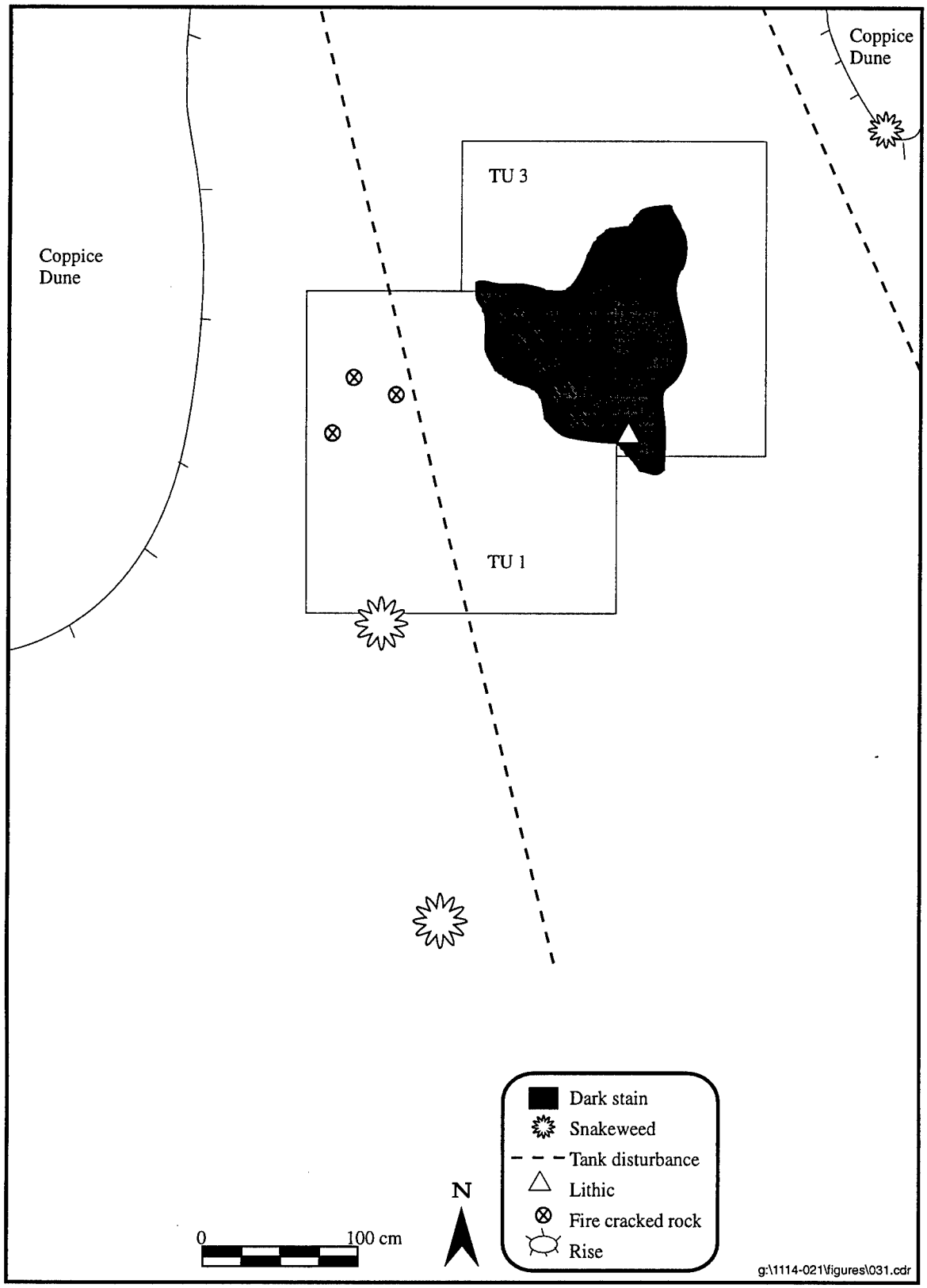


Figure 52. Surface plan view of F1, site FB 6940.

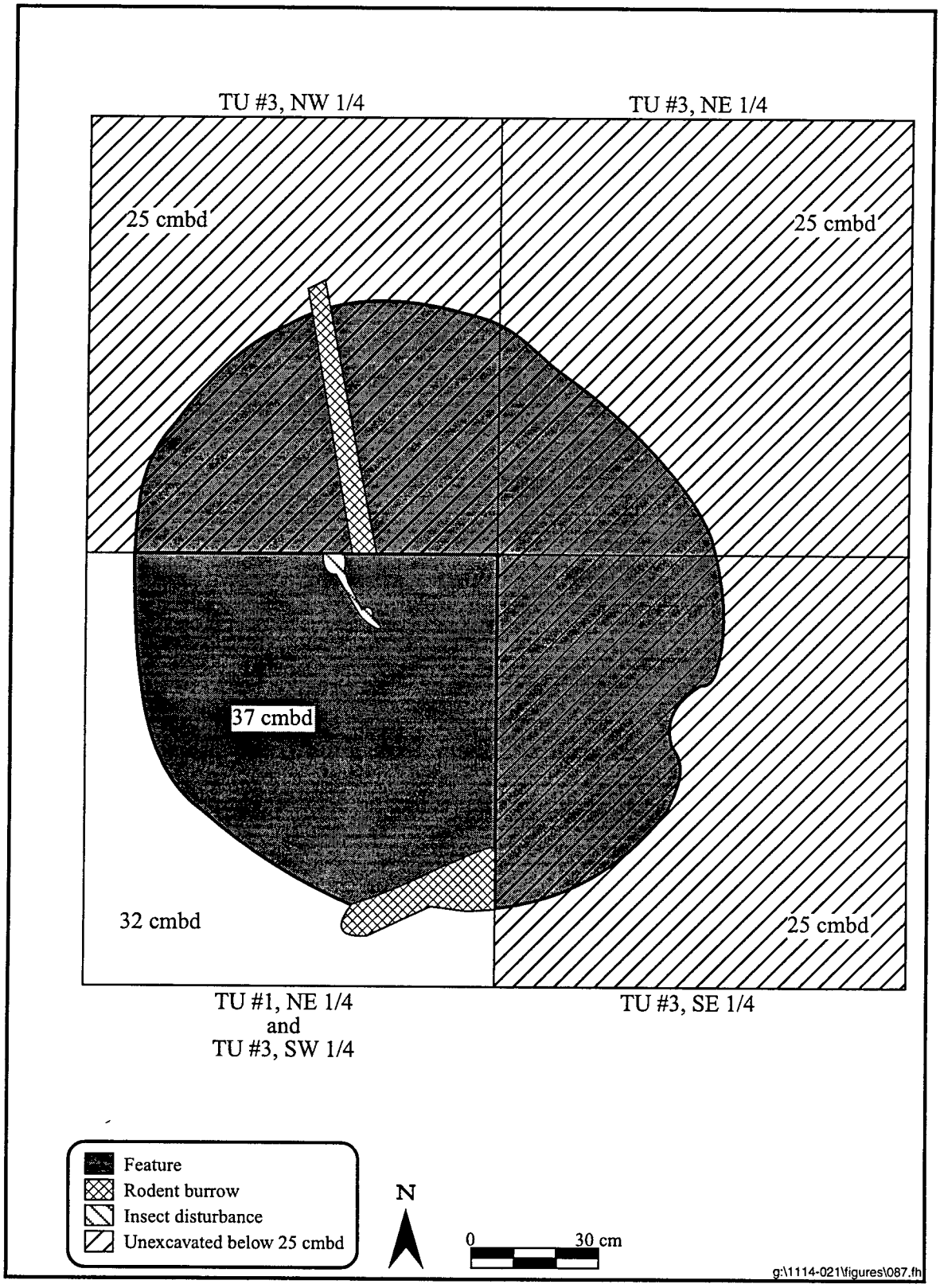


Figure 53. Post-excavation plan view of TU #1 and TU #3, F1, site FB 6940.

TU #2 (1-x-4 m) was excavated on the southern part of the site where a charcoal stain (F1) was exposed adjacent to a coppice dune. A second and smaller bowl-shaped stain (F2) with evidence of oxidation was exposed below the eolian overburden. The features are separated by a mottled area, possibly connecting them into a single feature. Although a ground stone fragment and a chert core were recorded on the surface one meter east of TU #2, no artifacts were encountered in the subsurface context. Excavation was terminated at 31 cm, but an auger core was taken between 31-78 cm below surface. Soil matrix from the auger core provided no physical evidence of cultural deposits. Flotation samples were taken from both features. Identified plant remains include mallow family and purslane; none of the remains were charred (Appendix J).

TU #4 (2-x-2 m), previously recorded as a hearth, was excavated down to 23 cm and augered from 23 cm to 75 cm below surface. Fire-cracked rock (.28 kg) was recovered from the eolian overburden and the contact zone between eolian overburden and the present erosional surface, between 0-23 cm below surface (see Table 17). No other artifacts were recovered from either the surface or subsurface.

TU #5, a 2-x-2-m block, was placed over a large surface stain (F4; Figure 54). The feature diminished substantially after the removal of the eolian overburden, and disappeared at the contact zone between the eolian overburden and the Organ-age surface. A ground stone fragment was collected from the surface and five debitage were recovered from the eolian overburden between 0-7 cm below surface. Analysis of the flotation sample collected from F4 resulted in the identification of amaranthus and purslane with no evidence of charring (Appendix J). Excavation was terminated at 17 cm below surface when culturally sterile level was encountered.

Two radiocarbon dates were obtained from site FB 6940, both of which are firmly Archaic in date. One sample, from TU #1, yielded a calibrated 2-sigma date of 1270-800 B.C., while the second sample, from TU #5, yielded a calibrated 2-sigma date of 980-780 B.C. (Appendix B).

This site spans the Late Archaic through the Early Formative periods (based on radiocarbon dating and diagnostic artifacts from the current project). It is recommended this site be considered eligible for inclusion in the NRHP. FB 6940 is, however, being impacted by tanks and the projected use of the Patrol Base is expected to exacerbate the impact. Current and future impacts on cultural resources should be mitigated through a data recovery strategy that includes:

1. a 10-x-10-m block-excavation around the large charcoal stains/possible burned prehistoric brush structures (TU #1 and TU #3),
2. a 10-x-10-m block-excavation of an unexcavated fire-cracked/burned caliche feature, and
3. mapping and collecting of all surface artifacts.

The relationship between this aceramic site and a scatter of unspecified brownware found just off its southern boundary remains unclear and should be determined during any data recovery program.

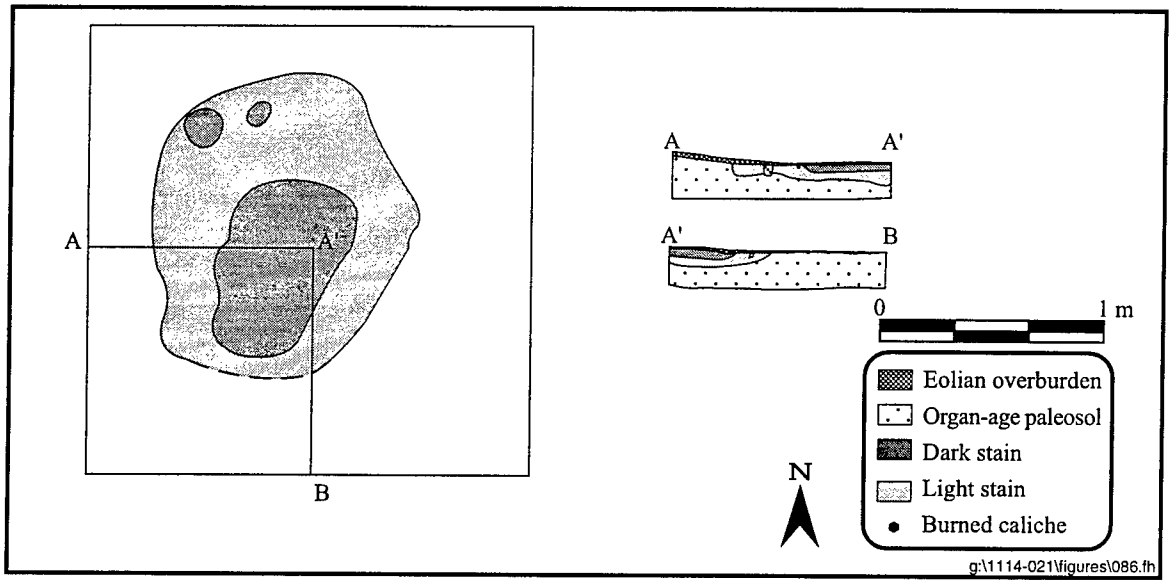


Figure 54. Plan view and profile of TU #5, site FB 6940.

FB 7312 (41EP2219)

Eligibility Status:	Eligible
Radiocarbon Date:	750 ± 60 B.P. (A.D. 1195-1385)
	2,120 ± 90 B.P. (380 B.C.-A.D. 85)
	1,270 ± 100 B.P. (A.D. 605-985)
	1,050 ± 60 B.P. (A.D. 960-1180)
Elevation (meters above mean sea level):	1,227 (4,024 ft)
Size (square meters)	
Previously Recorded:	1,500+
Current:	27,660
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	14
Total Area Tested (m^2):	56.5
Total Volume Excavated (m^3):	12.43
Artifact Density (n/m^3):	3.94
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.72
Backhoe Trenches	
Number of Trenches:	15
Mean Length of Trench (meters):	13.8
Extent of Erosion (%):	20
Extent of Modern Disturbance (%):	< 10

Site FB 7312 occupies geomorphic surface Mapping Unit 2b (Monger 1993:102) along a low rise overlooking a grassy plain area of lower elevation (relic playa) to the east (Figure 55). The site area consists of relatively large coppice dunes up to 3 m in height. Some interdunal areas are deflated down to Isaacks' Ranch-age deposits, but sand has accumulated in other areas. Parts of the site exhibit deep Hueco-Wink association soils and Pleistocene Rio Grande gravels are exposed in many deflated interdunal areas. Vegetation consisting of mesquite, yucca, four-wing saltbush, broom snakeweed, and grasses allows 60 percent ground surface visibility.

A low density scatter of artifacts (unspecified brownware, chipped and ground stone) was observed over most of the surface of FB 7312. The artifact scatter spreads beyond the previously identified boundary, effectively engulfing three other previously recorded but relatively smaller sites (FB 7313, 11614, and 11644). Multiple features (n=15) including fire-cracked rocks, burned caliche, and charcoal stains were recorded. A mano (Figure 56), a large basin metate (10.9 kg; Figure 57), a mano/pestle, an untyped projectile point fragment (the proximal end of a chert specimen; Figure 58), and a retouched flake were recovered from different areas on the site surface.

Overall, 14 2-x-2-m test units were excavated at FB 7312 (Table 18; see Figure 55). TU #1, a 2-x-2-m block, was excavated in the area of a fire-cracked rock and stain feature (F1; Figure 59a). The surface concentration contained .69 kg of fire-cracked rocks. More fire-cracked rocks were recovered from the eolian overburden (.84 kg) and from the subsurface context (1.36 kg). A flake and three bones were recovered from the subsurface between 1-23 cm below the modern erosional surface. A flotation sample was collected from the feature fill. Identified plant remains include purslane and smaller quantities of amaranthus, shining tickseed, spurge, and cowpen daisy; none of the plant remains exhibited evidence of charring (Appendix J). Excavation was terminated at 44 cm below surface after a culturally sterile level was excavated.

TU #2, a 2-x-2-m block, was placed over one half of a fire-cracked rock and stain feature (F2) on the southeastern side of the site. A mano was also found on the surface. Fire-cracked rocks were recovered from the eolian overburden (.11 kg) at 0-7 cm below surface, and from the subsurface context (.49 kg). Excavation was terminated at 30 cm below surface (see Figure 59b).

TU #3 (2-x-2 m) was placed over a fire-cracked rock/burned caliche feature. A flake, fire-cracked rocks (.03 kg), and burned caliche (.11 kg) were recorded on the surface. Two ground stone fragments (a mano fragment and an indeterminate fragment), fire-cracked rock (1.94 kg), and burned caliche (.36 kg) were recovered from the eolian overburden and the contact zone between the eolian overburden and the Organ-age surface from 0-20 cm. Fire-cracked rocks (.06 kg) and one flake were recovered from the subsurface between 4-30 cm below surface. Excavation was terminated at 41 cm below surface. No artifacts were recovered from the subsurface.

TU #4, a 2-x-2-m block, is in the south-central part of the site and was placed over a small (.5 m^2) charcoal stain (F4; see Figure 59c). It was excavated to 37 cm below surface. A single flake was recovered from the eolian overburden but the rest of the unit was sterile (see Table 18).

TU #5 (2-x-2 m), in the southeastern part of the site, was placed where a 2-m^2 charcoal stain (F5A and F5B) was eroding from the eolian overburden (Figure 60). A piece of debitage and a mano were recovered from the shallow into the subsurface context between 20-30 cm below surface. Three flotation samples and a charcoal sample for radiocarbon dating, were collected from the feature fill. The two samples submitted for dating produced calibrated 2-sigma dates of A.D. 1195-1385 and 380 B.C.-A.D. 85. Flotation analysis

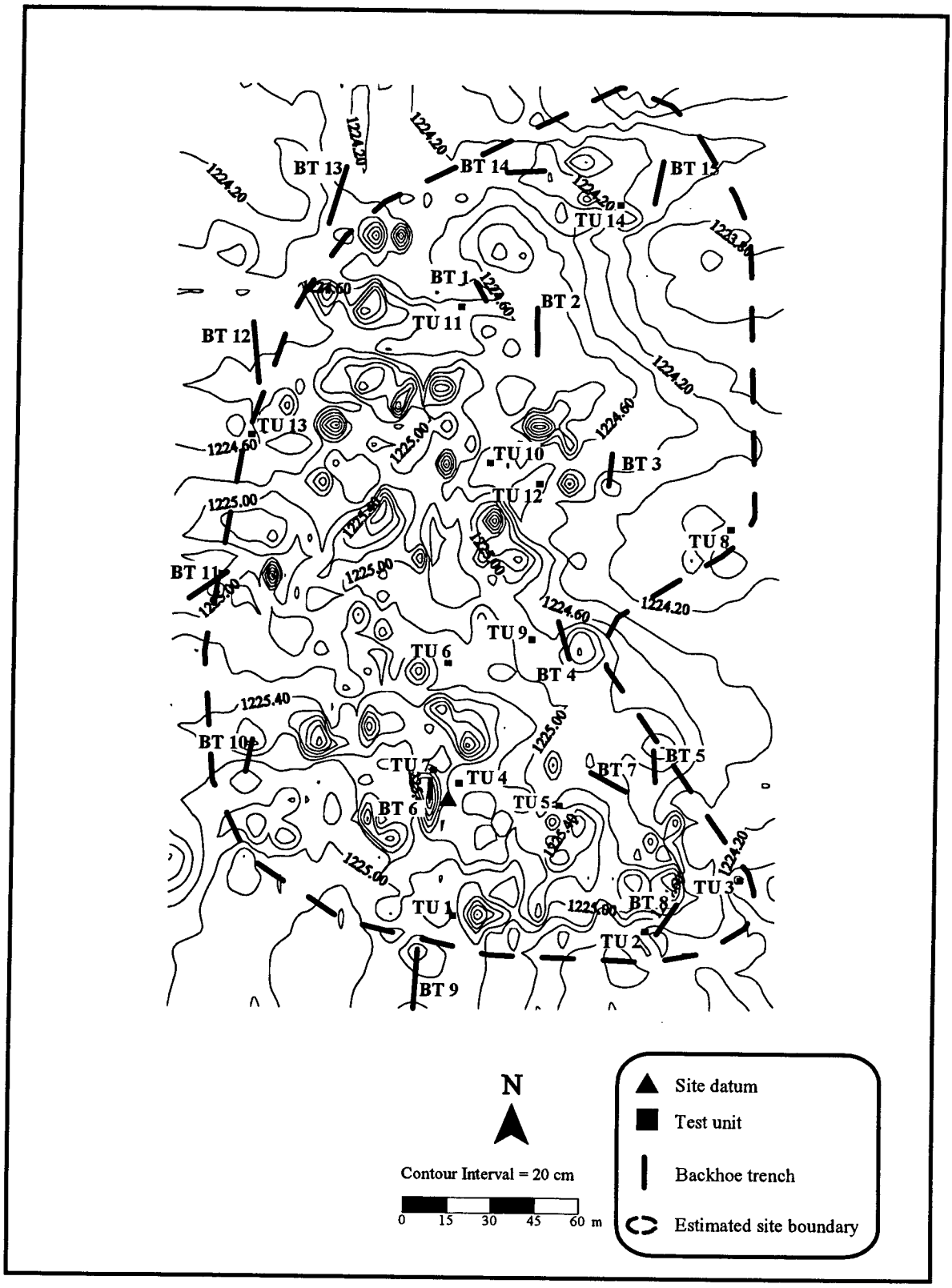


Figure 55. Contour map of site FB 7312.

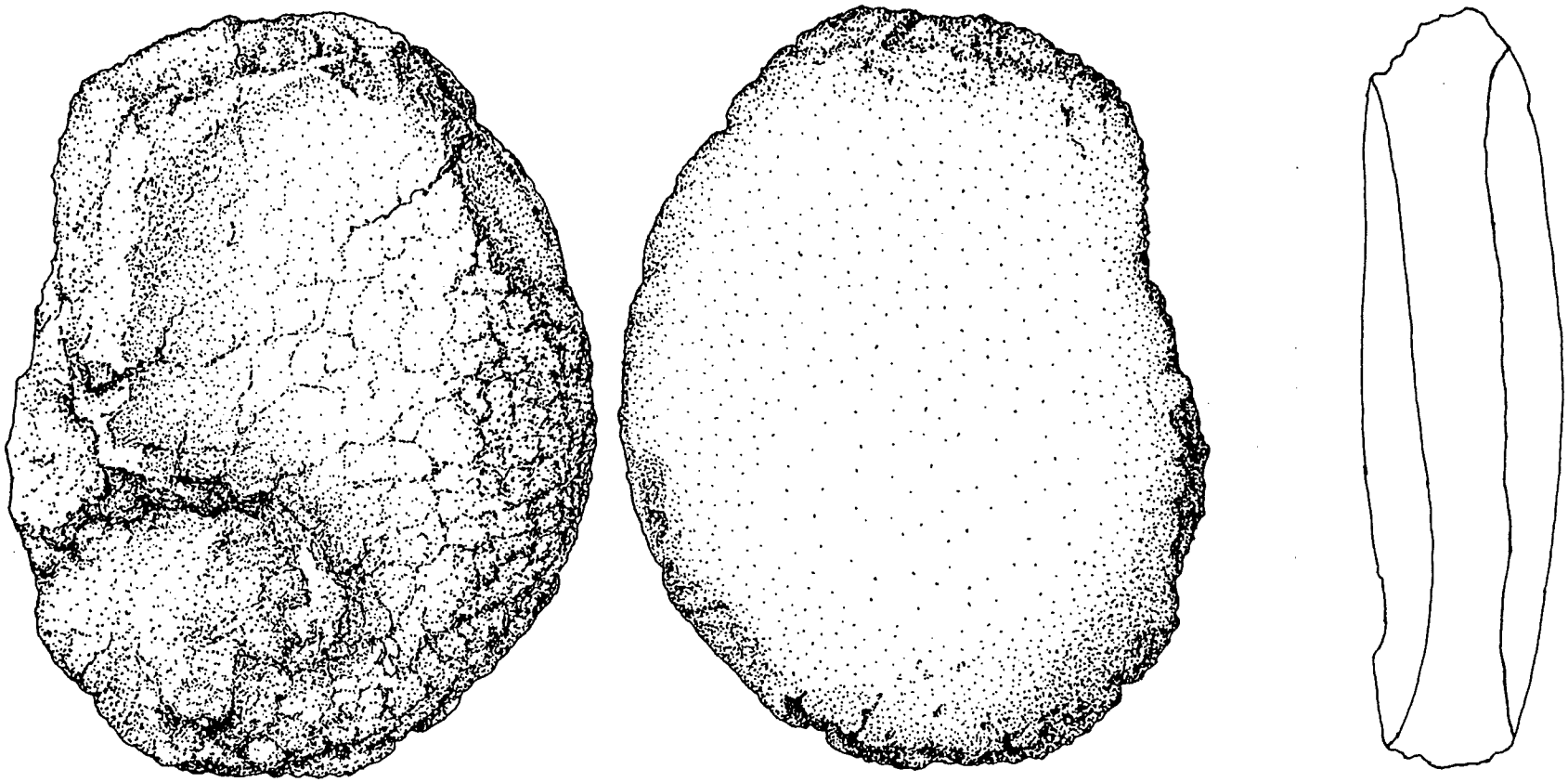


Figure 56. One-handed mano from site FB 7312. (Scale 1:1)

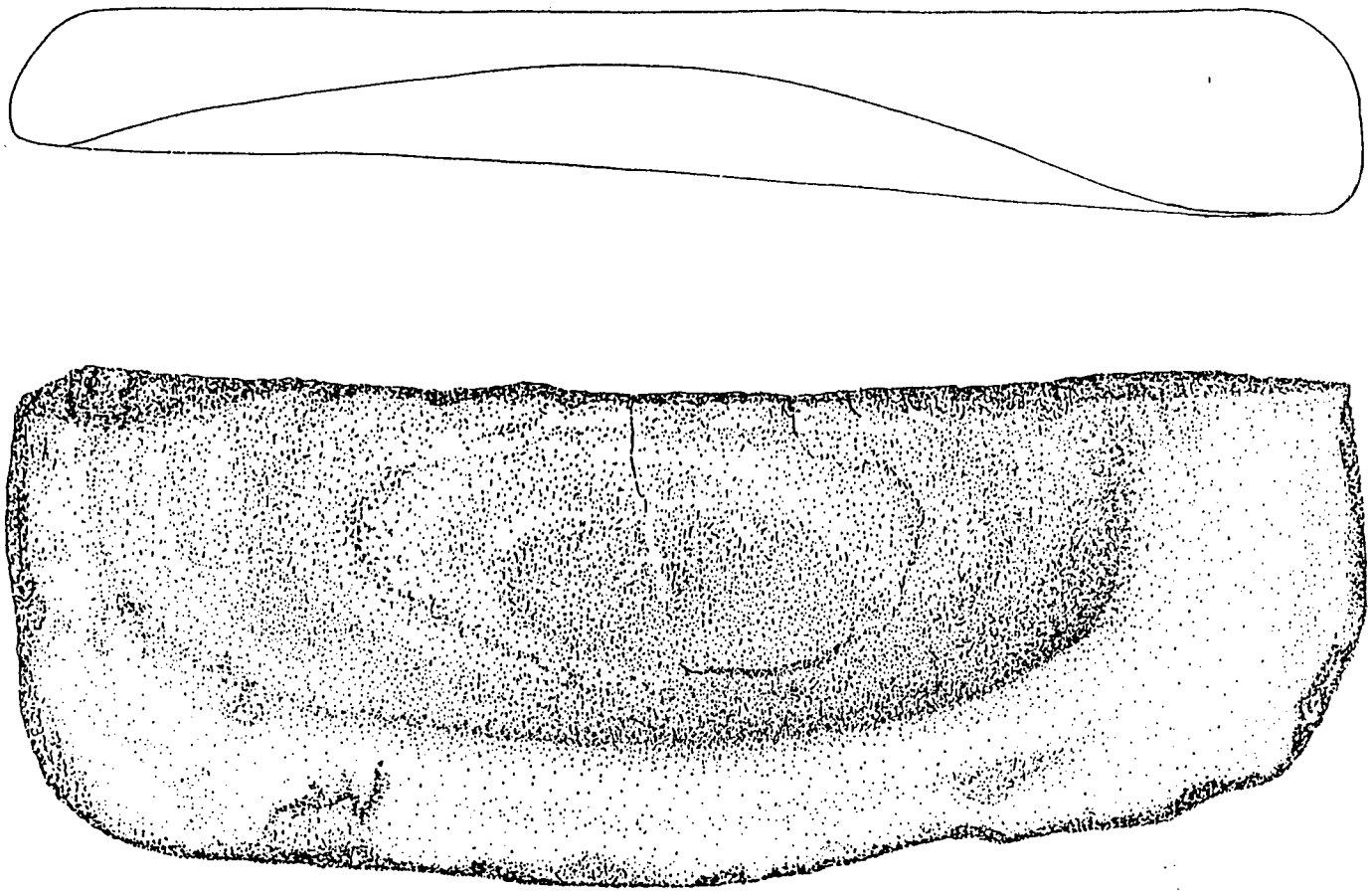


Figure 57. Large basin metate from site FB 7312. (Scale 1:3)

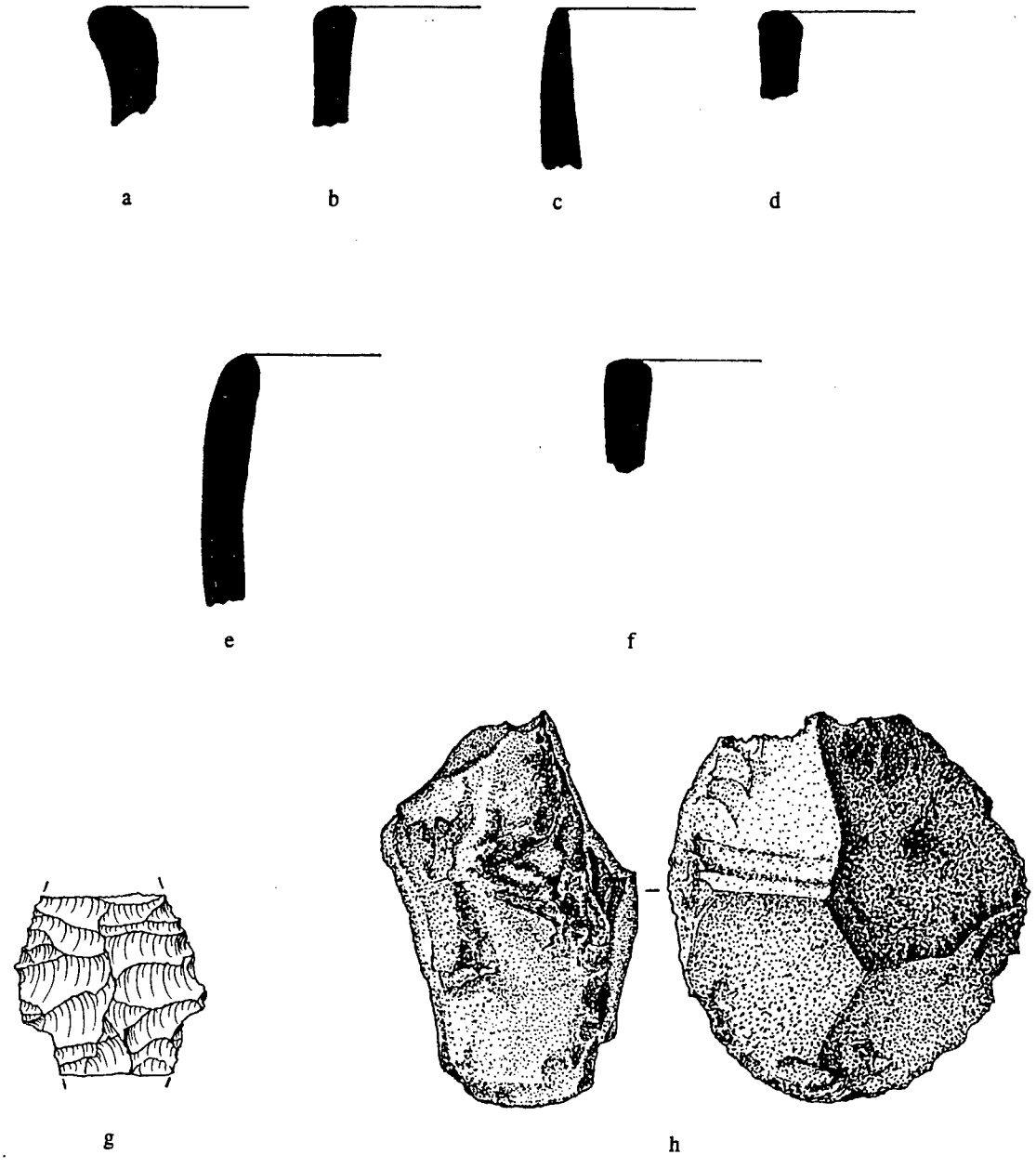


Figure 58. Artifacts recovered from site FB 7312: (a) bichrome rim sherd; (b-f) unspecified brownware rim sherds; (g) unidentified projectile point fragment; (h) core. (Scale 1:1)

Table 18
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 7312 (41EP2219)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4.5		1	FCR/Stain	S	S								.69		
		.04			Q4	0-6								.84		
		.04			Q3	1-23		1			1		3	1.30		
		.45			Q3	6-33								.06		
		.35			Q3	18-44										
Total TU #1	*4.5*	*.88*						*1*			*1*	*1.14*	*3*	*2.89*		*3.28*
2	4		2	FCR/Stain	S	S			1		1			.16		
		.20			Q4	0-7								.11		
		.22			Q3	3-22								.46		
		.34			Q3	5-30								.03		
Total TU #2	*4*	*.76*							*1*		*1*	*1.32*		*.76*		*1.00*
3	4		3	FCR/BC	S	S		1			1			.03	.11	
		.20			Q4	0-10								.73	.12	
		.20			Q4/Q3	3-20			2		2			1.21	.24	
		.40			Q3	4-30		1			1			.06		
		.30			Q3	14-41										
Total TU #3	*4*	*1.10*						*2*	*2*		*4*	*3.64*		*2.03*	*.47*	*2.27*
4	4	.15	4	Stain	Q4	0-17										
		.09			Q4	5-16		1			1					
		.82			Q3	2-37										
Total TU #4	*4*	*1.06*						*1*			*1*	*.94*				

Table 18 (cont'd)

	TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
	5	4		5A & 5B	Stains	S	S								.04		
			.11			Q4	0-6		1	1		2					
			.46			Q4/Q3	0-24							5			
			.15			Q3	12-33										
Total TU #5		*4*	*.72*	*2*					*1*	*1*		*2*	*2.77*	*5*	*.04*		*.06*
	6	4		6	FCR/Stain	S	S	3				3			.95		
			.18			Q4	0-5		1			1			.60		
			.22			Q4/Q3	3-15								.06		
			.30			Q3	10-23										
Total TU #6		*4*	*.70*	*1*				*3*	*1*			*4*	*5.71*		*1.61*		*2.30*
	7	4				S	S	4	1			5					
			.16			Q4	0-11		3			3			.02		
			.17			Q4/Q3	1-18		6			6					
			.10			Q3	7-27										
Total TU #7		*4*	*.43*					*4*	*10*			*14*	*32.56*		*.02*		*.05*
	8	4		7	FCR	S	S			1		1			.21	.09	
			.03			Q4	0-10								.08	.02	
			.26			Q3	1-25										
Total TU #8		*4*	*.29*	*1*						*1*		*1*	*3.45*		*.29*	*.11*	*1.38*
	9	4	.31	8	Stain	Q4/Q3	0-13										
Total TU #9		*4*	*.31*	*1*													
	10	4		9	FCR/Stain	S	S	2	1	1		4			.18		
			.67			Q3	0-22										
Total TU #10		*4*	*.67*	*1*				*2*	*1*	*1*		*4*	*5.97*		*.18*		*.27*

Table 18 (cont'd)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
11	4		10	Stain	S	S	5				5					
		.05			Q4	0-20										
		.03			Q4	0-7	1				1					
		1.18			Q4/Q3	0-30	6				6					
		1.37			Q3	0-45										
Total TU #11	*4*	*2.63*	*1*				*12*				*12*	*4.56*				
12	4		11A &11B	Stains	S	S			1		1					
		.07			Q4	0-4		2			2					
		.37			Q4/Q3	1-17		1			1					
		.38			Q3	6-27										
		.11			Q3	20-41										
Total TU #12	*4*	*.93*	*1*					*3*	*1*		*4*	*4.30*				
13	4	.16	12	Stain	Q4	0-7							7			
		.22			Q3	1-17							20			
		.10			Q3	5-20							4			
Total TU #13	*4*	*.48*	*1*										*31*			
14	4	.18	13	BC/ Stain	Q4	0-11									.56	
		.81			Q4/Q3	1-23										
		.48			Q3	12-32		1			1					
Total TU #14	*4*	*1.47*	*1*					*1*			*1*	*.68*			*.56*	*.38*
Total	*56.5*	*12.43*	*15*				*21*	*21*	*7*		*49*	*3.94*	*39*	*7.82*	*1.14*	*.72*
Surface Recovery								2	3		5					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

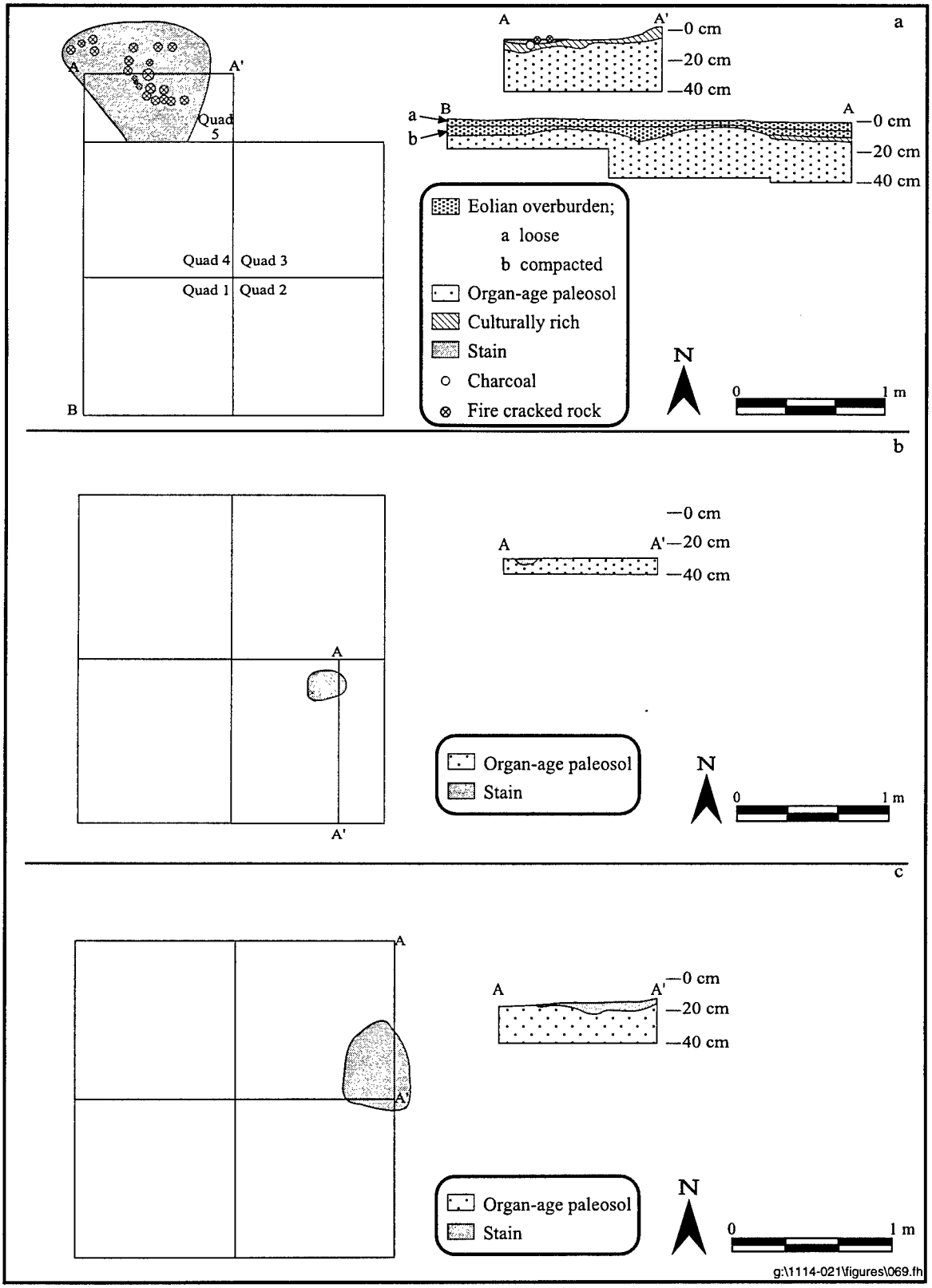


Figure 59. Plan views and profiles of: (a) TU #1, F1; (b) TU #2, F2; and (c) TU #4, F4, site FB 7312.

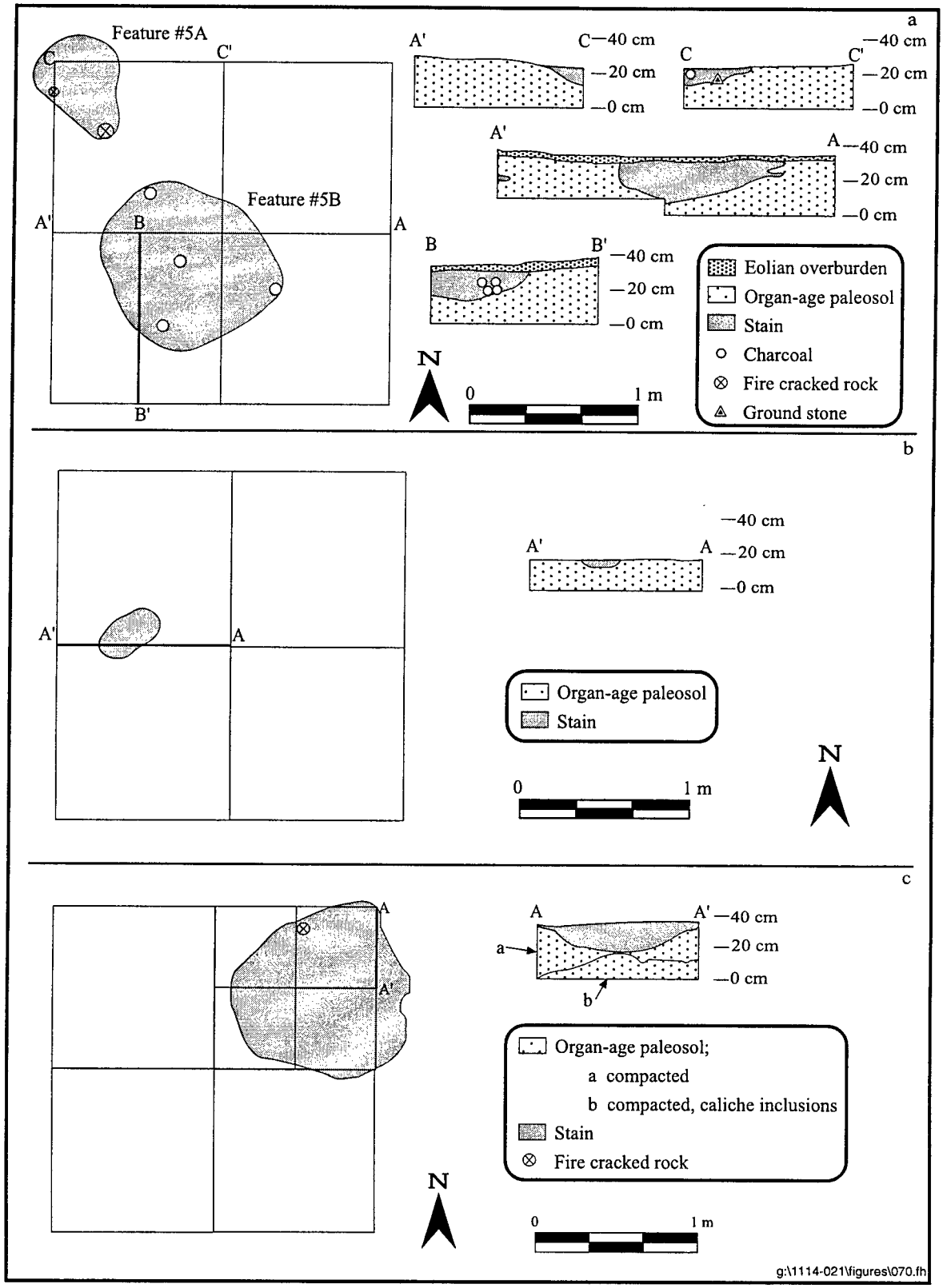


Figure 60. Plan views and profiles of: (a) TU #5, F5; (b) TU #6, F6; and (c) TU #11, F10, site FB 7312.

resulted in the identification of very few croton and purslane plant remains with larger quantities of charred mesquite and another unknown plant material (Appendix J). Excavation was terminated at 33 cm below surface.

TU #6, a 2-x-2-m block, was excavated on the east-central side of the site in a fire-cracked rock concentration (1 m^2) in association with a charcoal stain (F6). Two brownware rim sherds and one El Paso Bichrome sherds were collected from the unit surface (see Figure 58). A small quantity (.06 kg) of fire-cracked rock was recovered from the contact zone between the eolian overburden and the present erosional surface between 3-15 cm below surface. A single piece of debitage was recovered within the upper 5 cm of the eolian overburden. No subsurface cultural deposits were encountered, and excavation was terminated at 23 cm below surface (see Figure 60).

TU #7, a 1-x-4-m block, is located in the south-central part of the site. Four brownware sherds (one rim sherd; see Figure 58) and a flake were recovered from the surface of the unit. Nine pieces of debitage and fire-cracked rock fragments (.02 kg) were recovered from the eolian overburden and the transition zone between the latter and the Organ-age surface (see Table 18). The unit was excavated to a maximum depth of 27 cm below surface.

TU #8, a 2-x-2-m block on the eastern edge of the site, was placed over one half of a fire-cracked rock feature (F7). A metate fragment, .21 kg of fire-cracked rock, and .09 kg of burned caliche were collected from the surface. Small amounts of fire-cracked rock (.08 kg) and burned caliche (.02 kg) were recovered from the eolian overburden within the first 10 cm below surface; no cultural material was found in subsurface context. Excavation was discontinued at 25 cm below surface.

TU #9, a 2-x-2-m block, was excavated in the east-central part of the site where a small stain was exposed on the surface (F8; Figure 61). No artifacts, burned caliche, nor fire-cracked rocks were recovered from the unit. Excavation was terminated at 13 cm below surface.

TU #10, a 2-x-2-m block, was placed on the east-central side of the site over a fire-cracked rock feature and associated charcoal stain (F9; see Figure 61). Two brownware rim sherds (see Figure 58), a chert core (see Figure 58), a mano fragment, and a small quantity (.18 kg) of fire-cracked rock were collected from the surface. Although the vertical extent of the feature reaches 22 cm below surface, no artifacts were recovered from the subsurface. A charcoal sample for radiocarbon dating was collected from 9-14 cm below surface. A calibrated 2-sigma date of A.D. 605-985 was obtained from this sample (Appendix B).

TU #11, a 2-x-2-m block, was excavated in the northeastern part of the site to test a charcoal stain (F10; 1.1 m^2) and an associated ceramic scatter (see Figure 60). Five sherds were recovered from the surface and seven more from the eolian overburden (see Table 18). No subsurface artifacts were encountered and excavation was terminated at 45 cm below surface.

TU #12, a 2-x-2-m block on the east-central edge of the site, was placed over one half of a surface charcoal stain (F11; Figure 62). An indeterminate ground stone artifact was collected from the surface. Two flakes were recovered from the eolian overburden. In addition, one flake was recovered within the contact zone between the eolian overburden and the Organ-age surface at 17 cm below surface. Maximum depth of the feature was 41 cm below surface. Feature fill was collected for flotation and resulted in the identification of a small quantity of amaranthus and purslane plant remains, none of which were charred (Appendix J). A calibrated 2-sigma radiocarbon date of A.D. 960-1180 was obtained from F11 (Appendix B).

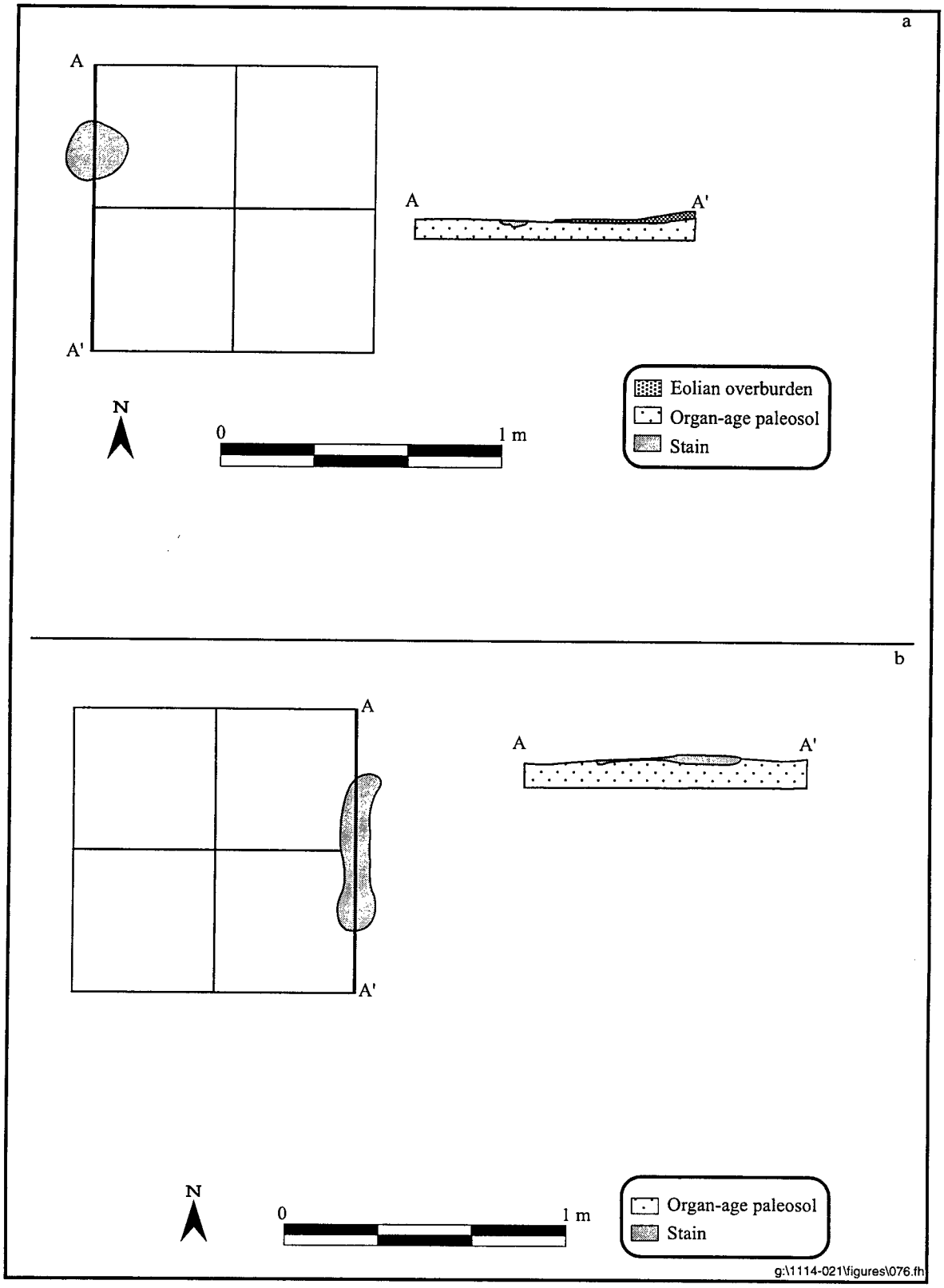


Figure 61. Plan views and profiles of: (a) TU #9, F8, and (b) TU #10, F9, site FB 7312.

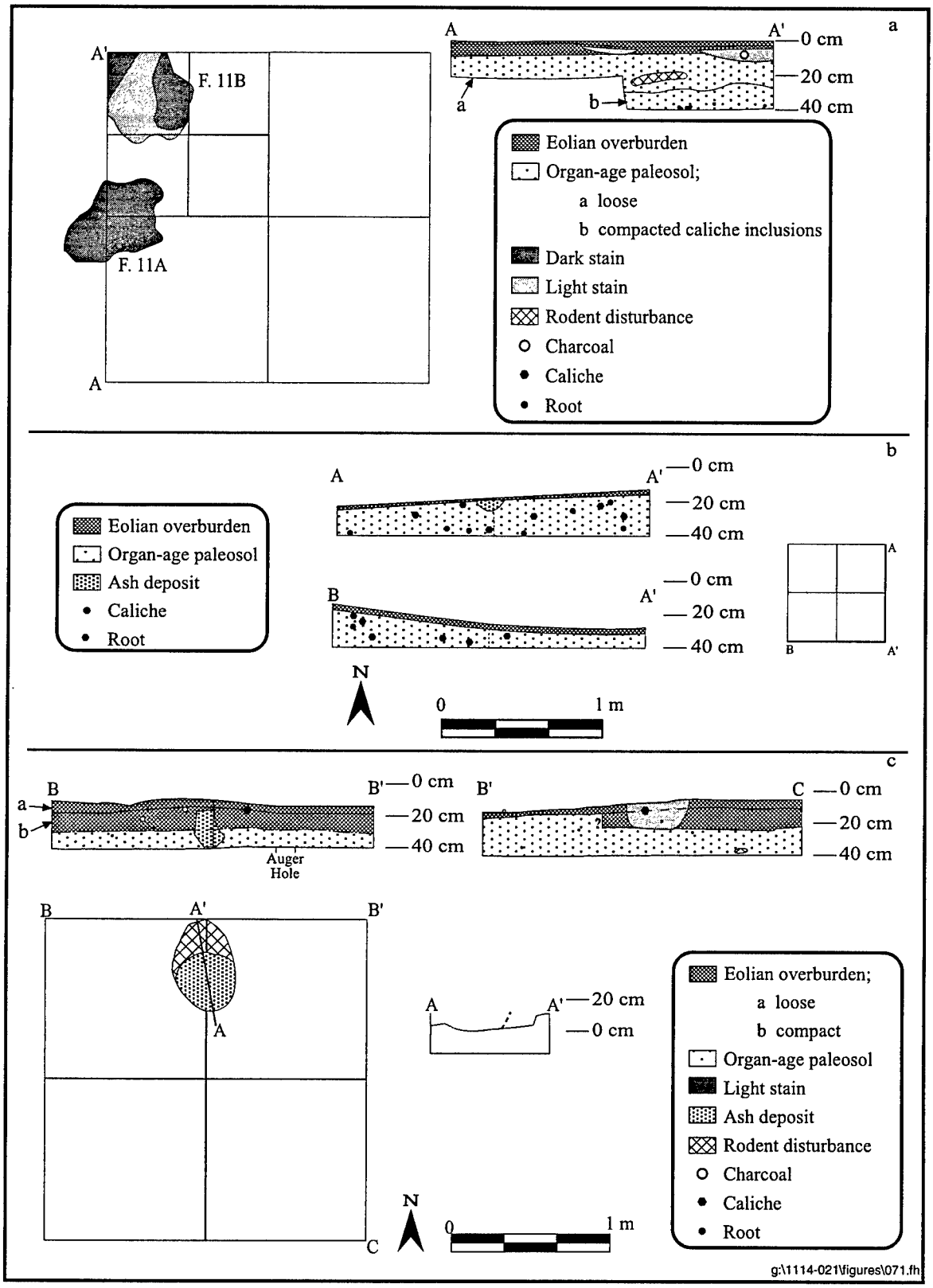


Figure 62. Plan views and profiles of: (a) TU #12, F11; (b) TU #13, F12; and (c) TU #14, F13, site FB 7312.

TU #13, a 2-x-2-m block, was excavated in the west-central part of the site where a charcoal stain was exposed on the surface (F12; see Figure 62). No surface or subsurface artifacts were recovered. Seven bone fragments were recovered from the eolian deposits between 0-7 cm below surface and an additional 24 came from the subsurface deposits. Excavation was terminated at 20 cm below surface (see Table 18).

TU #14, a 2-x-2-m block located on the northeastern edge of the site, was placed over a burned caliche and stain feature (F13). Burned caliche (.56 kg) was recovered from the eolian overburden between 0-11 cm below surface and a flake came from subsurface deposits between 12-32 cm below surface. Excavation was terminated at 32 cm below surface (see Figure 62).

Faunal remains from FB 7312 included bones from cottontail, jackrabbit, lagomorph, small rodent, lizard (believed to be modern), small bird or mammal, and cottontail to jackrabbit-sized mammals (Appendix I). A cottontail bone from F12 was identified as coming from a juvenile, which could suggest F12 was in use between early spring and early winter. In general the bones from FB 7312 are very fragmented; only two bones from the site exhibited evidence of burning.

Site FB 7312 is a site with multiple prehistoric components, as evidenced by a range of radiocarbon dates (85 B.C. to A.D. 1385), where longevity of various occupations may have varied from short to long durations as signified by the presence of a large (9.50 kg) metate collected from the site surface. The diagnostic artifact (El Paso Bichrome rim) and the majority of radiocarbon dates collected at the site suggest an occupation in the Late Mesilla and/or Dona Ana phases. The date of 380 B.C.-A.D. 85 was collected from the same unit as a sample dating to A.D. 1195-1385. This discrepancy may be explained by sampling error such as an old wood problem. The current project collected substantial prehistoric hearth/feature data from two hearth types: (1) those associated with fire-cracked rock and burned caliche, and (2) those containing a charcoal and ash matrix not associated with either burned caliche or fire-cracked rock. This site provides an opportunity to demonstrate intrasite variability of deflational effects on feature preservation and to study intrasite feature type variability on a prehistoric multicomponent site. Although the backhoe trenches were sterile of cultural features, the data demonstrated the presence of both undisturbed (BT 2) and collapsed (BT 6) Isaacks' Ranch horizon. Data on the Isaacks' Ranch horizon are crucial to understanding distribution and preservation of Paleo-Indian sites in the area.

The site size has expanded significantly from the previously recorded size. Most of the features excavated proved to be intact, and, for every feature tested, there is an unexcavated half feature remaining. In addition, more remnant cultural deposits are potentially present in areas of accumulated sand that cover approximately 20 percent of the site area. This site is considered eligible for inclusion in the NRHP under Criterion D, and since its location on the extreme southwest corner of the quadrat (see Figure 43) is amenable to avoidance without significantly reducing the area of the quadrat available for Patrol Base activities, site FB 7312 should be protected and preserved from future impacts by being kept off-limits to human and mechanical activities.

FB 10694 (41EP4691)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,223 (4,011 ft)
Size (square meters)	
Previously Recorded:	100
Current:	1,073
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.03
Artifact Density (n/m^3):	2.91
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	8.6
Extent of Erosion (%):	50
Extent of Modern Disturbance (%):	10

Site FB 10694 is located just southwest of FBH 98 in a low coppice dune field on the northern edge of the playa that occupies most of the southern half of the quadrant (see Figure 43). The site occupies Mapping Unit 2b geomorphic surface (Monger 1993:102). The area slopes gently to the south. The interdunal areas are relatively broad and flat and have been scoured of loose sand. The Hueco-Wink association soils are shallow and the La Mesa indurated caliche horizon is very close to the surface. Vegetation includes mesquite, broom snakeweed, yucca, an occasional ephedra, various forbes, and sparse amounts of four-wing saltbush that allow approximately 70 percent ground surface visibility.

Three charcoal stains were observed eroding from the surface of FB 10694. The first (1 x 1 m) has unspecified brownware sherds in association. The other two are less than 50 cm in diameter each and have no artifacts in association. Although a previously recorded fire-cracked rock feature was not relocated, one of the surface charcoal stains that had been identified during a prior survey (Whalen 1976) was relocated. A total of two test excavation units and two backhoe trenches was excavated at FB 10694 (Figure 63).

TU #1, a 2-x-2-m block on the eastern part of the site (Figure 64), was placed over one-half of a charcoal stain (F1; 1 m^2). Two sherds were recovered from the eolian overburden between 0-9 cm below surface (Table 19). A single flake was recovered from the subsurface between 1-15 cm below surface and three flotation samples were collected from the feature fill. Identified plant remains include purslane, with smaller quantities of amaranthus, sunflower family, shining tickseed, mustard, and spurge; no evidence of charring was exhibited on the plant remains (Appendix J). Excavation was terminated at 22 cm below surface.

The charcoal stain (F2; .2 m^2) in TU #2 (2-x-2 m) failed to yield any artifacts from either surface or subsurface contexts (see Figure 64). A flotation sample was collected from the feature fill; identified plant remains include mustard and purslane (Appendix J). Excavation was terminated at 16 cm below surface and an auger core was taken between 16-71 cm below surface.

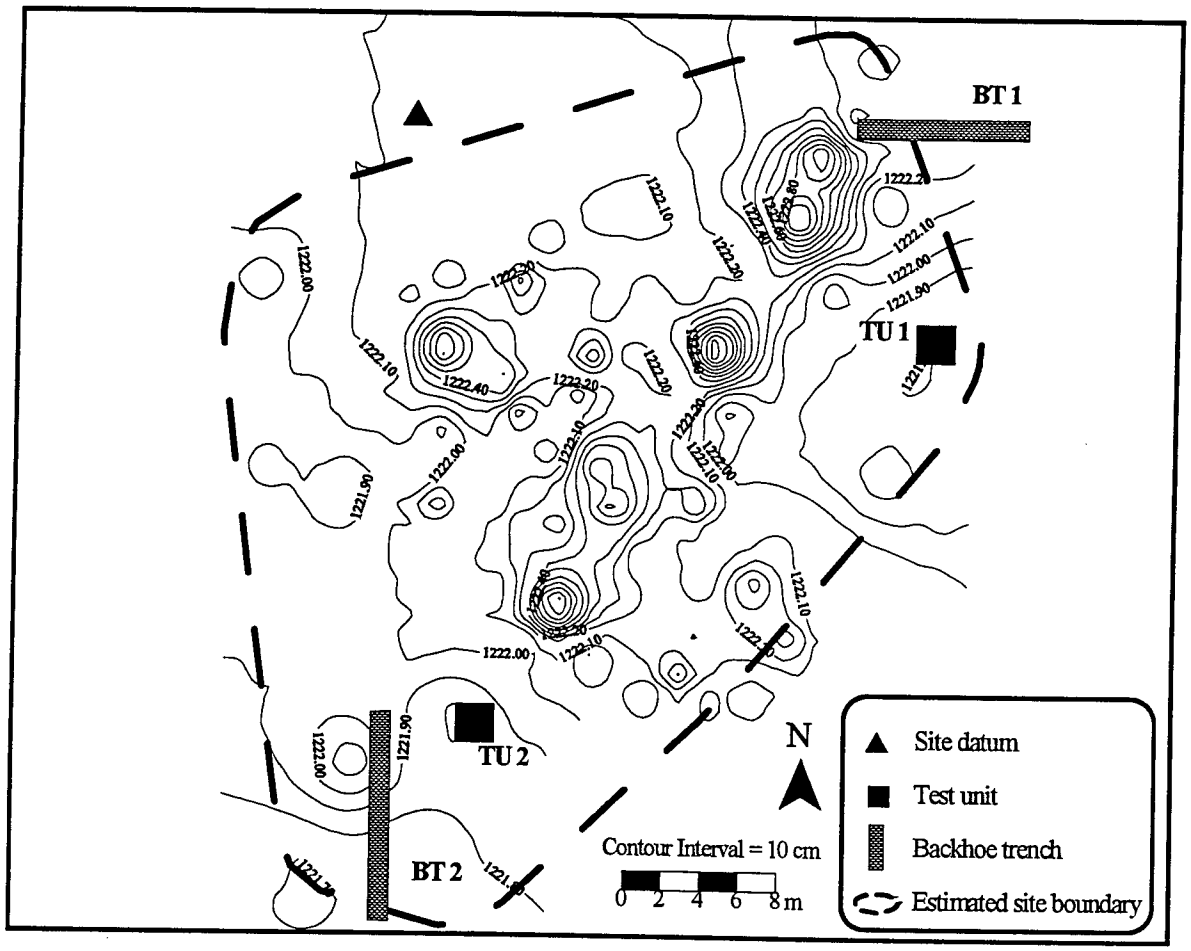


Figure 63. Contour map of site FB 10694.

Some charcoal stains with no artifact association may be the results of recent military activity. Military trash is common within the site parameters. A recent military bivouac may be the source of some of the small stains that exhibit no indication of oxidation and are not large enough to be fill from a burned prehistoric brush structure. No other features were identified on the site. Equally important, artifact occurrences on the surface are too scarce to justify either mapping or collecting and two backhoe trenches exposed no cultural deposits (Figure 65). Thus, site FB 10694 is considered ineligible for inclusion in the NRHP. The planned use of the Patrol Base will not impact the site. No further work is recommended.

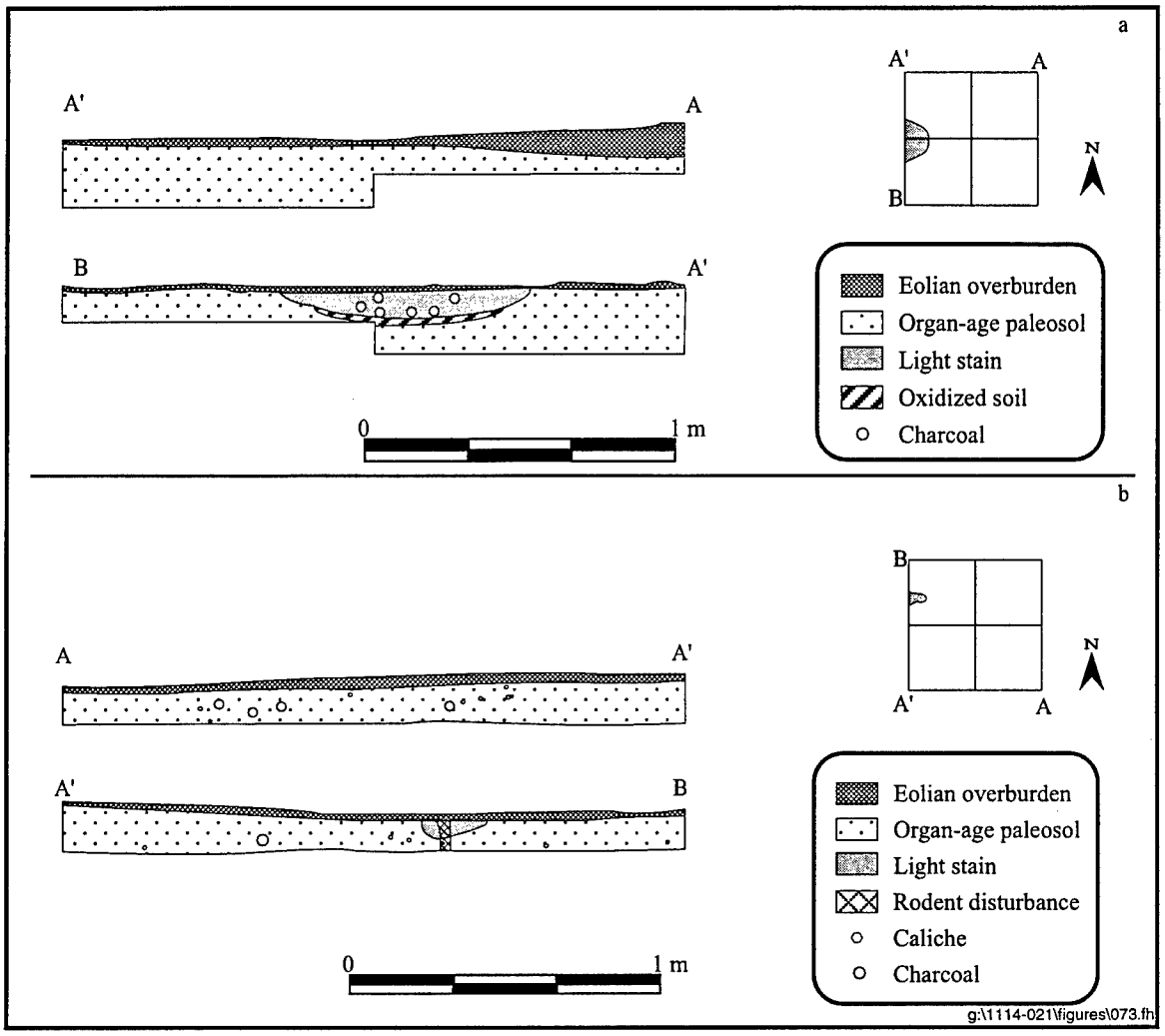


Figure 64. Profiles of (a) TU #1 and (b) TU #2, site FB 10694.

Table 19
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 10694 (41EP4691)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti/ m^3	Bone	FCR (kg)	BC (kg)	FCR- BC /m^3
1	4	.09	1	Stain	Q4	0-9	2				2					
		.33			Q3	1-15		1			1					
		.10			Q3	6-22										
Total TU #1	*4*	*.52*	*1*				*2*	*1*			*3*	*5.77*				
2	4	.07	2	Stain	Q4	2-3										
		.44			Q4/Q3	0-16										
Total TU #2	*4*	*.51*	*1*													
Total	*8*	*1.03*	*2*				*2*	*1*			*3*	*2.91*				

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

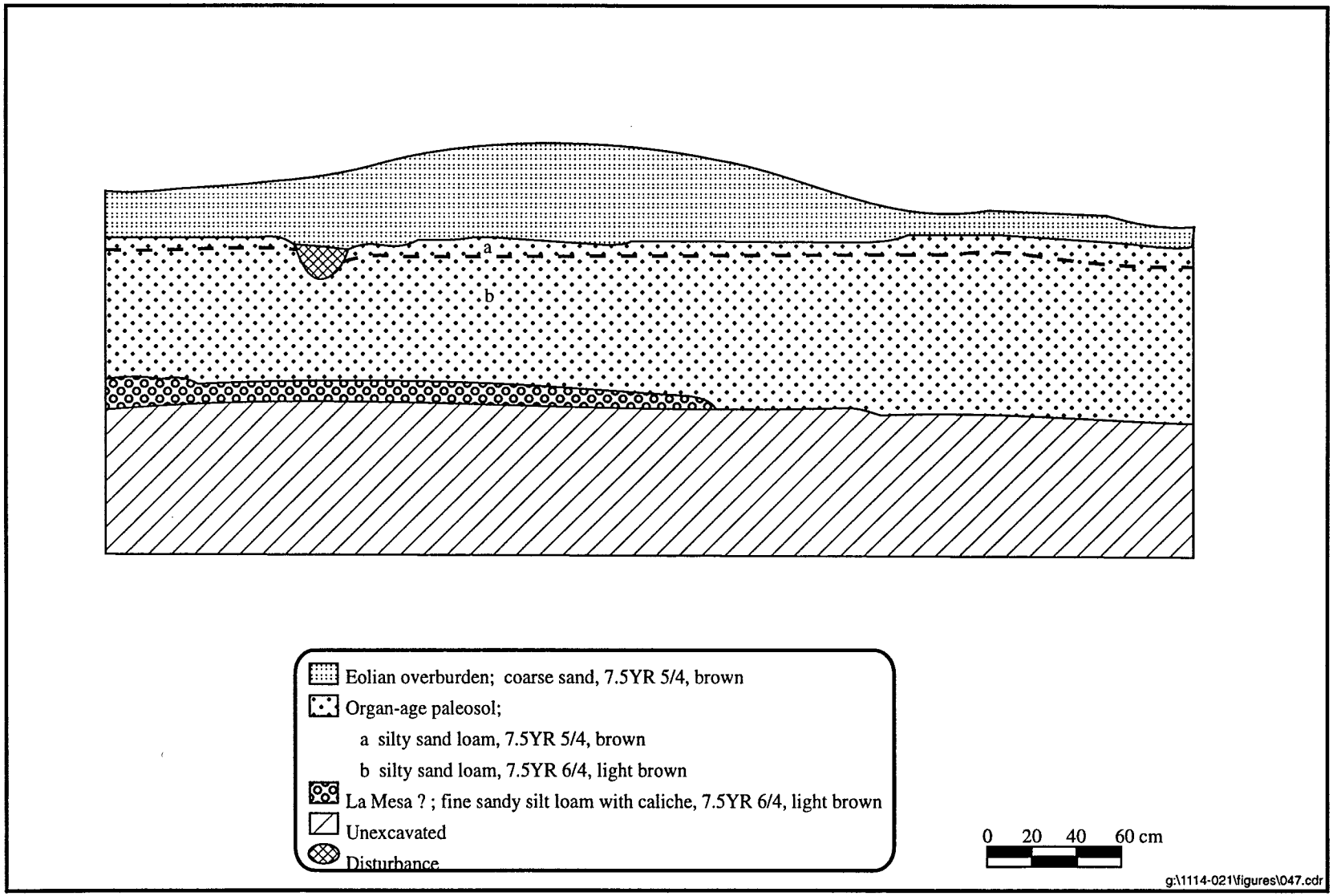


Figure 65. Backhoe Trench 2, profile of east wall, site FB 10694.

FB 11616 (41EP4692)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,224 (4,014 ft)
Size (square meters)	
Previously Recorded:	100
Current:	672
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.54
Artifact Density (n/m^3):	35.71
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.74
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	14.1
Extent of Erosion (%):	30
Extent of Modern Disturbance (%):	6

Site FB 11616 is nestled between low lying dunes in the grassy depression south of FB 10694 (see Figure 43). The locus of the site occupies geomorphic surface Mapping Unit 2a but most of the northeast portion is in Mapping Units 2b and 3. Interdunal areas are only moderately deflated and the northern portion of the site exhibits evidence of sand accumulation. Vegetation includes mesquite, broom snakeweed, four-wing saltbush, yucca, occasional ephedra, and various grasses and forbes. The ground surface visibility (approximately 60 percent) is moderately good. Site surface assemblage includes burned caliche, unspecified brownware sherds, and an occasional chipped stone, including a scraper, observed (but not collected) on a dune flank. A total of two test units and two backhoe trenches was excavated (Figure 66).

TU #1, a 2-x-2-m block, was placed on a previously recorded feature (Whalen 1977); burned caliche pieces (1.05 kg) were recovered from the eolian overburden from 0-14 cm below surface (Table 20). More burned caliche pieces (.09 kg) were recovered from the contact zone between the eolian overburden and the modern erosional surface between 2-24 cm below surface. No other artifacts were recovered from either surface or subsurface. Excavation was terminated at 27 cm below surface.

TU #2, a 2-x-2-m block, was placed over a scatter of unspecified brownware sherds in the eastern portion of the site. All artifacts recovered (n=55) were pot sherds of unspecified brownware. Six were collected from the surface, 40 were recovered from the eolian overburden (see Table 20) and the remainder (n=9) came from the subsurface. Excavation was terminated at 25 cm below surface. The ceramic concentration has the characteristics of a pot drop.

Two backhoe trenches exposed no subsurface evidence of buried cultural deposits at FB 11616 (Figure 67). No radiocarbon or flotation samples were collected. Assuming that stratigraphic interpretation is correct, it appears that the pot is eroding out of the subsurface. All sherds were recovered and little more potential exists at this site. The presence of sherds indicates that the site was occupied during the Mesilla phase or later. However, without additional diagnostic artifacts or radiocarbon dates, it is difficult to make more specific temporal estimates for occupation. Therefore, FB 11616 is recommended as ineligible for inclusion in the NRHP. Planned land use will have no adverse effects on any cultural resources. No further work except annual monitoring for exposed features and/or artifacts is recommended for site FB 11616.

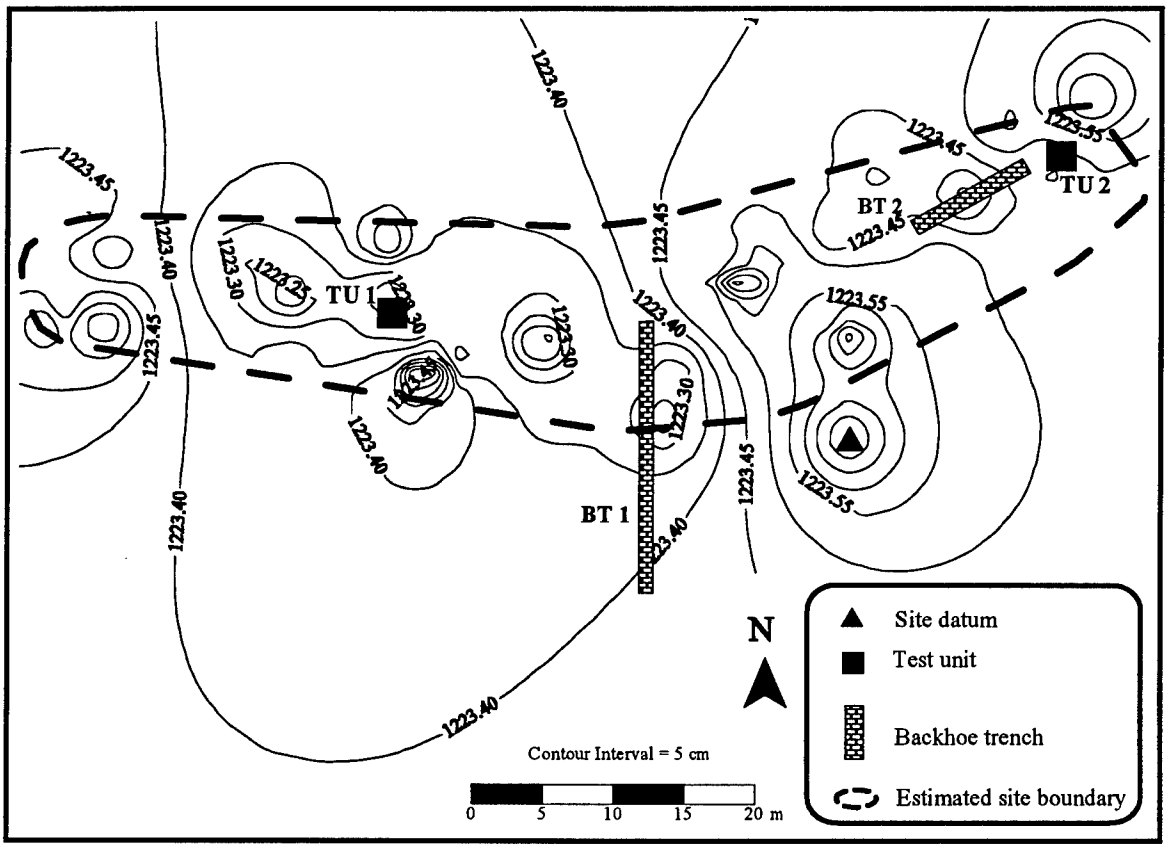


Figure 66. Contour map of site FB 11616.

FB 11617 (No TARL number assigned)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,222 (4,008 ft)
Size (square meters)	
Previously Recorded:	100
Current:	Unmapped
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	.17
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	0
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	7.0
Extent of Erosion (%):	60
Extent of Modern Disturbance (%):	15

Table 20
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 11616 (41EP4692)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4	.29	1	BC	Q4	0-14									1.05	
		.32			Q4/Q3	2-24									.09	
		.10			Q3	4-27										
Total TU #1	*4*	*.71*	*1*												*1.14*	*1.61*
2	4				S	S	6				6					
		.06			Q4	0-3	7				7					
		.02			Q4	1-5	33				33					
		.35			Q3	1-15	9				9					
		.40			Q3	6-25										
Total TU #2	*4*	*.83*					*55*				*55*	*66.27*				
Total	*8*	*1.54*	*1*				*55*				*55*	*35.71*			*1.14*	*.74*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

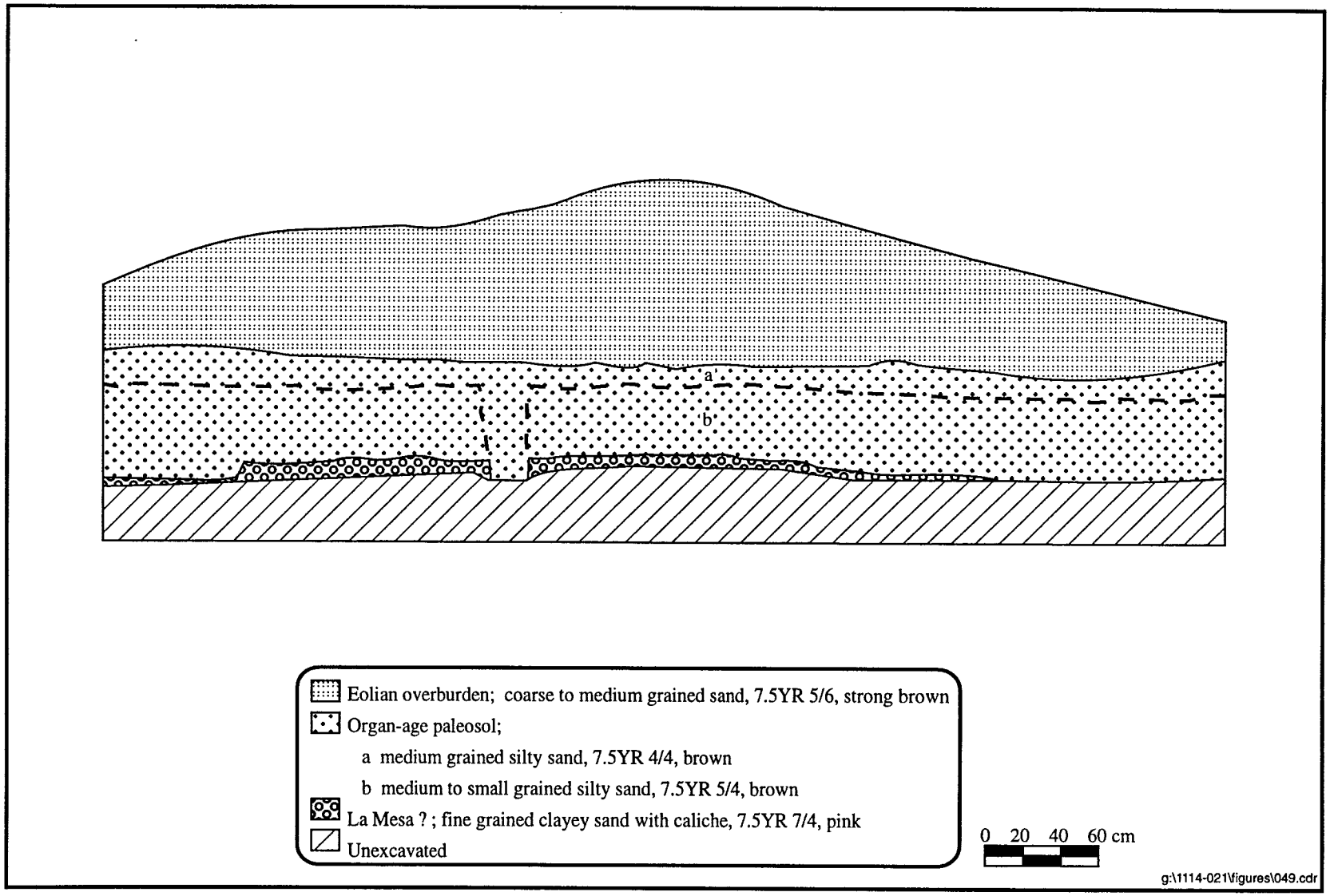


Figure 67. Backhoe Trench 1, profile of west wall, site FB 11616.

The location of this previously identified "site" is in the same grassy depression as site FB 11616, but to the southeast, in geomorphic surface Mapping Unit 3. FB 11617 is situated among sparsely occurring low lying coppice dunes. Vegetation includes various grasses and forbes, broom snakeweed, mesquite, yucca, four-wing saltbush, and an occasional ephedra, which allow 60 percent ground surface visibility.

Although the "site" location was identified as marked on the aerial photograph provided by the survey crews, neither artifacts nor features were observed on the surface. Approximately 140 m to the northeast, however, two surface stains were observed. One stain was tested but had little depth. The other stain remains untested but from surface characteristics the two appear related. A flotation sample was taken from 1-6 cm below surface; only purslane plant remains were identified with no evidence of burning (Appendix J). Excavation terminated at 11 cm below surface (Table 21). A trench cut through the location of a previously reported hearth exposed no subsurface cultural deposits.

The lack of subsurface deposits, surface artifacts, and datable material suggests little potential for significant data recovery from site FB 11617. Military trash is scattered in the area, especially to the east of the charcoal stain location, and the features could be from a military bivouac fire. FB 11617 is considered ineligible for NRHP inclusion. The planned use of the Patrol Base will not adversely impact FB 11617 at this juncture. No further work except annual monitoring for any exposed cultural features and/or materials is recommended.

FB 14501 (41EP4693)

Eligibility Status:	Eligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,226 (4,021 ft)
Size (square meters)	
Previously Recorded:	0
Current:	1,080
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.67
Artifact Density (n/m^3):	7.78
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	10.78
Backhoe Trenches	
Number of Trenches:	3
Mean Length of Trench (meters):	13.8
Extent of Erosion (%):	25
Extent of Modern Disturbance (%):	5

Table 21
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 11617 (no TARL # assigned)

	TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
	1	4	.17	1	Stain	Q4	0-11										
Total		*4*	*.17*	*1*													

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

Newly located site FB 14501, recorded for the first time during the current project, lies on a low playa ridge overlooking sites FB 11617, FBH 182, and FB 6940 to the west-southwest (see Figure 43). The general area is characterized by geomorphic surface Mapping Unit 2b but the site locus occupies Mapping Unit 1b among low to high coppice dunes. Caliche nodules are exposed in deflated interdunal areas. The vegetation consists of mesquite, broom snakeweed, four-wing saltbush, yucca, Russian thistle, ephedra, various grasses and forbes, but ground visibility (60 percent) was good when the site was visited.

The main site locus was defined by a low density scatter of chipped and ground stone observed on the surface, from which an Early Archaic Bajada-like projectile point was collected (Figure 68), and four prehistoric features. The first feature consisted of burned caliche and fire-cracked rock in tank tracks; was burned caliche and fire-cracked rock in a 40-x-40-cm area; the third was a concentration of El Paso Polychrome sherds; and the fourth was a concentration of burned caliche in a deflated interdune area. Only the first two features were test excavated; in addition, three backhoe trenches were excavated (Figure 69).



Figure 68. Early Archaic Bajada-like projectile point collected from site FB 14501. (Scale 1:1)

TU #1, a 2-x-2-m block, was placed over a burned caliche/fire-cracked rock concentration (F1). Burned caliche (.13 kg) was recovered from the eolian overburden between 0-9 cm below surface (Table 22). A much smaller quantity of burned caliche (.05 kg) was recovered from the contact zone between the eolian overburden and the Organ-age surface. Excavation was terminated at 24 cm below surface. No subsurface cultural deposits were encountered.

Excavation of TU #2, a 4-x-1-m block in a feature area of burned caliche and fire-cracked rock (F2), yielded an unspecified quantity of fire-cracked rock and burned caliche and 13 artifacts: six pot sherds and seven debitage fragments.

A significant number (n=10; 77 percent) of the artifacts were recovered from the subsurface of TU #2 between 10-35 cm below surface (Figure 70).

The three backhoe trenches failed to uncover additional features or artifacts (Figure 71). Although no radiocarbon samples were recovered from FB 14501, this site contains features, a Bajada-like projectile point, and diagnostic El Paso Polychrome ceramic sherds suggesting occupations in the Early Archaic period and Dona Ana phase of the Formative period. Site FB 14501 is, therefore, recommended for inclusion in the NRHP. Based on the test excavations and the quantity of artifacts observed on the surface, adverse effects from projected Patrol Base use can be effectively mitigated by data recovery. All surface features

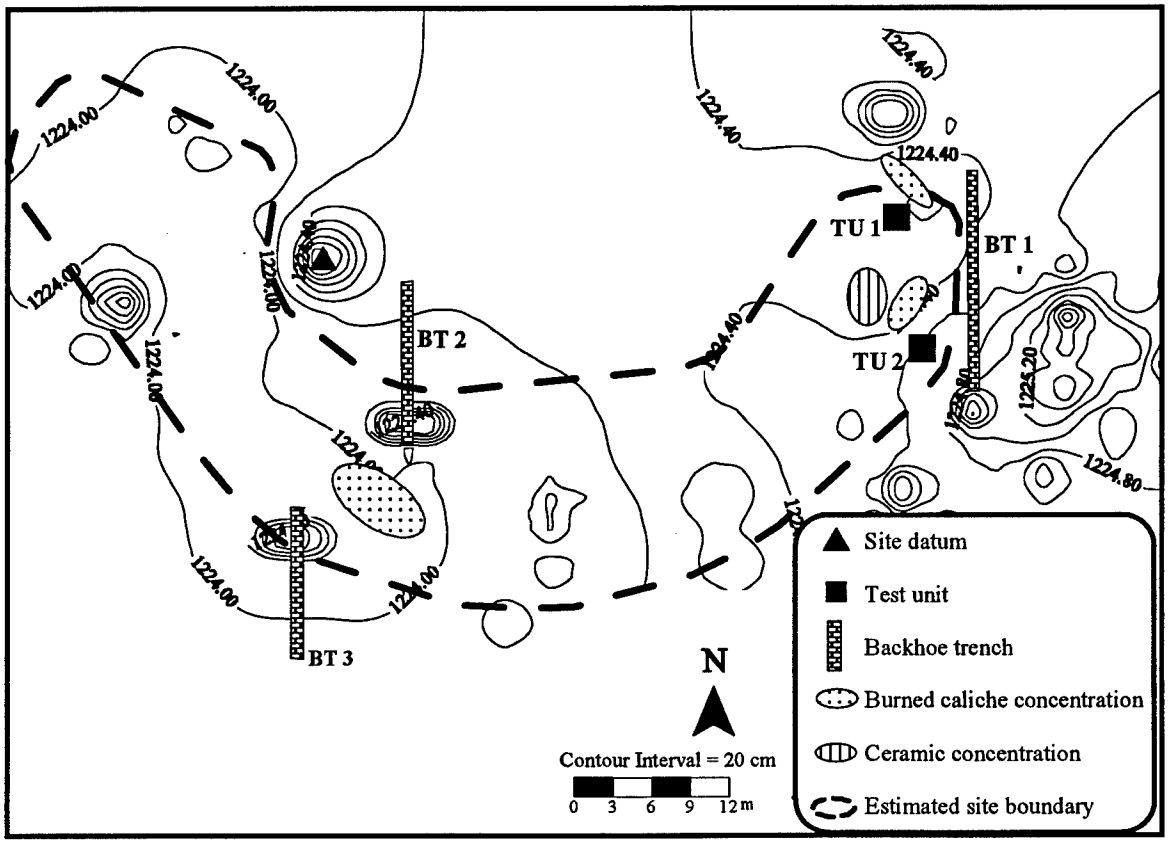


Figure 69. Contour map of site FB 14501.

and artifacts should be mapped and all artifacts, which include lithics and El Paso Polychrome ceramics, should be collected. TU #2 should be expanded into a block-excavation. Two features recorded at the site remain untested; both features should be block-excavated to recover flotation and radiocarbon dating samples. Thus, the effect of impacts to site FB 14501 by the military, current and potential, will have been mitigated.

Table 22
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 14501 (41EP4693)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4	.17	1	BC/FCR	Q4	0-9								?	.13	
		.31			Q4/Q3	1-18									.05	
		.10			Q3	9-24										
Total TU #1	*4*	*.58*	*1*											*?*	*.18*	*.31*
2	4		2	BC/FCR	S	S		1			1			?	?	
		.21			Q4/Q3	0-17										
		.48			Q4/Q	0-23	1	1			2					
		.40			Q3	10-35	5	5			10					
Total TU #2	*4*	*1.09*	*1*				*6*	*7*			*13*	*11.93*		*?*	*?*	
Total	*8*	*1.67*	*2*				*6*	*7*			*13*	*7.78*		*?*	*.18*	*10.78*
Surface Recovery								1			1					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

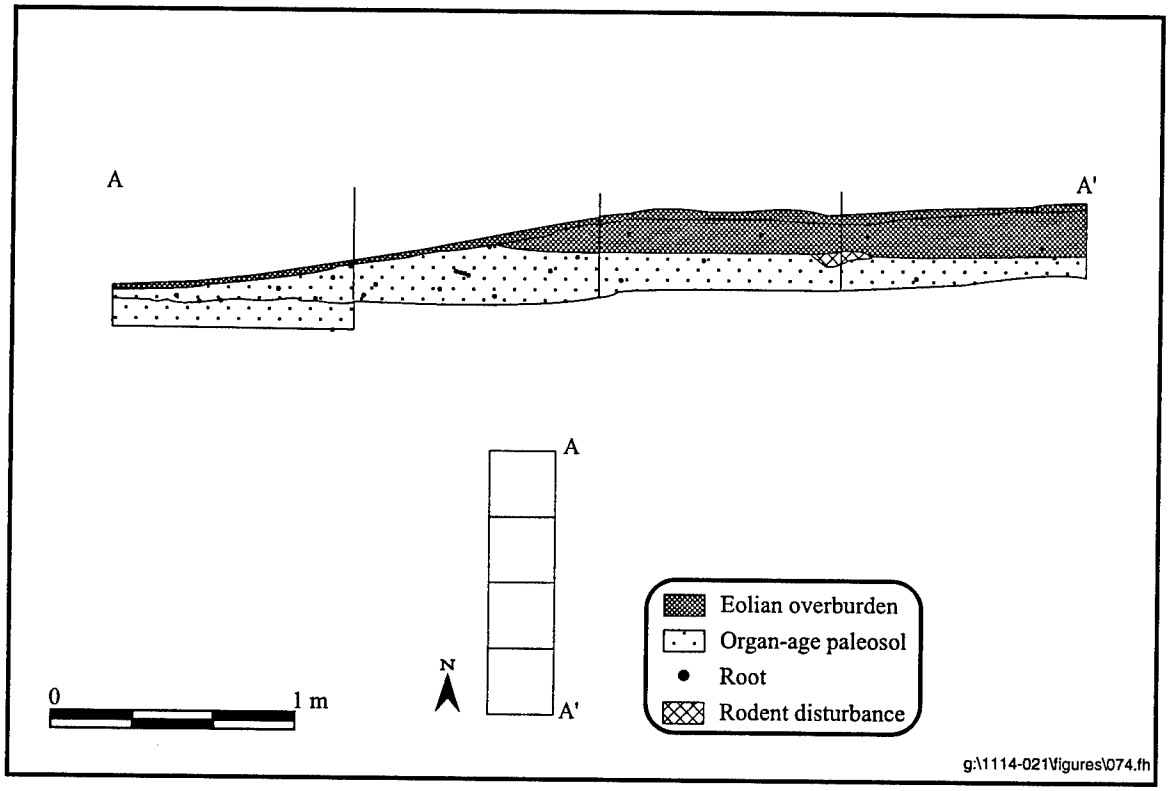


Figure 70. Profiles of TU #2, site FB 14501.

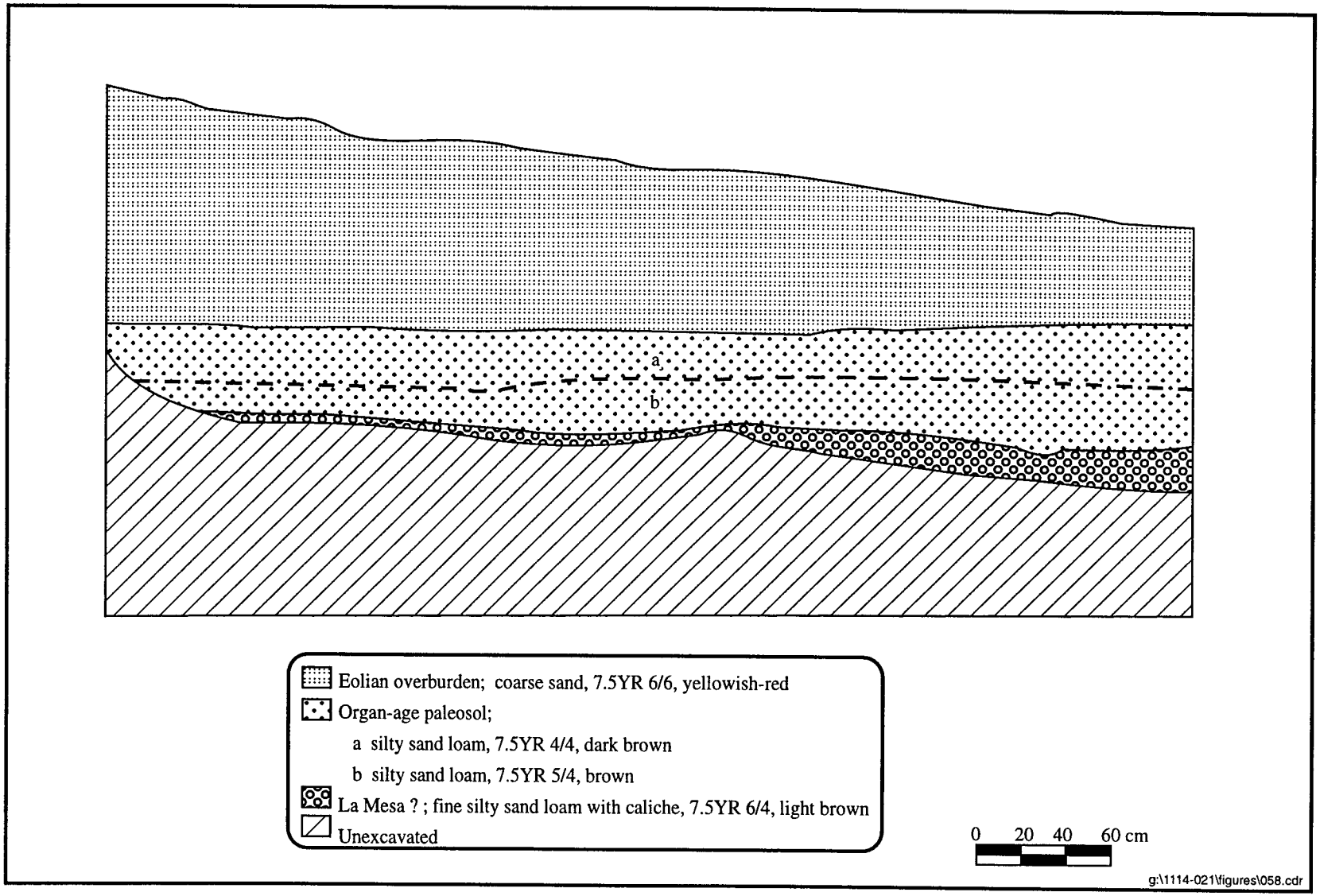


Figure 71. Backhoe Trench 1, profile of west wall, site FB 14501.

PATROL BASE 7, MANEUVER AREA 2a
SITES FB 10916, FB 13147, FB 13335, FB 13920, FB 13921

This quadrat is located 9.5 km east of Newman, Texas, .5 km south of the Texas/New Mexico State line, and 2.5 km north of Joint Well (Nations East Well Quadrangle, Texas, El Paso County) at 1,236 m amsl (Figure 72). Although identified as occupying geomorphic surface Mapping Unit 2a (Monger 1993:102), some areas of the quadrat exhibit characteristics of Mapping Unit 1a/1b. The Hueco-Wink soil association overlies a fragmented La Mesa horizon. The La Mesa is fragmented due to tectonic faulting (Monger, personal communication 1994). The southwestern portion of the quadrat is in a relatively low-lying area, the result of local tectonic downwarping. This depression is a potential reservoir (playa) during wet seasons. From the depression, the landscape rises 6.4 m within a distance of .7 km along a north-south axis. Sites occur along the playa ridge to the northeast and east of the depression. Mesquite-stabilized coppice dunes dominate the quadrat but are scarcer in the depression. No sites have been recorded in the grass-covered fault trough. Tank trails are found over most of the quadrat. Two of the largest features, tested at a site in this quadrat, were exposed in tank tracks.

FB 10916 (41EP4702)

Eligibility Status:	Eligible
Radiocarbon Date:	2205-1875 B.C. 1805-1975 B.C.
Elevation (meters above mean sea level):	1,236 (4,054 ft)
Size (square meters)	
Previously Recorded:	17,280
Current:	9,700
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	4
Total Area Tested (m^2):	16
Total Volume Excavated (m^3):	1.77
Artifact Density (n/m^3):	11.86
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	1.85
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	10.2
Extent of Erosion (%):	40
Extent of Modern Disturbance (%):	20

Site FB 10916 is located on the eastern side of the quadrat (western edge of Patrol Base 7) among coppice dunes, along a low-lying ridge overlooking the grassy fault trough floor to the south and west (Figure 73). Mesquite, yucca, grasses, and snakeweed constitute the main vegetation, allowing 70 percent ground surface visibility. The general area occupies geomorphic surface Mapping Unit 2a (Monger 1993:102), but the site area exhibits Mapping Unit 1b characteristics. Caliche nodules are exposed over 30 percent of the surface.

The site consists of a low density ceramic and chipped and ground stone scatter with several fire-cracked rock features and charcoal stains exposed on the surface. Artifacts and features were predominantly observed in deflated, interdunal areas. A Late Archaic-Early Formative projectile point (identified as Marcos-like;

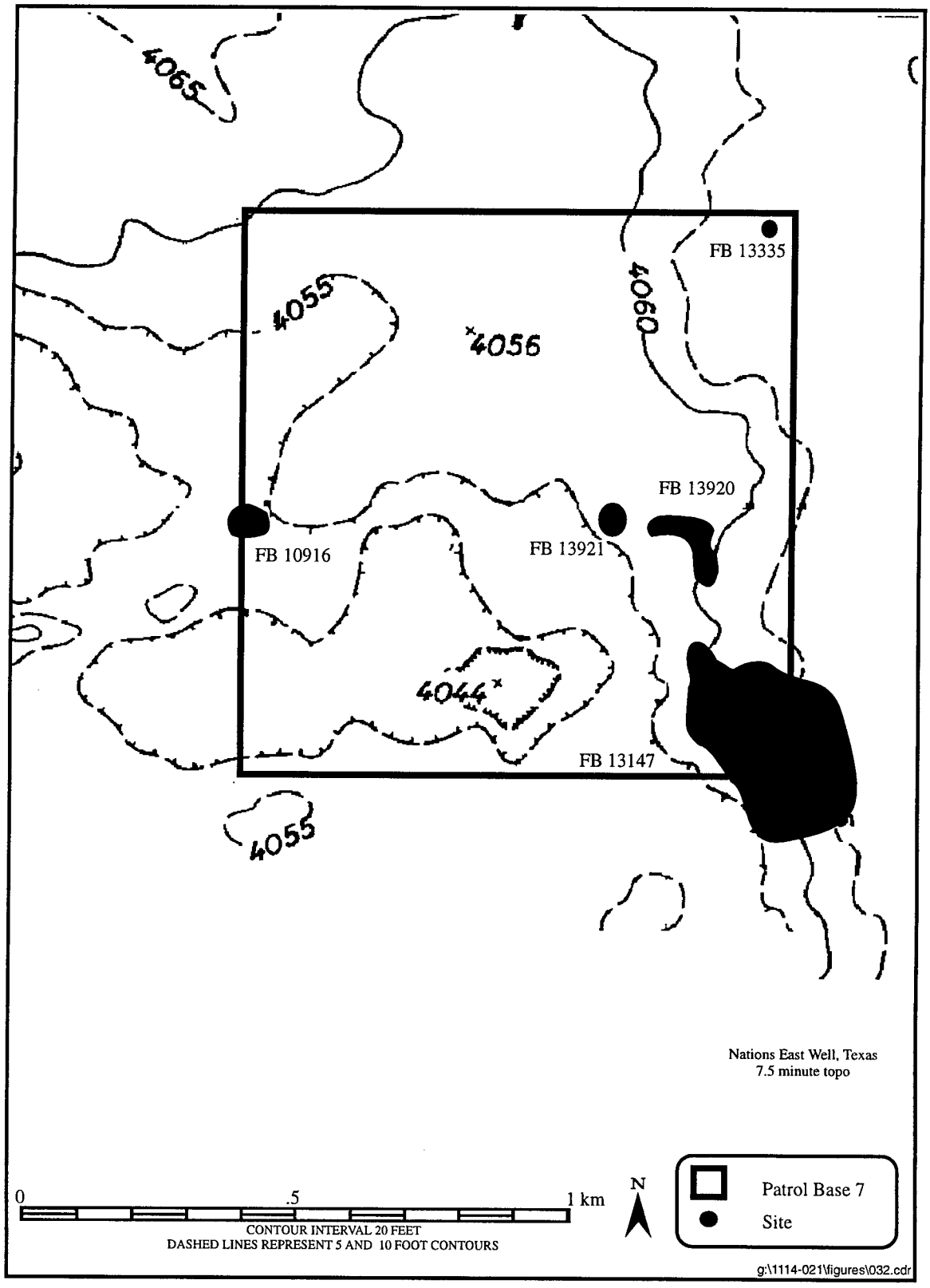


Figure 72. Site locations within Patrol Base 7.

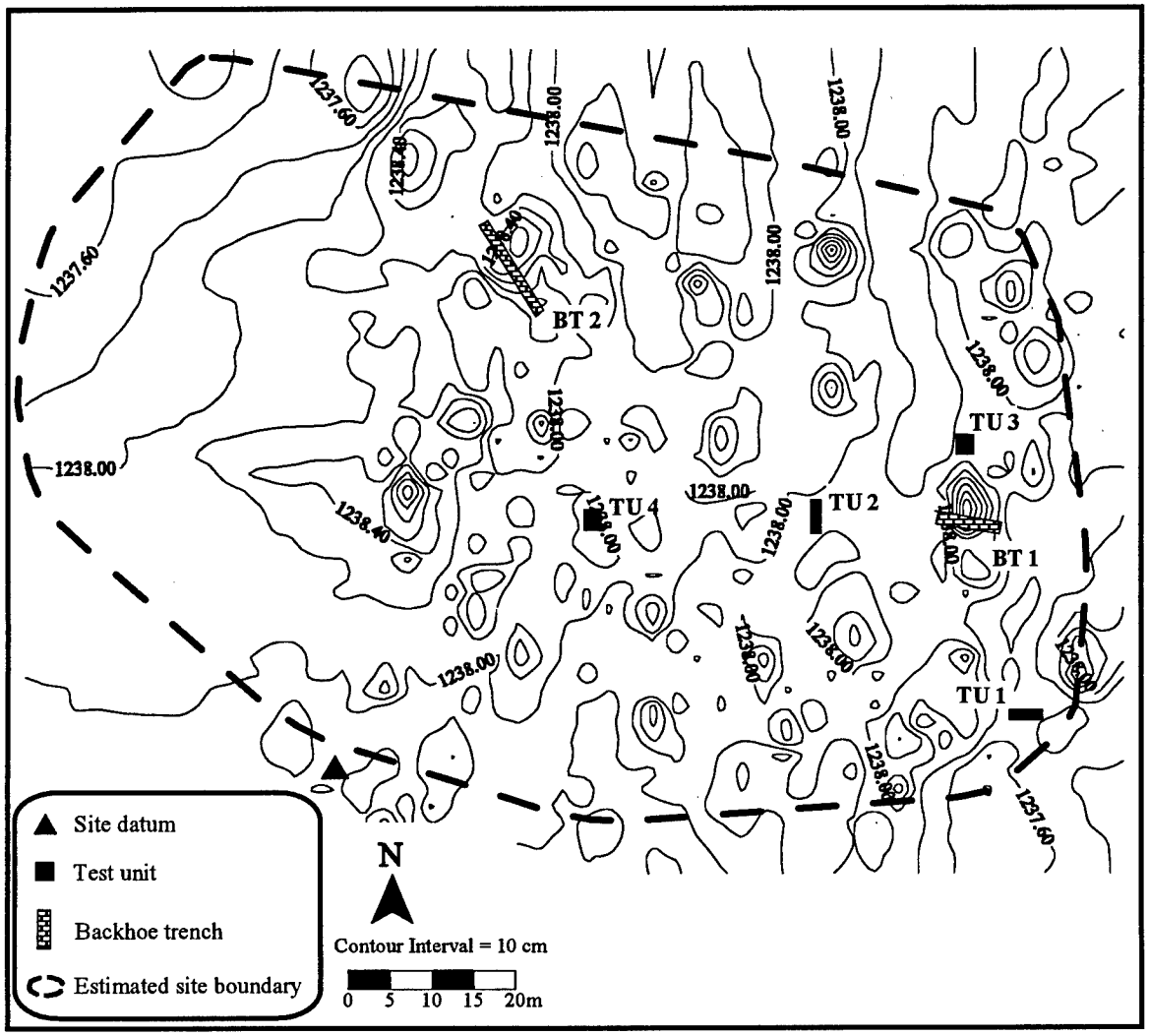


Figure 73. Contour map of site FB 10916.

Figure 74) was collected from the surface of the site. Chipped and ground stones were observed and brownware sherds were located on the western end of the site. Ground stone fragments are representative of both slab and basin metate types. A total of nine features was observed. Six of the features, each covering a 2-x-2-m area, consist of 10 or more fire-cracked rocks and burned caliche nodules. The remaining three features include a burned caliche concentration with staining, a fire-cracked rock concentration (including ground stone), and one isolated charcoal stain. Four test units (4 m^2 each) were excavated in areas around features (see Figure 73) observed at FB 10916. A total of 21 artifacts, including 20 chipped stones and one ground stone, and two bones was recovered from the test unit excavations (Table 23). Two backhoe trenches were also excavated (Appendix E).

TU #1 (2-x-2 m) was placed over a burned caliche and fire-cracked rock concentration (F1). The unit was excavated to maximum depth of 22 cm but only three debitage were recovered below surface in eolian



Figure 74. Marcos-like projectile point from site FB 10916. (Scale 1:1)

overburden. Altogether seven debitage and an unspecified amount of burned caliche and fire-cracked rocks was recovered (see Table 23). No cultural deposits were observed in subsurface context.

TU #2 (2-x-2 m), a fire-cracked rock/burned caliche feature (F2), yielded six debitage, .06 kg of fire-cracked rocks, and .31 kg of burned caliche from the first 3 cm of the eolian burden (see Table 23). No subsurface cultural deposits were recovered (Figure 75).

TU #3 (2-x-2 m) was placed over a burned caliche/stain (F3) in the eastern portion of the site (Figures 76 and 77). Artifacts were recovered from both the eolian overburden and the subsurface (see Table 23). One debitage fragment was recovered from the eolian overburden and two debitage fragments were recovered from 27-40 cm below the modern erosional surface. An unspecified amount of burned caliche was recovered from the excavation. Two pieces of bone were recovered from the subsurface, and two flotation samples was collected from feature fill. Identified plant remains include small quantities of amaranthus, mustard, spectacle pod, purslane, and mesquite (Appendix J). A charcoal sample collected from the feature resulted in a calibrated 2-sigma radiocarbon date of 2205-1790 B.C. (Appendix B). Excavation of TU #3 was terminated at 60 cm below surface.

TU #4 (2-x-2 m) was placed in a fire-cracked rock/burned caliche concentration that exhibited a charcoal stain (F4). Three debitage and one metate fragment were recovered from the eolian overburden. Only one piece of debitage was recovered from the subsurface. Unspecified amounts of fire-cracked rock and burned caliche were recovered. Excavation was discontinued at 26 cm below surface (Figure 78).

Two backhoe trenches were placed within the site limits, one in the eastern portion of the site between TU #1 and TU #3 and the other near the northern boundary of the site, northwest of TU #4 (see Figure 73). No cultural material was recovered from these excavations (Appendix E).

Although the two backhoe trenches yielded no cultural material (Figure 79), three of the four test units contained subsurface cultural deposits. The presence of five untested features, a Late Archaic to Early Formative period projectile point, and a radiocarbon date of 3,690 $\pm$ 70 B.P. (2200-1790 B.C.) from F3 (Appendix B), suggest that significant data that may yield important information to further the knowledge of the area prehistory exist on FB 10916. Thus, site FB 10916 is considered to be eligible for inclusion in the NRHP. The archeological resources, however, are being impacted by infantry and armored calvary

Table 23
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 10916 (41EP4702)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4		1	BC/FCR	S	S		4			4			?	?	
		.52			Q4/Q3	0-22		3			3			?	?	
Total TU #1	*4*	*.52*	*1*					*7*			*7*	*13.46*		*?*	*?*	
2	4	.09	2	BC/FCR	Q4	0-3		6			6			.06	.31	
		.11			Q4/Q3	3-15										
Total TU #2	*4*	*.20*	*1*					*6*			*6*	*30.00*		*.06*	*.31*	*1.85*
3	4	.16	3	BC/Stain	Q4	0-20									?	
		.13			Q4	17-30		1			1		2		?	
		.17			Q3	27-40		2			2				?	
		.20			Q3	8-60									?	
Total TU #3	*4*	*.66*	*1*					*3*			*3*	*4.55*	*2*		*?*	
4	4	.20	4	BC/FCR /Stain	Q4	0-10		3	1		4			?	?	
		.10			Q3	1-20		1			1			?	?	
		.09			Q3	12-26								?	?	
Total TU #4	*4*	*.39*	*1*					*4*	*1*		*5*	*12.82*		*?*	*?*	
Total	*16*	*1.77*	*4*					*20*	*1*		*21*	*11.86*	*2*	*?*	*?*	*?*
Surface Recovery								1			1					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

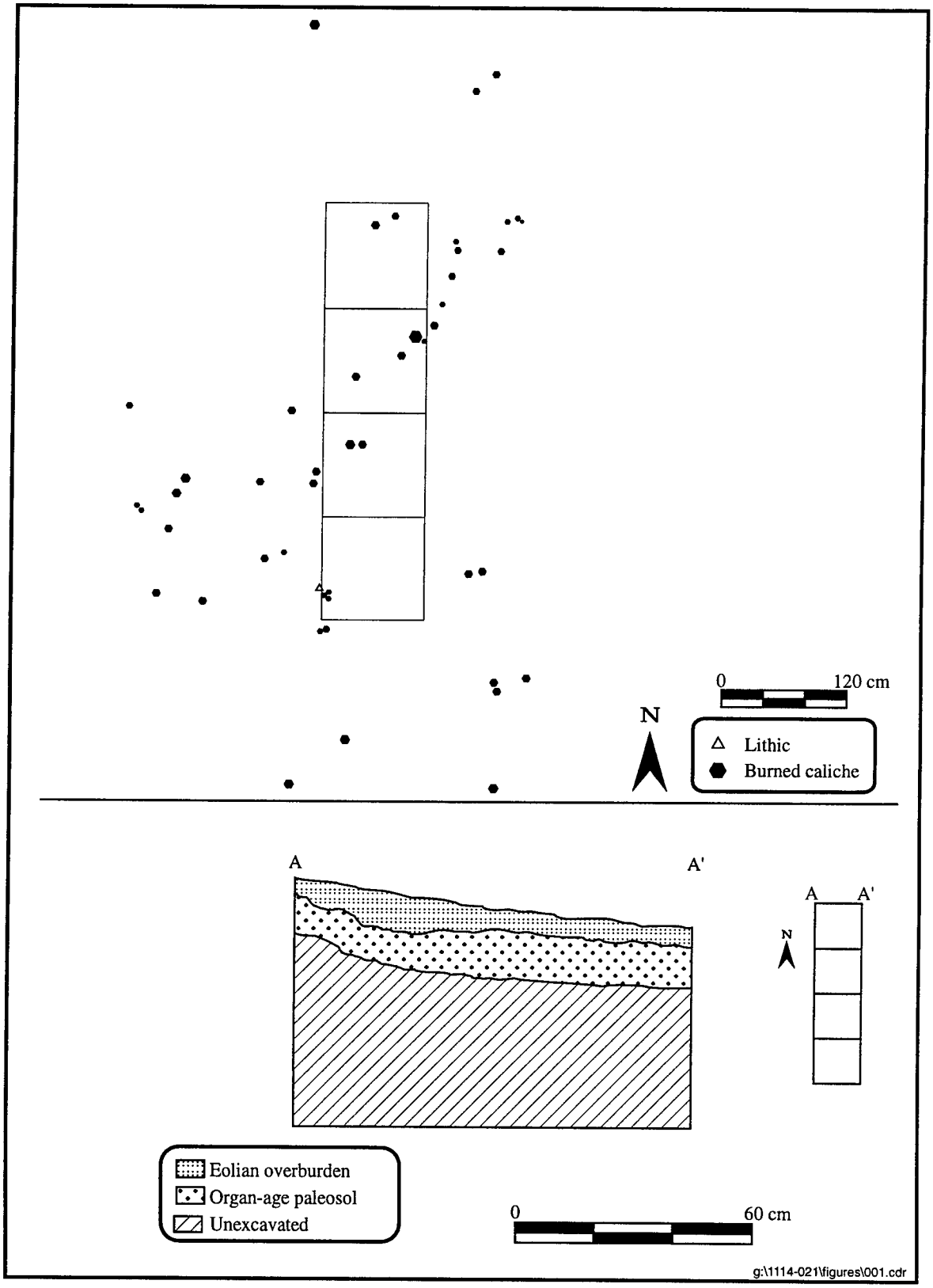


Figure 75. Plan view and profile of TU #2, F2, site FB 10916.

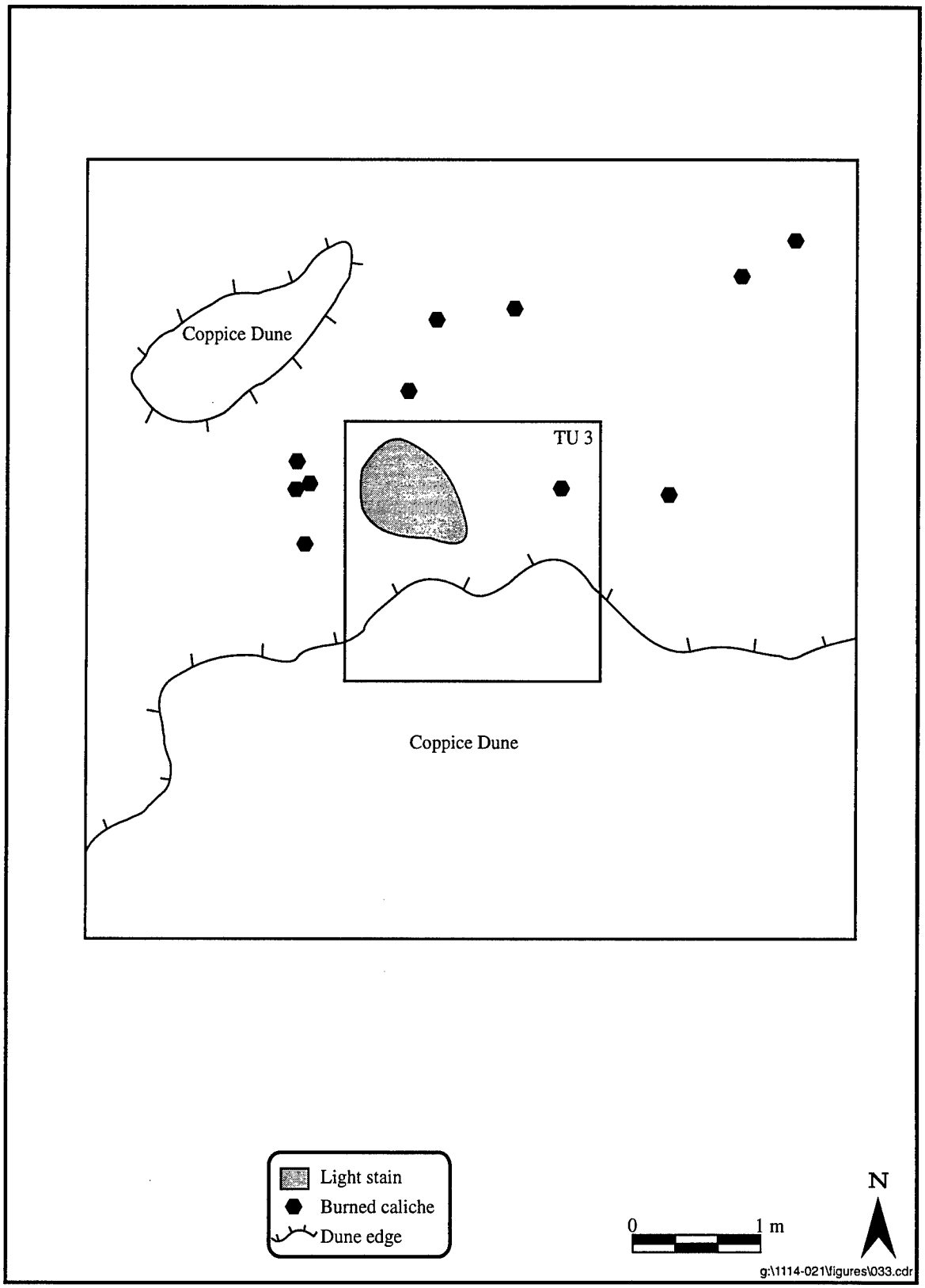


Figure 76. Surface plan of TU #3, F3, site FB 10916.

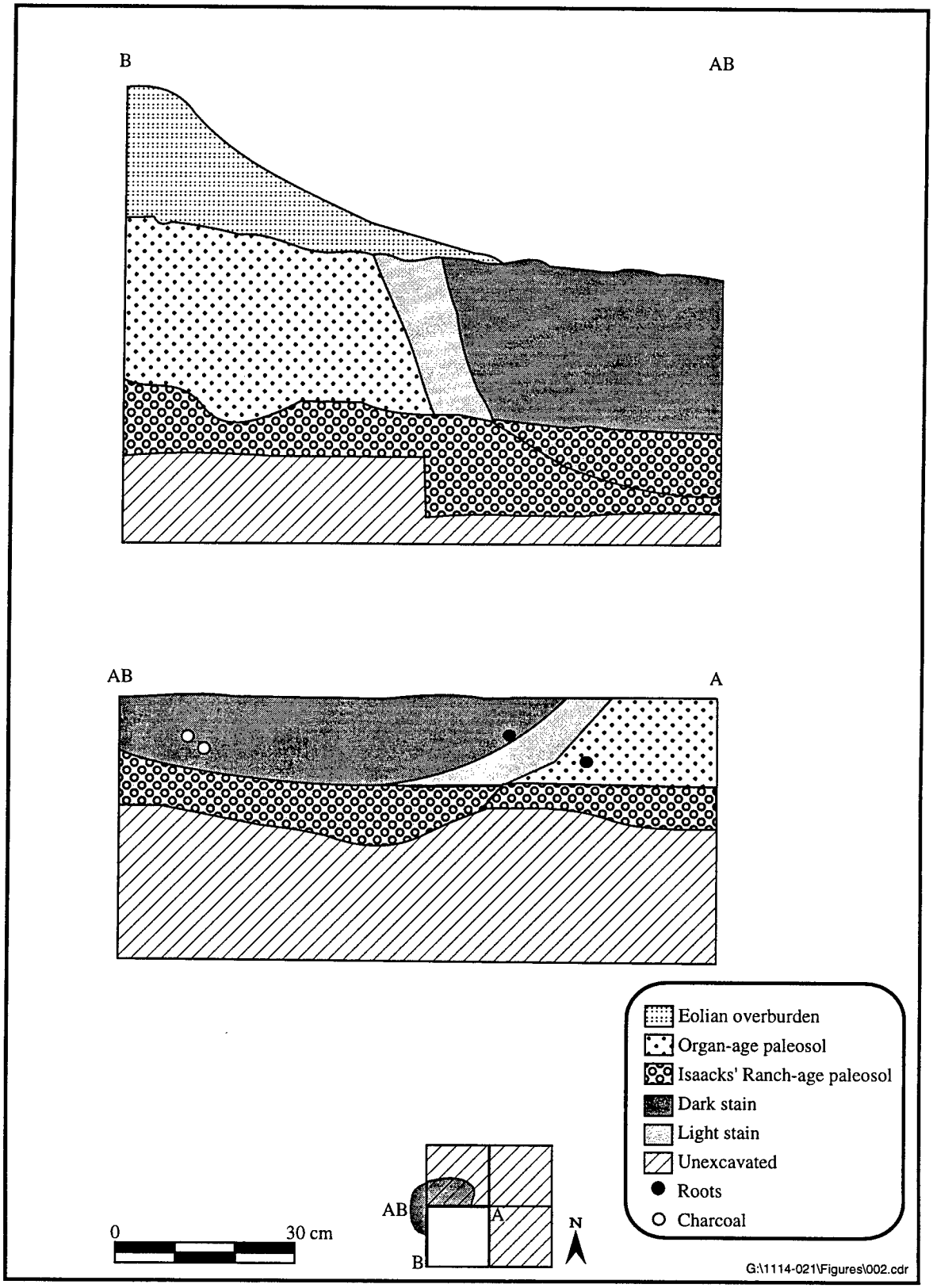


Figure 77. Profile of TU #3, F3, site FB 10916.

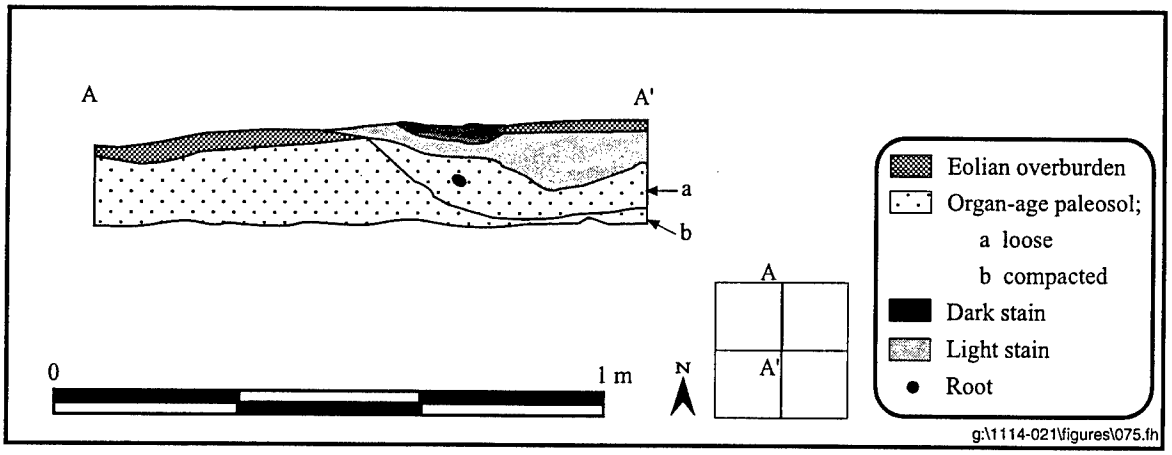


Figure 78. Profile of TU #4, site FB 10916.

military training maneuvers that have left tank trails throughout the site area (all excavated features had been exposed in tank tracks). Therefore, a recommendation is made to mitigate the destructive effects of training exercises on the cultural resources. Areas surrounding features, including the four tested and five untested features, should be block-excavated and areas of sand accumulation tested and/or trenched to expose features on FB 10916.

FB 13147 (41EP4697)

Eligibility Status:	Eligible
Radiocarbon Date:	3,670 ± 80 B.P.
	(2280-1870 B.C. and 1830-1780 B.C.)
	1,230 ± 70 B.P. (A.D. 665-980)
	1,030 ± 70 B.P. (A.D. 880-1170)
Elevation (meters above mean sea level):	1,237 (4,057 ft)
Size (square meters)	
Previously Recorded:	8,000
Current:	76,436
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	10
Total Area Tested (m^2):	46
Total Volume Excavated (m^3):	8.85
Artifact Density (n/m^3):	21.81
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	2.65
Backhoe Trenches	
Number of Trenches:	8
Mean Length of Trench (meters):	5.8
Extent of Erosion (%):	45
Extent of Modern Disturbance (%):	20

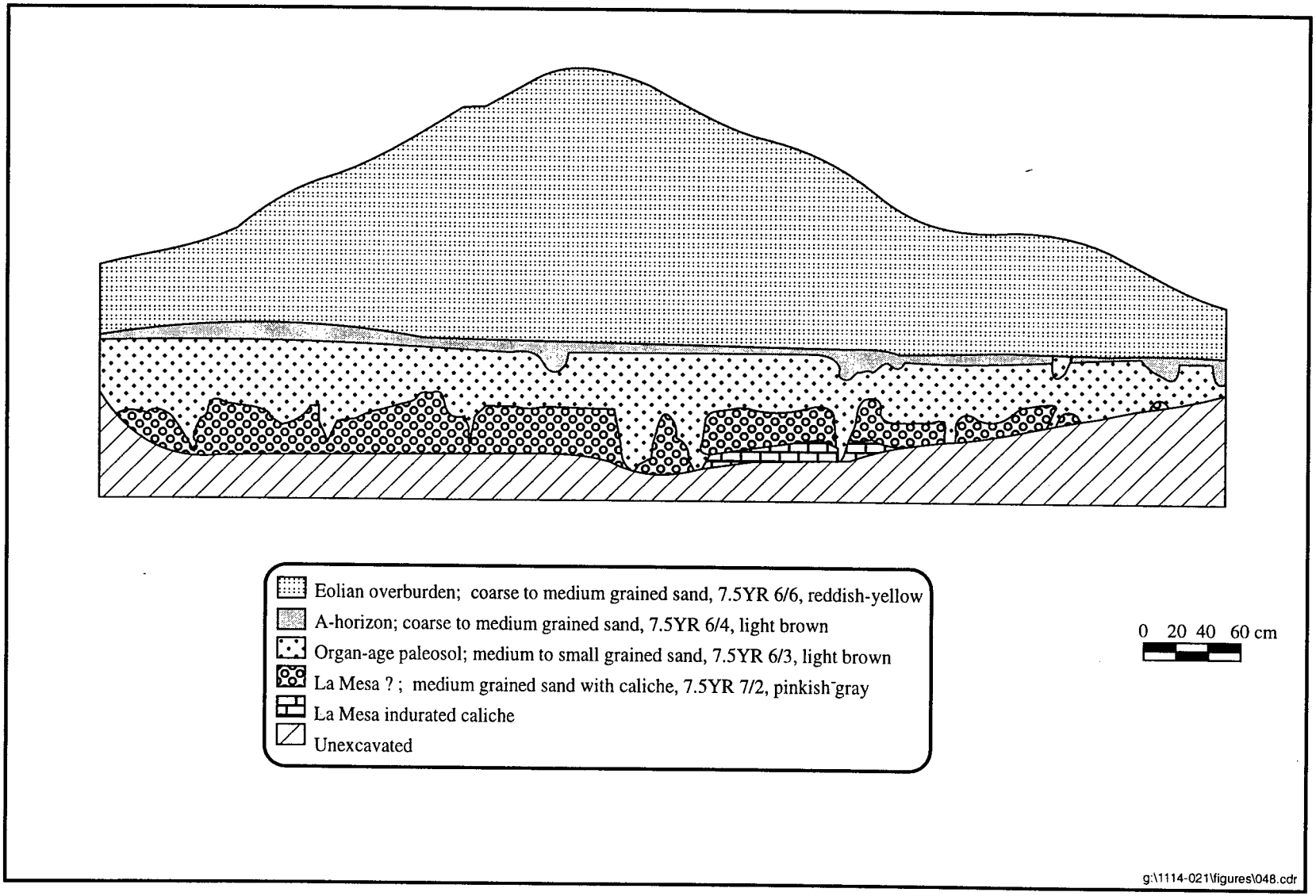


Figure 79. Backhoe Trench 2, profile of northeast wall, site FB 10916.

Site FB 13147 is located in the southeastern corner of Patrol Base 7 and extends to the southeast (see Figure 72). Although the general area surrounding site FB 13147 is in geomorphic surface Mapping Unit 2a (Monger 1993:102), the site area itself is in Mapping Unit 1a/1b. In some parts of the site, the interdunal areas are scoured down to the La Mesa indurated caliche horizon. The site lies on a playa ridge overlooking a grassy, low-lying, shallow trough floor to the west (Figure 80). Site FB 13147 has been considerably impacted by tracked vehicles; two features composed of large charcoal stains observed onsite were exposed in a tank trail. The vegetation consists of mesquite, grass, broom snakeweed, yucca, and four-wing saltbush, which reduce the ground surface visibility to 40-50 percent.

A low density scatter of artifacts (chipped stone, ground stone, and ceramics) was observed throughout the site area. Low to high density scatters of burned caliche and fire-cracked rocks occur in deflated areas. Artifacts observed on the surface range from an Early Archaic Bajada-like projectile point to late El Paso phase Tucson Polychrome sherds. Selected artifacts from site FB 13147 are illustrated in Figures 81 and 82. Twelve features were identified at FB 13147, eight of which were tested (see Figure 80).

A total of 10 artifacts were collected from the surface of the site, including the Early Archaic Bajada-like projectile point which was derived from chert, an untyped projectile point fragment also derived from chert, two retouched flakes, and six El Paso phase Tucson Polychrome sherds.

TU #1, a 2-x-2-m block, was positioned over F1, a burned caliche and fire-cracked rock feature located on the central part of the site (see Figure 80). Six pieces of debitage, 1.10 kg of fire-cracked rock, and 2.15 kg of burned caliche were recovered from the contact zone between the eolian overburden and the Organ-age surface from 0-20 cm below surface (Table 24). The unit was excavated to a maximum depth of 30 cm below surface.

The excavation of TU #2, a 2-x-2-m block, resulted in the recovery of three unspecified brownware sherds from the contact zone of the eolian overburden and the Organ-age surface. Burned caliche was also recovered from TU #2. After exposure, the stain on the ground surface proved not to be a feature (formerly F2). No cultural artifacts were recovered from subsurface context. Excavation was terminated at 59 cm below surface (Figure 83).

TU #3 is represented by a 1-x-4-m block adjacent to a 2-x-2-m block, making a total of $8m^2$. The unit exposed part of two burned caliche/charcoal stain features (F3 and F5; see Figure 83). All cultural material (10 unspecified brownware body sherds, three flakes, and 1.25 kg of burned caliche) found in association with F3 (see Table 24) occurred either on the surface or in the eolian overburden. In comparison, approximately 32 percent (n=36) of the artifacts (nine debitage, two El Paso Brown rim sherds, and 25 unspecified brownware body sherds) and approximately 87 percent of the bone fragments (n=13) in F5 were recovered from 2-14 cm into the subsurface (see Table 24). In addition, fire-cracked rocks (.50 kg) and burned caliche (2.00 kg) were also recovered from the subsurface excavation of F5. A total of 111 artifacts was recovered from F5, consisting of 80 ceramic sherds and 31 pieces of lithic debitage. Radiocarbon and flotation samples were collected from TU #3. The charcoal sample from F3 resulted in a date of 1,230 $\pm$ 70 B.P. (A.D. 665-980) (Appendix B). The single flotation sample from F5 revealedmesquite seed and leaf remains, as well as smaller amounts of trailing four o'clock, amaranthus, sunflower family, shining tickseed, spectacle pod, spurge, and purslane; none of the plant remains were charred (Appendix J). Faunal remains from F5 include jackrabbit, a lagomorph element, and small to medium-sized mammals (Appendix I). Subsequent to the collection of a sufficient amount of data, a primary goal of the Phase II testing research design, it was determined that F5 represented a suspected prehistoric structure floor or fill which terminated at 14 cm below surface (see Figure 83).

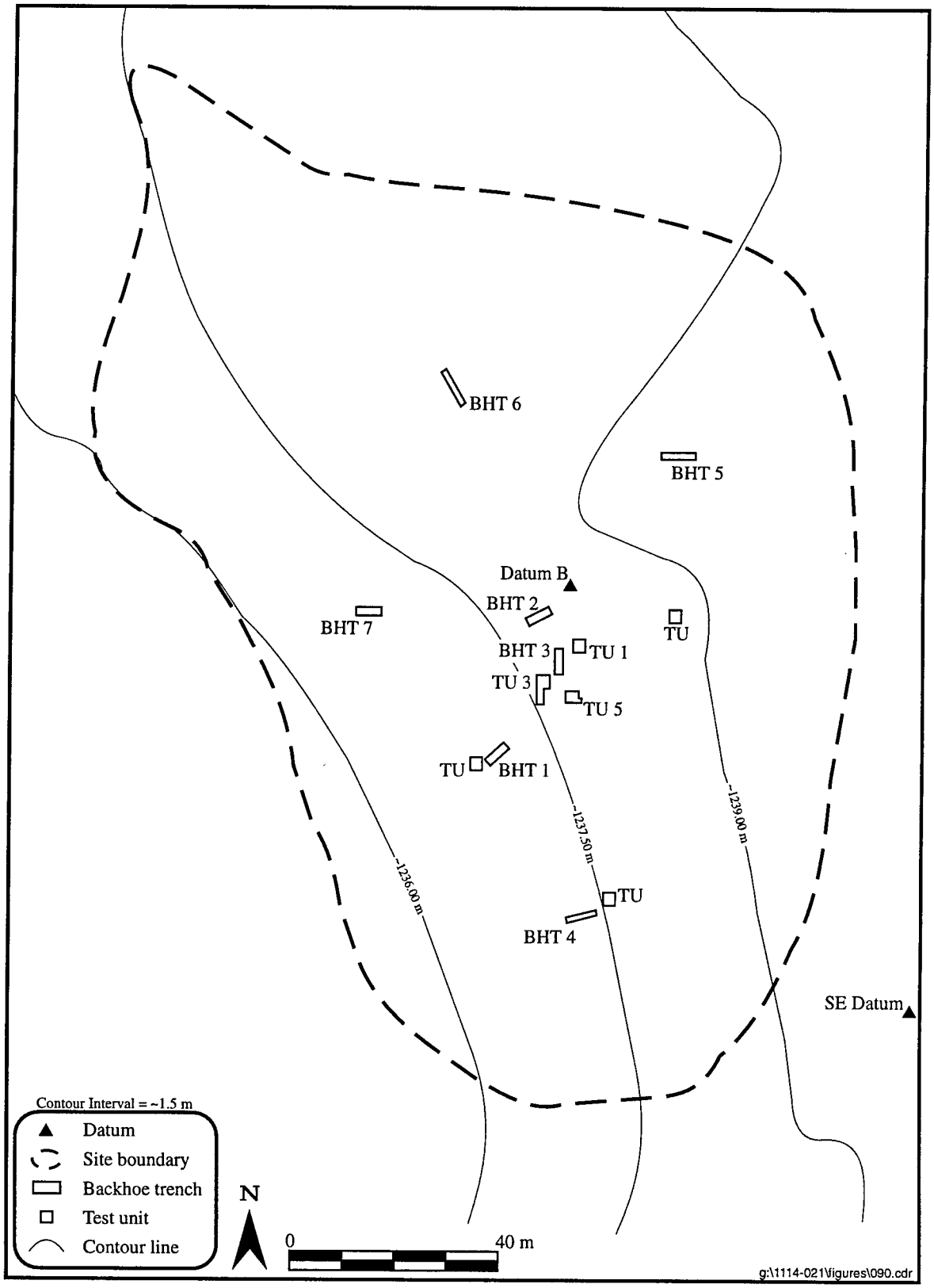


Figure 80. Plan view of site FB 13147.

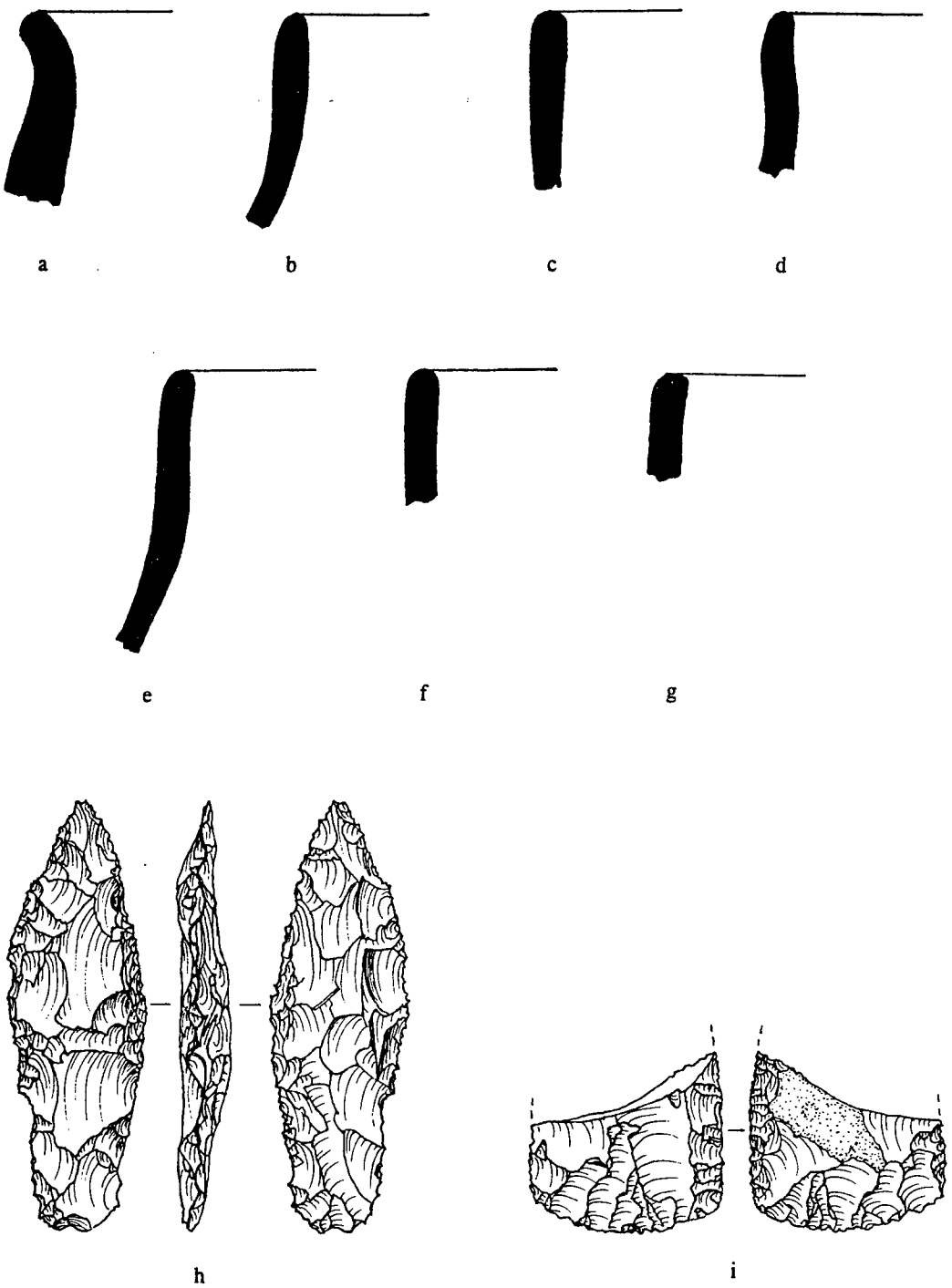


Figure 81. Artifacts recovered from site FB 13147: (a) Tucson Polychrome rim sherd; (b-g) unspecified brownware rim sherds; (h) Jay or Bajada-like point; (i) pink chert biface/preform fragment. (Scale 1:1)

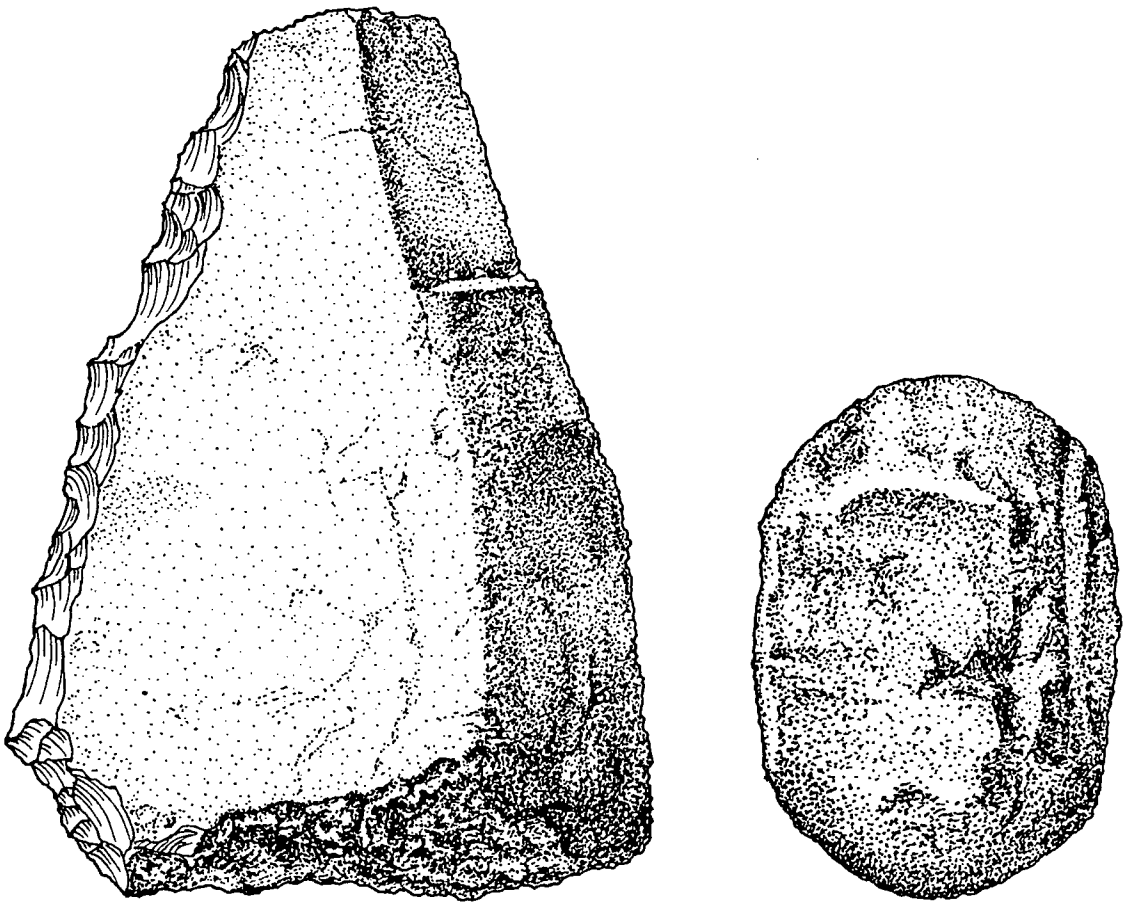


Figure 82. Artifacts recovered from site FB 13147: (a) agave knife; (b) hammerstone. (Scale 1:1)

TU #4, a 2-x-2-m block located on the southeastern side of the site, was positioned over F4 which consisted of burned caliche (see Figure 80). Three unspecified brownware ceramics and burned caliche were recovered from both the eolian overburden of TU #4; a single bone (medium-sized mammal) was recovered from the subsurface (Appendix I). Excavation of the unit was terminated at 34 cm below surface (see Figure 83).

TU #5, a 3-x-2-m block, was positioned over a burned caliche concentration with two distinct charcoal stains, F7A, located in the northwest quadrant of the unit, and F7B, located in the eastern extension of the southeast quadrant (Figure 84; see Figure 80). All artifacts from TU #5 at FB 13147 were recovered from the upper 11 cm of the eolian overburden. The assemblage consisted of 21 unspecified brownware sherds, three flakes, fire-cracked rock (1.00 kg), and burned caliche (5.75 kg). F7A was excavated to a maximum depth of 4 cm below surface. The fill from F7B was excavated to a maximum depth of 13 cm below surface (see Figure 84). Radiocarbon analysis on a charcoal sample from F7B resulted in a date of 1,030 $\pm$ 70 B.P. (A.D. 880-1170) (Appendix B); two flotation samples from F7B revealed small quantities of amaranthus, mesquite, purslane, and charred unidentifiable seed material (Appendix J).

Table 24
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13147 (41EP4697)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4	.10	1	BC/FCR	Q4/Q3	0-10		1			1				.50	
		.24			Q4/Q3	0-20		5			5			1.10	1.65	
		.50			Q4/Q3	0-30										
Total TU #1	*4*	*.84*	*1*					*6*			*6*	*7.14*		*1.10*	*2.15*	*3.87*
2	4	.50			Q4/Q3	0-43	3								?	
		.34			Q3	0-59										
Total TU #2	*4*	*.84*					*3*				*53*	*3.57*			*?*	
3	8		3	BC/Stain	S	S	3				3				.50	
		.10			Q4	0-7	7	3			10				.50	
		.10			Q4/Q3	0-14									.25	
			5	BC/Stain	S	S	5				5					
		.19			Q4	0-9	48	22			70		2		2.23	
		.17			Q3	2-14	27	9			36		13	.50	2.00	
Total TU #3	*8*	*.56*	*2*				*90*	*34*			*124*	*221.43*	*15*	*.50*	*5.48*	*10.68*
4	4	.27	4	BC	Q4	0-12	3				3				.62	
		.32			Q3	1-24							1			
		.10			Q3	14-34										
Total TU #4	*4*	*.69*	*1*				*3*				*3*	*4.35*	*1*		*.62*	*.90*
5	6	.12	7A	BC/FCR Stain	Q4	0-4	21	3			24			.20	4.25	
		.05			Q3	2-12										
		.06	7B	Stain	Q4	0-3								.80	1.50	
		.04			Q3	3-13								.01	.10	
Total TU #5	*6*	*.27*	*2*				*21*	*3*			*24*	*88.89*		*1.00*	*5.75*	*25.00*

Table 24 (cont'd)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
6	4	.25			Q4	0-11	4				4				.10	
		.51			Q3	4-25									.10	
		.20			Q3	17-35										
		.10			Q3	27-45										
Total TU #6	*4*	*1.06*					*4*				*4*	*3.77*			*.20*	*.19*
7	4		8	BC/FCR	S	S			1		1					
		.30			Q4	0-14		1	3		4			.19	6.32	
		.40			Q4	2-24									.18	
		.29			Q3	12-39										
Total TU #7	*4*	*.99*	*1*					*1*	*4*		*5*	*5.05*		*.19*	*6.50*	*6.76*
8	4	1.10			Q4/Q3	0-67										
Total TU #8	*4*	*1.10*														
9	4				S	S		1	1		2				?	
		.92			Q4	0-31		1	4		5				?	
		.36	6	Stain	Q3	25-42		3	2		5		1		?	
		.40			Q3	24-52		1			1					
Total TU #9	*4*	*1.68*	*1*					*6*	*7*		*13*	*7.74*	*1*		*?*	*?*
10	4				S	S		2	1		3					
		.52			Q4/Q3	0-21	8				8					
		.30			Q4/Q3	5-33										
Total TU #10	*4*	*.82*					*8*	*2*	*1*		*11*	*13.41*				
Total	*46*	*8.85*	*8*				*129*	*52*	*12*		*193*	*21.81*	*17*	*2.79*	*20.70*	*2.65***
Surface Recovery							6	4								

Note: Additional animal bone (n=1) was removed from BT 6.

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface; Q4 (Quaternary 4) Historic eolian overburden; Q3 (Quaternary 3) Organ-age paleosol; Q2 (Quaternary 2) Isaacks' Ranch-age paleosol; Q1 (Quaternary 1) La Mesa indurated caliche

** Total and density of burned caliche for this site was calculated without the "unspecified amounts" from TU #2 and TU #9.

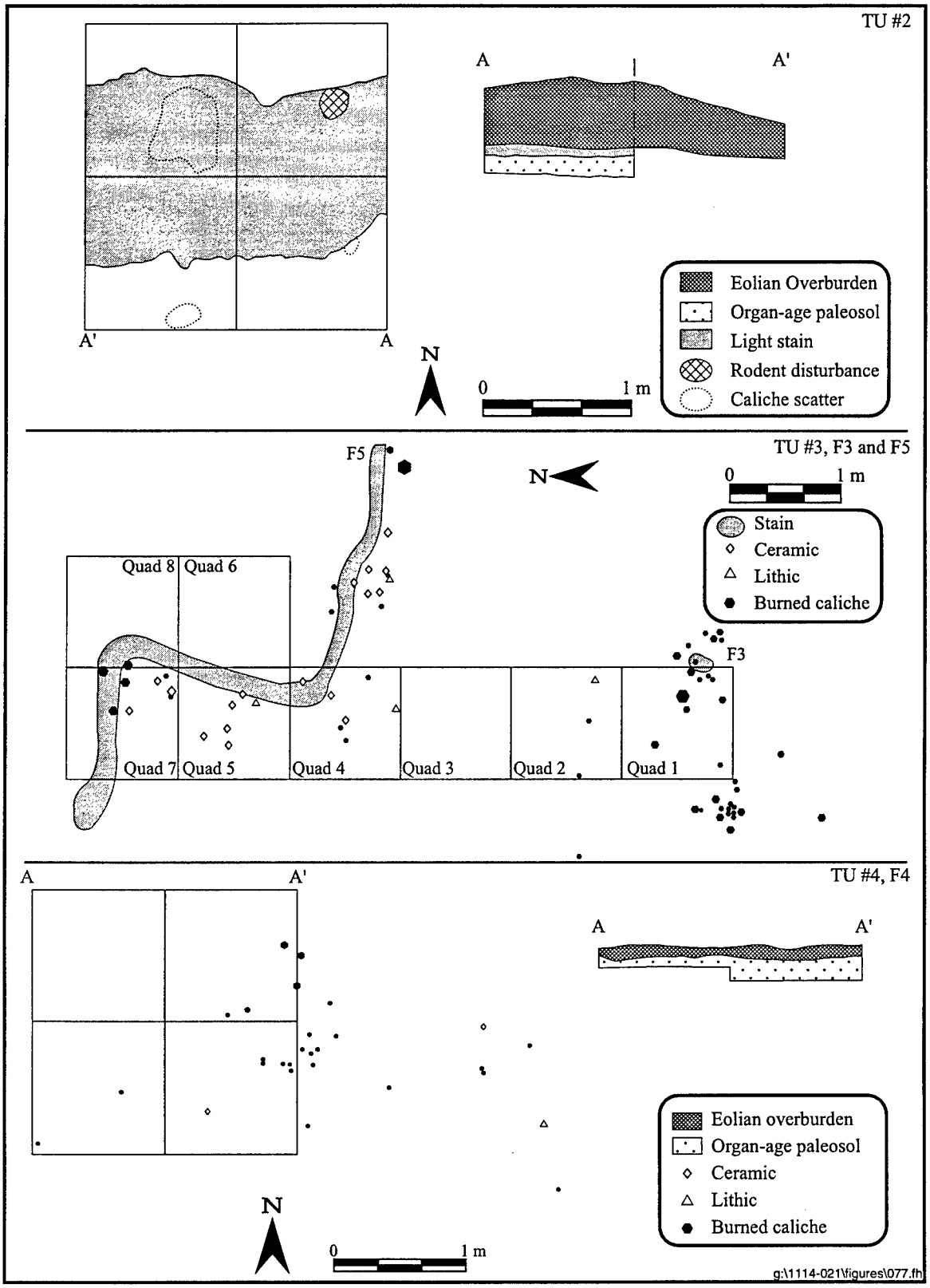


Figure 83. Plan view and profile of TU #2; plan view of TU #3, F3 and F5; and plan view and profile of TU #4, F4, site FB 13147.

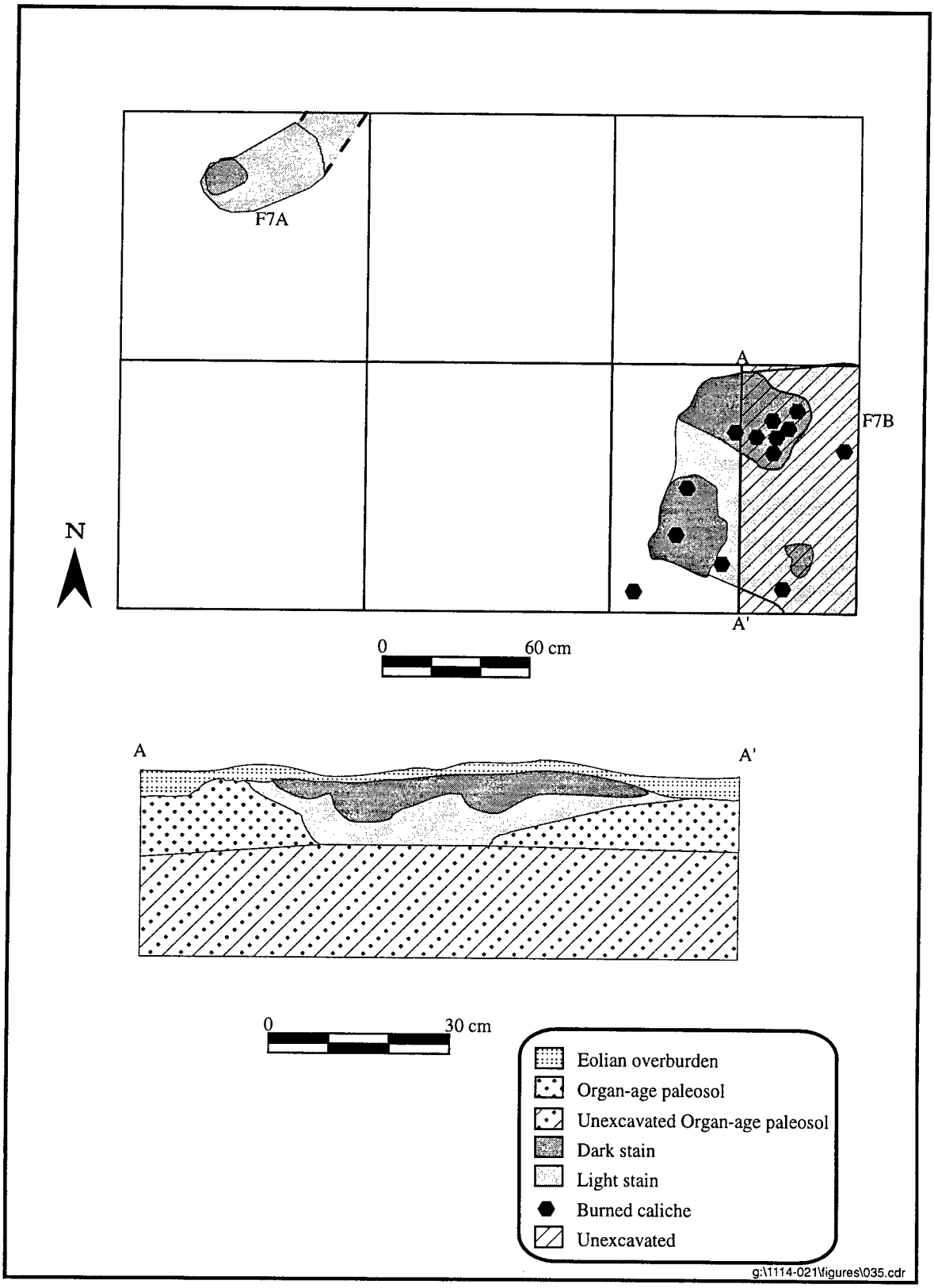


Figure 84. Plan view of TU #5, F7A and F7B; profile of F7B, site FB 13147.

TU #6, 2-x-2-m block, was excavated in an interdunal saddle of sand accumulation on the eastern edge of the site where Tucson Polychrome sherds were found on the surface (see Figure 80). Four sherds and .10 kg of burned caliche were recovered from the eolian overburden. An additional .10 kg of burned caliche was recovered from the subsurface at 17-35 cm below surface. Excavation was terminated at 45 cm below surface.

TU #7, a 2-x-2-m block, was placed over F8 which consisted of fire-cracked rock and burned caliche located on the northern edge of the site (see Figure 80). One indeterminate ground stone artifact was found on the surface, while three metate fragments, another indeterminate ground stone artifact, a single piece of debitage, .19 kg of fire-cracked rock, and 6.32 kg of burned caliche were recovered from the first 14 cm of the eolian overburden (Figure 85). The unit was excavated down to 39 cm below surface but no subsurface cultural deposits were encountered.

Neither surface nor sub-surface cultural deposits were recovered from TU #8 (2-x-2 m). The test unit, excavated near a ceramic scatter (see Figure 80), was taken down to 67 cm below surface, but the deposits were sterile of any cultural materials (see Figure 85).

In TU #9 (2-x-2 m), a mano/metate fragment, an indeterminate ground stone artifact, two flakes, and burned caliche were recovered from the surface and eolian overburden of F6 which started as a surface charcoal stain. Three debitage, a core, two metate fragments, a piece of bone (small to medium-sized mammal; Appendix I), and an undetermined amount of burned caliche were recovered from the subsurface (see Table 24). Two flotation samples were collected from the feature; amaranthus and purslane were identified in the samples (Appendix J). Excavation was terminated at 52 cm below surface.

TU #10, a 2-x-2-m block, was excavated in an interdunal area of sand accumulation where a mano was found on the surface (see Figure 80). The excavation was taken down to 33 cm below surface, but the 11 artifacts recovered (eight unspecified brownware sherds, a hammerstones, a flake, and an undeterminate ground stone artifact) were recovered only from the surface, the eolian overburden, and the contact zone between eolian overburden and the Organ-age surface (see Table 24).

A total of eight backhoe trenches was excavated on FB 13147 (Appendix E). A feature containing charcoal, ash, and tiny burned caliche fragments was exposed at the base of a coppice dune in BT 6. Feature provenience is an indication that cultural deposits do occur under the dunes in the Hueco Bolson coppice dune environment. A charcoal sample taken from this feature resulted in a radiocarbon date of 3670 $\pm$ 80 B.P. (2280-1870 B.C. and 1830-1780 B.C.) (Appendix B). In addition, a flotation sample taken from the feature exposed in BT 6 revealed amaranthus, mustard, spurge, and purslane plant remains, none of which were charred (Appendix J).

Time diagnostic artifacts recovered from site FB 13147 include an Early Archaic Bajada-like projectile point and 10 late El Paso phase (Late Prehistoric) Tucson Polychrome sherds. In addition, three radiocarbon samples collected, one from TU #3, one from TU #5, and one from BT 6, resulted in dates of 1,230 $\pm$ 70 B.P. (A.D. 665-980), 1,030 $\pm$ 70 B.P. (A.D. 880-1170), and 3,670 $\pm$ 80 B.P. (2280-1870 B.C. and 1830-1780 B.C.), respectively (Appendix B). Site FB 13147 represents a multicomponent site which has enormous research potential and without a doubt, will make a significant contribution to the area prehistory for the following reasons:

- sites with intact structural floors and artifact associations (F5), as that exposed in TU #3, constitute a small percentage of the prehistoric sites in the area;

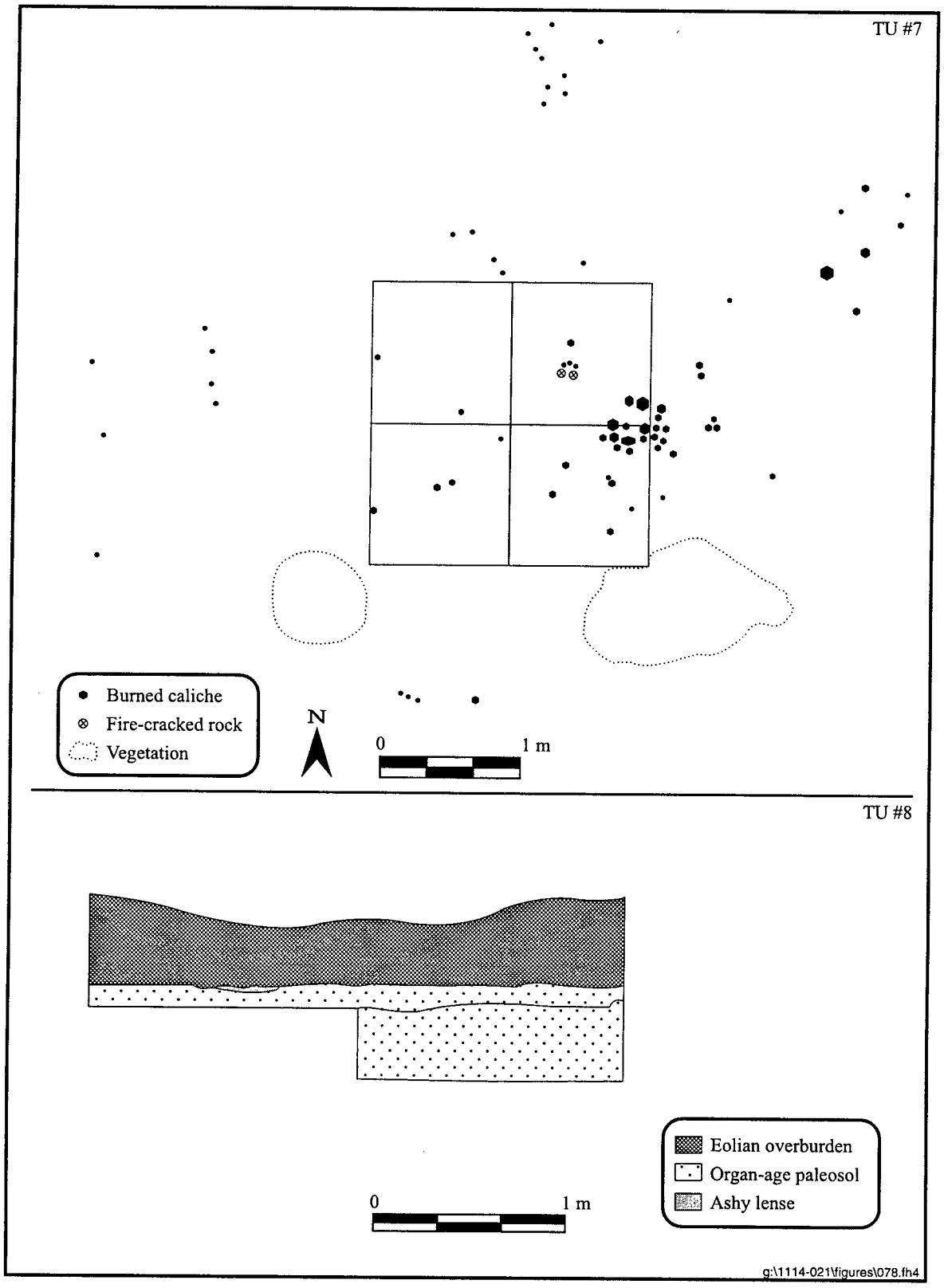


Figure 85. Plan view of TU #7 and profile of TU #8, site FB 13147.

- the surface assemblage at site FB 13147, which included more typologically diverse lithic tools (scraper, projectile point, agave knife, mano, and metate) than at any other site tested within the project, suggests multiple activities and possibly prolonged residency at the site;
- BT 6 revealed the best example from this project of a feature buried below the dune; and
- the range of diagnostic artifacts represented at site FB 13147 spans a longer period (Archaic to Late Prehistoric) than any other site tested during the current project.

Site FB 13147 is considered eligible for inclusion in the NRHP under Criterion D. The large size of the site, 76,436 m^2, would make mitigation by data recovery very costly. Therefore, the site should be protected and preserved by being kept off-limits to human and mechanical impacts. The site location on the extreme southeastern corner of the quadrat (see Figure 72) is amenable to avoidance without significantly reducing the area of the quadrat available for Patrol Base activities.

FB 13335 (41EP4698)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,121 (3,676 ft)
Size (square meters)	
Previously Recorded:	100
Current:	1,120
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	1.54
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.78
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	12.8
Extent of Erosion (%):	60
Extent of Modern Disturbance (%):	20

FB 13335 is located on the northeastern corner of Patrol Base 7 where the surrounding landscape slopes gently in all directions except to the north (see Figure 72). Although the general area is in geomorphic surface Mapping Unit 2a (Monger 1993:102), the site area has characteristics of Mapping Unit 1b, where interdunal areas are deflated down to a caliche lag layer. Caliche gravels are present over 60 percent of the site area signifying the extent of erosion and deflation. The vegetation consists of grass, snakeweed, yucca, mesquite, and four-wing saltbush, but the ground surface visibility is approximately 60 percent at FB 13335.

The site boundary is delineated by a low density surface artifact and burned caliche scatter (Figure 86). Two apparently distinct activity areas (30 m apart) varying in artifact type content were observed; on the west is an artifact concentration consisting of unspecified brownware ceramics, a ground stone, and miscellaneous flakes, while a locus of burned caliche nodules and chipped stone is located on the east side of the site (see Figure 86). A single stain feature was identified in the northern portion of the site and was designated F1. A single test unit and two backhoe trenches were excavated at FB 13335.

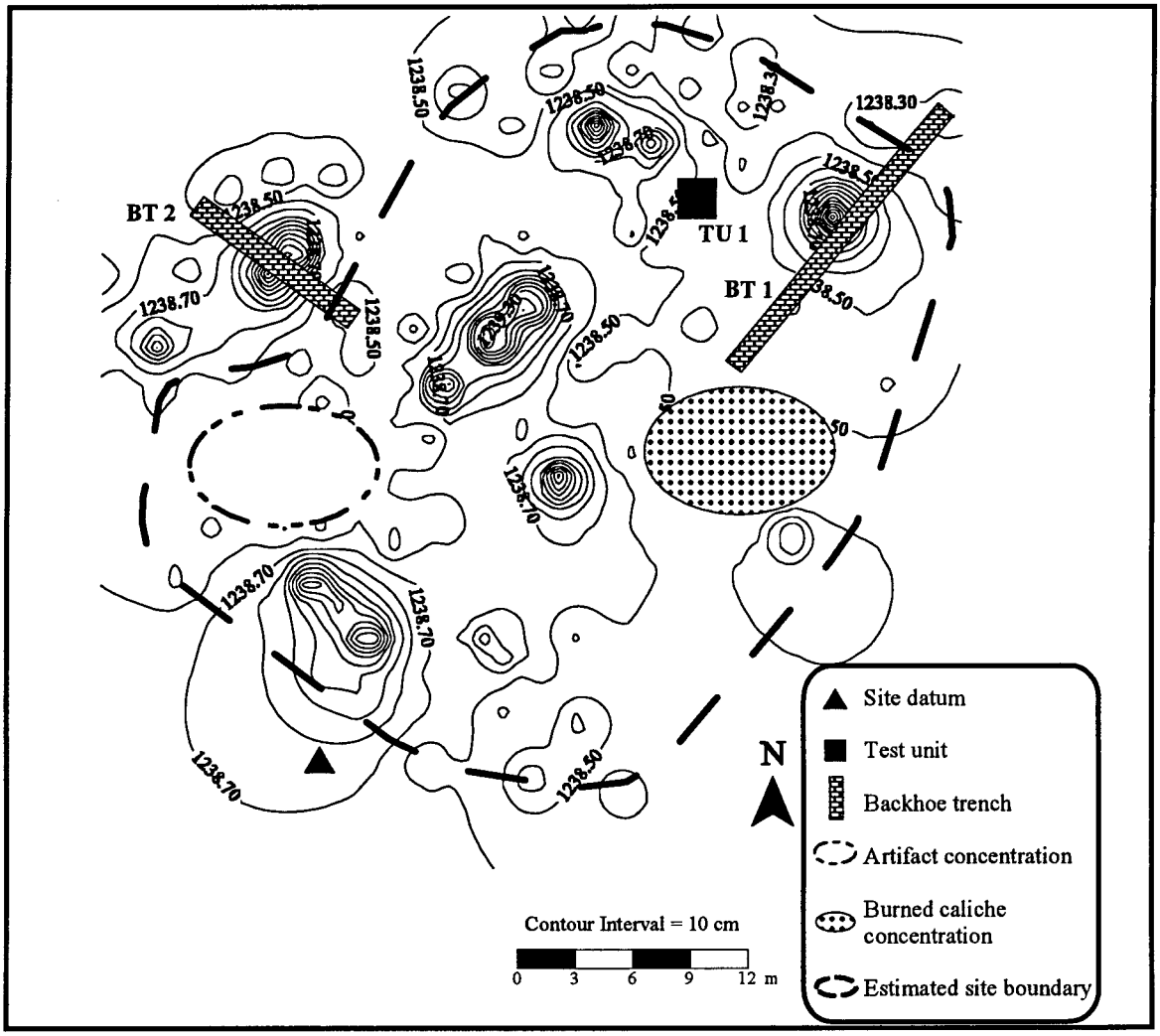


Figure 86. Contour map of site FB 13335.

TU #1, a 2-x-2-m block, was excavated within close proximity to F1 in a 15-x-15-m deflated interdunal area where staining was observed (see Figure 86). Testing revealed a charcoal stain remnant along a root tunnel into the modern erosional surface, suggesting overall feature erosion (Figure 87). Small amounts of burned caliche were recovered at every level between 0-70 cm below surface (Table 25). No cultural material was recovered from TU #1. Two backhoe trenches excavated through coppice dunes in the northwest and northeast portions of the site also did not expose any cultural debris (Figure 88).

A low artifact density, an unclear relationship between artifacts and the burned caliche scatter, and the extent of erosion seem to suggest that little site potential remains at FB 13335; excavations revealed no artifact association with the 1.20 kg of burned caliche recovered from TU #1. Therefore, it is recommended that site FB 13335 be considered ineligible for inclusion in the NRHP. The intended use of the Patrol Base will not have adverse effects on the site and no further work is recommended.

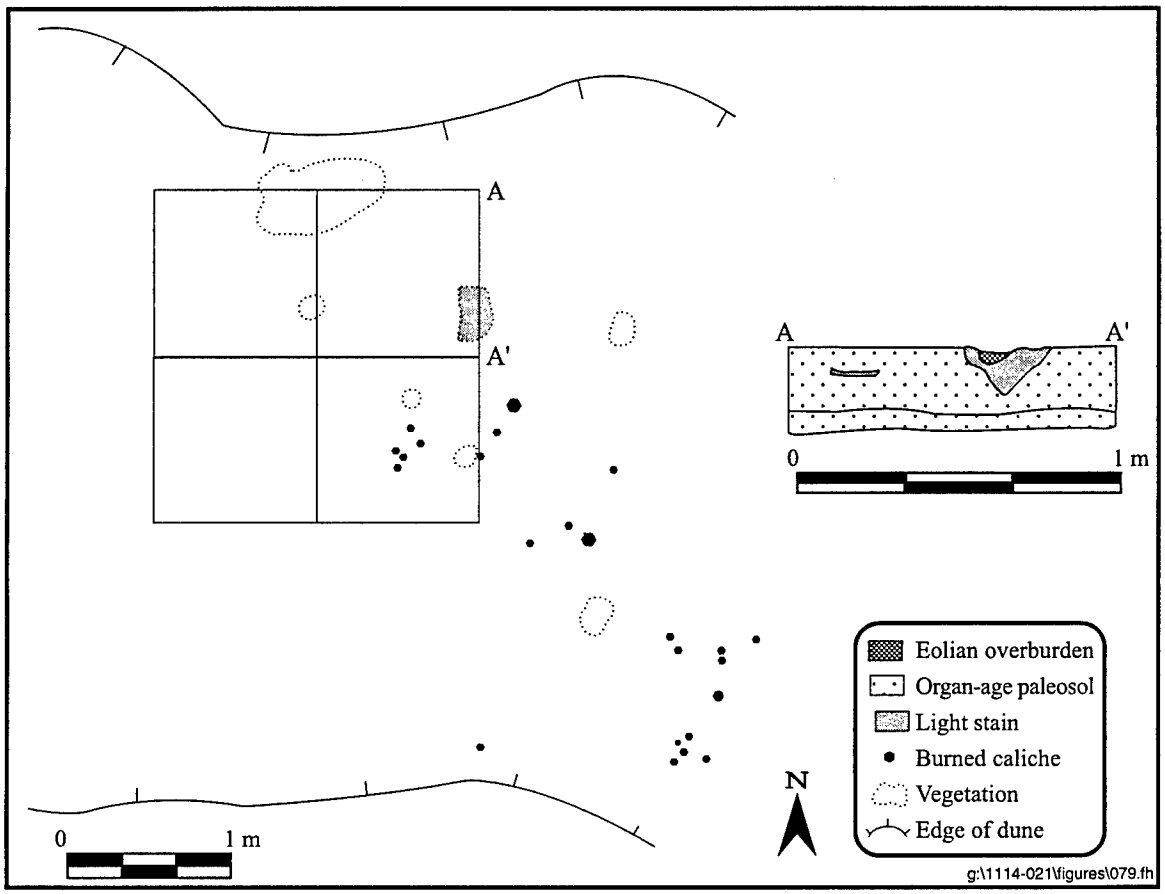


Figure 87. Plan view and profile of TU #1, F1, site FB 13335.

Table 25
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13335 (41EP4698)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4		1	BC/Stain	S	S									.20	
		.14			Q4	0-20										
		.20			Q4	0-30									.60	
		.35			Q3	0-40									.12	
		.35			Q3	10-50									.12	
		.35			Q3	20-60									.15	
		.15			Q3	34-70									.01	
Total TU #1	*4*	*1.54*	*1*												*1.20*	*.078*
Total	*4*	*1.54*	*1*												*1.20*	*.78*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
- S Surface
- Q4 (Quaternary 4) Historic eolian overburden
- Q3 (Quaternary 3) Organ-age paleosol
- Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
- Q1 (Quaternary 1) La Mesa indurated caliche

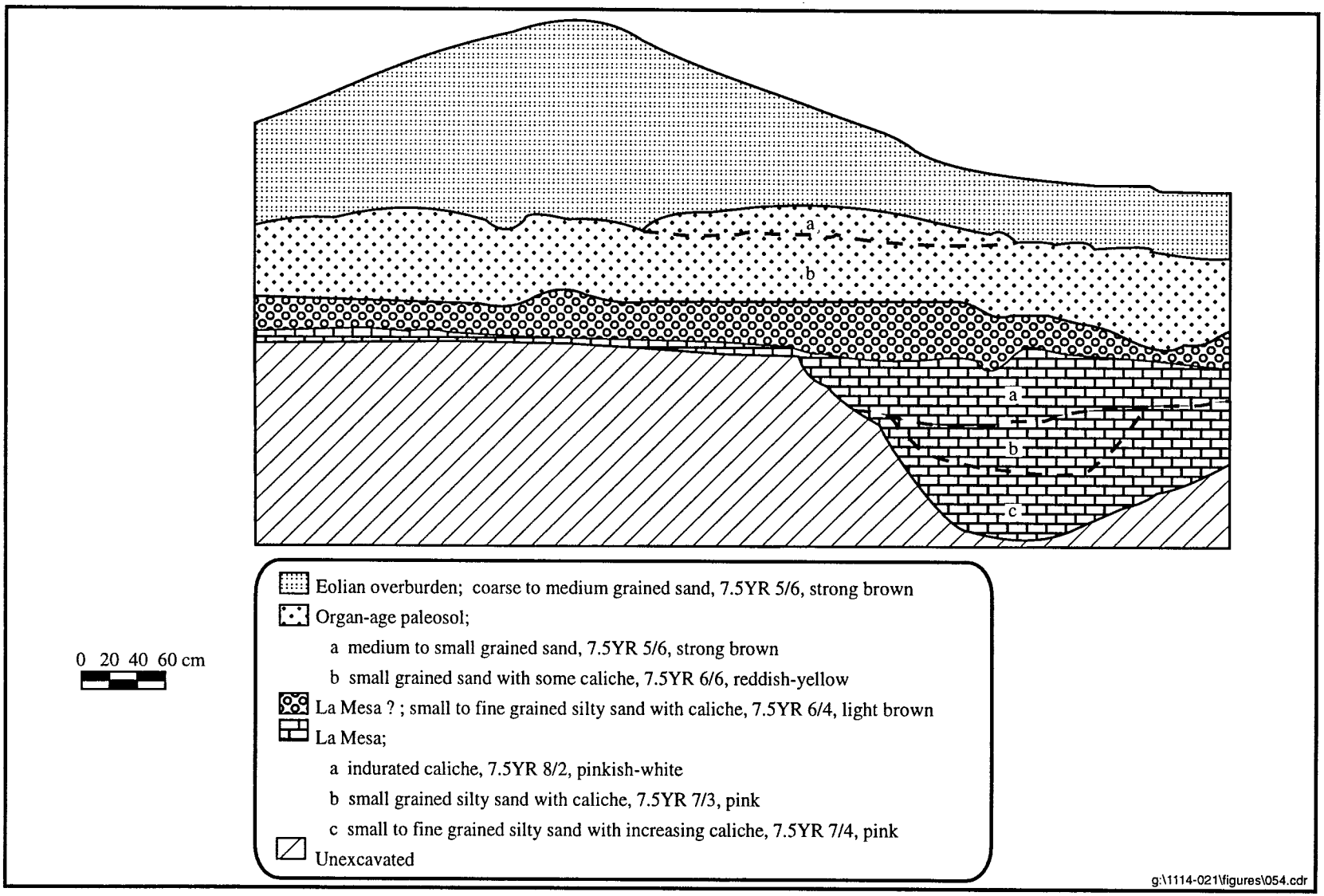


Figure 88. Backhoe Trench 1, profile of southeast wall, site FB 13335.

FB 13920 (41EP4699)

Eligibility Status:	Eligible
Radiocarbon Date:	1,230 ± 80 B.P. (A.D. 655-990)
Elevation (meters above mean sea level):	1,239 (4,064 ft)
Size (square meters)	
Previously Recorded:	200
Current:	5,400
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	3
Total Area Tested (m^2):	12
Total Volume Excavated (m^3):	3.25
Artifact Density (n/m^3):	30.77
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.18
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	15.0
Extent of Erosion (%):	35
Extent of Modern Disturbance (%):	5

Site FB 13920 is located east of the center of Patrol Base 7 (see Figure 72) and exhibits characteristics of geomorphic surface Mapping Unit 1a/1b (Monger 1993:35). It is located in a low to medium-height coppice dune field. Overall, the landscape slopes slightly to the south and west. Eolian overburden, caliche nodules in deflated interdunal areas, and patches of relatively level areas dominated by grasses characterize the site surface. The vegetation is dominated by mesquite, various grasses, snakeweed, yucca, an occasional ephedra, and various forbes that reduce ground surface visibility to approximately 60 percent. The site boundary is defined by a previously recorded El Paso Polychrome sherd concentration, a low density scatter of unspecified brownware, chipped stones artifacts, and three surface charcoal stain features; all three features were tested. Two retouched flakes and three El Paso Polychrome rimsherds were collected from the surface of the site. Selected artifacts are illustrated in Figure 89. Three 2-x-2-m test units and two backhoe trenches were excavated at site FB 13920 (Figure 90).

TU #1 was excavated over F1 located in the extreme southern portion of the site (see Figure 90). F1 consists of a low density scatter of fire-cracked rock and burned caliche on the northern flank of a coppice dune. The feature exhibits a hearth with well-oxidized soil and either fill from a burned brush structure or staining from a blown-out hearth. Limited quantities of burned caliche were recovered from the eolian overburden and the subsurface (Table 26). Four flotation samples were recovered from TU #1; identified plant remains include amaranthus, devil's head cactus, purslane, mesquite, soaptree yucca, and charred unidentifiable seeds (Appendix J). A charcoal sample from the feature fill was taken for radiocarbon dating and resulted in a date of 1,230 ± 80 B.P. (A.D. 655-990) (Appendix B). Excavation was terminated at 44 cm below surface (Figure 91).

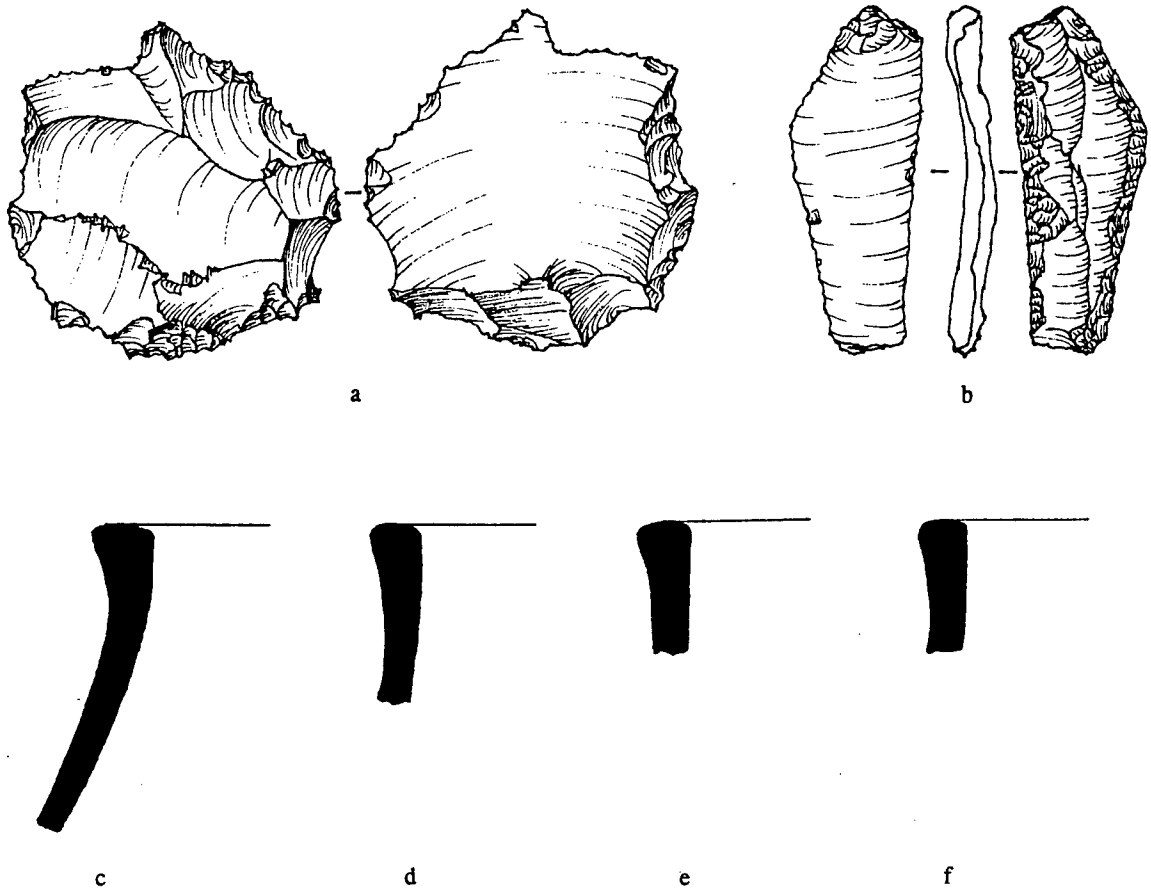


Figure 89. Artifacts recovered from site FB 13920: (a-b) unifacially retouched flakes; (c-f) El Paso Polychrome rim sherds. (Scale 1:1)

TU #2 was placed over F2, a concentration of El Paso Polychrome sherds, possibly a pot drop, in the northern portion of the site (see Figure 90). Of the 97 artifacts (96 sherds and one piece of lithic debitage) recovered from the test unit, approximately 58 percent (n=56) were from the subsurface deposit; the remaining artifact assemblage was from the surface and the eolian overburden (see Table 26). Small quantities of fire-cracked rock were recovered from the subsurface. Excavation was terminated at 63 cm below surface, but an auger core was taken for an additional 55 cm. The auger core exhibited no physical evidence of cultural deposits.

TU #3 was positioned over F3, a burned caliche feature, in the central portion of the site (see Figure 90). Three ground stone fragments were recovered, two indeterminate ground stone artifacts from the eolian overburden and a mano fragment from the subsurface. Small quantities of burned caliche were recovered from both the eolian overburden and the subsurface (see Table 26).

The two backhoe trenches, one located in the northern portion of the site and one in the south, exposed no subsurface cultural deposits (Figure 92), but one exposed evidence of local tectonic faulting (Curtis Monger, personal communication 1994).

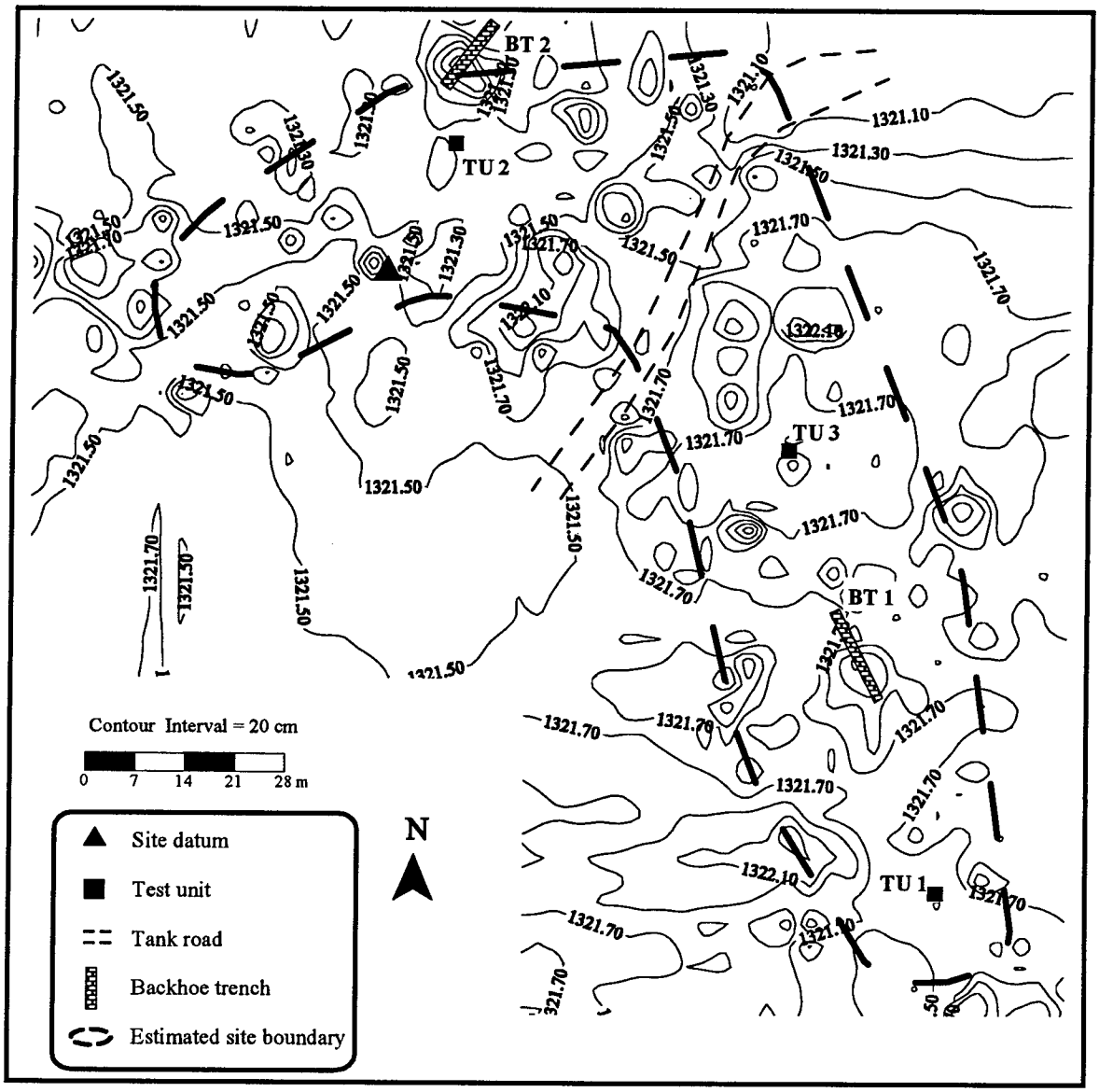


Figure 90. Contour map of site FB 13920.

The radiocarbon analysis of the sample from TU #1, F1, resulted in a date of 1,230 ± 80 B.P. (A.D. 655-990) (Appendix B) while the time sensitive El Paso Polychrome sherds recovered from TU #2, F2, suggest a later (post-A.D. 1100) middle to late Formative phase occupation of the site.

Although site FB 13920 has been impacted by erosion and tanks, 40 percent of the site is still intact, and the site is considered eligible for NRHP inclusion. Therefore, adverse effects from current and planned land use should be mitigated via data recovery. The remainder of the suspected burned brush structure fill of F1 should be excavated, and 10-x-10-m blocks should be excavated around two untested charcoal stain features located 15 m north of TU #1. Similarly, block-excavation should be undertaken around the brownware concentration on the northwest part of the site in the area of TU #2. In addition, all artifacts on the surface of the site should be mapped and collected.

Table 26
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13920 (41EP4699)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4	.18	1	Stain	Q4	0-9								?	?	
		.49			Q3	0-26								?	?	
		.41			Q3	5-44								?	?	
Total TU #1	*4*	*1.08*	*1*											*?*	*?*	
2	4		2	Ceramic Conc	S	S	18				18					
		.07			Q4	0-7	23				23					
		.20			Q3	0-10	18	1			19					
		.41			Q3	4-20	35				35					
		.49			Q3	14-31	2				2			?		
		.07			Q3	20-63										
Total TU #2	*4*	*1.24*	*1*				*96*	*1*			*97*	*78.23*		*?*		
3	4	.32	3	BC	Q4	0-22			2		2				.10	
		.50			Q3	1-30			1		1				.07	
		.11			Q3	12-42										
Total TU #3	*4*	*.93*	*1*						*3*		*3*	*3.23*			*.17*	*.18*
Total	*12*	*3.25*	*3*				*96*	*1*	*3*		*100*	*30.77*			*.17*	*?*
Surface Recovery							3	2			5					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

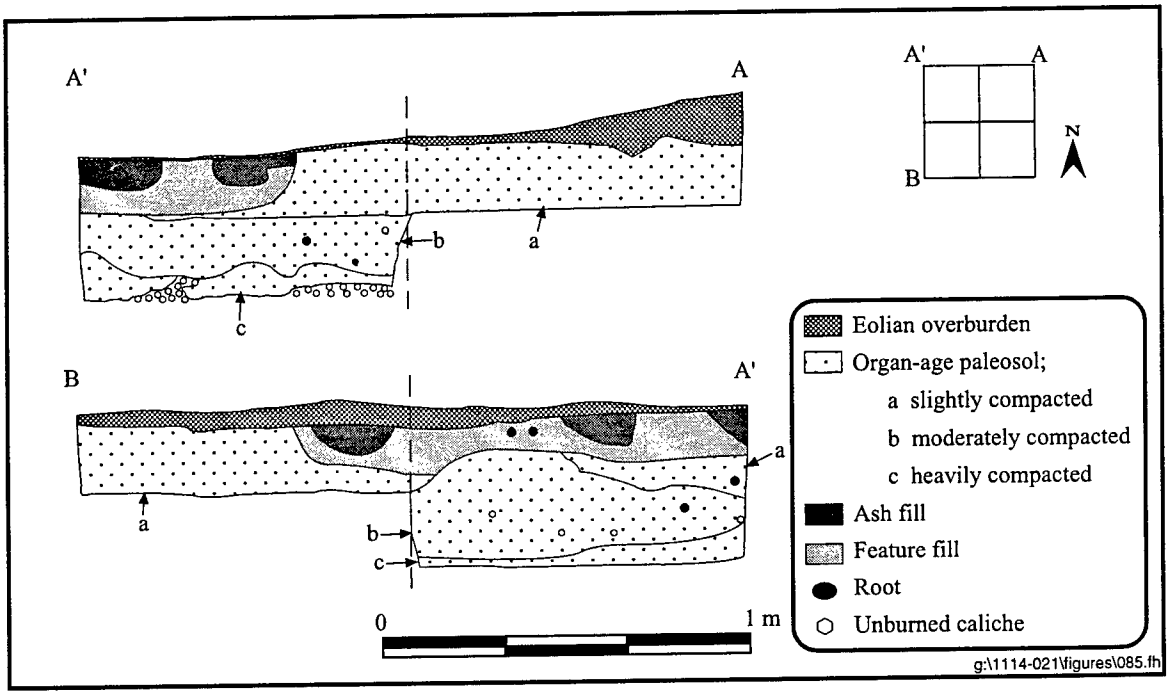


Figure 91. Profile of TU #1, F1, site FB 13920.

FB 13921 (41EP4700)

Eligibility Status:	Unknown
Radiocarbon Date:	610 ± 80 B.P. (A.D. 1270-1445)
Elevation (meters above mean sea level):	1,237 (4,057 ft)
Size (square meters)	
Previously Recorded:	100
Current:	840
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	1
Total Area Tested (m^2):	4
Total Volume Excavated (m^3):	.40
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	1.23
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	10.7
Extent of Erosion (%):	35
Extent of Modern Disturbance (%):	5

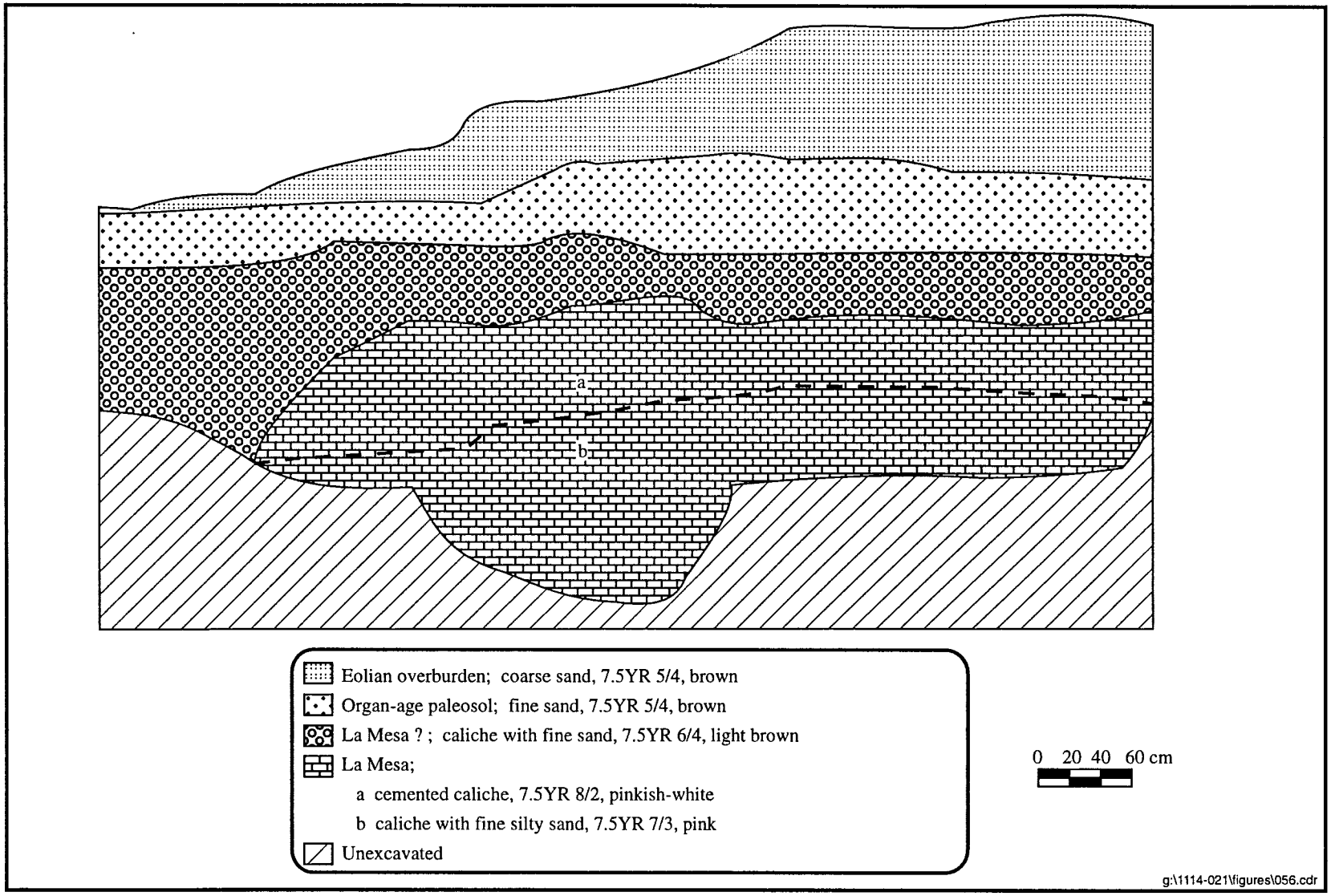


Figure 92. Backhoe Trench 1, profile of northeast wall, site FB 13920.

Site FB 13921 lies immediately northwest of FB 13920 in Patrol Base 7 in a low to medium-height coppice dune field on a low playa ridge (see Figure 72). Although the quadrat is characterized by geomorphic surface Mapping Unit 1b (Monger 1993:35) the site occupies a Mapping Unit 1a/1b geomorphic surface. A single, isolated hearth, is located in a relatively wide interdunal area of sand accumulation. Grass, snakeweed, yucca, and mesquite comprise the dominant vegetation which allows 60 percent ground surface visibility.

The hearth and a very low density cluster of burned caliche define site FB 13921. An untyped projectile point and an El Paso Polychrome rim were collected from the site during a prior survey. Previously recorded concentrations of unspecified brownware and El Paso Polychrome sherds (Brown 1991) were not relocated. A close examination of aerial photograph data and the distribution of features and artifact scatters, however, indicates that the two ceramic concentrations recorded on the northern part of site FB 13920 are less than 40 m from the southeastern boundary of site FB 13921, strongly suggesting that sites FB 13920 and FB 13921 overlap and constitute a single site (see Figure 72). This overlap should be confirmed during Phase III (mitigation) work.

A total of one test unit and two backhoe trenches was excavated at site FB 13921 (Figure 93). The 2-x-2-m test unit (TU #1) was excavated in the northwest portion of the site (see Figure 93). Burned caliche (.49 kg) was recovered from the eolian overburden (Table 27). A burned caliche and stain hearth 40-50 cm in diameter was exposed immediately below the eolian overburden (Figure 94). Excavation was terminated at the bottom of the hearth at 31 cm below surface. Evidence of oxidation along the perimeter of the hearth was noted. Charcoal samples were collected from the oxidized hearth for both radiocarbon and archaeomagnetic dating (Appendices B and G, respectively). The radiocarbon analysis resulted in a date of 610 $\pm$ 80 B.P. (A.D. 1270-1445) (Appendix B). The sample collected for archaeomagnetic dating did not produce a sufficient amount of magnetism to obtain a date, perhaps due to the sandy soil in the Fort Bliss area which does not allow for strong magnetization. Two flotation samples were collected from F1; identified plant remains include amaranthus (two specimens of which were charred), charred mustard, purslane, and charred corn cupules. The corn cupules appear to represent a single cob and may indicate that this site was the locus of activities ancillary to those of a nearby habitation site; the amaranth and mustard seeds may suggest occupation between late spring and early fall (Appendix J).

Two backhoe trenches through dunes on the periphery of the site to the north and south exposed no subsurface deposits (Figure 95).

Although site FB 13921 is comprised of a sparse scatter of artifacts and no artifacts were recovered from the subsurface excavation, the presence of charred corn cupules in a prehistoric feature is unusual in the project area. Analysis of the botanical material from the hearth revealed evidence for seasonality and has suggested a possible relationship between FB 13921 and a nearby site. Before an assessment of site eligibility can be made, the relationship of sites FB 13920 and FB 13921 should be determined. Therefore, site FB 13921 is considered to be of unknown eligibility and further testing is recommended based primarily on the potential for additional prehistoric features and the possible relationship between FB 13920 and FB 13921. All surface artifacts should be mapped and collected.

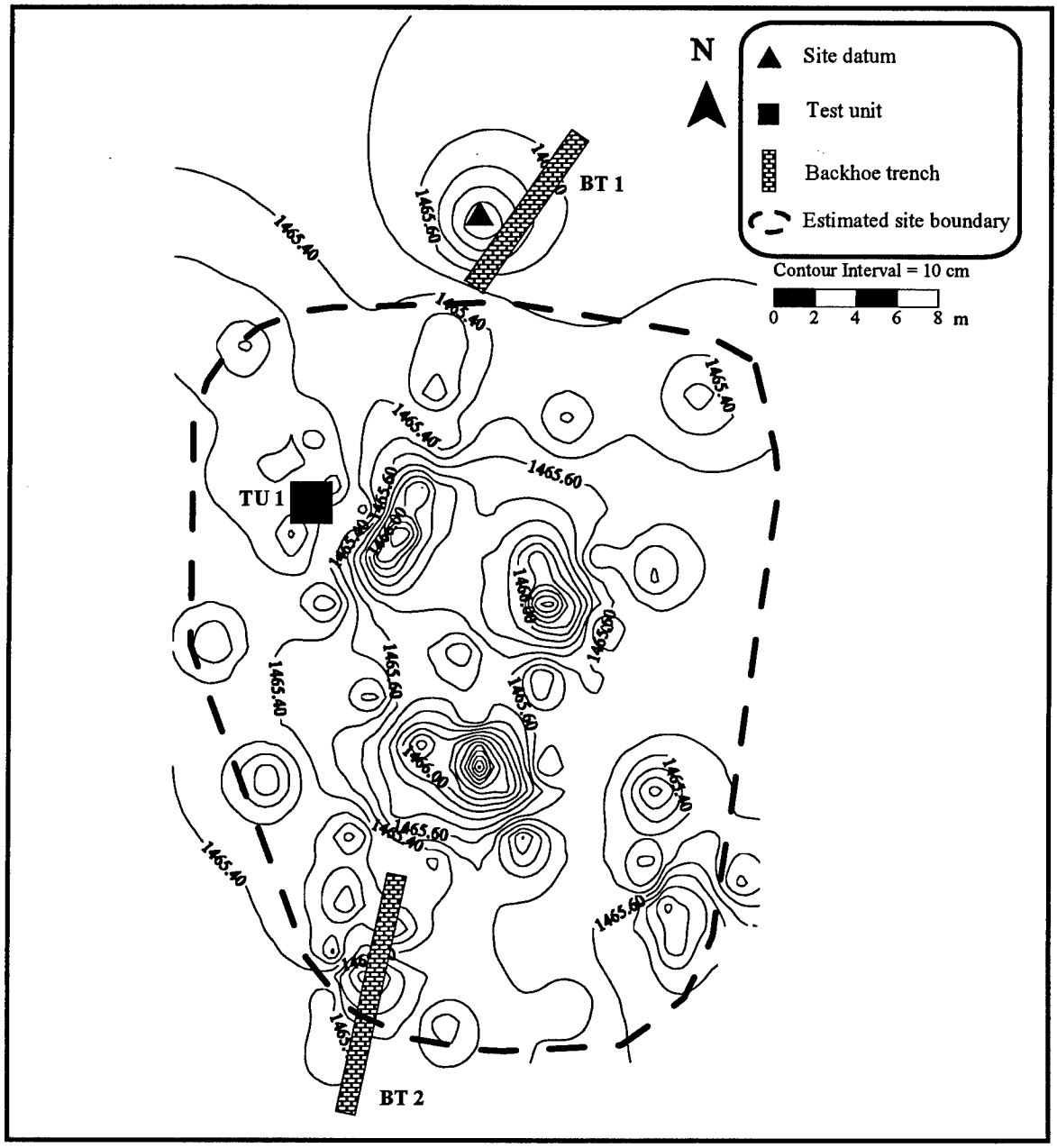


Figure 93. Contour map of site FB 13921.

Table 27
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13921 (41EP4700)

	TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
	1	4	.13	1	BC/Stain	Q4	0-9									.49	
			.27			Q4/Q3	1-31										
Total		*4*	*.40*	*1*												*.49*	*1.23*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

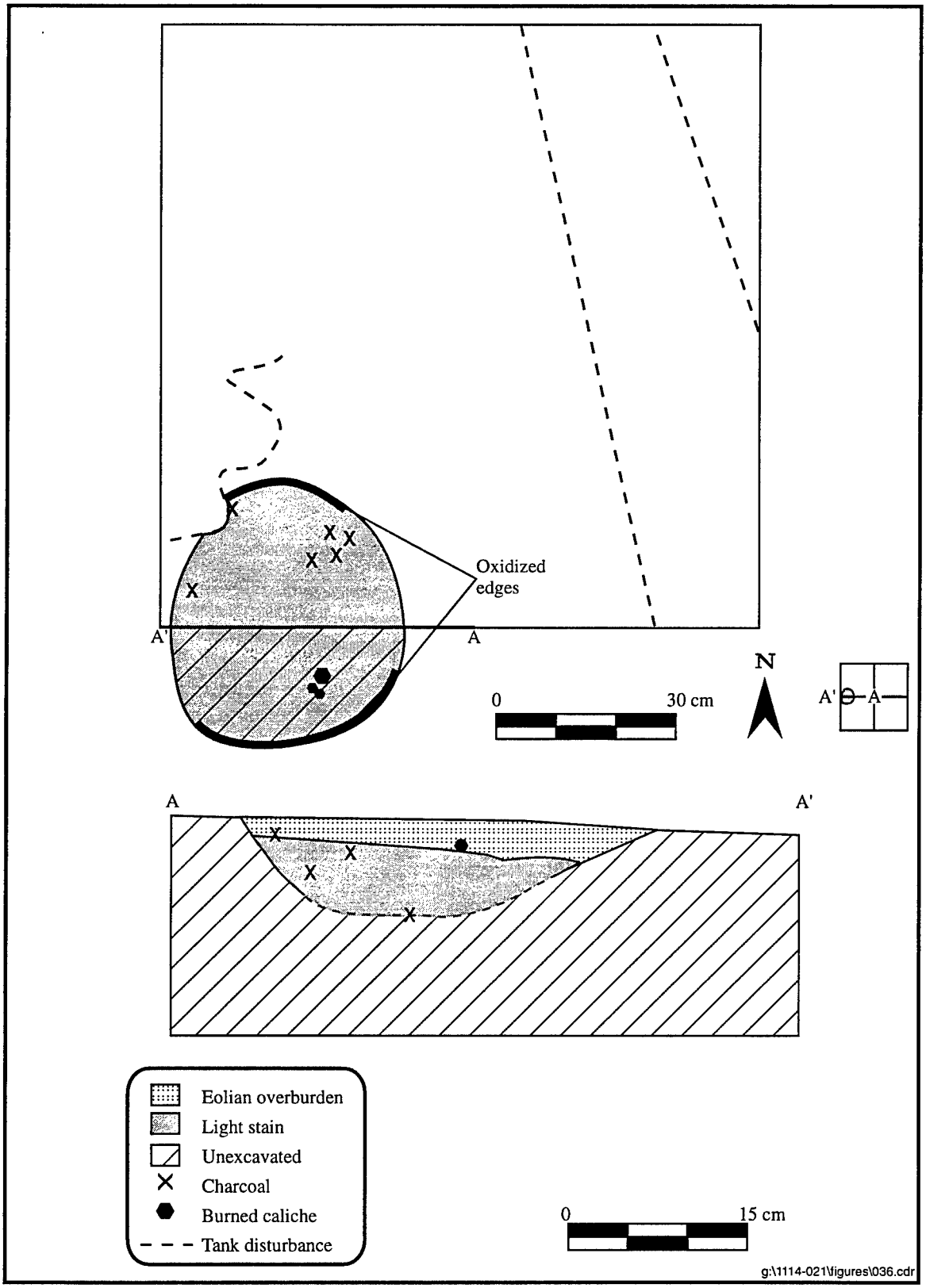


Figure 94. Post-excavation plan view and profile of TU #1, F1, site FB 13921.

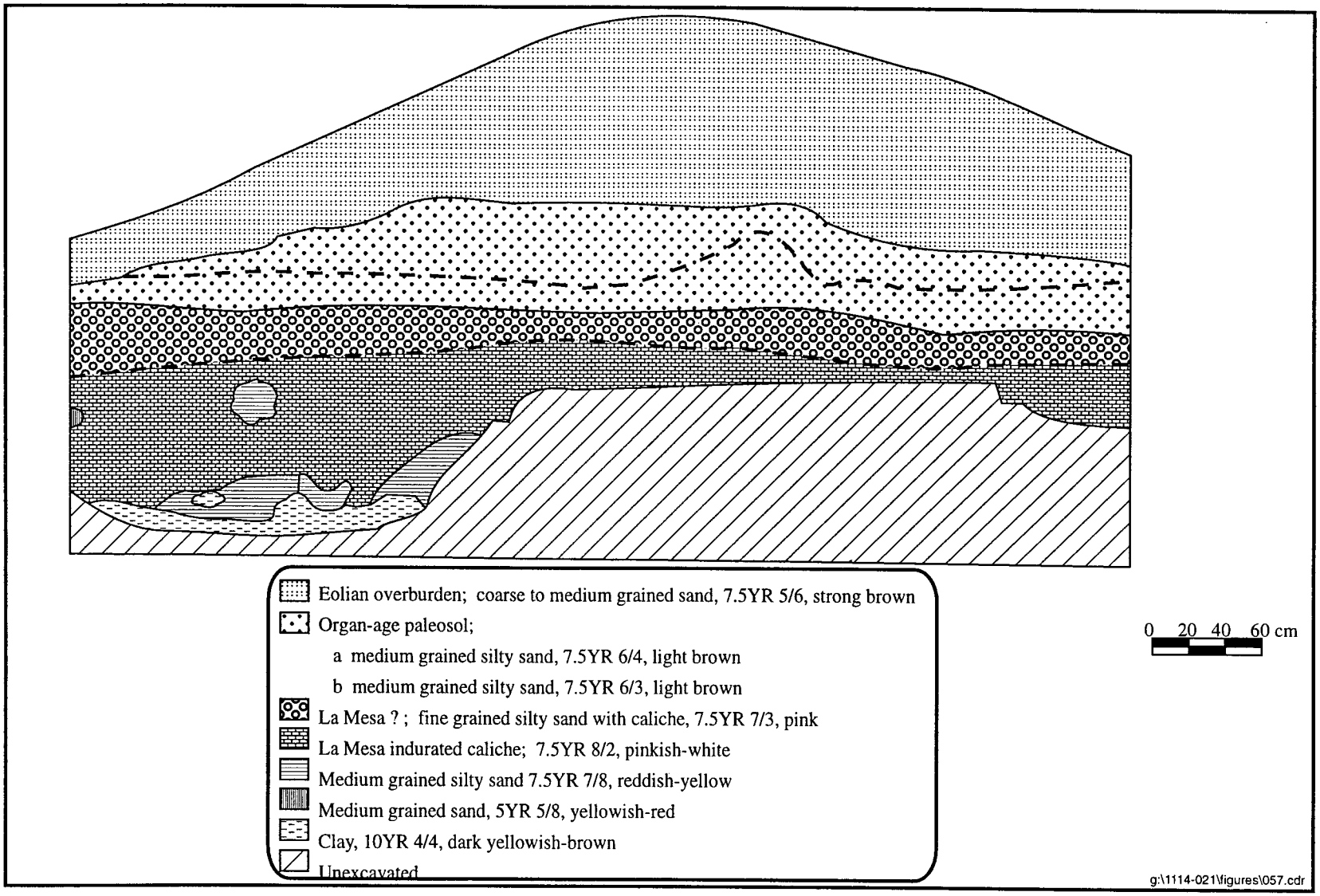


Figure 95. Backhoe Trench 2, profile of northwest wall, site FB 13921.

PATROL BASE 8, MANEUVER AREA 8
SITES FB 4525, FB 6084, FB 6085, FB 6086, FB 6089, FB 13139, FB 13140

Patrol Base 8 is located 11 km east of Newman astride the Texas/New Mexico state line road (Desert SW Quadrangle, New Mexico, Otero County, and Texas, El Paso County) at 1,241 m amsl. The southern approximate one-tenth of the quadrat is in Texas and the rest is in New Mexico.

The landscape slopes to the northeast, falling 3.7 m in .5 km. The quadrat is dominated by coppice dunes (Mapping Unit 2a) with sparse interdunal vegetation. The Hueco-Wink association soils overlie the La Mesa indurated caliche formation. Mesquite, snakeweed, yucca, and grass dominate the plant community. The western half of the quadrat has undergone considerable interdunal deflation compared to the eastern half where sand accumulation has taken place. Nine sites cluster in the eastern half of the quadrat (Figure 96). The eastern one-fifth of the quadrat is in a "Green" district (an area designated by the Fort Bliss cultural resources management office as having potential to be recommended for protection as an archeological district). Three sites and a portion of a fourth are in the "green" district. The quadrat exhibits considerable military impact, primarily in the central area where light grading may have taken place in the past.

FB 4525 (LA 95481)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,241 (4,070 ft)
Size (square meters)	
Previously Recorded:	1,600
Current:	800
Features (+ = present; 0 = absent):	0
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	.94
Artifact Density (n/m^3):	2.13
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.48
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	10.2
Extent of Erosion (%):	80
Extent of Modern Disturbance (%):	70

Site FB 4525 is located along the western boundary of Patrol Base 8 (see Figure 96). The geomorphic surface of the general area is characterized by medium-height coppice dunes with exposed caliche in deflated interdunal areas (Mapping Unit 1a). Mesquite, broom snakeweed, sand sage, yucca, four-wing saltbush, and various forbes constitute the dominant vegetation and have reduced ground surface visibility to 80 percent.

FB 4525 (Figure 97) was previously recorded (Carmichael 1979) as a feature but when revisited during the current project, only three pieces of burned caliche in a 4-x-4-m area were relocated. Evidently the site has been heavily impacted since it was previously recorded. A large metate recorded in the original survey notes could not be relocated. The site is close to a well-used tank road and the metate could have been collected.

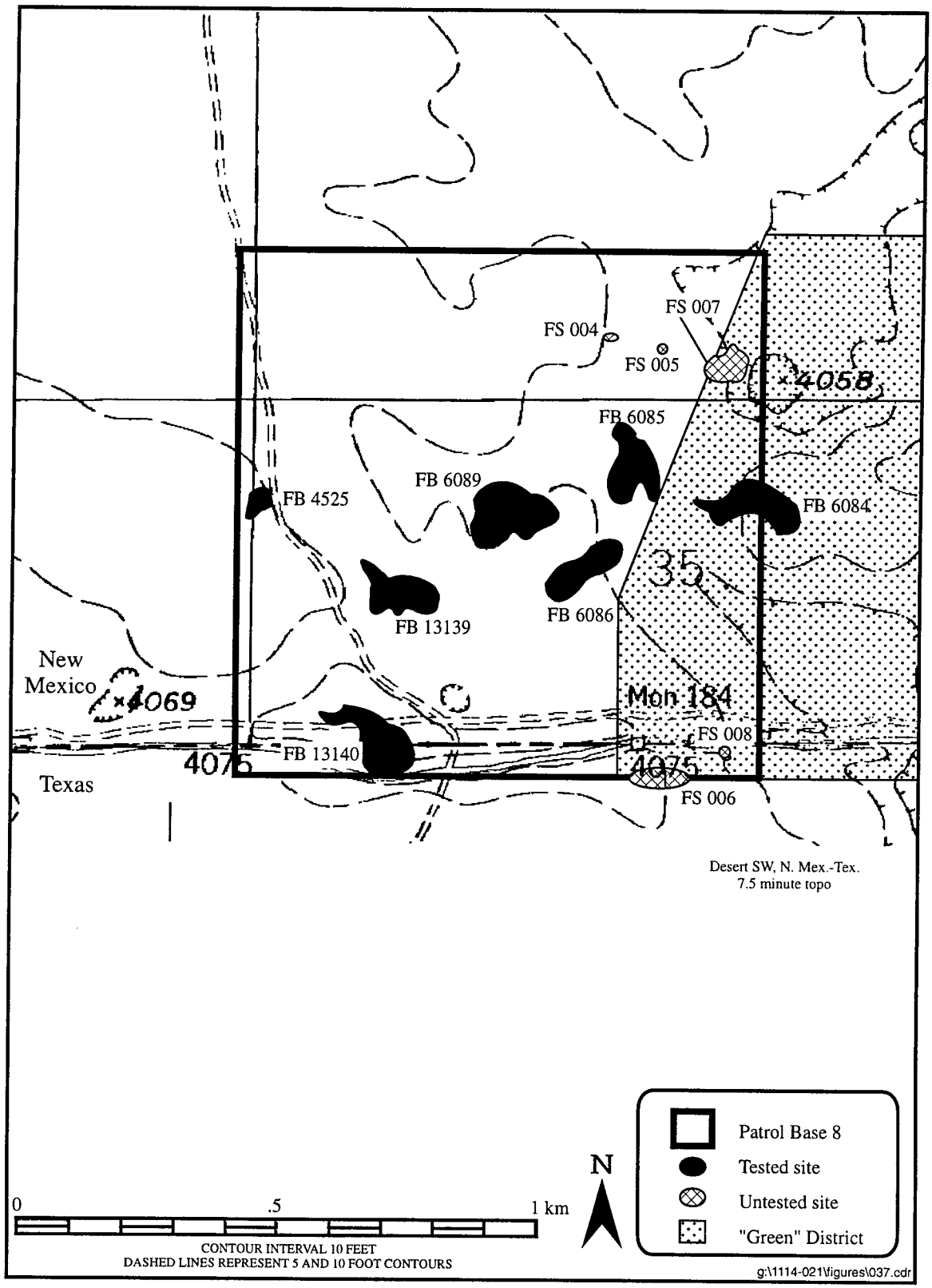


Figure 96. Site locations within Patrol Base 8 (see Appendix A for information on untested sites).

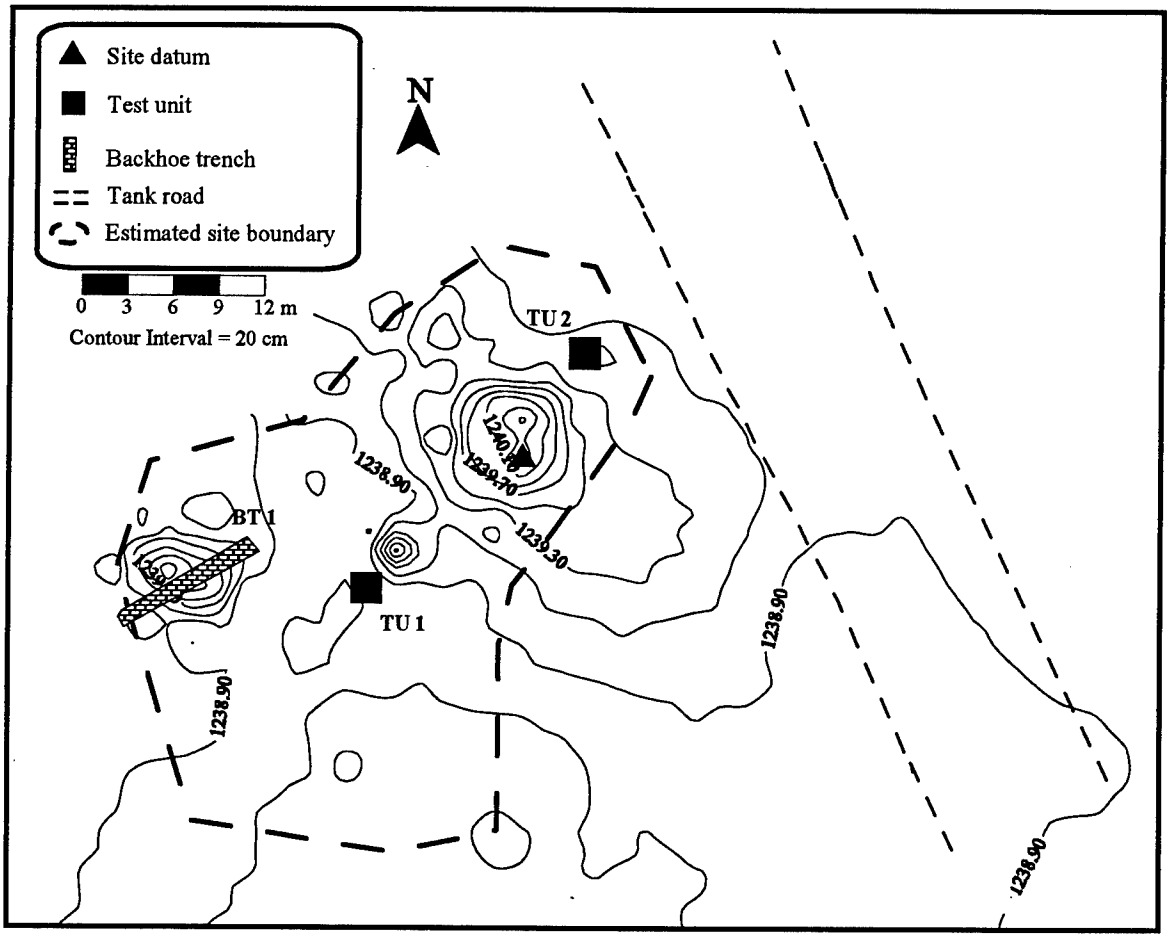


Figure 97. Contour map of site FB 4525.

Areas around the site appear to have been mechanically disturbed and dirt piles have been left on the site. Military trash litters the area. Two test units and one backhoe trench were excavated at the site (see Figure 97); a total of two lithic artifacts, .20 kg of fire-cracked rock, and .25 kg of burned caliche was collected.

TU #1 (2-x-2 m), placed in the central portion of the site to include the burned caliche/fire-cracked rock scatter (F1; see Figure 97), was excavated down to 49 cm below surface (Table 28). A mano fragment, .20 kg of fire-cracked rock, and .25 kg of burned caliche were recovered from the eolian overburden. No diagnostic artifacts were recovered from the surface deposit. No evidence of a feature existed below the surface; therefore, the burned caliche/fire-cracked rock scatter was interpreted as a surface manifestation.

TU #2 (2-x-2 m), placed near the tank road in the northern portion of the site, in an area with apparent potential for undisturbed soils (see Figure 97), produced only a single chipped stone recovered from the eolian overburden; no features were identified (see Table 28). Excavation was terminated at 29 cm below surface and an auger core taken between 29-100 cm below surface (Figure 98). The core sediments showed no evidence of cultural deposits.

Table 28
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 4525 (LA 95481)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4	.20	1	BC/FCR	Q4	0-20			1		1			.20	.25	
		.20			Q3	1-49										
Total TU #1	*4*	*.40*	*1*						*1*		*1*	*2.5*		*.20*	*.25*	*1.13*
2	4	.30			Q4	0-13		1			1					
		.24			Q3	3-29										
Total TU #2	*4*	*.54*						*1*			*1*	*1.85*				
Total	*8*	*.94*	*1*					*1*	*1*		*2*	*2.13*		*.20*	*.25*	*.48*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

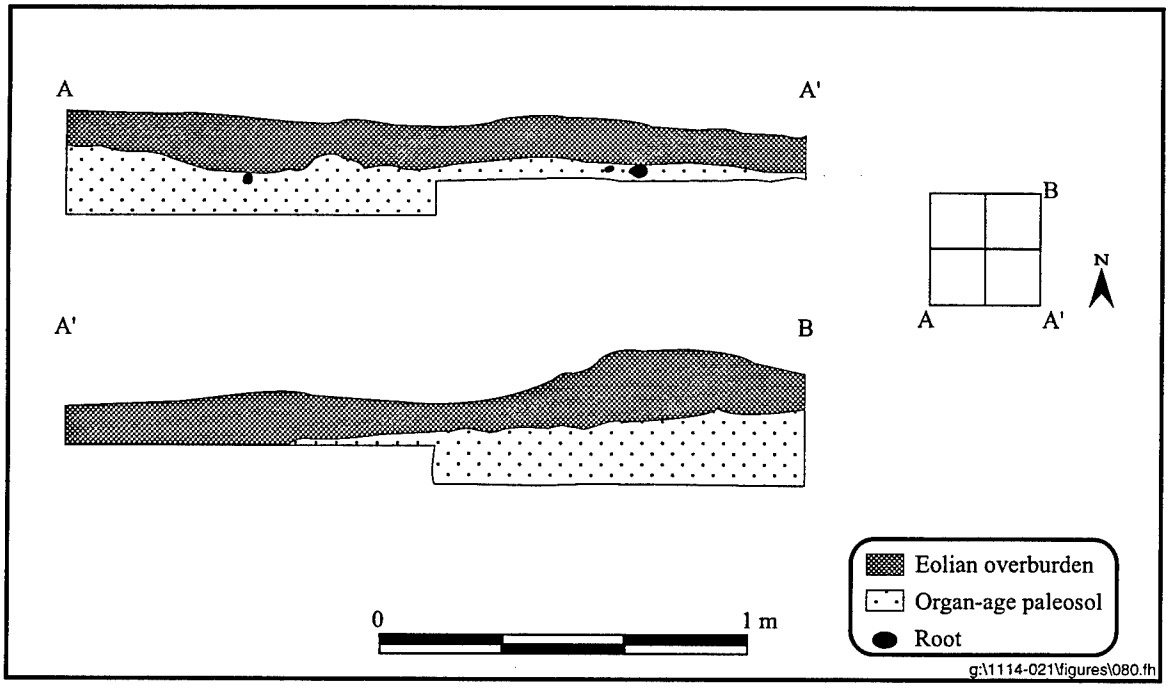


Figure 98. Profile of TU #2, site FB 4525.

A backhoe trench cut through a dune adjacent to TU #1 exposed no cultural material. The previously recorded feature at site FB 4525 was interpreted as a surface manifestation and therefore exhibits no further research potential. No direct or indirect evidence found at site FB 4525 suggests any potential for listing in the NRHP. The site has been tested adequately and its research potential exhausted. The projected use of the Patrol Base will not adversely affect the site; no further work is recommended.

FB 6084 (LA 96937)

Eligibility Status:	Eligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,237 (4,057 ft)
Size (square meters)	
Previously Recorded:	?
Current:	4,800
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	.91
Artifact Density (n/m^3):	4.40
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	1.46
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	10.7
Extent of Erosion (%):	30
Extent of Modern Disturbance (%):	10

FB 6084 is in a low to medium-height coppice dune field (Mapping Unit 2a/2b) on the eastern edge of Patrol Base 8 (see Figure 96) where interdunal areas are deflated but not scoured. The immediate area is a broad plain with a slight rise to the east and slight slope toward relict playas to the north and south. Mesquite, sand sage, broom snakeweed, yucca, four-wing saltbush, and various forbes constitute the dominant vegetation and allow 65 percent ground surface visibility in the winter. The site boundary is defined by a very low density scatter of chipped and ground stone, fire-cracked rock, and burned caliche. A Late Archaic/Early Formative Marcos-like projectile point (Figure 99) and a retouched flake were collected from the site surface.

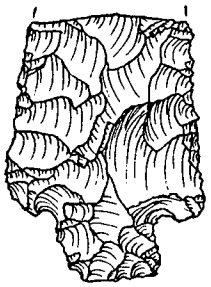


Figure 99. Marcos-like projectile point from site FB 6084. (Scale 1:1)

TU #1 (2-x-2 m) was placed in a burned caliche concentration (F1) near the southwest boundary of the site that appears to be eroding from the north flank of a medium coppice dune (Figure 100). Excavation reached a caliche lag layer (Isaacks' Ranch) at 42 cm below the eolian overburden; no artifacts were recovered (Table 29). Excavation of the unit was terminated at 42 cm below surface.

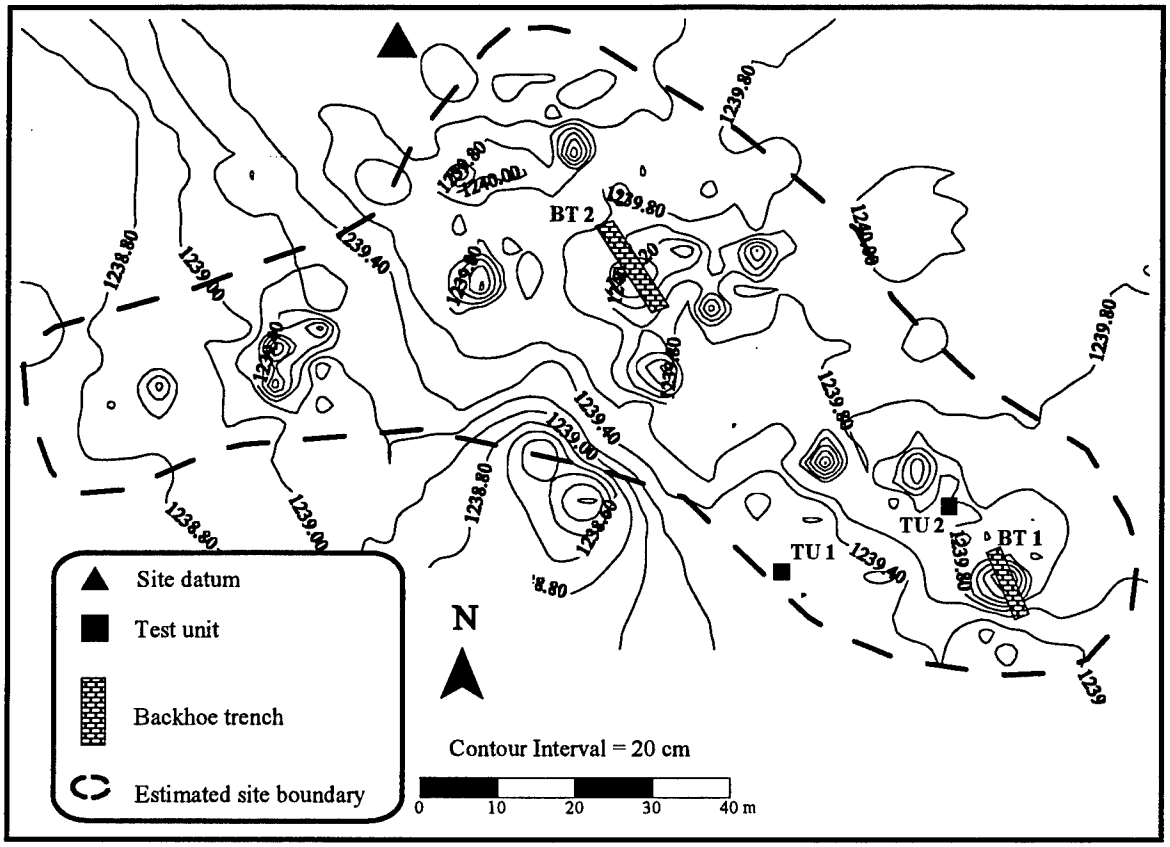


Figure 100. Contour map of site FB 6084.

TU #2 (2-x-2 m) was positioned northeast of TU #1 in the southern portion of the site and included part of a fire-cracked rock/burned caliche feature (F2) eroding from interdunal sand deposits (see Figure 100). Excavation exposed a small charcoal stain remnant of a hearth at an advanced stage of disarticulation. Artifacts, including a core, a retouched flake, a piece of debitage, and a metate fragment, were recovered from the eolian overburden. A small quantity of unspecified burned caliche was recovered from the subsurface; however, no cultural artifacts were recovered in the subsurface deposit (see Table 29). Excavation was taken down to 19 cm below surface.

Two backhoe trenches, one excavated southeast of TU #1 and TU #2 (BT 1) and the other excavated in the northern portion of the site (BT 2), did not expose any further cultural deposits, although BT 1 exposed an Isaacks' Ranch-age paleosol.

Over 50 percent of site FB 6084 is intact and exhibits a moderately dense chipped and ground stone scatter composed of a variety of lithic raw material types. Research potential is not exhausted and, therefore, the site is eligible for inclusion in the NRHP under Criterion D. Adverse impacts to cultural resources at this site from projected use of the Patrol Base should be mitigated via a data recovery program that would excavate the remainder of the TU #2 feature. All surface artifacts should be mapped and collected, and other features found on the site should be excavated.

Table 29
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 6084 (LA 96937)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4	.09	1	BC	Q4	0-8										
		.05			Q4	3-28									.15	
		.11			Q4/Q3	0-38									.28	
		.08			Q4	0-6									.14	
		.06			Q3	28-42									?	
Total TU #1	*4*	*.39*	*1*												*.57*	*1.46*
2	4		2	BC/FCR /Stain	S	S		1	1		2					
		.22			Q4	0-7		2			2			?	?	
		.30			Q3	2-19									?	
Total TU #2	*4*	*.52*	*1*					*3*	*1*		*4*	*7.69*		*?*	*?*	
Total	*8*	*.91*	*2*					*3*	*1*		*4*	*4.40*			*?*	*?*
Surface Recovery								2			2					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

FB 6085 (LA 96938)

Eligibility Status:	Eligible
Radiocarbon Date:	1,820 ± 110 B.P. (35 B.C.- A.D. 440)
Elevation (meters above mean sea level):	1,237 (4,057 ft)
Size (square meters)	
Previously Recorded:	?
Current:	6,000
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.66
Artifact Density (n/m^3):	28.31
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	?
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	12.4
Extent of Erosion (%):	25
Extent of Modern Disturbance (%):	20

Site FB 6085 is located east of center in Patrol Base 8, in an area of low to medium-height coppice dunes in geomorphic surface Mapping Unit 2a (Monger 1993:36) (see Figure 96). Deflated interdunal areas range from narrow to broad and are generally characterized by sand accumulation with sparsely exposed caliche nodules. The vegetation contains broom snakeweed, sand sage, yucca, mesquite, and four-wing saltbush, but ground surface visibility (50 percent) is moderately good.

The site boundary is defined by chipped and ground stone, burned caliche, and fire-cracked rock (Figure 101). A single feature (F1) was observed on the surface which consisted of a charcoal stain with an associated fire-cracked rock and burned caliche scatter. The northwest site boundary is delineated by a disturbed/graded area adjacent to a dirt road. Two (4 m^2) test units and two backhoe trenches were excavated at FB 6085. A total of 48 artifacts was recovered, consisting of 46 chipped stones (44 debitage, one retouched flake, and one core) and one metate fragment.

TU #1 (1 x 4 m) was placed over a surface charcoal stain (F1) found in association with chipped stone, one ground stone, and scanty amounts of burned caliche and fire-cracked rock. An ashy/charcoal stain of a roughly circular plan was encountered immediately beneath the loose eolian deposits. Eight debitage and a metate fragment were recovered from the surface. Moderate quantities of burned small animal bones (n=90) and lithic debitage (n=31) were recovered from both the eolian overburden and the subsurface (Table 30). One-half of F1 was excavated down to its presumed base (Figure 102) where two additional features were encountered: an unburned pit (F2) and a probable hearth (F3) (Figure 103); no artifacts were recovered from these two features. Upon excavation, the stain was inferred to represent the remains of a probable brush shelter with an internal hearth. A radiocarbon sample collected from this feature was dated to 1,820 ± 110 B.P. (35 B.C.-A.D. 440) (Appendix B). This date range corresponds to the Late Archaic-Early Formative temporal periods. Excavation of the unit was terminated at 23 cm below surface. Flotation samples from TU #1 revealed ten unidentifiable shell fragments, in addition to purslane and charred dropseed remains (Appendix J).

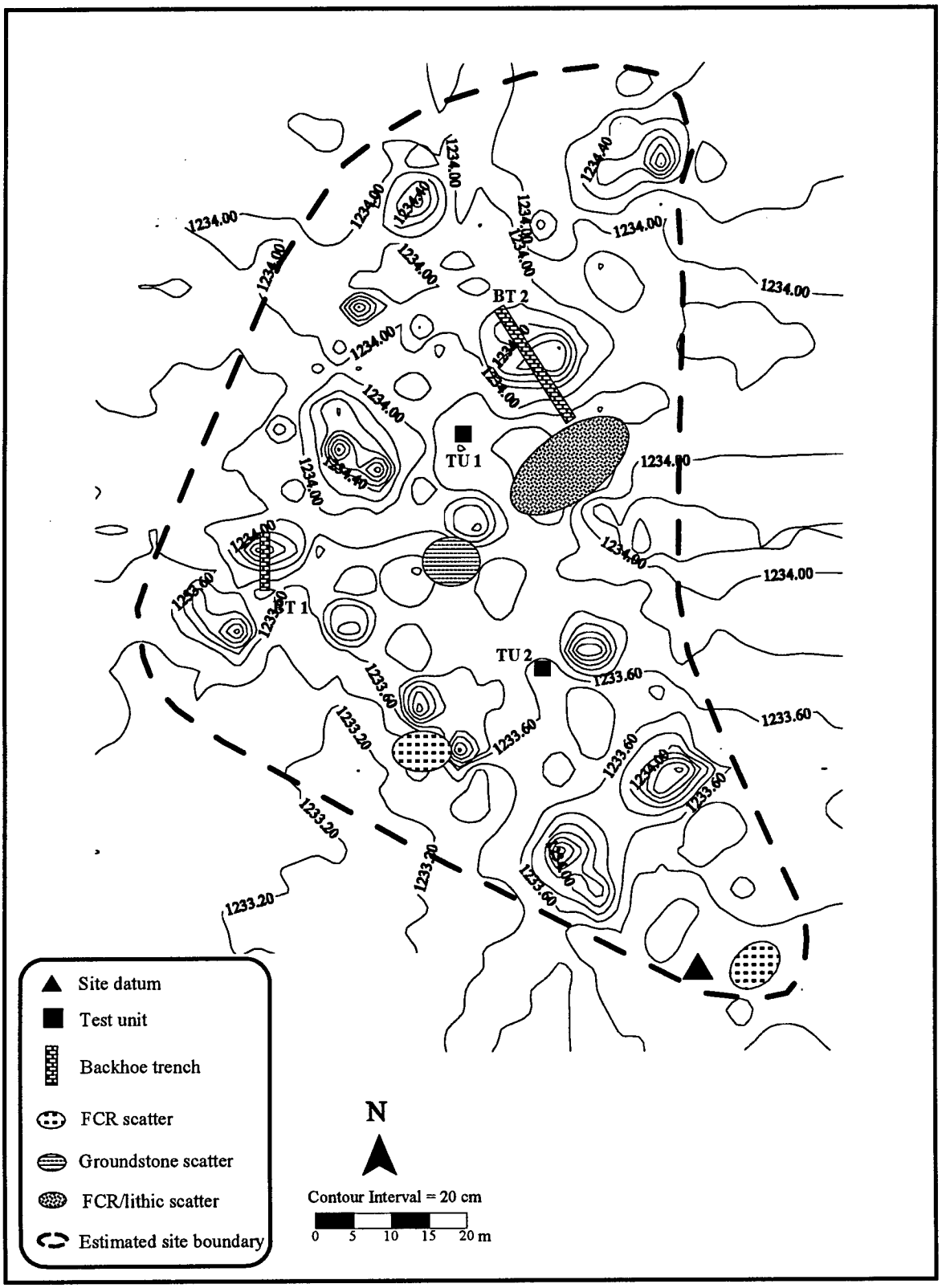


Figure 101. Contour map of site FB 6085.

Table 30
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 6085 (LA 96938)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone/ Shell	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4		1	BC/FCR/ Stain	S	S		8	1		9			?	?	
		.08			Q4	0-5		28			28		9/0	?	?	
		.30			Q4/Q3	0-23		3			3		64/10	?	?	
			2	Brush shelter (?)	Q3	2-20							14/0	?	?	
			3	Stain	Q3	9-15							3/0	?	?	
Total TU #1	*4*	*.38*	*3*					*39*	*1*		*40*	*107.89*	*90/10*	*?*	*?*	*?*
2	4	.15			Q4	0-9										
		.23			Q4	1-19		2			2					
		.40			Q4/Q3	1-29		5			5					
		.50			Q3	10-49										
Total TU #2	*4*	*1.28*						*7*			*7*	*5.47*				
Total	*8*	*1.66*	*3*					*46*	*1*		*47*	*28.31*	*90/10*			

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

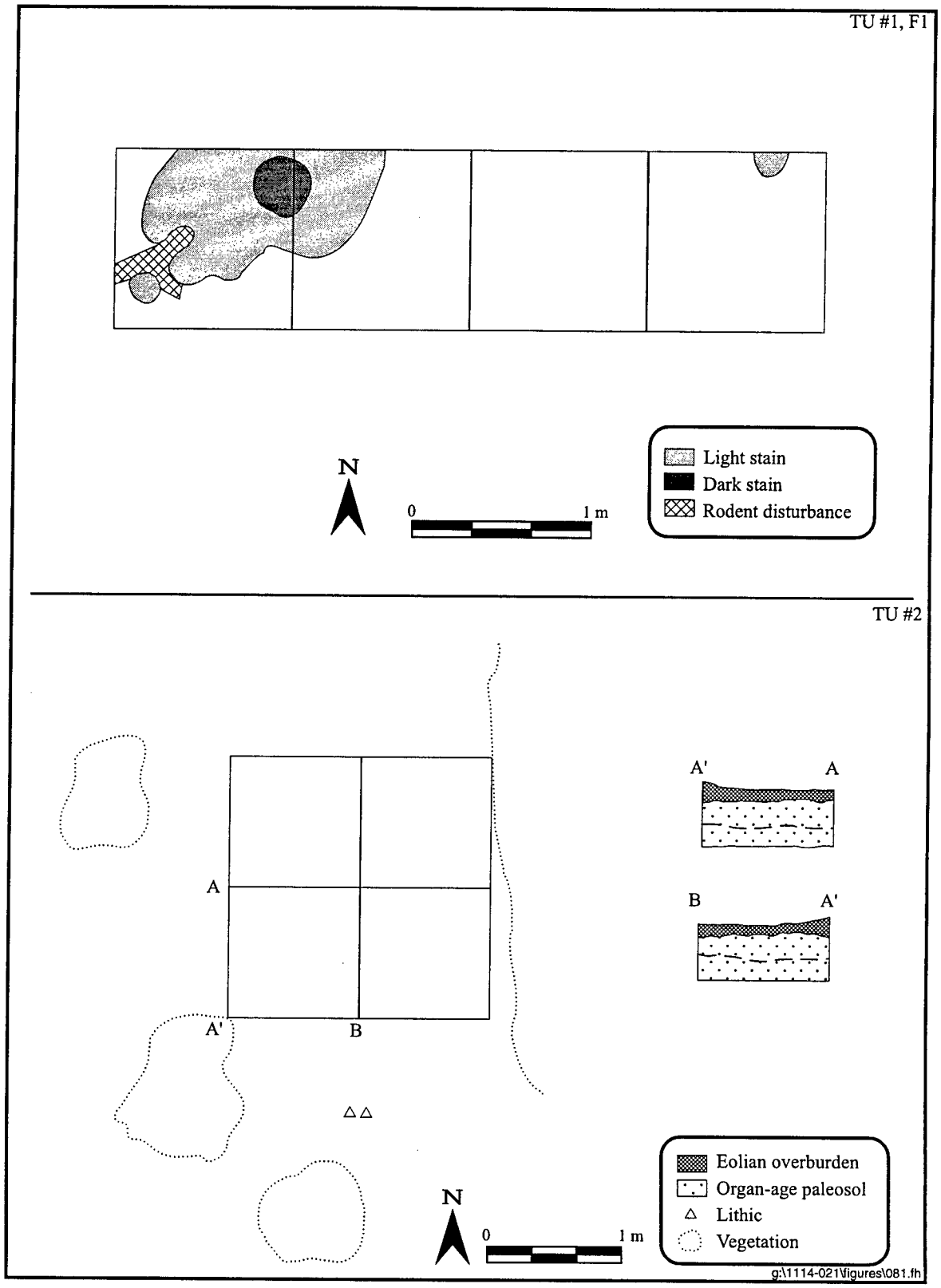


Figure 102. Plan view of TU #1, F1 (base of level 1); plan view and profile of TU #2, site FB 6085.

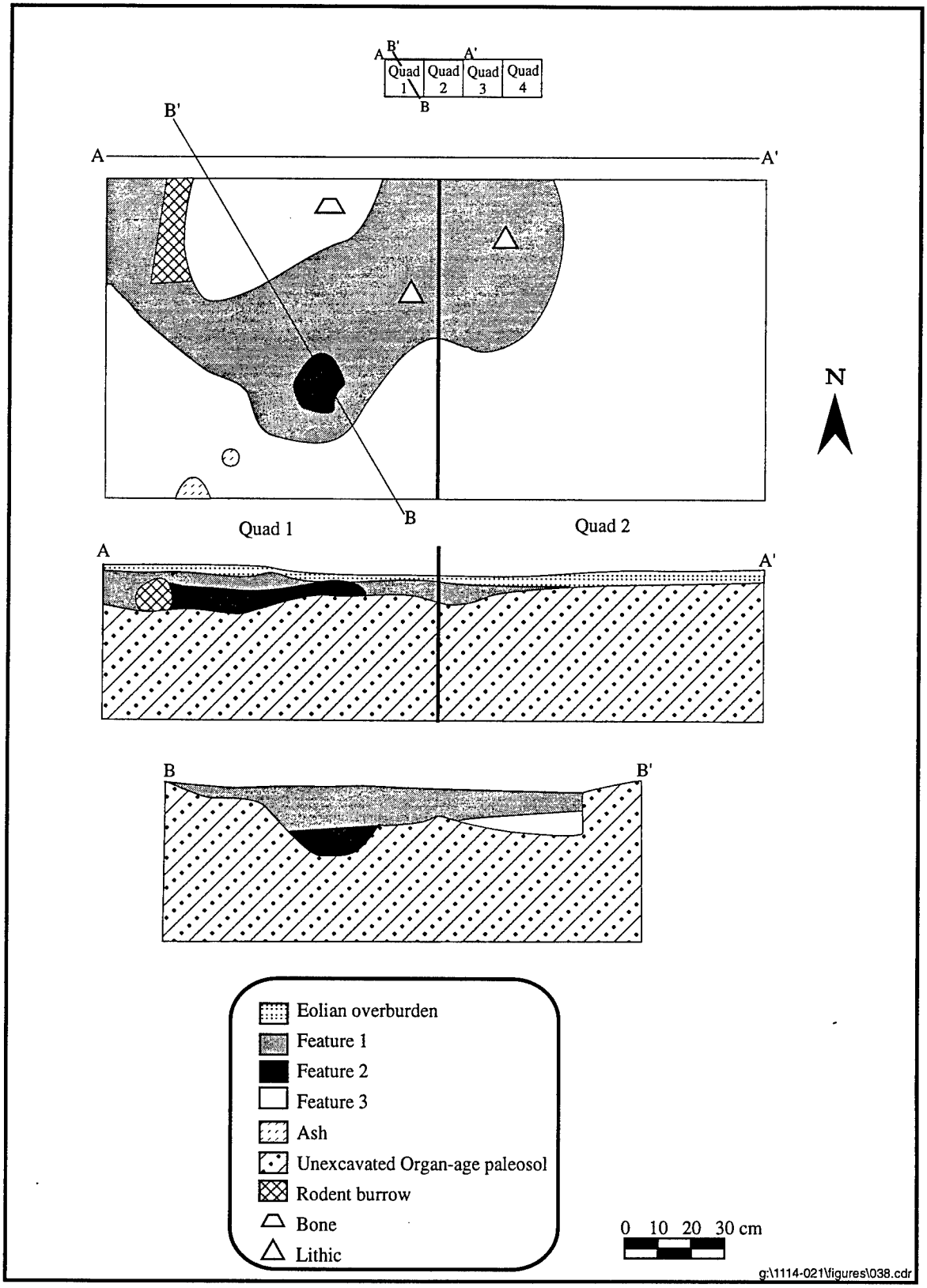


Figure 103. Post-excavation plan view and profiles of TU #1, F1, site FB 6085.

TU #2 (2-x-2 m) was placed in an area of built-up sand on a dune flank that appeared to have potential for buried soils (see Figure 101). Five lithic debitage, a core, and a retouched flake were recovered from both the eolian overburden and the subsurface between 1-29 cm below surface (see Table 30). Excavation was terminated at 49 cm below surface and an auger core taken between 49-114 cm below surface (see Figure 102).

Two backhoe trenches, one positioned on the western edge of the site (BT 1) and the other north of a fire-cracked rock and lithic scatter northeast of TU #1 (BT 2), exposed no cultural deposits (see Figure 101).

Although site FB 6085 has been impacted by erosion, deflation, and military tracked and wheeled vehicles, approximately 50 percent is still intact. On the basis of the existing surface artifact scatter (chipped and ground stone), the discovery of intact subsurface cultural deposits (including faunal remains), and the presence of a probable prehistoric brush structure with an associated radiocarbon date of 1,820 $\pm$ 110 B.P., site FB 6085 is deemed eligible for NRHP inclusion. To mitigate the adverse impacts of planned land use on the cultural resources, all three tested features and any additional features found on the site should be block-excavated and the distribution of all surface artifacts mapped to maximize data recovery from the site.

FB 6086 (LA 96939)

Eligibility Status:	Eligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,239 (4,063 ft)
Size (square meters)	
Previously Recorded:	500
Current:	8,400
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.27
Artifact Density (n/m^3):	0.79
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.56
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	10.1
Extent of Erosion (%):	25
Extent of Modern Disturbance (%):	40

Site FB 6080 is located just southeast of center in Patrol Base 8 (see Figure 96). Although the general area is included in geomorphic surface Mapping Unit 2a (Monger 1993:102), the site area is characterized by Mapping Unit 2b/1b erosional conditions. Site FB 6086 is in low to medium-height coppice dunes where deflated interdunal areas range from narrow to broad, and generally show evidence of scouring down into the subsurface deposits. Mesquite, sand sage, snakeweed, yucca, four-wing saltbush, and various forbes constitute the vegetation, which allows approximately 60 percent ground surface visibility.

The site boundary was delineated on the basis of distribution of features and artifacts. The surface artifact assemblage consists of a very low density scatter of chipped stone, fire-cracked rocks, burned caliche, and

occasional ground stone. Chipped stones included two Archaic-style projectile points, a San Pedro-like and a Todsen/Chiricahua, both of which were collected from the surface of the site (Figure 104). The western site boundary is somewhat artificial in that an approximate 40-m wide strip appears to have been mixed/graded by mechanical means. The site may be connected with FB 6089 to the west, but due to the ground disturbance, the relationship between the two sites is difficult to ascertain. Two backhoe trenches and two 2-x-2-m test units were excavated at FB 6086 (Figure 105).



a b

Figure 104. Artifacts recovered from site FB 6086: (a) San Pedro-like projectile point; (b) Todsen/Chiricahua projectile point. (Scale 1:1)

TU #1, placed in the area of a burned caliche/fire-cracked rock feature (F1; see Figure 105), was excavated to a maximum depth of 39 cm below surface (Figure 106). One mano fragment was recovered from the surface, while undesignated amounts of fire-cracked rock and burned caliche were recovered from the eolian overburden. Burned caliche, faunal remains (n=8), and fire-cracked rock were recovered from the subsurface (Table 31); however, sediments recovered from an auger core which ranged from 39 to 114 cm below surface failed to yield additional cultural material. Faunal analysis revealed the bones to be from a calf and represent modern intrusions (Appendix I).

TU #2 was excavated on another burned caliche/fire-cracked rock feature (F2) in the southeast portion of the site (see Figure 105). Small quantities of fire-cracked rock and burned caliche constitute all the cultural material recovered from the excavation (see Table 31). Excavation was terminated at 18 cm below surface.

Two backhoe trenches were excavated at site FB 6086; BT 1 is located in the northern portion of the site near TU #1 and BT 2 is in the southwest portion of the site near TU #2. Animal bones which have been tentatively attributed to a bovine were recovered from the east wall of BT 1, excavated at the base of a dune.

Site FB 6086 has been impacted by tracked and wheeled vehicles, but approximately 40 percent is still intact. The presence of faunal remains and the variety of artifacts found on the surface, including time-diagnostic projectile points, indicate that the research potential is not exhausted and the site is recommended for inclusion in the NRHP under Criterion D. Adverse effects from current and projected use of the Patrol Base should be mitigated through data recovery. A 10-x-10-m block should be excavated around TU #1 and the remainder of the TU #2 feature should be excavated. Faunal material remaining under the dune at the location of BT 1 should be exposed and recovered by a combination of mechanical and hand excavation. Since the site area has expanded significantly, additional unexposed features may still exist. If such features are identified during Phase III work, they should be excavated and the data recovered.

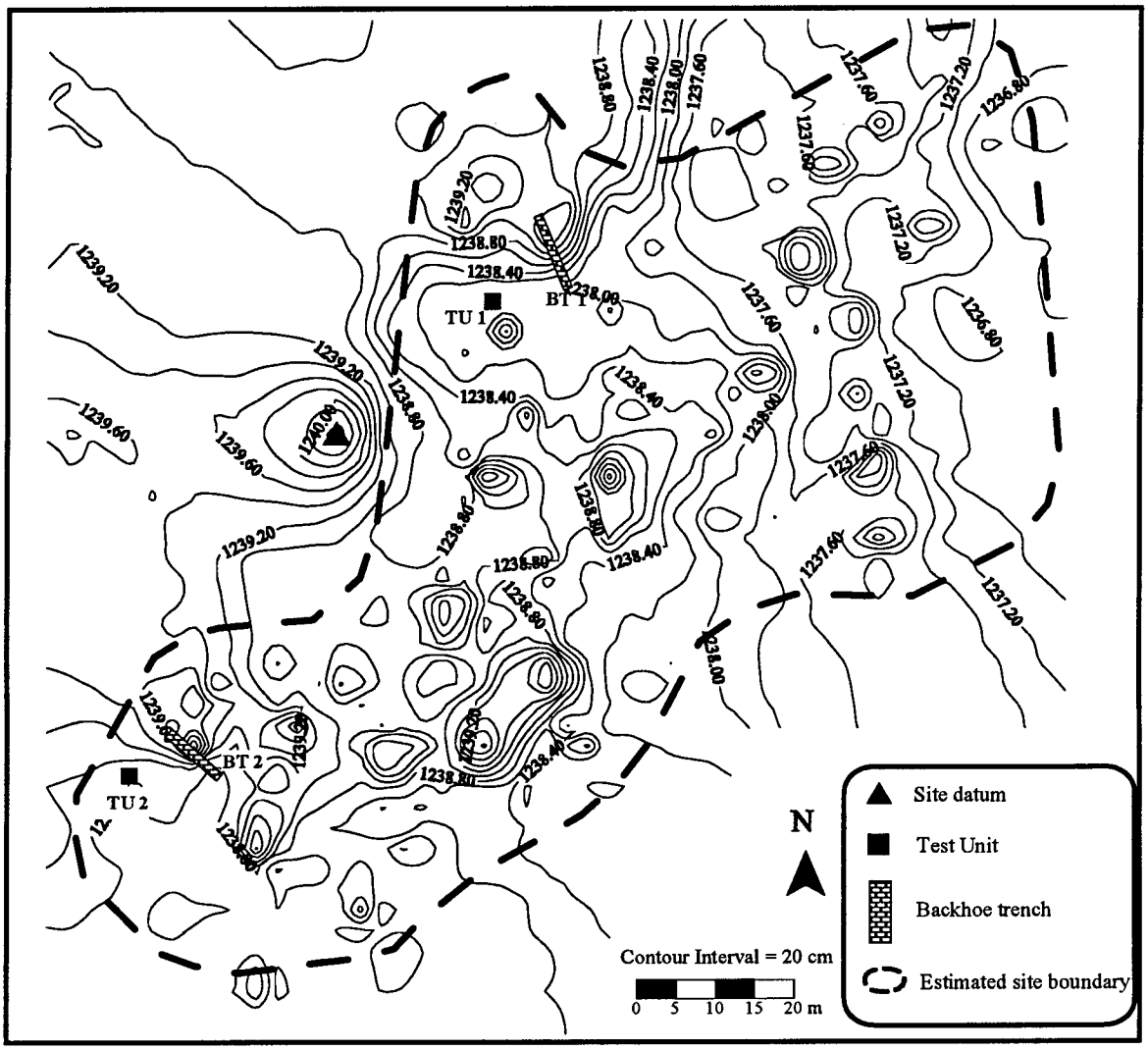


Figure 105. Contour map of site FB 6086.

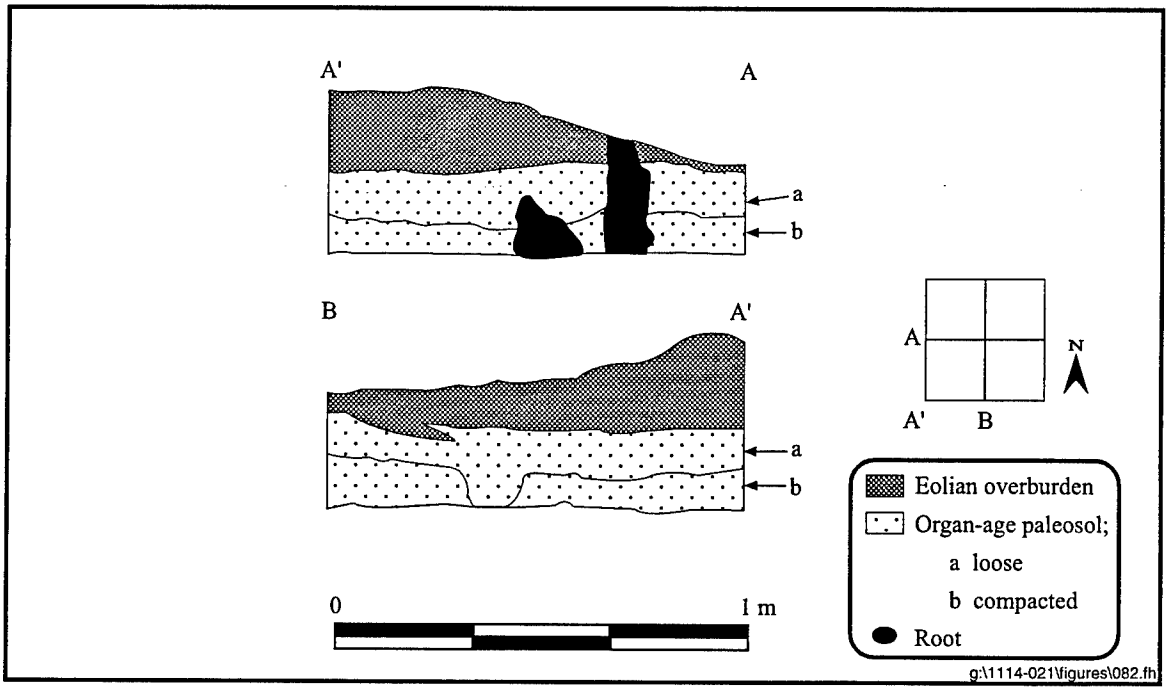


Figure 106. Profile of TU #1, site FB 6086.

FB 6089 (LA 96942)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,240 (4,067 ft)
Size (square meters)	
Previously Recorded:	350
Current:	13,600
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	.93
Artifact Density (n/m^3):	4.30
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	3.19
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	10
Extent of Erosion (%):	30
Extent of Modern Disturbance (%):	40

Table 31
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 6086 (LA 96939)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone**	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4		1	BC/ FCR	S	S			1		1					
		.18			Q4	0-9								?	?	
		.09			Q4	1-19							8	.03	.30	
		.33			Q3	2-29									.33	
		.20			Q3	4-39										
Total TU #1	*4*	*.80*	*1*						*1*		*1*	*1.25*	*8*	*.03*	*.63*	*.83*
2	4	.13	2	BC/ FCR	Q4	0-5								?	?	
		.34			Q3	1-18									.05	
Total TU #2	*4*	*.47*	*1*											*?*	*.05*	*.11*
Total	*8*	*1.27*	*2*						*1*		*1*	*0.79*	*8*	*.03*	*.68*	*.56*
Surface Recovery								2			2					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

** Additional animal bones (n=5) were recovered from BT 1.

Site FB 6089 is located in the center of Patrol Base 8 (see Figure 96). The general area is in geomorphic surface Mapping Unit 2a (Monger 1993:102), but the site has Mapping Unit 1b characteristics. Coppice dunes range from low to medium heights and interdunal deflated areas are relatively broad and flat. Ubiquitous caliche nodules occur in deflated interdunal areas. Mesquite, broom snakeweed, yucca, sand sage, four-wing saltbush, and various forbes constitute the plant community, which has reduced ground surface visibility to approximately 50 percent.

The site boundary is defined by a low density scatter of chipped and ground stone artifacts with a low to moderate density scatter of fire-cracked rocks and burned caliche. A chalcedony San Jose projectile point (Middle Archaic; Figure 107) was recovered from the surface of TU #1. FB 6089 is possibly connected to FB 6086, located approximately 45 m to the east (see Figure 105), where the boundary is somewhat arbitrarily established within an area that has been mechanically disturbed previously. Recent military trash is present on the site surface. Two features were evident on the surface, both of which were tested by test unit excavations. A total of two test units and two backhoe trenches were excavated at site FB 6089 (Figure 108).



Figure 107. Chalcedony San Jose projectile point recovered from site FB 6089. (Scale 1:1)

TU #1, a 2-x-2-m block, was placed in the northwest portion of the site over a burned caliche, fire-cracked rock, and charcoal stain feature (F1; see Figure 108). Moderate quantities of fire-cracked rock (.31 kg) and burned caliche (1.63 kg) were recovered from both the eolian overburden and the subsurface (Figure 109; Table 32). Scanty amounts of burned caliche (.29 kg) and fire-cracked rocks (.74 kg) were recovered from the subsurface. Aside from the San Jose projectile point recovered from the surface of TU #1, two flakes were recovered from the subsurface between 1-23 cm below surface. The flotation sample collected from F1 revealed plant remains identified as purslane, with smaller quantities of the sunflower family and spurge; none of these remains showed evidence of burning (Appendix J). Excavation was terminated at 33 cm below surface.

TU #2, a 2-x-2-m block, was placed in the eastern portion of the site over a charcoal stain (see Figure 109). A single flake was recovered from the surface of TU #2, where a thin eolian layer overlaid a deflated hearth (see Figure 109). The base of the feature was reached at 21 cm below surface. A flotation sample was collected from the feature fill; the only plant remains identified in the sample was that of a small quantity of unburned purslane (Appendix J). Two trenches dug on the site periphery exposed no cultural deposits.

The artifact scatter representing site FB 6089 is extremely sparse and exhibits no areas of artifact concentration. Few artifacts were recovered in the test excavations and no intact buried cultural deposits were identified; trenching revealed no cultural material. Based on the low density of artifacts and absence of intact buried deposits, it is recommended that site FB 6089 be considered ineligible for inclusion in the NRHP. The projected use of the Patrol Base will not adversely affect the site; no further work is recommended.

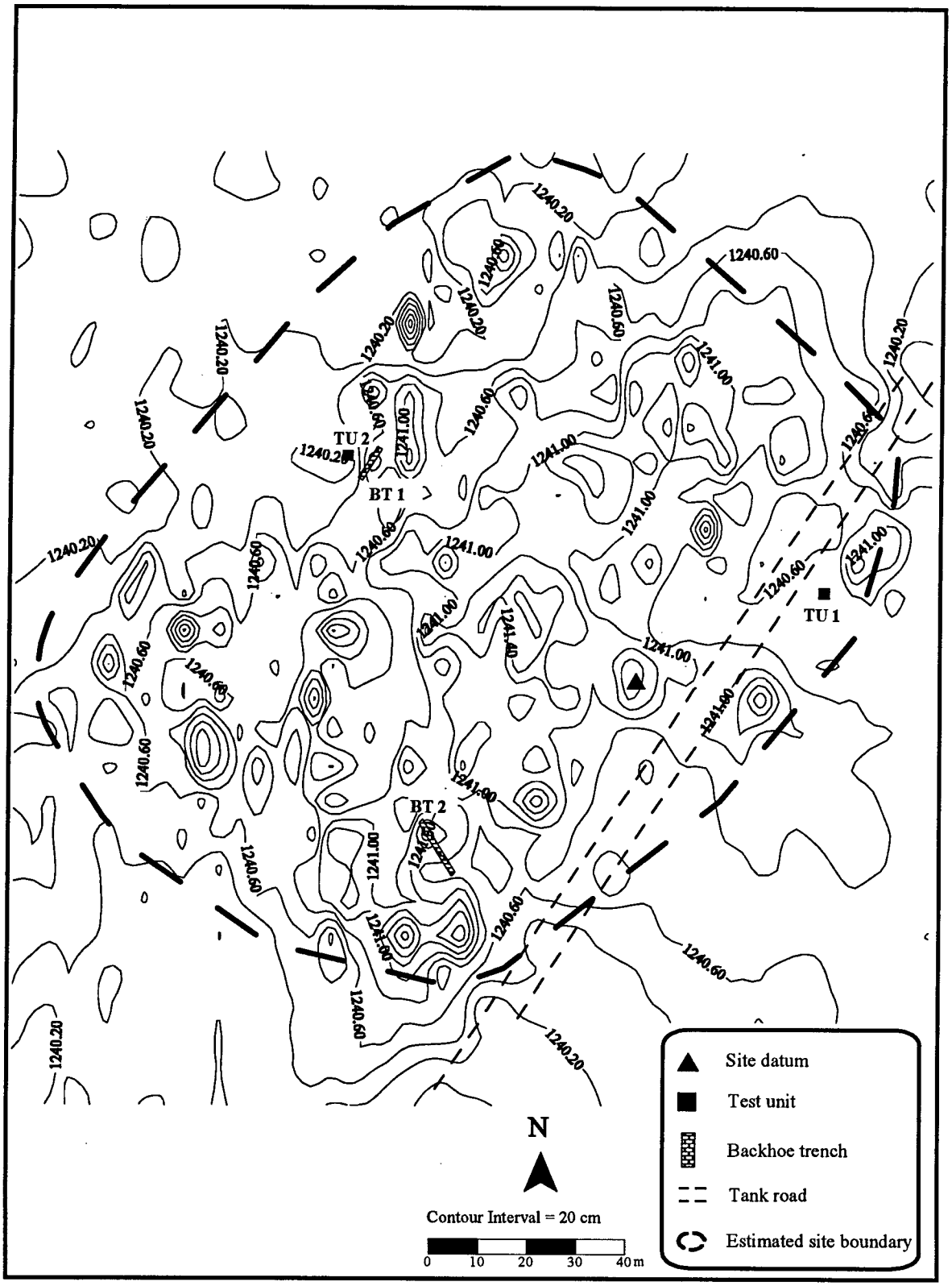


Figure 108. Contour map of site FB 6089.

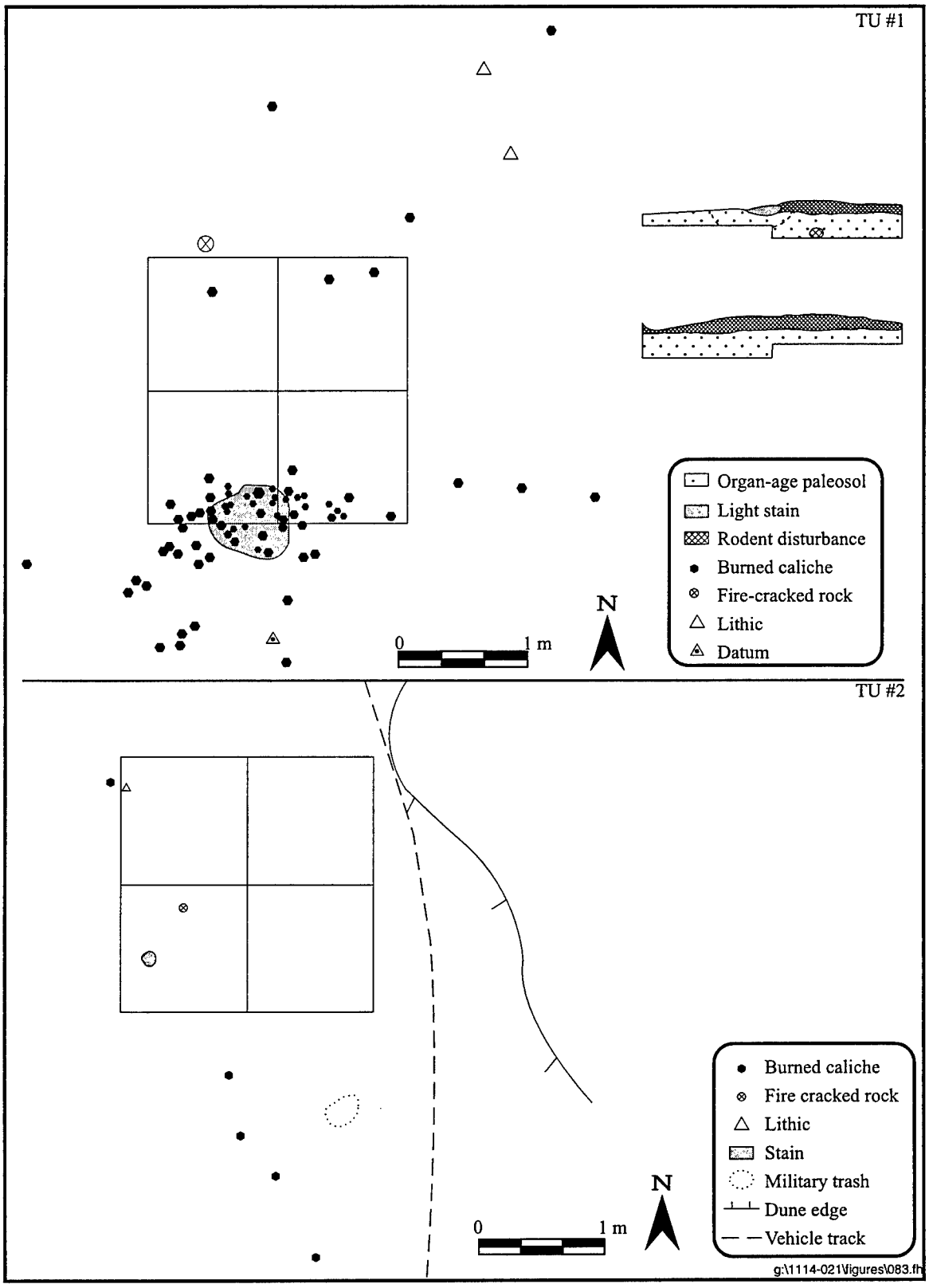


Figure 109. Plan view and profile of TU #1 and plan view of TU #2, site FB 6089.

Table 32
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 6089 (LA 96942)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4		1	BC/FCR /Stain	S	S		1			1					
		.17			Q4/Q3	0-12								.31	1.63	
		.39			Q3	1-23		2			2			.74	.29	
		.20			Q3	10-33										
Total TU #1	*4*	*.76*	*1*					*3*			*3*	*3.95*		*1.05*	*1.92*	*3.91*
2	4		2	Stain	S	S		1			1					
		.09			Q4/Q3	0-7										
		.08			Q4/Q3	1-21										
Total TU #2	*4*	*.17*	*1*					*1*			*1*	*5.88*				
Total	*8*	*.93*	*2*					*4*			*4*	*4.30*		*1.05*	*1.92*	*3.19*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

FB 13139 (LA 106700)

Eligibility Status:	Unknown
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,240 (4,067 ft)
Size (square meters)	
Previously Recorded:	9
Current:	3,200
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	1.57
Artifact Density (n/m^3):	1.91
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	?
Backhoe Trenches	
Number of Trenches:	2
Mean Length of Trench (meters):	8.7
Extent of Erosion (%):	15
Extent of Modern Disturbance (%):	20

Site FB 13139 is located southwest of center in Patrol Base 8 (see Figure 96). The general area is in geomorphic surface Mapping Unit 2a (Monger 1993:102), but site FB 13139 occupies a Mapping Unit 1b surface. Caliche nodules occur in deflated interdunal areas. The vegetation, consisting of mesquite, snakeweed, sand sage, four-wing saltbush, and various forbes, allows 65 percent ground surface visibility.

The site boundary was defined by fire-cracked rock, burned caliche, and a chipped and ground stone scatter. A single feature was observed on the surface and was tested. A total of two backhoe trenches and two 2-x-2 m test units was excavated (Figure 110).

TU #1, a 1-x-4-m block, was excavated in an area of fire-cracked rock, burned caliche, and charcoal stain (F1; see Figure 110). An additional feature was identified immediately beneath the eolian deposits (F2; Figure 111). The features appear to be a hearth and a small pit in direct association. Three artifacts (a flake, a core, and a metate fragment), burned caliche, and fire-cracked rocks were recovered from the eolian overburden (Table 33). Two flotation samples were collected from the fill of F1; analysis revealed remains of amaranthus, spectacle pod, spurge, purslane, mesquite, and charred remains of dropseed grass (Appendix J). Excavation of TU #1 was terminated at 79 cm below surface, and an auger core extracted between 79-95 cm below surface. The auger core was sterile of cultural deposits.

TU #2, a 1-x-4-m block, is in an interdunal saddle where soil deposits appear to be relatively well-preserved. No cultural materials were recovered. The test unit was excavated to 42 cm below surface, but was sterile of any cultural material. The two backhoe trenches did not yield any cultural deposits.

Site FB 13139 has been a focus for military activities in the past as evidenced by military trash scattered over the site area. The eligibility of site FB 13139 for inclusion in the NRHP remains unknown, largely due to the fact that it has significantly expanded in size. In addition, the lack of caliche lag in most of the interdunal depressions and saddles appears to be a good indication of intact or minimally disturbed subsurface deposits. Additional testing is recommended.

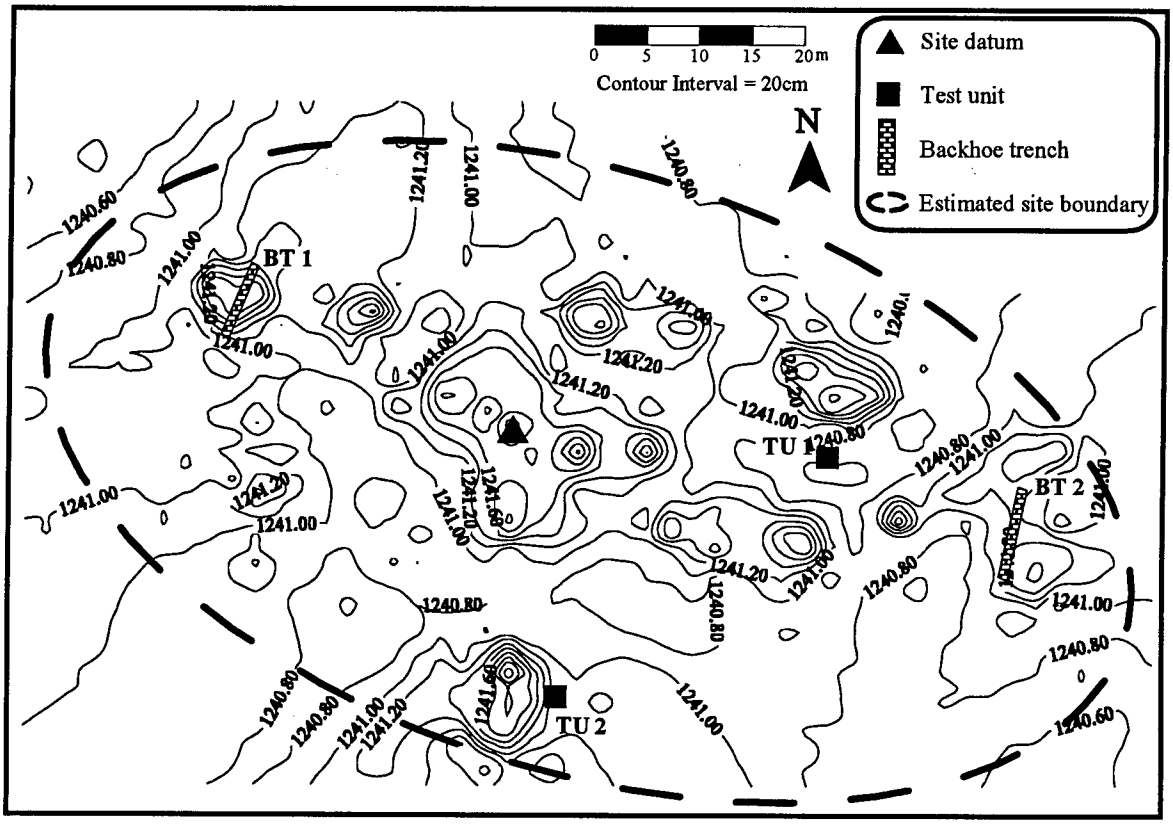


Figure 110. Contour map of site FB 13139.

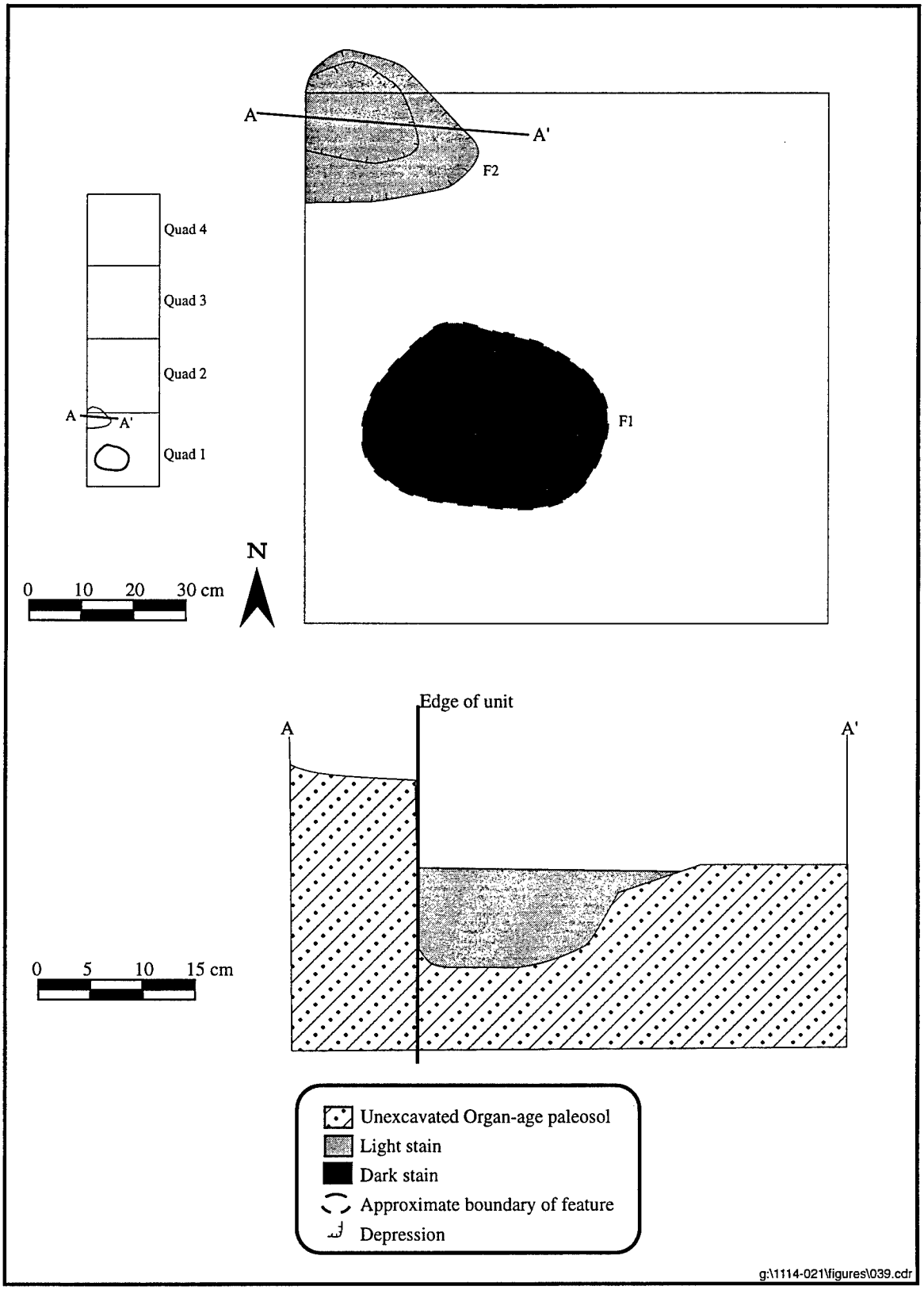


Figure 111. Post-excavation plan view of TU #1, F1 and F2, and profile of F2, site FB 13139.

Table 33
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13139 (LA 106700)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti /m^3	Bone	FCR (kg)	BC (kg)	FCR-BC /m^3
1	4		1	BC/FCR /Stain	S	S			1		1					
		.13			Q4	0-26		2			2			?		?
		.28			Q3	0-49										
		.30			Q3	0-79										
			2	Stain	Q3	8-17										
Total TU #1	*4*	*.71*	*2*					*2*	*1*		*3*	*4.23*		*?*		*?*
2	4	.86			Q4/Q3	0-42										
Total	*8*	*1.57*	*2*					*1*	*2*		*3*	*1.91*		*?*		*?*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

FB 13140 (LA 106701)

Eligibility Status:	Unknown
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,242 (4,075 ft)
Size (square meters)	
Previously Recorded:	~8,100
Current:	15,438
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	+
Number of (2 x 2 m) Test Units	3
Number of (1 x 2 m) Test Units	2
Total Area Tested (m^2):	16
Total Volume Excavated (m^3):	3.29
Artifact Density (n/m^3):	532.82
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.99
Backhoe Trenches	
Number of Trenches:	4
Mean Length of Trench (meters):	10
Extent of Erosion (%):	50
Extent of Modern Disturbance (%):	60

Site FB 13140 consists of both prehistoric and historic debris and, although it straddles the state boundary/road between Texas and New Mexico, the bulk of the site area lies to the north of the state line (see Figure 96). The site is situated in a five-way road intersection approximately 4.5 km southwest of site FBH 54 (another historic trash scatter--not excavated during this project) and approximately 4 km south of the Newman ranch (FBH 56) covering a total area of 10,845 m^2. It occupies a Mapping Unit 2a geomorphic surface in desert scrub dominated by mesquite, snakeweed, four-wing saltbush, and yucca. Ground surface visibility is approximately 60 percent. Military activities have accelerated the broadening of the deflated interdunal areas. The area around the site is in active use by the military as evidenced by recent tank tracks.

FB 13140 (Figure 112) is a multicomponent site containing both prehistoric and historic materials. A ground stone concentration on the north side of the site and a low density scatter of prehistoric ceramics and chipped stone comprise the prehistoric component. Historic artifacts (glass, metal, ceramics) occur in two concentrations (one northern and one southern) as well as scattered throughout the site. The general site area is defined largely by the distribution of historic artifacts. Five test units and four backhoe trenches were excavated at site FB 13140.

TU #1 (2 x 2 m) was excavated on the south-central part of the site over a historic artifact scatter (see Figure 112). All artifacts (n=93) date to the historic period and the majority came from subsurface deposits (Table 34). Excavation was terminated at 53 cm below surface (Figure 113).

TU #2 (2 x 2 m) was excavated in an area containing historic/military artifacts and a disarticulated fire-cracked rock concentration (see Figure 112). Aside from 1.3 kg of fire-cracked rock, only historic artifacts was found in the eolian deposit; both historic and prehistoric artifacts were recovered in the subsurface deposits. Two prehistoric ceramic sherds, an indeterminate ground stone artifact, and 1.93 kg of fire-cracked rocks were recovered from the subsurface in association with bones (n=39) and historic artifacts (n=534; see Table 34); the faunal remains were interpreted as historic debris (Appendix I). At 20 cm below surface,

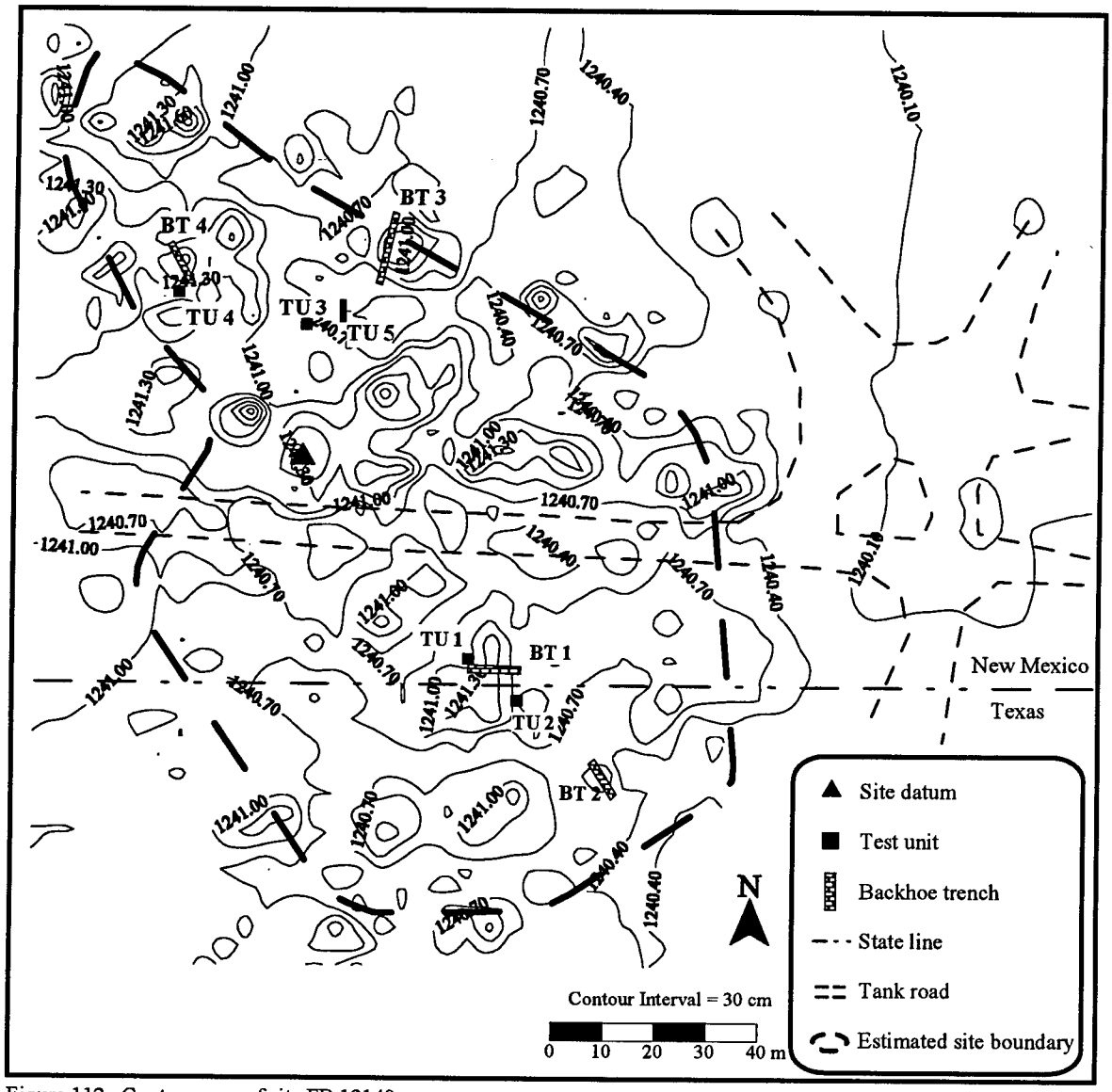


Figure 112. Contour map of site FB 13140.

a thin, 2-cm redeposited caliche layer was encountered. The charcoal and artifact debris above the caliche layer appear to constitute a historic trash dump subsequently redeposited on the mechanically created caliche layer. Deposits between the caliche layer and the termination of the excavation at 46 cm bs yielded no additional material.

TU #3 (1-x-2 m) was placed in an area where two manos (one fragmented) and a pestle were found together, partially exposed in the northwestern area of the site (see Figure 112). Removal of the eolian overburden revealed an apparently unburned pit outline. The manos and pestle were found resting in a subsurface pit (see Figure 113). The ground stone probably represents a disposal pile, and the pit may have been the mortar

Table 34
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 13140 (LA 106701)

TU#	Area m^2	m^3 Exca	Strat Zone*	cm bs	Glass			can met		nail	cartridg	oth met		cer	misc	prehst art	bone	TTL Arti	Art /m3
					botl	wind	othr	dia	n/dia			dia	n/dia						
1	4	.21	Q4	0-8															
		.25	Q4	4-18	7				1									8	
		.34	Q4/Q3	7-26	15			1	5				1	1				23	
		.20	Q3	10-33	29	1		2		6				3	1		8	42	
		.10	Q3	20-43	9				5	2				1			9	17	
		.10	Q3	30-53	1					1				1				3	
Total TU #1	*4*	*1.20*			*61*	*1*		*3*	*11*	*9*			*1*	*6*	*1*		*17*	*93*	*77.5*
2	4	.18	Q4	0-9	45	8	1		86	16	2	4	5	6	1			174	
		.60	Q3	3-45	46	7		1	202	71	5	14	4	1	5	3	39	359	
Total TU #2	*4*	*.78*			*91*	*15*	*1*	*1*	*288*	*87*	*7*	*18*	*9*	*7*	*6*	*3***	*39*	*533*	*683.33*
3	2	.07	Q4	0-7															
		.02	Q3	5-11												3		3	
Total TU #3	*2*	*.09*														*3*		*3*	*33.33*
4	4	.12	0	0-5	54			34	450	3		1	1					543	
		.26	0	1-14	38			6	357	3		2			5	1	3	412	
		.15	0	5-19	8	1		3	99	4		1					10	116	
		.25	1	7-24	5	2			14	5	1	1					4	28	
		.10	2	15-32												1		1	
		.20	2	25-52															
Total TU #4	*4*	*1.08*			*105*	*3*		*43*	*920*	*15*	*1*	*5*	*1*		*5*	*2*	*17*	*1100*	*1018.52*
5	2	.06	0	0-6					2									2	
		.08	2	1-14											21	1		22	
Total TU #5	*2*	*.14*							*2*						*21*	*1*		*24*	*171.43*
Total	*16*	*3.29*			*257*	*19*	*1*	*47*	*1221*	*111*	*8*	*23*	*11*	*13*	*33*	*9*	*73*	*1753*	*532.83*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S=Surface; Q4=(Quaternary 4) Historic eolian overburden; Q3=(Quaternary 3) Organ-age paleosol; Q2=(Quaternary 2) Isaacks' Ranch-age paleosol; Q1=(Quaternary 1) La Mesa indurated caliche
** TU 2 = 3.23 kg of FCR in addition to prehistoric artifacts

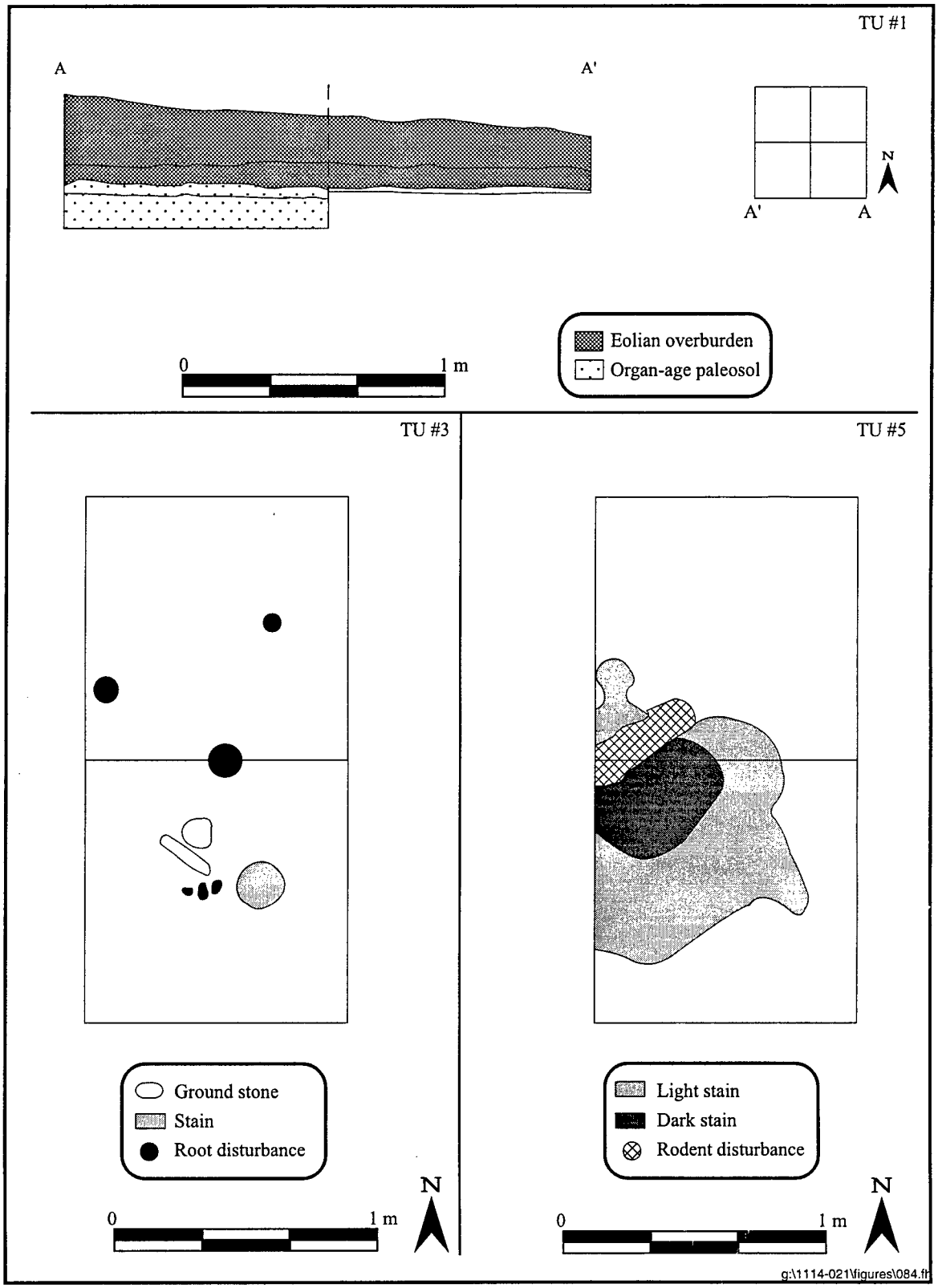


Figure 113. Profile of TU #1 and plan views of TU #3 and TU #5, site FB 13140.

rest. A flotation sample was collected and revealed small quantities of sunflower family and purslane plant remains, all unburned (Appendix J). Excavation terminated at 11 cm below surface.

TU #4 (2-x-2 m) was excavated in a historic dump in the northwest corner of the site west of TU #3 (see Figure 112). Most of the historic artifacts (n=1100) and 17 bone fragments were recovered from the eolian overburden. Four pieces of bone, 28 historic artifacts, and two lithic debitage were recovered from questionable subsurface context (compacted sand?). Excavation was taken to 52 cm below surface.

TU #5, a 1-x-2-m block excavated over a charcoal stain (F3) in the northern area of the site (see Figure 112), produced 23 historic artifacts and one chert flake from the subsurface (see Figure 113 and Table 34). Two flotation samples were collected from F3 and revealed amaranthus, sunflower family, mesquite plant remains, in addition to an unidentified seed (Appendix J). Excavation was terminated at 14 cm below surface.

A backhoe trench (BT 1) cut through a dune separating TU #1 and TU #2 (Figure 114), exposed a partial cranium and jaw fragments of a small carnivore, possibly coyote (Appendix I). The bones were recovered from under the base of the dune. A flotation sample collected from the floor of BT1 revealed the remains of pitaya cactus and a charred amaranthus seed (Appendix J).

Based on the recovered historic assemblage on FB 13140 the data strongly suggest the site may be the remnant of a structure. The majority of the assemblage (67 percent) consists of nondiagnostic can fragments. Primary domestic trash such as ceramics, cartridges, window glass, nails, and miscellaneous refuse, as well as glass bottles (Figure 115), an ink bottle, a button, and a ceramic doll's foot (Figure 116), account for 12 percent of the total assemblage. The historic component assemblage (n=1744) recovered from four 2-x-2 m areas at site FB 13140 consists of:

Bottle Glass (n=257)
- 77 clear body
- 1 panel bottle fragment
  " . . . ectoral" (medicine)
- 1 panel bottle fragment
  " . . . owder" (medicine)
- 1 clear neck (post-1903 medicine)
- 1 clear whole (pre-1903 medicine)
- 1 clear whole (post-1903 ink)
- 1 clear neck screwtop (juice?)
- 3 milk glass body (cosmetic?)
- 18 amber body (Vaseline)
- 20 amber body "Vaseline Cheesbrough New York" (4+ bottles)
- 5 amber neck screwtop (Vaseline)
- 8 amber base (Vaseline)
- 25 dk green body (champagne)
- 1 dk green neck (post-1903 champagne)
- 1 dk green base (champagne)
- 51 aqua body (medicine)
- 1 aqua base "W.F. % S. 4 MIL" (liquor?)
- 38 purple body (pre-1925)

Ceramics (n=13)
- 1 brown glazeware
- 2 ceramic unidentified
- 3 white glazeware plate
- 3 porcelain plate?
- 2 gold leaf plate
- 1 porcelain mug
- 1 doll foot

Metal Cans (n=47)
- 2 tobacco tin lids
- 1 square lid
- 6 solder seal lids
- 1 screwtop lid (brass?)
- 9 solder seal cans
- 1 paint can lid
- 27 crimped cans

Nondiagnostic Can Metal (n=1,221)

Nails (Length in inches; n=111)
- 18 unknown length

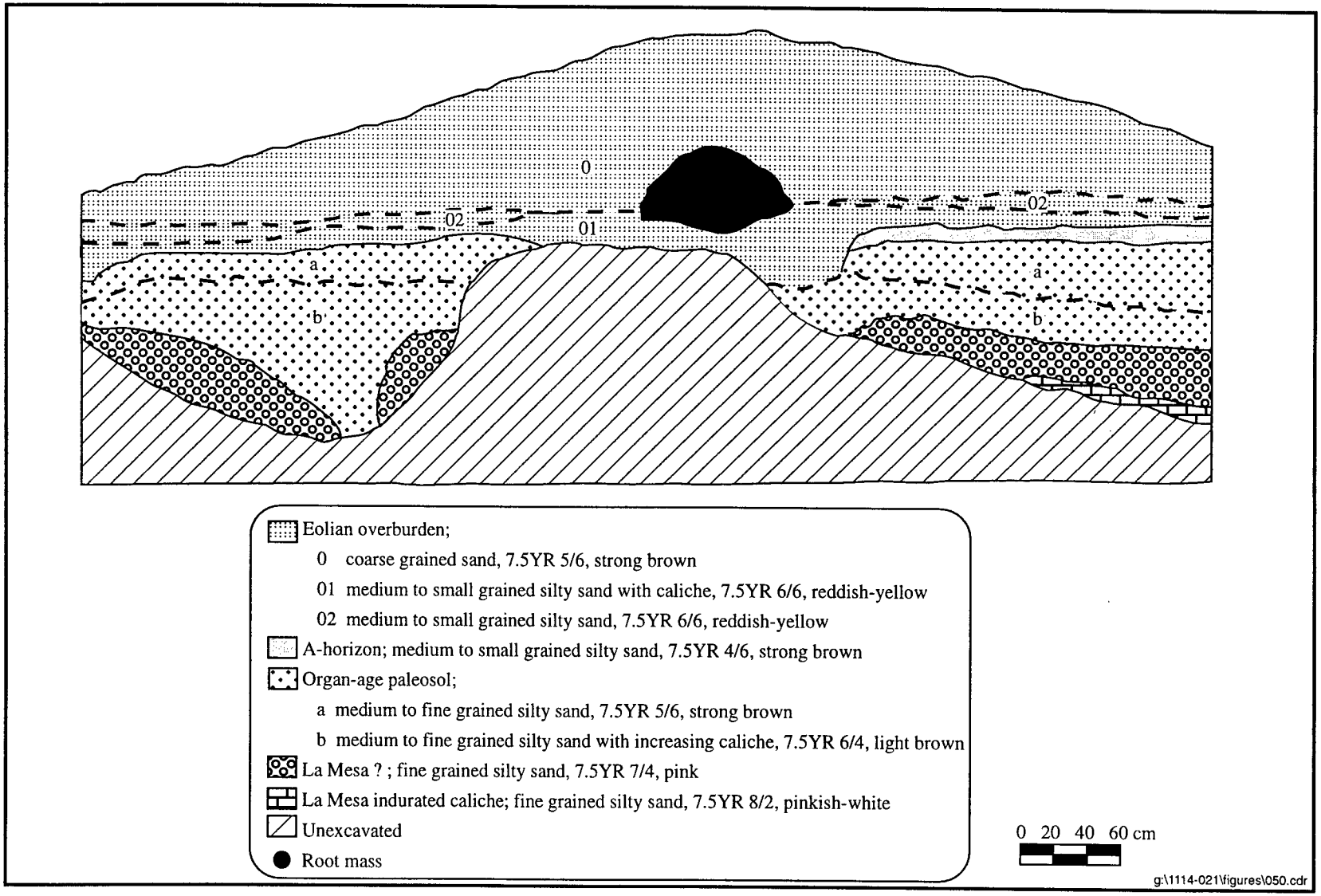


Figure 114. Backhoe Trench 1, profile of south wall, site FB 13140.

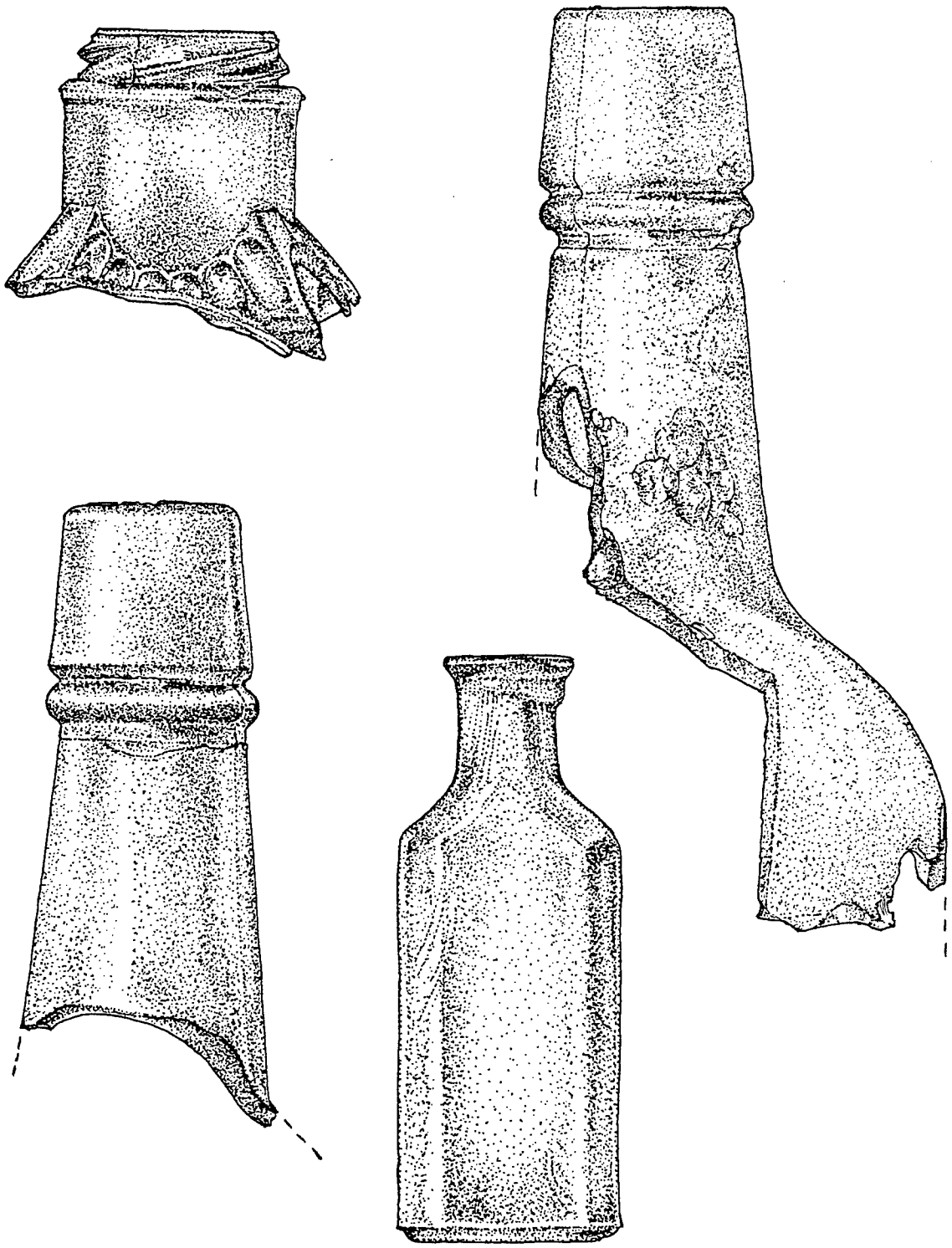


Figure 115. Historic artifacts recovered from FB 13140: glass bottles. (Scale 1:1)

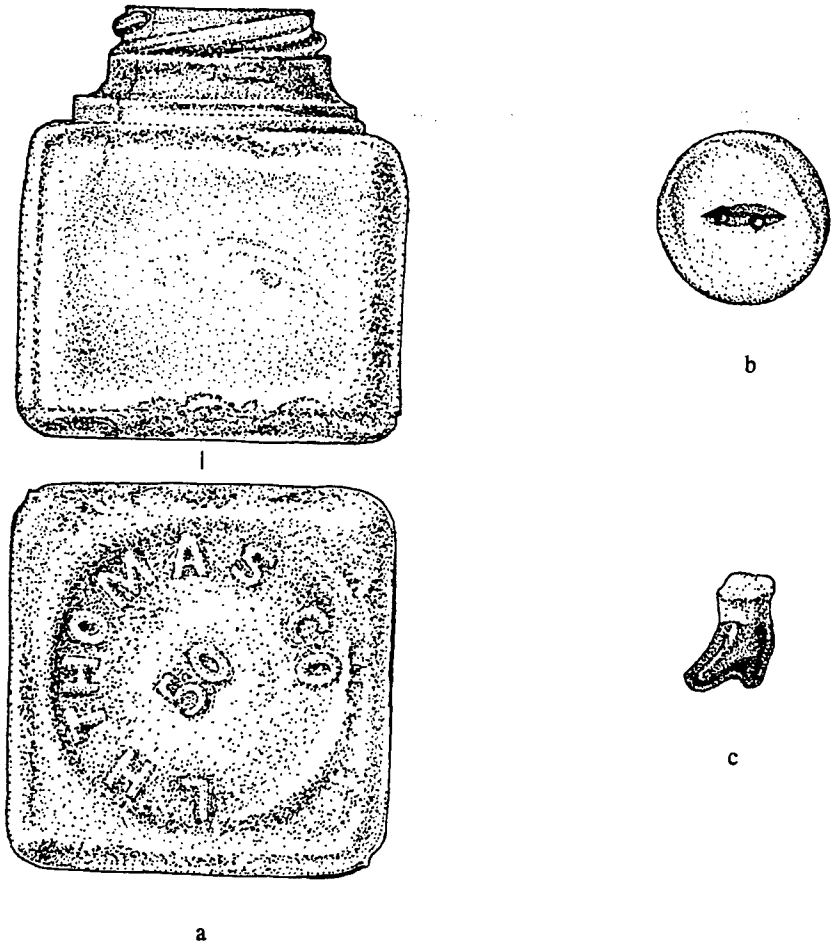


Figure 116. Historic artifacts recovered from FB 13140: (a) ink bottle; (b) shell button; (c) ceramic doll foot. (Scale 1:1)

(historic assemblage from FB 13140, continued)

Bottle Glass
- 2 purple necks (post-1903 liquor)

Window Glass
- 19 fragments

Other Glass
- 1 tumbler
- 8 wire nails (4.5)
- 2 square nails (1.5)

Nails (Length in inches)
- 19 fence nails
- 1 fence nail (.8)
- 27 wire nails (1.5)
- 1 wire nail (2.0)
- 29 wire nails (2.5)
- 2 wire nails (3.0)
- 4 wire nails (3.5)
- 1 battery top
- 1 washer
- 1 brass fastener

Cartridges (n=8)
- 2 .32L S&W post-1878
- 1 .32 ACP post-1900
- 1 .32 WRA Co. post-1878
- 1 .25-35 post-1895
- 1 .41L WRA Co. post-1964?
- 1 38 WRA Co. W.C. (no date available)
- 1 .45 REM UMC Colt post-1873

Other Nondiagnostic Metal (n=11)
- 1 strainer?
- 1 stove part?
- 9 ???

Miscellaneous Metal (n=23)
- 1 single strand barbed wire
- 1 stove burner fragment
- 1 barrel band fragment
- 1 dog leash fastener
- 3 fasteners (unknown)
- 2 .22 bullets
- 1 square bolt
- 1 large wing nut
- 1 shutter latch
- 1 safety pin
- 1 button
- 1 bullet
- 2 lead blobs
- 3 wire fragments

Miscellaneous (n=33)
- 28 leather scraps
- 1 textile (cloth fragment)
- 4 shell buttons

Bone (n=73)

Site History

Through archival research conducted at the Fort Bliss Historical Archeology Laboratory and analysis of the recovered artifacts, the suggested date of the historic occupation of site FB 13140 is placed in the 1920s. On March 14, 1928, the northern half of the northwest quarter of the section in which FB 13140 lies was sold by Henry R. Murray to John B. Pitman. On March 15, 1929, the same piece of land was sold to Ranch Realty Company. The 1920-1930s map shows the Newman ranch in ruins at this time and that someone named McCracken was homesteading in the area at the time. Lands on the New Mexico side of FB 13140 were taken over by the U.S. government between 1948 and 1950, and land ownership has not changed to the present day.

Summary

Overall, testing indicated that the historic concentration on the southern part of site FB 13140 is contained in deposits that have been highly disturbed, probably by mechanical means. The prehistoric features are deflated and impacted by tracked vehicles and the seemingly intact historic concentration was largely confined to the eolian overburden, with some artifacts occurring in the contact zone between the eolian overburden and the Organ-age surface. Consequentially, prehistoric research value of site FB 13140 is considered low based on the highly deflated nature of the features. Historic research value is also low considering the disturbed and redistributed nature of the artifacts.

Preliminary archival research indicates that the historic occupation dates back to the 1920s, although little is known about D. McCracken, the possible owner. It is of interest that more historic faunal remains were recovered from site FB 13140 than any other historic site in the project, including all bone conclusively identified as bird. The information potential of the site's historical context and historic artifacts has not been fully documented. Thus, the research potential of site FB 13140 is not exhausted. It is recommended the site be considered to be of unknown eligibility to the NRHP and that historic diagnostic artifacts be mapped and collected. The feature containing faunal remains in BT 1 should be excavated to maximize data recovery.

PATROL BASE 9, MANEUVER AREA 8
SITES FB 3994, FB 3996

The quadrat is located 9 km northeast of Newman astride Meyer Range road (Desert SW Quadrangle, New Mexico, Otero County, and Texas, El Paso County) at 1,245 m amsl. The moderately eroded dune topography is characterized by geomorphic surface Mapping Unit 2b/1b (Monger 1993:102). The topography is relatively flat except for a few elevated points away from the quadrat. Local relief slopes gently in every direction. A small playa is located .10 km to the south. Two more playas exist to the west and northwest. The vegetation consisting of snakeweed, yucca, mesquite, four-wing saltbush which allows approximately 60 percent ground surface visibility. All sites except one are located along the western edge of the quadrat (Figure 117). Military impacts include a borrow pit in the southern one-third of the quadrat, along the Newman-McGregor Camp military road. Military hardware debris is scattered over most of the two sites tested within this quadrat.

FB 3994 (LA 94953)

Eligibility Status:	Unknown
Radiocarbon Date:	A.D. 775-1030
Elevation (meters above mean sea level):	1,247 (4,090 ft)
Size (square meters)	
Previously Recorded:	<100
Current:	32,400
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	4
Total Area Tested (m^2):	16
Total Volume Excavated (m^3):	2.16
Artifact Density (n/m^3):	2.78
Diagnostic Artifacts (+ = present; 0 = absent):	+
Fire-cracked rock/burned caliche density (kg/m^3):	.58
Backhoe Trenches	
Number of Trenches:	4
Mean Length of Trench (meters):	10.3
Extent of Erosion (%):	65
Extent of Modern Disturbance (%):	15

Site FB 3994, located in the western portion of Patrol Base 9 (see Figure 117), occupies geomorphic surface Mapping Unit 2b/1b. Much of the site surface is eroded, especially in the northern one-half, and caliche gravels are in deflated interdunal areas. Approximately 15 percent of the site is covered by dune formation and the surrounding area slopes gently in all directions. Vegetation consisting of mesquite, four-wing saltbush, yucca, sand sage, and broom snakeweed restricts ground surface visibility to approximately 60 percent.

The site consists of a low density artifact scatter spread over an extensive area, which includes chipped stone, unspecified brownwares, ground stone, fire-cracked rock, burned caliche, and charcoal staining. An untyped projectile point and a retouched flake were recovered from the surface of the site. Burned caliche was observed intermittently across the entire site suggesting multiple features, but only four features were defined and tested: a burned caliche concentration, a burned caliche/fire-cracked rock/stain concentration, and two burned caliche/stain concentrations. A total of four test units and four backhoe trenches was excavated (Figure 118).

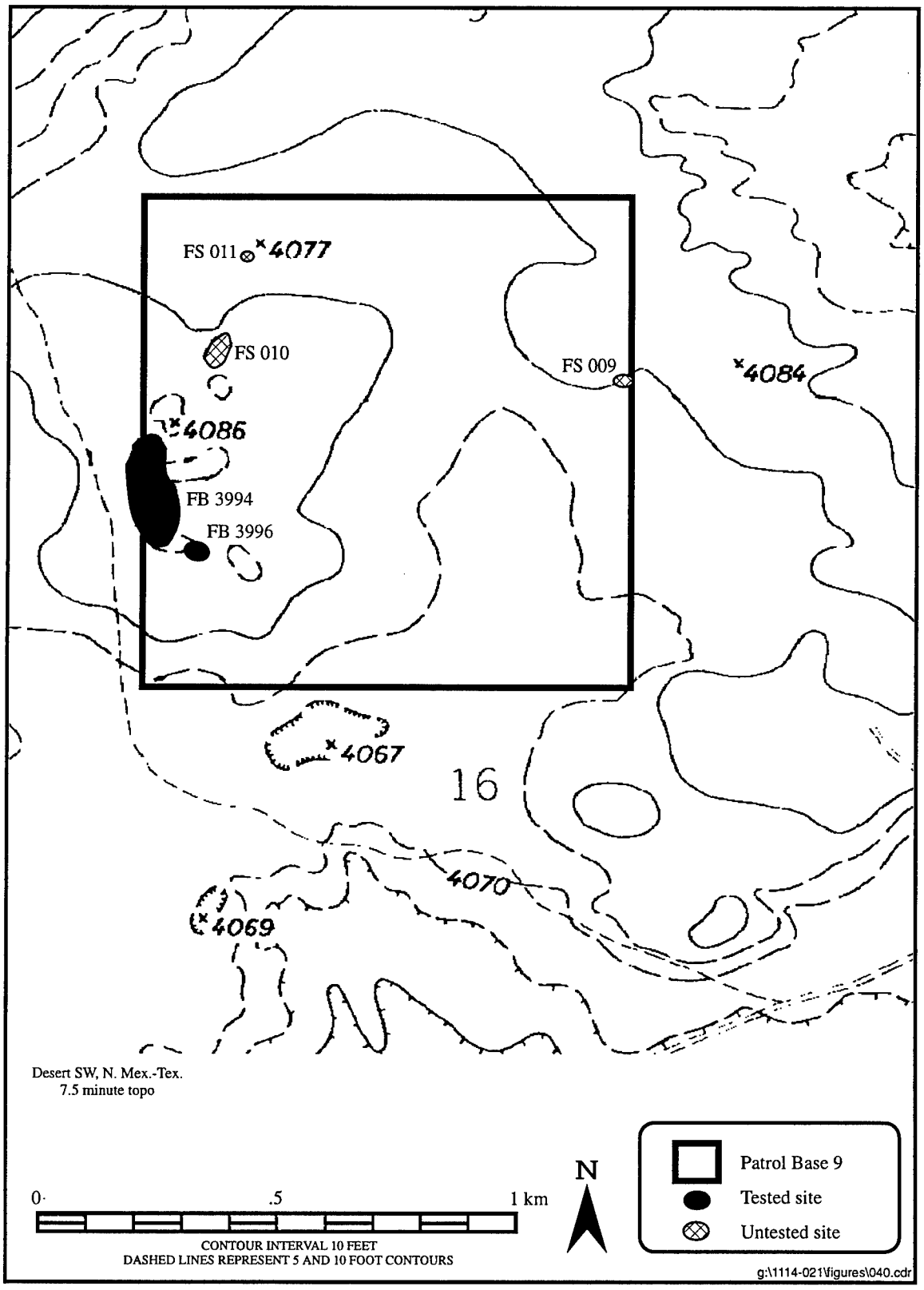


Figure 117. Site locations within Patrol Base 9 (see Appendix A for information on untested sites).

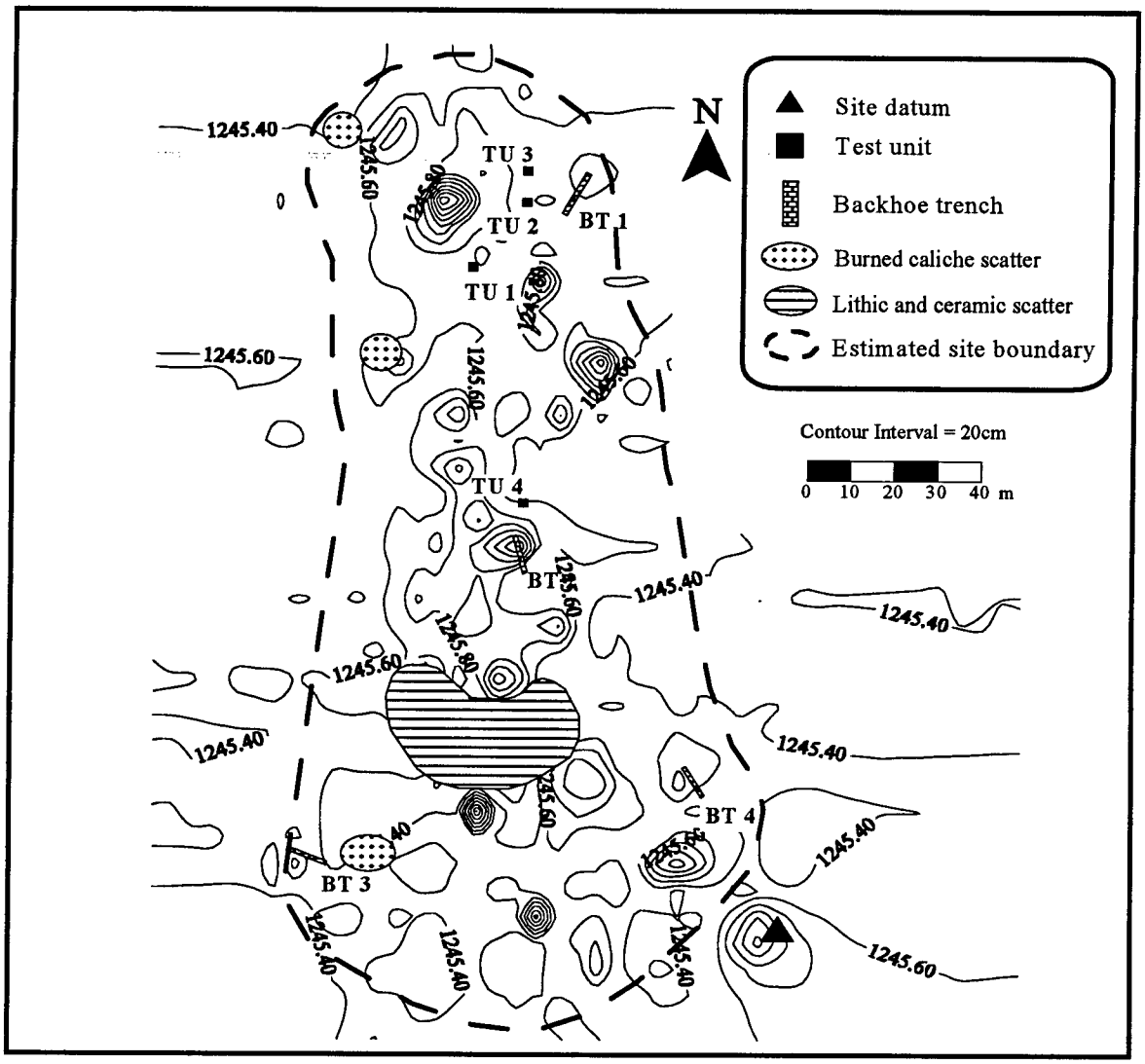


Figure 118. Contour map of site FB 3994.

TU #1, a 2-x-2-m block, was excavated in a burned caliche concentration (F1) in the northern area of the site (see Figure 118). One unspecified brownware sherd, four lithic debitage, and an indeterminate ground stone artifact were recovered from the eolian overburden and the contact zone between the overburden and the Organ-age surface. Fire-cracked rocks (.05 kg) and burned caliche (.12 kg) were recovered (Table 35). The base of the hearth was on an erosional surface beneath the eolian overburden. No buried features or artifacts were found in subsurface context and excavation was terminated at 30 cm below surface.

TU #2, a 2-x-2-m block, was placed over a fire-cracked rock/burned caliche/stain feature (F2), in the northern area of the site (see Figure 118). The unit was sterile of cultural deposits except for minimal amounts of burned caliche recovered from the historic eolian deposits. Excavation was terminated at 24 cm below surface.

Table 35
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 3994 (LA 94953)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4		1	BC	S	S		1			1				.05	
		.25			Q4	0-11	1	2	1		4			.05	.04	
		.17			Q4/Q3	5-20		1			1				.03	
		.10			Q3	8-30										
Total TU #1	*4*	*.52*	*1*				*1*	*4*	*1*		*6*	*11.54*		*.05*	*.12*	*.33*
2	4	.34	2	BC/FCR /Stain	Q4/Q3	0-24								?	?	
Total TU #2	*4*	*.34*	*1*											*?*	*?*	
3	4		3	BC/Stain	S	S									.07	
		.21			Q4	0-8									.07	
		.23			Q3	8-20									.02	
		.08			Q3	8-25										
Total TU #3	*4*	*.52*	*1*												*.16*	*.31*
4	4		4	BC/Stain	S											
		.13			Q4	0-5									.31	
		.30			Q4/Q3	0-20									.60	
		.35			Q3	8-36									.01	
Total TU #4	*4*	*.78*	*1*												*.92*	*1.18*
Total	*16*	*2.16*	*4*				*1*	*4*	*1*		*6*	*2.78*		*.05*	*1.20*	*.58*
Surface Recovery								2			2					

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

TU #3, a 2-x-2-m block, was placed over one-half of a burned caliche/stain feature (F3), also in the northern area of the site (see Figure 118). Burned caliche from the surface (.07 kg), the eolian overburden (.07 kg), and the subsurface (.02 kg) constitute the only cultural material recovered. Excavation was terminated at 25 cm below surface.

TU #4, also a 2-x-2-m block, was placed over the burned caliche/stain concentration (F4) and produced similar results (Figure 119). Burned caliche was recovered from the surface (.31 kg), the eolian overburden (.60 kg), and from the subsurface (.01 kg). A charcoal sample submitted for radiocarbon dating analysis resulted in a date of 1120 ± 70 B.P. (A.D. 775-1030) (Appendix B). A flotation sample collected from the feature fill revealed purslane plant remains, with smaller quantities of trailing four o'clock, amaranthus, sunflower family, and spurge remains (Appendix J). Excavation of TU #4 was terminated at 36 cm below surface.

Several other features may be present, in association with the burned caliche scatter found throughout the extensive site area. None of the tested features were intact; all proved to be deflated, remnant hearth deposits. Typically, these remnants include diffuse stains and tiny charcoal flecks, presumably the effects of leaching.

Presently, the eligibility of site FB 3994 for inclusion in the NRHP is unknown. Additional testing and surface artifact mapping and collecting are being recommended at site FB 3994 for the following reasons:

1. the site size has increased significantly;
2. although 75 percent of the site area is extensively eroded and no subsurface deposits appear to be preserved, there are, however, untested burned caliche concentrations still exposed on the surface on the southern side of the site which could yield dating samples;
3. the lithic and ceramic assemblages, although sparse, are diverse and could provide data on site function, raw material sources, and procurement strategy; and
4. the site is being impacted by military traffic.

FB 3996 (LA 94955)

Eligibility Status:	Ineligible
Radiocarbon Date:	None
Elevation (meters above mean sea level):	1,247 (4,090 ft)
Size (square meters)	
Previously Recorded:	~400
Current:	256
Features (+ = present; 0 = absent):	+
Fauna (+ = present; 0 = absent):	0
Number of (4 m^2) Test Units	2
Total Area Tested (m^2):	8
Total Volume Excavated (m^3):	.93
Artifact Density (n/m^3):	0
Diagnostic Artifacts (+ = present; 0 = absent):	0
Fire-cracked rock/burned caliche density (kg/m^3):	.55
Backhoe Trenches	
Number of Trenches:	1
Mean Length of Trench (meters):	10.5
Extent of Erosion (%):	75
Extent of Modern Disturbance (%):	15

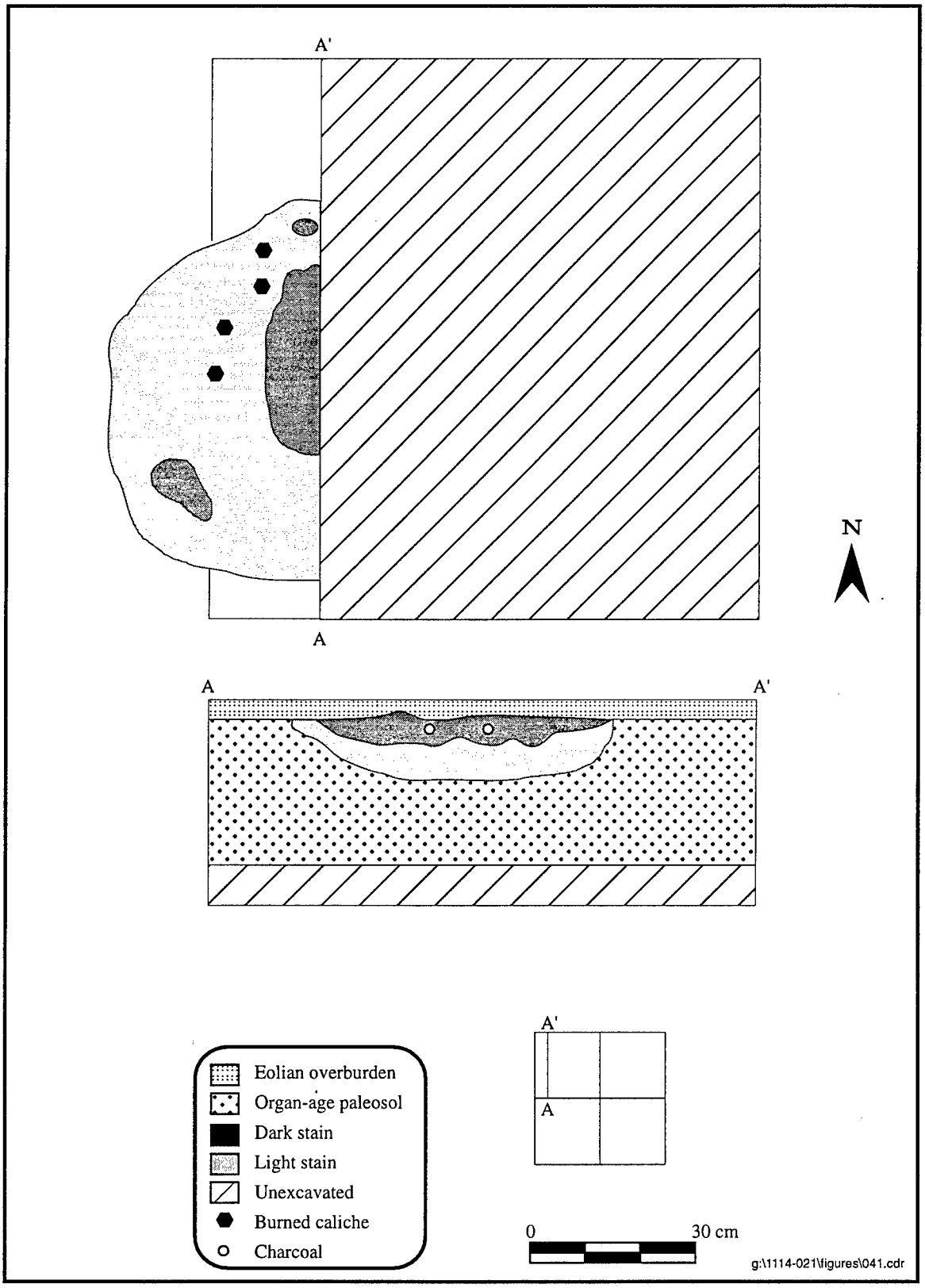


Figure 119. Plan view and profile of TU #4, F4, site FB 3994.

Site FB 3996 is located in the western portion of Patrol Base 9, southeast of site FB 3994 (see Figure 117). The general area of site FB 3996 stretches over geomorphic surface Mapping Unit 2b/1b (Monger 1993:102), but the site occupies Mapping Unit 1a in low dunes, interspersed with eroded and deflated interdunal areas. Caliche gravels on the surface cover more than 90 percent of site area at an average density of approximately 70 pieces/m^2. The relief rises slightly to the west and slopes gently in all other directions. Eastward runoff erosion is evident. Mesquite, four-wing saltbush, yucca, and broom snakeweed, which constitute the dominant vegetation, reduce ground surface visibility to approximately 75 percent.

Four features were observed on the surface of site FB 3996, two of which were tested. The two features tested consist of a 2-x-2-m charcoal stain and a burned caliche/fire-cracked rock concentration. The stain feature is comprised of about 15 pieces of burned caliche and two fragments of fire-cracked rock in a 5-x-5-m area that appears highly eroded, as demonstrated by surface caliche gravel frequency. No lithics or other artifacts were observed. A total of two test units and one backhoe trench was excavated (Figure 120).

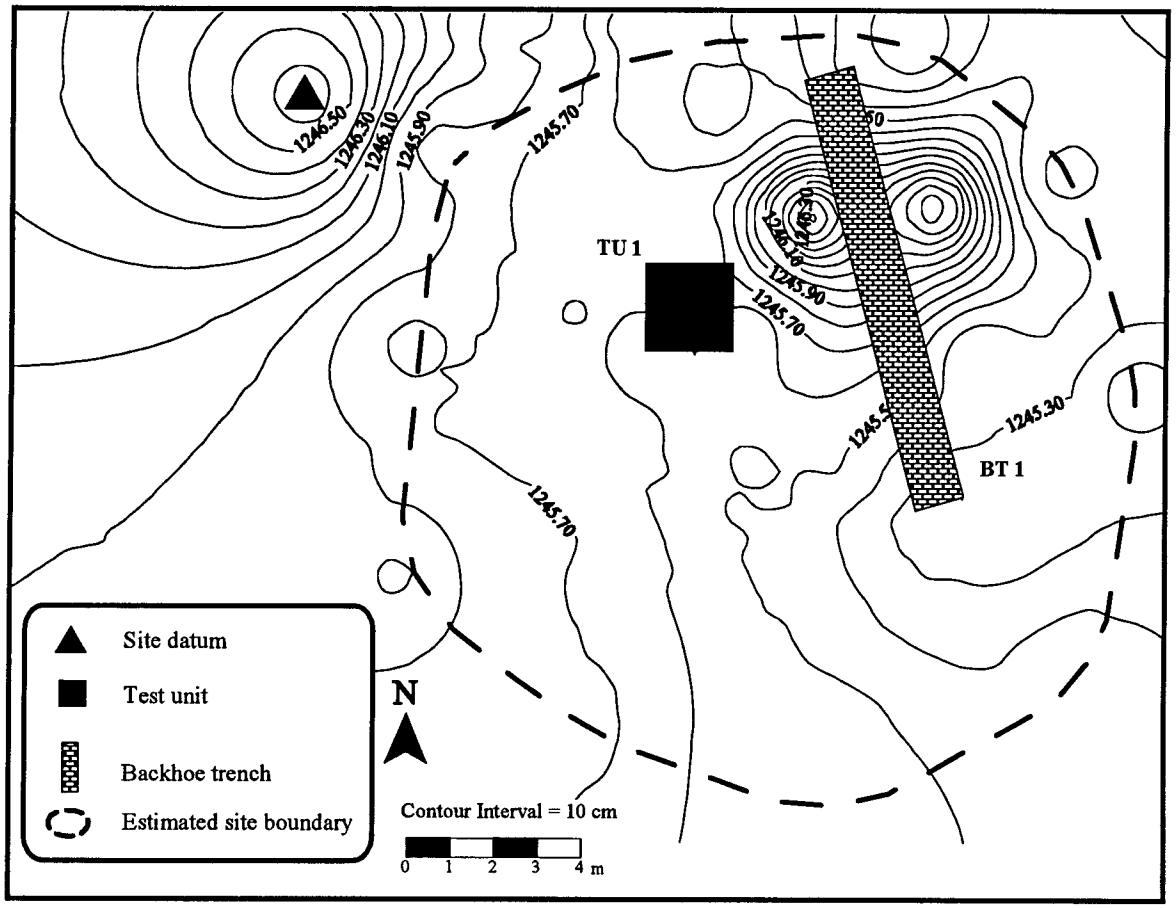


Figure 120. Contour map of site FB 3996.

TU #1 (2 x 2 m) bisected the charcoal stain (F1), excavating the western half. The only recovery consisted of .26 kg of burned caliche recovered from the loose eolian deposits (Table 36). A partially charred piece of mesquite wood, recovered from the eolian overburden, coupled with nearby military trash, is of recent origin. Eolian overburden was cleared to indicate the subsurface nature of the hearth, but no oxidation was observed. All burned caliche appears to be surface gravel. The probability of the charcoal stain representing modern military-related activity is very high. Excavation was terminated at 21 cm below surface.

Excavation of TU #2 (4 x 4 m), placed in an area of a fire-cracked rock and burned caliche scatter (F2), resulted in the recovery .25 kg of burned caliche from the contact zone between the eolian overburden and the modern surface (Figure 121). No other cultural deposits were encountered. Excavation was terminated at 27 cm below surface.

The third feature (F3), a charcoal stain, was exposed on the southern end of BT 1 (see Figure 120) from which a flotation sample was collected; small quantities of spurge, bush muhly grass, purslane, and an unidentifiable seed were identified (Appendix J). Five meters to the southeast of F3 another charcoal stain (F4) with a diameter of more than 1.5 m is exposed on the surface. Neither feature has been tested.

Of the four features identified at site FB 3996, F1 was identified as recent, probably resulting from military activities, while the remaining three features exhibited no associated artifacts. Test unit and trench excavations revealed no cultural artifacts. The research potential of the site is considered exhausted and, therefore, it is recommended that site FB 3996 be considered ineligible for inclusion in the NRHP. The projected use of the Patrol Base will not adversely affect the site and no further work is recommended.

Table 36
Stratigraphic Context of Excavated Features, Artifacts, and Faunal Remains, Site FB 3996 (LA 94955)

TU #	Area m^2	m^3 Exca	Fea #	Feature Type	Strat Zone*	Depth cm bs	Ceramic	Chip Stone	Ground Stone	His Arti	Total Arti	Arti $/m^3$	Bone	FCR (kg)	BC (kg)	FCR-BC $/m^3$
1	4	.23	1	Stain	Q4	0-21									.26	
Total TU #1	*4*	*.23*	*1*												*.26*	*1.13*
2	4	.08		military hearth	Q4	0-20										
		.06			Q4/Q3	0-30									.03	
		.21			Q4/Q3	0-40									.10	
		.25			Q4/Q3	0-17									.12	
		.10			Q3	12-27										
Total TU #2	*4*	*.70*													*.25*	*.36*
Total	*8*	*.93*	*1*												*.51*	*.55*

* Stratigraphic Zones (after Blair et al. 1990; Monger, this volume)
S Surface
Q4 (Quaternary 4) Historic eolian overburden
Q3 (Quaternary 3) Organ-age paleosol
Q2 (Quaternary 2) Isaacks' Ranch-age paleosol
Q1 (Quaternary 1) La Mesa indurated caliche

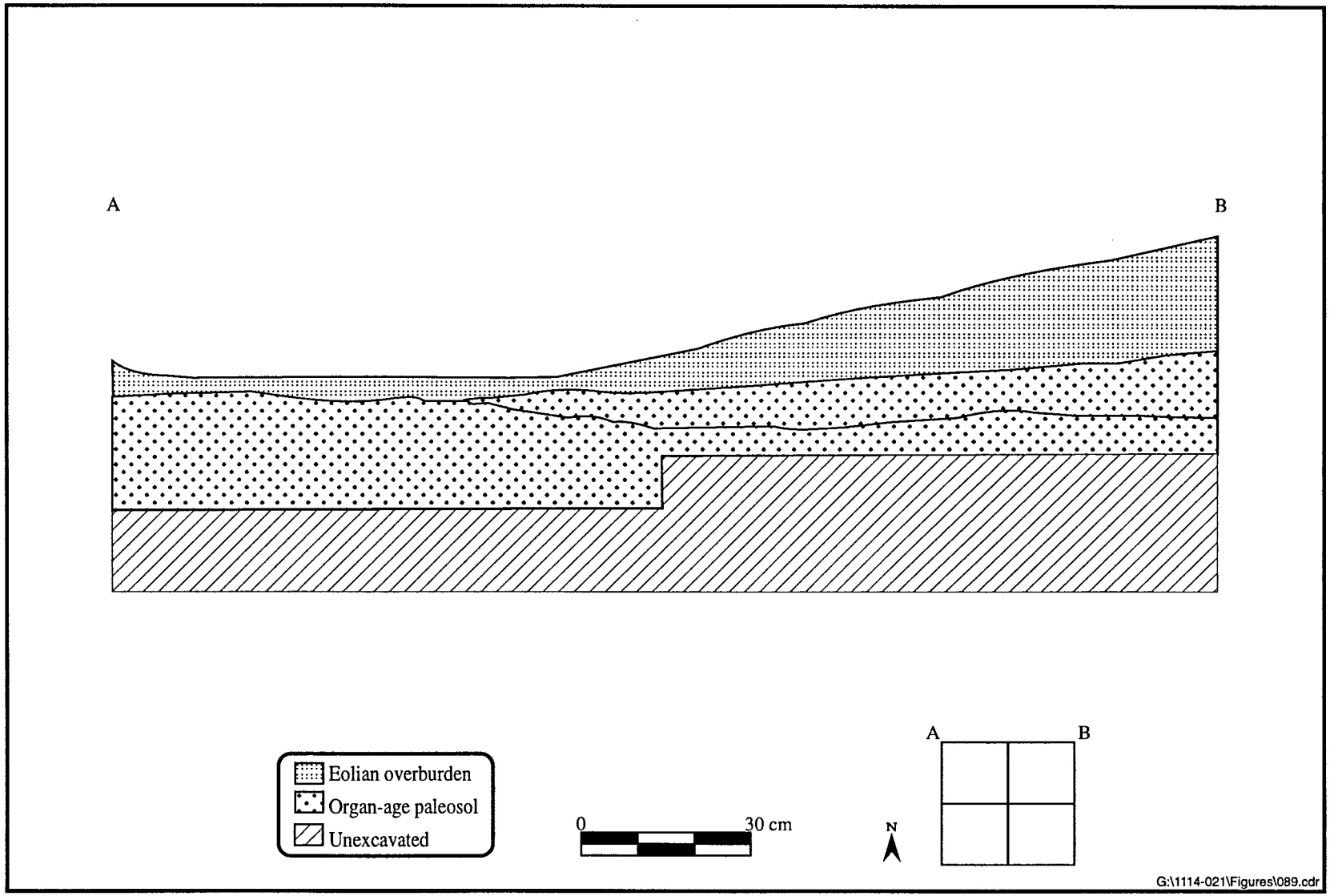


Figure 121. Profile of TU #2, F2, site FB3996.

CHAPTER 5
SUMMARY AND RECOMMENDATIONS

by
Duane E. Peter and Stephen K. Mbutu

SUMMARY OF RESEARCH

Introduction

By providing new geomorphological and archeological data, the current project has contributed significantly toward a better understanding of the archeological record within the Fort Bliss Military Reservation generally, and the Hueco Bolson desert floor, specifically. All new findings are included in the pertinent chapters but highlights are summarized here. Following the highlights is a presentation of the variability of the several data sets (features, faunal and floral assemblages, radiocarbon samples, lithic and ceramic samples) that were recovered. Examination of the temporal and spatial variability of these data sets was integral to the eventual perception of the data potential of each recognized site.

Stable isotopes data gathered during this project have documented 18,000 years of paleo-environmental changes within the project area (Appendix H). The studies have facilitated documentation of landform evolution since the terminal Pleistocene throughout the Holocene. Of significance to cultural resources management at Fort Bliss is the identification, dating, and documentation within the Fort Bliss Military Reservation of a severely eroded late Pleistocene-early Holocene paleosol (Isaacks' Ranch) that was subsequently severely eroded during the Altithermal (Appendices E and H). The earliest human occupation of the area began on the stabilized Isaack's Ranch stratum (deposited between 15,000 and 8,000 B.P.); however, stability lasted only until approximately 8,000 B.P. when an environmental shift toward a drier climate caused replacements of grasses by scrub plants. Erosion of the Isaack's Ranch stratum would have affected any existing Paleo-Indian cultural deposits, causing them to be deposited into the underlying caliche lag nodules or washed away completely. This phenomenon may provide an explanation for the current paucity of Paleo-Indian and early Archaic sites in the project area; however, no artifacts were observed in the winnowed lag caliche in any of the trenches excavated. If extensively mapped, the distribution of the paleosol horizon may provide cultural resources managers at Fort Bliss with a predictive model indicative of areas with the potential for retaining Paleo-Indian and early Archaic cultural deposits. One such area identified during this project is in Patrol Base 8 in Maneuver Area 8 in the vicinity of sites FB 6084 (LA 96937) and FB 6085 (LA 96938).

The current stratigraphic data (Appendices E and H) corroborate previous research conclusions (Gile 1966; York and Dick-Peddie 1969) on the relatively young age of the coppice dunes, common in the maneuver areas of Fort Bliss. In addition, the stratigraphy demonstrates a marked absence of paleo-dunes in the project

area. The landscape under the extant coppice dune mantle is remarkably flat as demonstrated by data from each dune that was trenched (Appendix E).

The test excavations have demonstrated that all archeological deposits in primary context in the project area are contained in the Organ age (Q3) paleosol (see Chapter 4). In addition, the excavations have demonstrated the extent to which the eolian alteration process is severely impacting cultural resources and site integrity. The paucity of artifacts in primary context is indicative of post-depositional erosion and soilscape instability. The discovery that the Eolian Alteration Mapping Units (Monger 1993) have potential in predicting the spatial distribution pattern of sites in coppice dune environments (see Chapter 4; Appendix A) may prove significant to cultural resources managers at Fort Bliss. The low number of sites in Monger's (1993) Mapping Unit 3 requires further investigation.

Gaps in radiocarbon dates and the absence of particular ceramic types from the tested sites have provided corroborative data supporting an early Mesilla occupation hiatus of the project area. None of the 15 radiocarbon dates generated from the project area sites falls within the temporal range of the early Mesilla phase. Similarly, brownware rim sherd morphological types expected in early Mesilla assemblages are absent from the tested sites (see Chapter 5). Rim sherd morphological types recovered during test excavations are typical of those expected in the late Mesilla and El Paso phases in the area and corroborate previous research on the general trend based on the Rim Sherd Index in ceramic assemblages of the El Paso area and Fort Bliss (Carmichael 1986; Mills 1988; West 1982).

Site type data compiled during this project corroborate previous research conclusions (Carmichael 1983; Mauldin 1994; Mbutu and Peter 1996; O'Laughlin 1990; Whalen 1978) regarding the ephemeral nature of the sites in the project area (see Chapter 4). Prehistoric subsistence in the project area was based largely on seasonal plant foods augmented by opportunistic hunting (Appendices I and J). Corn cupules recovered from a hearth dated to the El Paso phase support the model of contemporaneity of valley floor ancillary camps in conjunction with farming communities (Appendix J) situated outside the project area, possibly closer to the alluvial fans (Hard 1983; Mauldin 1986; Mbutu and Peter 1996).

Test excavations at the historic sites indicate that historic activities in the area centered around ranching (see Chapter 4). Archival records document the existence of ranches in the project area in the late nineteenth and early twentieth centuries. Diagnostic artifacts from site FBH 98 (41EP2226) indicate the site probably represented a temporary occupation or a domestic dumping area used between 1903 and 1930; archival research indicates the site may be related to the McLeary cow camp which was occupied during the 1920s. Site FBH 98 (41EP2226) produced no material which might suggest structural remains such as window glass, wood, or nails; the artifact assemblage from this site was comprised primarily of can and ceramic fragments, and bottle glass. Research indicates site FBH 70 (LA 97697) may be related to the pre-1920 Newman Ranch (site FBH 56 approximately 1.8 km to the north-northwest; site FBH 70 (LA 97697) produced a small quantity of nails which may indicate the presence of a structure. Site FBH 128 produced both window glass and nails (representing 13 percent and 11 percent of the artifact assemblage from that site, respectively), although no remnants of a structure were identified. Similarly, remains recovered from the historic component of site FB 13140 (LA 106701) suggest a structure may be present; domestic refuse, including bottle glass, window glass, ceramics, can fragments, and nails, comprised approximately 12 percent of the assemblage. The historic occupation of site FB 13140 (LA 106701) appears to date to the 1920s. Bovine bones (Appendix I) recovered from a backhoe trench at site FB 6086 (LA 96939) (Appendix E) and test unit excavations at site FB 13140 (LA 106701) emphasize the presence of cattle on the range during the Historic period. With the exception of one bone that was identified as either bird or mammal, all bird bone from the project was recovered from site FB 13140 (LA 106701) in association with historic artifacts (Appendix I).

Features

Artifact concentrations, fire-cracked rocks, burned caliche, and charcoal stains are the most visible prehistoric cultural manifestations within the project area. The goal of this analysis is to identify the variety and function of features tested during the current project, and their implication for site function and age. The features were only partially excavated as stipulated in the scope of work. Radiocarbon samples from the features, as discussed in this chapter, have provided a suite of dates that place the sites in a temporal perspective.

Seventy-two prehistoric features were tested within 29 sites. The distribution of these features by patrol base and site is presented in Table 37. The range of prehistoric feature types includes both fire-cracked rocks, burned caliche, and charcoal stains indicative of burning, as well as features such as artifact concentrations and/or pits with no indication of having been associated with heat. Features with one or more of the components indicative of burning are common within the Fort Bliss Military Reservation and have been categorized as thermal features (Burgett, personal communication 1994; Mauldin 1994; O'Laughlin, this volume). The different thermal feature types are not mutually exclusive in composition and often occur in combinations: for example, fire-cracked rock/burned caliche, fire-cracked rock/charcoal stain, burned caliche/stain, or burned caliche/fire-cracked rock/stain. A few nonthermal features such as artifact concentrations and pits were encountered during the test excavations.

Feature Types

Feature designations follow the procedure and nomenclature used at Fort Bliss. The most common feature type is the charcoal stain, followed by various combinations of stain, burned caliche, and fire-cracked rocks. Features that are composed only of fire-cracked rocks are rare in the sample. Metric dimensions for excavated subsurface features are presented in Table 38.

Charcoal Stain Features

Of the 72 prehistoric features on the 29 sites, 47 features (65 percent) contain charcoal stains, either singly or in combination with burned caliche and/or fire-cracked rock (see Table 37). Of these 47 stain features, approximately half (n=23, 49 percent) are stains only and not associated with either burned caliche or fire-cracked rock. Of the 23 excavated subsurface charcoal stains not associated with either fire-cracked rock or burned caliche, 14 (61 percent) are small (<1 m^2) in area (see Table 38; see Figure 19). The nine large charcoal stains (>1 m^2) contain charcoal and ash matrix fill in circular features (mean length=146.7 cm, mean width=125.7 cm; see Table 38 and Figures 38, 53, and 103). Some of the large charcoal stain features contained faunal remains, and a pit was uncovered at site FB 6085 (LA 96938). At sites FB 3929 (LA 94889) and FB 13206 (41EP4695), the feature matrix contained powdery ash which is sometimes associated with pithouse floors.

The remaining 24 stain features (51 percent) were composed of charcoal stains in association with other components. Four (8.5 percent) were associated with only fire-cracked rocks, and eight (17 percent) were associated with only burned caliche. Eleven (22.7 percent) of the charcoal stains were associated with both fire-cracked rock and burned caliche. One stain (2 percent) was associated with a ceramic concentration.

Burned Caliche Features

Slightly more than half of the 72 prehistoric features (n=39, 54 percent) contain burned caliche (see Table 37). Of the burned caliche features, six (15.4 percent) were not associated with either fire-cracked rock,

Table 37
Prehistoric Feature Types by Patrol Base

PB # / FB #	FCR[1]	FCR/ Stain	BC[2]	BC/ Stain	Stains <1m²	Stains >1m²	BC/ FCR	BC/ FCR/ Stain	Internal Hearth	Ceram conc/ Stain	Other Feat[3]	Site Total	PB Total
PB #1 /14502								1				1	
PB #1 Total								***1***					***1***
PB #2 / H 70					1							1	
/ 3929						1						1	
/ 13145								1				1	
PB #2 Total					***1***	***1***		***1***					***3***
PB #3 / 3389					1		1			1		3	
/ 3398			1									1	
PB #3 Total			***1***		***1***		***1***			***1***			***4***
PB #4 / 7820								1				1	
/ 7823							1					1	
PB #4 Total							***1***	***1***					***2***
PB #5 /13155							1					1	
/13206								1				1	
/13346											1[a]	1	
PB #5 Total							***1***	***1***			***1***		***3***
PB #6 / 6940					1	3						4	
/ 7312	1	4		1	5	3	1					15	
/ 10694					2							2	
/ 11616			1									1	
/ 14501							2					2	
PB #6 Total	***1***	***4***	***1***	***1***	***8***	***6***	***3***						***24***
PB #7 /10916				1			2	1				4	
/13147			1	2	2		2	1				8	
/13335				1								1	
/13920			1			1					1[b]	3	
/13921				1								1	
PB #7 Total			***2***	***5***	***2***	***1***	***4***	***2***			***1***		***17***

Table 37 (cont'd)

PB # / FB #	FCR[1]	FCR/ Stain	BC[2]	BC/ Stain	Stains <1m²	Stains >1m²	BC/ FCR	BC/ FCR/ Stain	Intrnl Hrth	Crmc conc/ Stain	Other Feat[3]	Site Total	PB Total
PB #8 / 4525							1					1	
/ 6084			1					1				2	
/ 6085								1	1		1[c]	3	
/ 6086							2					2	
/ 6089					1			1				2	
/ 13139					1			1				2	
/ 13140						1					1[d]	2	
PB #8 Total			***1***		***2***	***1***	***3***	***4***	***1***		***2***		***14***
PB #9 / 3994			1	2				1				4	
PB #9 Total			***1***	***2***				***1***					***4***
Totals for 29 sites	***1***	***4***	***6***	***8***	***14***	***9***	***13***	***11***	***1***	***1***	***4***	***72***	***72***

[1]FCR Fire-cracked rock
[2]BC Burned caliche
[3]Other Features:
[a] BC/Lithic/Ceramic concentration
[b] Ceramic concentration
[c] Pit (possible brush shelter)
[d] Pit w/ground stone

charcoal stain, or artifact concentrations (see Table 37). Eight burned caliche features (20.5 percent) contained charcoal stains, 13 (33.3 percent) contained fire-cracked rocks, and 11 (28.2 percent) contained both fire-cracked rock and stain. One burned caliche feature (2.6 percent) contained lithic and ceramic concentrations. See Table 37 for metric data concerning burned caliche features.

Fire-Cracked Rock Features

Twenty-nine (40 percent) of the prehistoric features contained fire-cracked rock (see Table 37). Of the fire-cracked rock features, a single hearth contained only fire-cracked rock with no association with either burned caliche, charcoal stain, or artifact concentrations (see Table 37). Four fire-cracked rock features (13.8 percent) contained charcoal stain. The majority of the fire-cracked rock features (n=13, 44.8 percent) contained burned caliche. The next most frequently observed fire-cracked rock feature contained a combination of burned caliched and charcoal stain (n=11, 37.9 percent). Many of the fire-cracked rock assemblages included ground stone fragments. The most common lithic material was limestone followed by rhyolite, basalt, sandstone, and quartzite. See Table 38 for fire-cracked rock feature sizes.

Other Features

The five remaining feature types are all represented by single occurrences. Ceramic features were found on two sites: one consisted of a concentration of burned caliche, ceramics, and lithics at site FB 13346

Table 38
Size Comparisons of Feature Types with Four or More Occurrences

Feature Type[1]	Feature Total[2] (n=40)	Length (cm) Range	Length (cm) Mean	Length (cm) SD[3]	Width (cm) Range	Width (cm) Mean	Width (cm) SD	Depth (cm) Range	Depth (cm) Mean	Depth (cm) SD
Stain (<1 m^2)	14	12-95	46	26.4	10-80	34	21.4	2-15	8.6	3.3
Stain (>1 m^2)	9	100-250	146.7	48.1	100-200	125.7	33	6-23	12.5	6.0
BC/Stain (<1 m^2)	5	15-57	37.6	19.7	15-50	33.2	13.6	5-17	10.6	5.1
FCR/Stain (all <1m^2)	4	22-88	50	12	12-24	17.5	5.5	3-9	5.5	9
BC/FCR/Stain (<1 m^2)	8	28-78	44	15.9	20-45	32.5	8.8	7-17	10.4	4.1

[1] (<1 m^2) = less than 1 square meter
[1] (>1 m^2) = 1 square meter or greater
[2] Only feature types with four or more occurrences are included in the table
[3] SD = Standard deviation

(41EP4696); and the other was considered to be a possible pot drop at site FB 3389 (LA 94392). A ground stone/pit feature was excavated at site FB 13140 [LA 106701]. The feature contained two manos and a pestle found together and resting in an apparently unburned subsurface pit. The ground stone probably represents a disposal pile, and the pit may have been the mortar rest. A possible brush shelter was discovered at site FB 6085 (LA 96938) when a surface stain was tested. Toward the bottom of the surface stain, two additional stains were discovered: a large circular unburned pit with a smaller hearth-like stain inside the larger stain. It is possible that the larger stain may represent the remains of a brush shelter with a small internal hearth within the shelter.

Feature/Prehistoric Artifact Association

Features yielded artifacts that were recovered from surface, eolian overburden, and subsurface contexts (Table 39). Artifacts were recovered from the eolian overburden as frequently as from the subsurface. The surfaces of stain features produced the least number of artifacts. The majority of the tested features contained chipped stone, ground stone, and ceramics in various combinations. The frequency of specific artifact class occurrences found in association with different feature types is tabulated in Table 40 (e.g., the single fire-cracked rock feature yielded only ground stone; but of the four fire-cracked rock with stain features, three yielded chipped stone, two produced ground stone, and one contained bone). Most of the features contained chipped stone, with ground stone and ceramics encountered slightly less frequently. The least frequently found cultural remains from features were bone and shell.

Feature/Faunal and Floral Association

Frequency of feature types that yielded faunal remains, including bones and shell fragments, is presented in Table 40, and a discussion of the floral and faunal analyses is presented in Appendices I and J. It is not clear from available data how much of the variability is a result of taphonomy rather than feature function. Flotation samples produced the only floral remains recovered, which were limited to macrobotanical samples

Table 39
Summary of Feature Contexts and Artifact Associations Based on Testing of Prehistoric and Historic Features

Patrol Base	FB Site #	Number of Features and Type *		Surface **	Overburden	Subsurface
1	14502	—	nonfeature		gs	
		1	bc/fcr/stain		cer,gs	
2	H 70	—	nonfeature	gs		
		1	stain	cer	cer,chst,b	chst,b
		—	nonfeature	h	h	h
	3929	1	stain	cer,chst	cer,chst	cer,chst,gs,b
	13145	1	bc/fcr/stain	gs	chst	
	13146	—	nonfeature			
	13338	—	nonfeature		chst	
3	3389	1	cer/stain		cer	
		1	bc/fcr			
		1	stain		cer	cer
	3398	1	bc			
4	7820	1	bc/fcr/stain	gs	gs	
		—	nonfeature			
	7823	—	nonfeature			cer
		1	bc/fcr		chst	chst
5	13155	1	bc/fcr		chst,gs	chst,gs
		—	nonfeature		chst,gs	chst,gs
	13206	1	bc/fcr/stain	cer,chst	cer,chst,b	cer,chst,b
		—	nonfeature			chst
	13346	—	nonfeature		gs	chst,gs
		1	bc/cer/lithic	cer	cer,chst	
		—	nonfeature			
		—	nonfeature	cer, chst	cer	cer,chst
6	H 98	—	nonfeature	h	h	
		1	hist stain/cer, ash pocket	h	h	
		—	nonfeature	h	h	h
		—	nonfeature	chst		
	H 182	1	hist trash	h	h	
		1	hist glass, poss pit	h	h	h
	6940	1	stain	chst		
		2	stains			
		1	stain	gs	chst	
	7312	1	fcr/stain			chst
		1	fcr/stain	gs		

Table 39 (cont'd)

Patrol Base	FB Site #	Number of Features and Type *		Surface **	Overburden	Subsurface
		1	bc/fcr	chst	gs	chst
		1	stain		chst	
		2	stains		chst,gs	b
		1	fcr/stain		chst	
		—	nonfeature	cer,chst	chst	chst
		1	fcr	gs		
		1	stain			
		1	fcr/stain	chst,gs		
		1	stain	cer	cer	cer
		2	stains	gs	chst	chst
		1	stain		b	b
		1	bc/stain			chst
	10694	1	stain		cer	
		1	stain			
	11616	1	bc			
		—	nonfeature	cer	cer	cer
	11617	x	stain (modern)			
	14501	1	bc/fcr			
		1	bc/fcr	chst	cer,chst	cer,chst
7	10916	1	bc/fcr	chst	chst	chst
		1	bc/fcr		chst	
		1	bc/stain		chst,b	chst
		1	bc/fcr/stain		chst,gs	chst
	13147	1	bc/fcr		chst	chst
		1	bc/stain	cer	cer,chst	
		1	bc/stain	cer	cer,chst,b	cer,chst,b
		1	bc		cer	b
		1	bc/fcr/stain, stain		cer,chst	
		—	nonfeature			
		1	bc/fcr	gs	chst,gs	
		—	nonfeature			
		—	nonfeature/sub stain	chst,gs	chst,gs	chst,gs
		—	nonfeature	chst,gs	cer,gs	cer,gs
		2	stains			
	13335	1	bc/stain			
	13920	1	stain			
		1	ceramic	cer	cer	cer,chst
		1	bc		gs	gs
	13921	1	bc/stain			

Table 39 (cont'd)

Patrol Base	FB Site #	Number of Features and Type *		Surface **	Overburden	Subsurface
8	4525	1	bc/fcr		gs	
		—	nonfeature		chst	
	6084	1	bc			
		1	bc/fcr/stain	chst,gs	chst	
	6085	3	bc/fcr/stain; internal pit; internal hearth	chst,gs	chst,b,s	chst,b
		—	nonfeature		chst	chst
	6086	1	bc/fcr	gs		
		1	bc/fcr			
	6089	1	bc/fcr/stain	chst		chst
		1	stain	chst		
	13139	2	bc/fcr/stain; stain	gs	chst	
		—	nonfeature			
	13140	—	nonfeature		h	h
		—	nonfeature		h	cer,gs,b,h
		1	gs/pit			gs
		1	hist trash	h	chst,h	chst,h
		1	stain		h	chst,h
PB 9	3994	1	bc	chst	cer,chst,gs	chst
		1	bc/fcr/stain			
		1	bc/stain			
		1	bc/stain			
	3996	x	stain (modern)			
		—	nonfeature			
Total features = 76 (72 prehistoric, 4 historic; 2 modern stains not included in feature count)						

* nonfeature = placement of test units based on presence of artifacts or probability of buried deposits
** b = bone; cer = ceramic; chst = chipped stone; gs = ground stone; h = historic; s = shell

(Appendix J). Corn cupules identified in flotation samples from a hearth in site FB 13921 (41EP4700) constitute the only cultigen identified in a prehistoric context. A range of wild plants, including amaranthus, mustard, purslane, and soaptree yucca, was identified (Appendix J).

Recovered from flotation as well was a minuscule amount (.6 g) of what appears to be fresh-water clam shell fragments. The flotation samples were taken from sites FB 6085 (LA 96938), FB 6940 (41EP2227), and FB 13206 (41EP4695). The first two sites are situated on a playa edge and it is likely that these inland water reservoirs may have been the source of the clams. Faunal remains were recovered from the eolian overburden and subsurface context of stain features (see Table 39). Burned bones are associated with relatively large charcoal stain features or possible structures, such as at sites FB 3929 (LA 94889) and FB 6085 (LA 96938). A single bone fragment was recovered from the subsurface of a burned caliche feature. Results of faunal analysis from this project are provided in Appendix I.

Table 40
Frequency of Occurrences of Artifact Classes Among Feature Types

Feature Type	Feature Type Totals *	Number of Features Exhibiting Specific Artifact Classes					
		Ceramic	Chip Stone	Ground Stone	Bone	Shell	Historic
Fire-Cracked Rock	1			1			
Fire-Cracked rock with Stain	4		3	2	1		
Burned Caliche	6	2	2	1	1		
Burned Caliche with Stain $< 1m^2$	6	1	1				
Burned Caliche with Stain $> 1m^2$	2	1	2		2		
Stain $< 1m^2$	15	7	5	1	2		1
Stain $> 1m^2$	8	1	7	4	3	2	
Burned Caliche/Fire-Cracked Rock	13	4	7	6	2		
Burned Caliche/Fire-Cracked Rock with Stain $< 1m^2$	9	3	6	6			
Burned Caliche/Fire-cracked Rock with Stain $> 1m^2$	2	1	2	1	2	1	
Ceramic Concentration	1	1	1				
Stain with Ceramic Concentration	1	1					
Burned Caliche/ Lithic/Ceramic Concentration	1	1	1				
Ground stone/pit	1		1	1			
Total # of features with specific artifact classes		*23*	*37*	*24*	*13*	*3*	*1*

* Only features (n=70) associated with artifacts are included in the table

Structural Attributes of Features

Plan view and cross section data of the 47 excavated features that had subsurface primary contexts are presented in Tables 41 and 42. Of the 47 features, 40.4 percent (n=19) are oval in plan view (see Table 41), 36.2 percent (n=17) are circular, 14.9 percent (n=7) are amorphous, and 8.5 percent (n=4) are indeterminate in shape. Of the stain features greater than 1 m^2, 66.7 percent (n=9) are circular in plan view.

Of the 47 features, 61.7 percent (n=29) have a basin-shaped cross section (see Table 42), 14.9 percent (n=7) are amorphous, 10.6 percent (n=5) are lenticular, 2.1 percent (n=1) are cylindrical, and 10.6 percent (n=5) are indeterminate. Of the large stains, 66.7 percent (n=6) have basin-shaped cross sections and may be delineating structural outlines of prehistoric brush huts. With the exception of the large stains, the rest of the features are within one standard deviation in mean length, width, and depth (see Table 38), and may have been utilized for a related function.

Table 41
Prehistoric Feature Plan View Variability*

Feature Type	Circular	Oval	Amorphous	Indeterminate	Total
Stain (<1 m^2)	5	7	2		14
Stain (>1 m^2)	6	1	1	1	9
BC/Stain (<1 m^2)	2	2	1		5
BC/Stain (>1 m^2)	1	1		1	3
FCR/Stain (all < 1m^2)	1	2	1		4
BC/FCR/Stain (<1 m^2)	2	5	1		8
BC/FCR/Stain (>1 m^2)		1	1	1	3
Ceramic Concentration/Stain				1	1
*Feature Type Total**	*17*	*19*	*7*	*4*	*47*

* Only excavated features having subsurface context are included.

Table 42
Prehistoric Feature Cross Section Variability*

Feature Type	Irregular	Basin	Lenticular	Cylindrical	Indeterminate	Total
Stain (<1 m^2)	2	10	1	1		14
Stain (>1 m^2)		6	1		2	9
BC/Stain (<1 m^2)	2	2			1	5
BC/Stain (>1 m^2)		2			1	3
FCR/Stain (<1 m^2)		1	3			4
BC/FCR/Stain (<1 m^2)	1	7				8
BC/FCR/Stain (>1 m^2)	1	1			1	3
Ceramic Concentration/Stain	1					1
*Feature Type Total**	*7*	*29*	*5*	*1*	*5*	*47*

* Only excavated features having subsurface context are included.

Chronometric Dating of Features

Radiocarbon Dating of Features

Samples from 19 features were submitted to Beta Analytic, Inc., for radiocarbon dating. Eighteen samples consisted of charcoal recovered from well-controlled excavation levels of features in primary context. The nineteenth sample was recovered from a backhoe trench (Table 43). The samples consisted of several charcoal fragments recovered from the same provenience as the excavation progressed. After pretreatment of the 19 samples by Beta Analytic, Inc., 10 of the samples proved insufficient for radiocarbon extraction. Additional charcoal, recovered from flotation samples collected from the same proveniences as the charcoal samples, was used to augment the insufficient samples. The additional samples notwithstanding, two samples from sites FB 6940 (41EP2227) and FB 14502 (LA 106715), respectively, required analysis by Accelerator Mass Spectrometry (AMS). Two other samples (from FBH 70 [LA 97697] and FB 7312 [41EP2219]) were given extended counting to increase precision.

A ^{14}C isotope half life of 5568 years was used in determining the age of the samples. All ^{14}C dates were corrected for $^{13}C/^{12}C$ ratio and calibrated at both one sigma (68 percent probability) and two sigma (95 percent probability) (see Table 43; Appendix B). Application of the dates to culture history interpretation focuses on the two sigma calibrated dates because the calendar calibration obtains the best approximation of the calendar equivalent age of the features being dated.

The calendar calibrated ages of features range from 3630-3120 B.C. to A.D. 1220-1445 at the two sigma level probability (see Table 43). Five dates (26 percent) belong to the Archaic period. The range of dates exhibits a pronounced paucity of radiocarbon dates between the Late Archaic period and the beginning of the late Mesilla phase. Only two dates (10.5 percent) belong to the Archaic-to-early-Mesilla transition but no feature produced an early Mesilla date. The apparent hiatus coincides with the early Mesilla period. Seven dates (36.8 percent) cluster between A.D. 610 and A.D. 990, signifying dominance of late Mesilla phase components in the sample. Two dates (10.5 percent) span both late Mesilla and early Doña Ana phases, and one date (5.3 percent) spans late Mesilla, Doña Ana, and early El Paso phases. The dominant presence of late Mesilla components is corroborated by rim sherd data. One date (5.3 percent) spans the late Doña Ana and early El Paso phases, and two radiocarbon dates (9.5 percent) fall within the El Paso phase. One sample that yielded an El Paso phase date (A.D. 1270-1445) was recovered from a hearth that contained corn cupules. The hearth was located approximately 40 m west-northwest of a broken El Paso Polychrome pot.

Archeomagnetic Dating of Features

Archeomagnetic samples were collected from two hearths (FB 3929 [LA 94889] TU #1 and FB 13921 (41EP4700) TU #1) by the New Mexico Museum of Anthropology staff, but the samples did not yield dates. Although the samples were taken from oxidized hearths, they did not yield the necessary alpha-95 values (greater than 4°) to obtain dates (Dan Wolfman, personal communication 1994; Appendix G). The sandy soils in the project area do not allow strong magnetization (J. Royce Cox, personal communication 1994; Appendix G). Previously, archeomagnetic dating of samples from pueblo sites in adjacent areas has proved more successful than dating samples from small encampments (Whalen 1980).

Table 43
Radiocarbon Dates and Calendar Calibrations for Samples from Excavated Sites

Beta #	Patrol Base #	FB Site #	State Site #	Test Unit #	Feature Type	Material	^{14}C Age Years B.P.	$^{13}C/^{12}C$ (o/oo)	$^{13}C/^{12}C$ Age Years B.P.	Calibrated age and Intercepts (1 Sigma)	Calibrated age (2 Sigma)	Temporal Assoc.
71740	1	14502	LA 106715	2	BC/FCR/Stain	Charcoal	4560+70	-19.9	4645+70	3510 (3370) 3350 B.C.	3630-3120 B.C.	Archaic
71725	2	3929	LA 94889	1	Stain (>1 m^2)	Charcoal	980+80	-25.8	970+80	A.D. 1000 (1035) 1175	A.D. 905-1245	L. Mesilla/ E. El Paso
71724	2	3929	LA 94889	1	Stain (>1 m^2)	Charcoal	1040+80	-26.2	1020+80	A.D. 975 (1015) 1115	A.D. 655-890	Mesilla
71722	2	H 70	LA 97697	2	Stain	Charcoal	1240+70	-25.7	1230+70	A.D. 700 (790) 890	A.D. 660-980	Mesilla
71737	5	13206	41EP4695	1	BC/FCR/Stain (>1 m^2)	Charcoal	1090+60	-14.1	1270+60	A.D. 770 (680) 855	A.D. 655-890	Mesilla
71727	6	6940	41EP2227	5	Stain	Charcoal	2680+55	-23.2	2710+60	910 (830) 810 B.C.	980-790 B.C.	Archaic
71728	6	6940	41EP2227	1	Stain (>1 m^2)	Charcoal	2870+100	-26.9	2830+100	1120 (980) 840 B.C.	1270-800 B.C.	Archaic
71729	6	7312	41EP2219	5	Stain	Charcoal	750+60	-26.8	750+60	A.D. 1245 (1275) 1295	A.D. 1195-1385	El Paso
71730	6	7312	41EP2219	5	Stain	Charcoal	2120+90	-25.3	2110+90	330 (110) 10 B.C.	380 B.C.-A.D. 80	L. Archaic
71731	6	7312	41EP2219	10	FCR/Stain	Charcoal	1270+100	-24.7	1280+100	A.D.660 (720, 740, 760) 880	A.D. 610-990	Mesilla
71732	6	7312	41EP2219	12	Stain	Charcoal	1050+60	-27.6	1000+60	A.D. 1000 (1020) 1110	A.D. 960-1180	L. Mesilla/ Dona Ana
71733	7	10916	41EP4702	3	BC/Stain(>1 m^2)	Charcoal	3690+70	-26.6	3660+70	2130 (2020) 1920 B.C.	2200-1790 B.C.	Archaic
71734	7	13147	41EP4697	5	BC/Stain	Charcoal	1050+70	-26.4	1030+70	A.D. 970 (1010) 1040	A.D. 880-1170	L. Mesilla/ Dona Ana
71735	7	13147	41EP4697	3	BC/Stain	Charcoal	1250+70	-26.7	1230+70	A.D. 790 (695) 885	A.D. 665-980	Mesilla
71736	7	13147	41EP4697	BT6	BC/Stain	Charcoal	3680+80	-25.5	3670+80	2140 (2025) 1920 B.C.	2280-1780 B.C.	Archaic
71738	7	13920	41EP4699	1	Stain	Charcoal	1240+80	-26.1	1230+80	A.D. 690 (790) 890	A.D. 655-990	Mesilla
71739	7	13921	41EP4700	1	BC/Stain	Charcoal	650+80	-26.9	610+80	A.D. 1295 (1325; 1340; 1390) 1420	A.D. 1270-1445	El Paso
71726	8	6085	LA 96938	1	Stain (>1 m^2)	Charcoal	1820+110	-25.0	1820+110	A.D. 85 (225) 370	35 B.C.-A.D. 440	L. Archaic/ E. Mesilla
71723	9	3994	LA94953	4	BC/Stain	Charcoal	1110+70	-24.6	1120+70	A.D. 875 (960) 1000	A.D. 775-1030	Mesilla

Obsidian Hydration Dating of Features

Although obsidian hydration dating has been used extensively to date sites on the Fort Bliss Military Reservation (Mauldin 1994; O'Laughlin 1980), the techniques's reliability is questionable (Giese 1994:46). The problem is illustrated by obsidian hydration dates from an adjacent area (Mauldin 1994). The dates cluster within the late Mesilla phase (Mauldin 1994), whereas radiocarbon dates from the same sites cluster in the early Mesilla phase (Mauldin 1994). The few pieces of obsidian recovered from test excavations during the current project did not constitute an adequate enough sample to warrant submission for obsidian hydration dating.

Discussion and Conclusions

The surface distribution of features in the project area does not represent the original cultural patterning, but instead represents differential exposure of the features resulting primarily from erosion and military activity. Hence, any attempt to determine patterns in feature distribution at the site level would be tenuous at best. Poor feature preservation partially explains the paucity of macrobotanical remains in the tested features. Introduction of commercial ranching in the area around A.D. 1850 triggered a desertification process that has since impacted the features severely. Today, features are more commonly found in exposed settings—eroded by wind, water, and vehicular activity—where they are often disarticulated and dispersed (Appendix E, Plate E-3) rather than in areas of sand accumulation. When test units were placed in areas of sand accumulation, fire-cracked rock features were found to be better preserved and less fragmented than those in exposed areas. Periodic exposure to water and sheet wash action has had a significant impact on features by breaking up and dispersing fire-cracked rocks.

Structural and contextual attributes of thermal features in the project area indicate that the features can be grouped into two broad functional categories: hearths and possible brush structures. The latter may or may not contain an associated hearth. The functional difference is reflected in the bimodality in the mean metric dimensions of the features (see Table 38). All features categorized as hearths are smaller in area than the brush structures, and all the hearths in the sample cluster within one standard deviation in mean length, width, and depth.

Hearths are recognizable at two functional levels; those with fire-cracked rock (including burned caliche), and those composed of small stains (< 1 m^2) with no associated fire-cracked rock or burned caliche. Hearths without fire-cracked rock or burned caliche may have functioned as general purpose hearths (O'Laughlin 1987:35), whereas burned rock/caliche hearths may have been used to process starchy plant foods requiring prolonged baking to break down starches and reduce toxin levels (Mauldin 1994). The amount of fire-cracked rock/burned caliche in a hearth reflects either: heat requirement levels by the plant foods being processed (Mauldin 1994); intensity of site occupation; multiple use of the hearth resulting from re-occupation of the site (Mauldin 1994; O'Laughlin 1987:35); or simply the availability of lithic raw material. As a result of work in the Mesilla Valley, Giese (1994:100) has concluded that hearths containing fire-cracked rock in prehistoric contexts that lack evidence of a specialized function may simply represent a way of protecting a fire, used for heating or light, from the elements. Disarticulated fire-cracked rock concentrations can also represent discard from a nearby hearth.

Presence or absence of caliche or rocks in a hearth may have depended on availability of the raw material and the level of heat retention required to process a particular kind of plant food. Hence, the single feature containing only fire-cracked rock with no associated burned caliche or stain does not represent a functionally different role from burned caliche features; rather, the idiosyncracy may be attributable to raw material

availability. Caliche is ubiquitous in the project area and was readily available for use in hearths. Evidently rocks, either occurring naturally or in the form of ground stone, were used to augment the caliche in hearths for greater heat retention. Experiments have demonstrated that fire-cracked rock and burned caliche used in hearths prolong heat retention to the optimal extent for baking plants that may require heat and moisture for the destruction of toxins, and to improve the palatability and digestion of plant foods such as agave, sotol, and possibly yucca (Mauldin 1994). Thus, baking potential may be correlated to the amount of fire-cracked rock or burned caliche in the hearth. Weights for recovered fire-cracked rock and burned caliche are presented in Chapter 4 with the site descriptions.

The range of artifact classes (chipped stone, ground stone, and ceramics) and the typological diversity of chipped stone tools (projectile points, unifaces, bifaces) found at the sites indicate that hearths were commonly associated with food procurement, processing, and storage activities. The limited quantity of recovered tools may be indicative either of low intensity or transient use of the hearths, or be a product of sample size. The majority of the features in the project area fit well with a low intensity or transient use model (Carmichael 1986; Hard 1983b). Although the majority of features in the project area were associated with artifacts, the artifact density is too low to allow quantitative interfeature and intrasite comparisons.

Possible brush structures contained large charcoal stains with a charcoal and ash matrix fill in roughly circular features greater than one meter in diameter. Some of the apparent brush structures contained artifacts, faunal remains, and, at site FB 6085 (LA 96938), a pit and possible hearth. A well-oxidized hearth remnant was also identified within a possible structure at FB 3929 (LA 94889). At sites FB 3929 (LA 94889) and FB 13206 (41EP4695), the feature matrix contained powdery ash reminiscent of pithouse floors. These structures are more often associated with higher frequencies of faunal remains than any other feature type in the project area.

The recovery of corn cupules—dated to the El Paso phase from site FB 13921 (41EP4700)—indicates that pueblo populations living along the valley periphery may have seasonally occupied ancillary camps on the desert valley floor for the exploitation of plant and animal resources. Carmichael (1986), Hard (1983b), and Mauldin (1986) have made similar observations in relation to prehistoric settlement patterns in the El Paso area.

The significance of the paucity of radiocarbon dates during the early Mesilla phase (see Table 43) is not yet clear. Lack of features dated to that period is corroborated by a paucity of straight pinched rims in the ceramic assemblages. Carbon and oxygen isotope data indicate that the early Mesilla period was characterized by a warmer climate and more xeric vegetation than during the late Archaic (Appendix H). Thus, the valley floor may have been less habitable. Increased population during the late Mesilla phase has been suggested (Carmichael 1986; Whalen 1978). "It is clear, however, that the total number of hectares of village area increases substantially from early to late Pithouse times" (Whalen 1980:40). Both straight and rounded rim sherds, typical of the late Mesilla phase ceramic assemblage, were recovered from Feature 5 at site FB 13147 (41EP4697) as well as a ^{14}C sample dating to A.D. 665-980.

To an unknown extent, the problem of identifying and categorizing prehistoric hearth types is exacerbated by the presence of modern hearths related to military activities. At site FB 3996 (LA 94955), what was originally thought to be a prehistoric charcoal stain actually contained charred mesquite wood which appeared to be from a recent fire. Similarly, the shallow charcoal stain feature tested at FB 16167 appeared to be of modern origin, and trash from military bivouac is scattered on the surface in the adjacent area to the east.

Lithic Assemblages

Seventy-three of the 98 test excavation units yielded the lithic assemblage that includes 263 chipped stone and 60 ground stone artifacts. Lithics were observed on the general surfaces of 26 of the 37 tested sites. Of the 26 sites containing lithic artifacts, 25 yielded chipped stone (Table 44); site FB 7820 (41EP2248) produced only ground stone, and, although a previous survey recovered a projectile point from the surface of site FB 13921 (41EP4700), the current project recovered no chipped stone materials from that site. Of the 26 sites with observed lithic remains, nine sites contained chipped stone, ground stone, and ceramics; nine sites contained chipped stone and ground stone; one contained only ground stone; and none of the sites contained ground stone and ceramics exclusively. Although three of the 26 sites with prehistoric lithic remains are predominantly historic sites, one of these historic sites (FBH 70 [LA 97697]) contained prehistoric chipped stone, ground stone, and ceramic artifacts, and one historic site (FBH 98 [41EP2226]) yielded prehistoric chipped stone.

Site inventories of lithic artifacts proved too small to allow a meaningful application of statistical interpretive models, but frequency summary tables were constructed for tool and raw material types. Selected chipped and ground stone artifacts that are typical of the lithic assemblage were illustrated. A cross section view of each ground stone piece was recorded.

Chipped Stone Assemblage

Two hundred and sixty-three pieces of chipped stone were recovered from 25 of the 37 tested sites (see Table 44; Appendix C). Thus, 67.6 percent of the 37 sites yielded chipped stone. The chipped stone assemblage includes debitage (n=224, 85.2 percent), modified tools (n=24, 9.1 percent), cores (n=11, 4.2 percent), and hammerstones (n=4, 1.5 percent). Debris or shatter (n=89) comprises 33.8 percent of the total chipped stone assemblage and 39.7 percent of the debitage category (see Table 44).

The total flake sample is characterized by a predominance of tertiary flakes (78.5 percent, n=106) and limited occurrences of primary flakes (n=9, 6.7 percent). Secondary flakes make up 14.8 percent (n=20) of the flake sample (Table 45). An analysis of flake scar patterns on the dorsal side of the flakes revealed that flakes with unidirectional scars (n=38) occur only slightly more commonly than flakes with bidirectional scars (n=31). Multidirectional scars occur on 22 of the flakes. The bipolar reduction technique is represented by a single flake with one slightly scaled lateral edge. Scar patterns were indeterminable on 43 flakes (Table 46).

Cores and hammerstones are less well-represented than flakes. Two cores, eight core fragments, and one tested nodule were recovered. Multiple (n=5) and opposed (n=4) platform cores are nearly equally represented in the sample. One single platform core, one tested nodule, and no bipolar cores were identified. Cores were found in a variety of raw material types including chert (n=5), quartzite (n=2), rancheria chert (n=1), limestone (1), basalt (n=1),tested nodule of obsidian. Of four hammerstones identified, one is wedge-shaped and three are round. The wedged hammerstone is of limestone. Two of the round hammerstones are of quartzite and one is of porphyry. One of the round hammerstones was recovered from a hearth. Hammerstones were characterized by localized battering and grinding (Figure 122).

The chipped stone assemblage shows little technological variability within the project area although the site occupations span the time frame from Archaic period through the Formative period. At the site level, the assemblages are characterized by a paucity, in both quantity and diversity, of modified tools. The 24 modified tools recovered from all sites tested included 12 projectile points, nine unifaces, and three bifaces (Figures 123 and 124; see Table 44).

Table 44
Chipped Stone Typology

	Debitage		Modified Tools			Core	Hammerstone	Total (n)
FB Site #	Flake	Debris	Uniface	Biface	Proj Point			
13147	27	22	2	1	2 (Jay or Bajada-like; untyped frag)		2	56
10916	14	6			1 (Marcos-like)			21
7312	15	5		1	1 (untyped frag)	1		23
13346	7	4	1			1		13
13206	11	3						14
13155	3	5						8
3929	10	3				3	2	18
6940	3	2			1 (Toyah)	1		7
13338	9	2				1		12
6085	17	27	1			1		46
3994	4		1		1 (untyped frag)			6
13139	1					1		2
13920		1	2					3
6084		1	1	1	1 (Marcos-like)	1		5
14501	3	4			1 (Bajada-like)			8
14502		1						1
7823		1						1
6086					2 (San Pedro-like; Todsen/ Chiricahua)			2
10694	1							1
6089	3				1 (San Jose)			4
H98					1 (San Pedro)	1		2
13140	2	1						3
H70	4		1					5
13145	1							1
4525		1						1
Subttl	135	89	9	3	12	11	4	263
Total (25 sites)	*224*			*24*		*11*	*4*	*263*

Table 45
Flake Classification Based on Remaining Amounts of Dorsal Cortex

FB Site #	Primary	Secondary	Tertiary	Total (n)
13147	1	4	22	27
10916	1	1	12	14
7312	1	2	12	15
13346			7	7
13206	2	1	8	11
13155		2	1	3
3929	1	2	7	10
6940		1	2	3
13338		1	8	9
6085	1	2	14	17
3994		3	1	4
13139		1		1
14501			3	3
6089			3	3
13140			2	2
H70	1		3	4
13145	1			1
10694			1	1
Total	9 (6.7%)	20 (14.8%)	106 (78.5%)	135

Ten different raw materials were identified among the lithic sample (Table 47). Chert is the most dominant raw material (73.0 percent, n=192). Rancheria chert, a black chert occurring naturally in the limestone formations of the fault blocks surrounding the Hueco Bolson, is represented by 21 (8.0 percent) chipped stone artifacts. The other raw materials include quartzite (n=11, 4.2 percent), limestone (n=5, 1.9 percent), rhyolite (n=7, 2.7 percent), sandstone (n=1, .4 percent), basalt (n=4, 1.5 percent), vesicular basalt (n=4, 1.5 percent), chalcedony (n=1, .4 percent), obsidian (n=8, 3.0 percent), and unidentified (n=9, 3.4 percent). Obsidian and the majority of the cherts occur naturally in the Pleistocene gravels left behind by the ancestral Rio Grande that are now exposed along tectonic faults from which they have been redistributed on the Hueco Bolson desert floor.

Ground Stone Assemblage

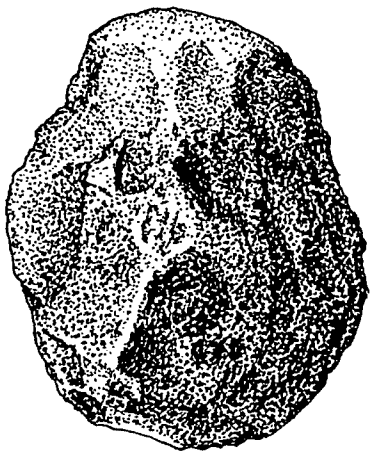
A total of 19 sites (51.4 percent of all tested sites) yielded whole or fragmentary ground stone artifacts (Appendix C). Overall, 60 ground stone artifacts were collected (Table 48). The ground stone assemblage includes mostly small fragments (n=52), but eight whole specimens—including five manos, one metate, one

Table 46
Flake Scars Observed on Whole Flakes

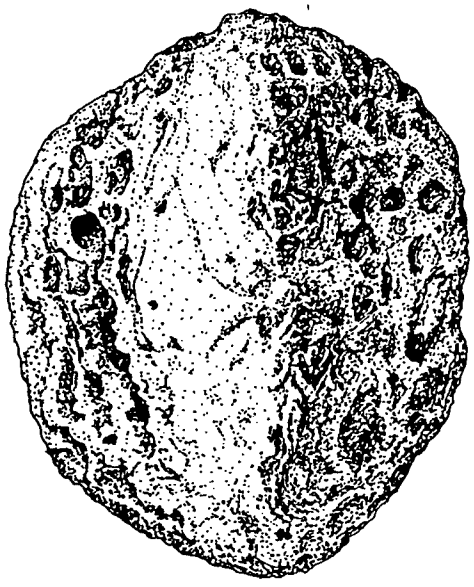
FB Site #	Unidirectional	Bidirectional	Multidirectional	Bipolar	Indeterminate	Total (n)
13147	11	1	1		14	27
10916	1	4	4		5	14
7312	3	1	6		5	15
13346	3	2	1		1	7
13206	3	1		1	6	11
13155	1	1	1			3
3929	7	2	1			10
6940	1	2				3
13338		7	2			9
6085		6	6		5	17
3994	4					4
13139		1				1
14501	2	1				3
6089		2			1	3
H70	2				2	4
13140					2	2
10694					1	1
13145					1	1
Total	*38 (28.1%)*	*31 (23.0%)*	*22 (16.3%)*	*1 (0.7%)*	*43 (31.9%)*	*135*

mano/pestles, and one pestle—were recovered from sites FBH 70 (LA 97697), FB 7312 (41EP2219), and FB 13140 (LA 106701) (see Table 48). The majority of the ground stones and ground stone fragments (n=28, 46.7 percent) were collected from only three sites (FB 13147 [41EP4697], n=12; FB 7312 [41EP2219], n=10; FB 14502 [LA 106715], n=6). Eight sites produced only one ground stone artifact each (see Table 48). The 52 ground stone fragments included pieces from 14 manos and 18 metates, one mano/metate (could not be distinguished due to fragmentation), and 19 from indeterminate ground stone artifacts. Radiocarbon dates from the sites yielding ground stone artifacts range from 3630 B.C. to A.D. 1445 (see Table 43).

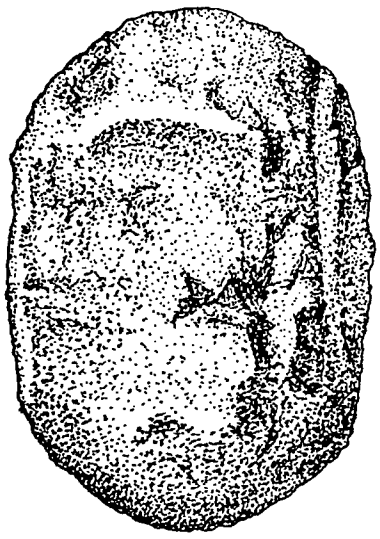
Two types of metates (slab and basin) were recognized. Metate sizes cannot be accurately estimated from the small fragments recovered, for eight (44.4 percent) of the fragments weigh less than 200 g each. It is evident, however, that the metates represented by the fragments include some large basin metates. One such intact metate was collected from the surface of site FB 7312 (41EP2219) (see Figure 57), and fragments of relatively smaller samples were collected from site FBH 70 (LA 97697). A fragment of a double-sided metate was observed on the surface of FBH 70 (LA 97697).



a



b



c

Figure 122. Hammerstones from sites: (a and b) FB 3929; and (c) FB 13147. (Scale 1:1).

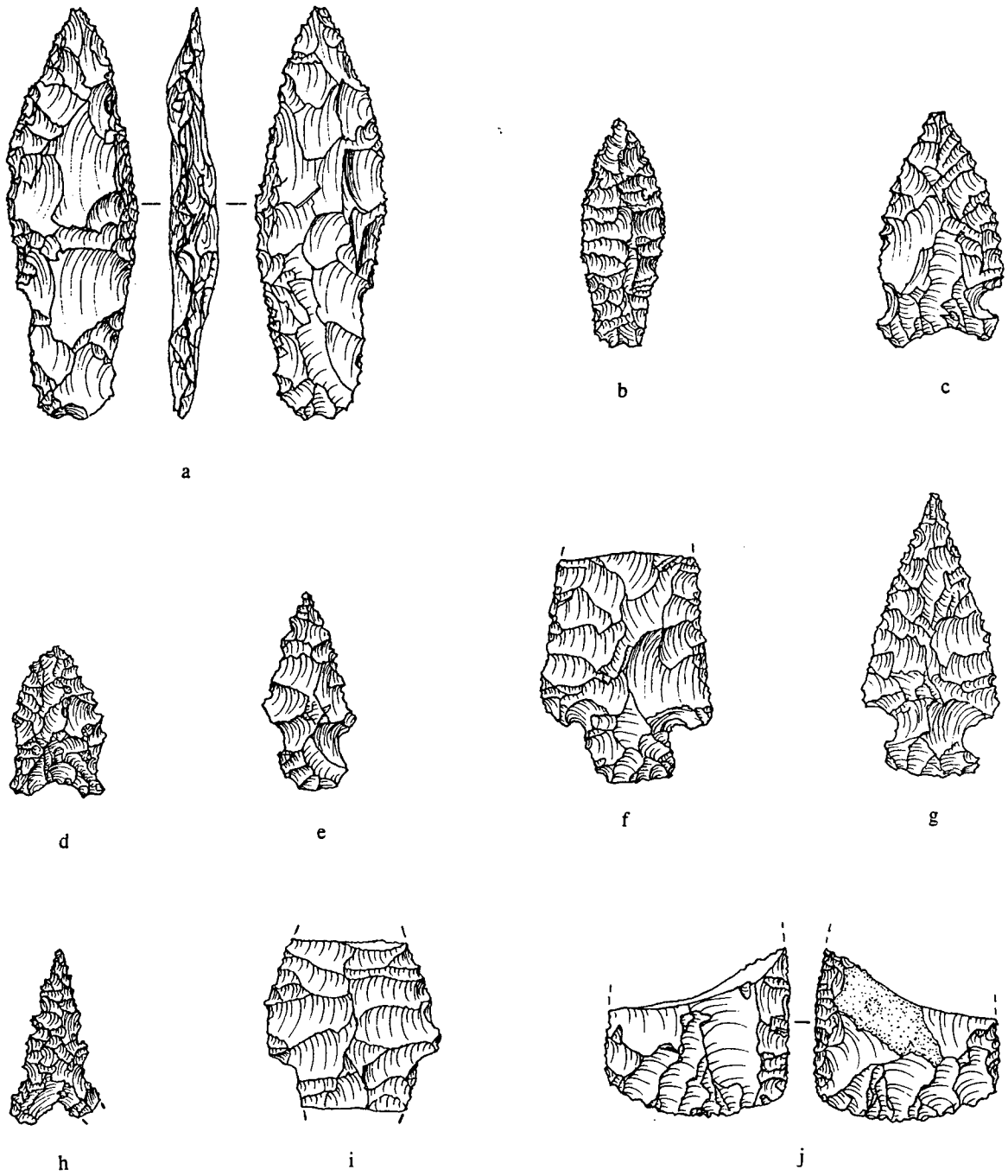


Figure 123. Temporally assignable projectile points from sites in the project area: (a) Early Archaic Bajada-like from FB 13147; (b) Early Archaic Bajada-like from FB 14501; (c) Middle/Late Archaic Chiricahua/Todsen from FB 6086; (d) Late Archaic/Early Formative San Jose from FB 6089; (e) San Pedro from FB 6086; (f) Marcos-like from FB 6084; (g) Marcos-like from FB 10916; (h) Late Formative Toyah from FB 6940; (i) unidentifiable fragment from FB 7312; and (j) unidentifiable fragment from FB 13147. (Scale 1:1)

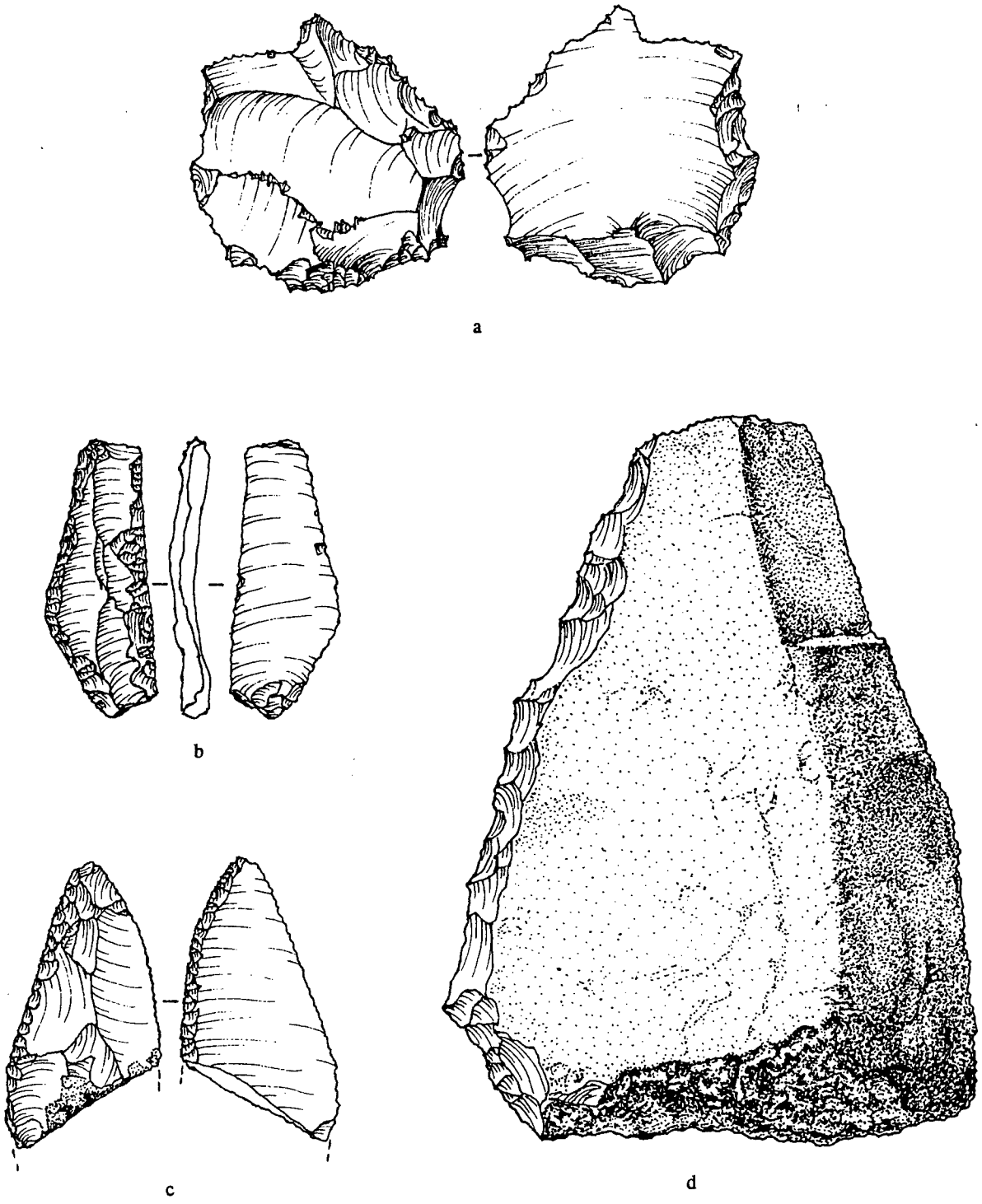


Figure 124. Unifacially retouched flakes from sites: (a and b) FB13920; (c) FB 13346; and (d) FB 13147. (Scale 1:1)

Table 47
Chipped Stone Raw Material

FB Site #	Chert	Rnch Chert	Qtzt	Lime-stone	Rhyolite	Sand-stone	Basalt	Vesicular Basalt	Chalced-ony	Obsidian	Unident	Total (n)
13147	41	3	4	3	1					1	3	56
10916	15	5			1							21
7312	17	1			1		2				2	23
13346	8	3					1			1		13
13206	13		1									14
13155	1		2		3		1			1		8
3929	7	2	3							3	3	18
6940	7											7
13338	12											12
6085	40	4		1				1				46
3994	5					1						6
13139	1		1									2
13920	3											3
6084	4			1								5
14501	6							2				8
14502	1											1
7823										1		1
6086	1										1	2
10694	1											1
6089	3								1			4
H98	1									1		2
13140	2							1				3
H70	2	3										5
13145	1											1
4525					1							1
Total	192	21	11	5	7	1	4	4	1	8	9	263
	73.0%	8 %	4.2%	1.9%	2.7%	.4%	1.5%	1.5%	.4%	3.0%	3.4%	

The five whole manos recovered included both one-handed and two-handed manos. Four of the manos are one-handed/one-sided (see Figure 56) and one is two-handed/double-sided. Mean measurements of the whole manos are: length 115.8 mm, width 96.2 mm, and thickness 32.2 mm. The manos come in a variety of cross sections (Appendix C); three are convex, while two are plano-convex. The one-handed manos range in length from 90 to 117 mm, and in weight from 303 to 800 g. The single complete two-handed mano from site FBH 70 (LA 97697) is 160 mm in length and weighs 900 g. Among the assemblage are manos made from pebbles that were utilized with little formal preparation. A multiuse mano/pestle was recovered from FB 7312 (41EP2219) and a pestle was recovered from FB 13140 (LA 106701).

Table 48
Ground Stone Typology

Patrol Base	FB Site #	Mano	Mano Frag	Pestle	Mano/ Pestle	Mano/ Metate	Metate	Metate Frag	Indeterminate Frag	Total
1	14502		3						3	6
2	3929		1					1		2
2	13145							2		2
2	H70	1						2		3
4	7820		3							3
5	13155							2	1	3
5	13346		1						3	4
6	7312	3	2		1		1	2	1	10
6	6940							1		1
7	13147					1		4	7	12
7	10916							1		1
7	13920		1						2	3
8	4525		1							1
8	6084							1		1
8	6085							1		1
8	6086		1							1
8	13139							1		1
8	13140	1	1	1					1	4
8	3994								1	1
Total		*5*	*13*	*1*	*1*	*1*	*1*	*18*	*19*	*60*
		8.3%	*23.3%*	*1.7%*	*1.7%*	*1.7%*	*1.7%*	*30%*	*31.7%*	

Note: ground stone observed outside the test units at sites FB 6089 and FB 13335 are not included in the above table.

Coarse-grained rocks were selected as ground stones. Quartzite is the most dominant identified raw material (Table 49),with lesser amounts of sandstone, limestone, granitic rock, and rhyolite. Seventeen of the 19 manos or mano fragments are of quartzite and two are of unidentifiable lithic materials. The mano/pestle is of quartzite, while the pestle is of rhyolite. The mano/metate fragment is of quartzite. Thirteen of the 19 metates or metate fragments are of quartzite, two are of sandstone, one is of limestone, and three are of an unidentifiable lithic material. Of the 19 indeterminate fragments, 16 are of quartzite, one is of a granitic rock, one is of sandstone, and one is of an unidentified material.

Discussion and Conclusions

The objective of the lithic analysis was to isolate meaningful groups of lithic artifacts to allow determination of their technological, functional, and temporal significance at both the site and project level. The most striking aspects of the prehistoric components in the project area are the scarcity of chipped stone artifacts

Table 49
Ground Stone Raw Material

Patrol Base	FB Site #	Quartzite	Sandstone	Limestone	Granitic	Rhyolite	Unidentifiable	Total
1	14502	6						6
2	3929	2						2
2	13145	2						2
2	H70	3						3
4	7820	3						3
5	13155	1					2	3
5	13346	4						4
6	7312	5	1		1		3	10
6	6940	1						1
7	13147	9	1	1			1	12
7	10916		1					1
7	13920	3						3
8	4525	1						1
8	6084	1						1
8	6085	1						1
8	6086	1						1
8	13139	1						1
8	13140	2	1			1		4
8	3994	1	—	—	—	—	—	1
Total		*47* *78.3%*	*4* *6.7%*	*1* *1.7%*	*1* *1.7%*	*1* *1.7%*	*6* *10%*	*60*

in general and the lack of typological diversity in the tool kit. The small sample of chipped stone artifacts (n=263) does not allow meaningful summary statements at the site level. The data, however, provide the potential for very generalized conclusions and trends at the project level. Data from this analysis should allow preliminary evaluation of generalized site function, patterns of raw material utilization, and relative chronology.

The limited diversity of the modified tool assemblage implies a limited range of activities at both the site and project levels. No intraproject functional variability is implied. All tools recovered from the project area can be categorized as procurement tools. The absence of maintenance tools may reflect a degree of mobility and the ephemeral nature of the sites. More data are required to support such a hypothesis; however, the presence of relatively large metates and metate fragments from sites FB 7312 (41EP2219), FB 13140 (LA 106701), and FBH 70 (LA 97697), suggests a relative longevity of occupation or a reoccupation of the sites through time.

Twenty-six of the 37 tested sites yielded lithic artifacts. Eighteen (66.7 percent) of these 27 sites yielded both chipped stone and ground stone. Of the 27 lithic sites, one (3.7 percent) site yielded only ground stone and seven sites (25.9 percent) produced only chipped stone in the lithic assemblages, suggesting diversity in site function and/or length of occupation. The total chipped stone inventory at the project level, represented by 24 modified tools (9.1 percent), 11 cores (4.2 percent), four hammerstones (1.5 percent), and 224 pieces of debitage (85.2 percent), indicates that part of the lithic reduction and tool production took place at 25 (67.5 percent) of the 37 tested sites in the project area. The chipped stone data, when considered in conjunction with the relatively large quantity (n=60) and large specimen sizes of ground stone, suggest that many of the sites in the project area were more than single episode overnight camps.

Some of the activity was related to plant food processing, as evidenced by the presence of ground stone (Appendix C). Hunting, scraping, and cutting activities are represented by projectile points, other bifaces (see Figure 122), and unifaces (see Figure 124). Projectile points in the sample are consistent with hunting activities, which are also implied by faunal remains recovered from the excavations (Appendix I).

The high ratio of flakes to modified tools in the assemblage may suggest the possibility of unmodified flake utilization. Use-wear studies on flakes from an adjacent area (Mauldin 1994) show unmodified flakes were used as tools. At the regional level, studies have shown that abundant local availability of high quality lithic materials supports the expedient use of unmodified flakes (Andrefsky 1994:30-31). The fact that no expediently used flakes were identified in the sample assemblage from this project may suggest variability in site function or may simply be a reflection of the small sample size.

Although the predominance of debitage (n=224, 85.2 percent) in the sample suggests that core reduction and tool production took place at the sites, the predominance of tertiary flakes (n=106, 78.5 percent) and the scarcity of primary flakes (n=9, 6.7 percent), however, makes the observation equivocal. The later stages of tool production will yield a high percentage of small tertiary flakes with multiple scars (Crabtree 1972; Giese 1994:66; Parry 1987:214; Stahle and Dunn 1982). Therefore, the low percentage of primary flakes coupled with a paucity of cores and hammerstones suggests that core testing and preliminary reduction occurred away from the camp site, after which flakes and bifaces were brought to the sites for further modification and tool finishing. Hammerstones would have been used for flake removal or the refurbishing of ground stones, and wedged hammerstones may have been used for more delicate flake removal (Mbutu 1991).

Core reduction strategy appears to be common to all the prehistoric components in the sample, spanning the Early Archaic to the Early Formative. Assemblages that include chipped stone show no variability in core reduction strategy as exhibited by flake scar patterns on the dorsal side of the flakes. Flake scar patterns indicate that flakes were removed from single, opposed, and multiple platforms, in order of frequency. Bipolar technique is markedly absent from these assemblages (see Table 46). A marked absence of the bipolar technique, except for rare obsidian split pebbles, from the entire project area raises an important theoretical question in lithic technology. Although the bipolar technique has been considered ideal for flake removal from small nodules such as those found in the project area, this technique apparently was not employed in the project area based on data from the test excavations.

Raw material composition also shows no variability among sites. Studies of the correlation between artifact assemblages and natural gravels show that the choice of raw material depended on availability (Andrefsky 1994; Church et al. 1994; Giese 1994:122-125; Mauldin 1994; O'Laughlin 1980:166-174;). The majority of the raw material in the project area that was used in the production of chipped stone tools appears to follow this pattern. A recent survey of gravel deposits in the area adjacent to the project area revealed that the majority of the nodules in the gravels have a diameter of 30 mm or less (Mauldin 1994). The mean

lengths, widths, thickness, and standard deviation values of complete flakes (Table 50) are consistent with the size of nodules from the locally occurring gravels. The size range, however, includes values higher than 30 mm. This is indicative of raw materials from nongravel sources, such as rancheria chert, rhyolite, silicified limestone, and basalt, being brought into the project area from the surrounding Hueco and Franklin mountains.

Table 50
Flake Length, Width, and Thickness of 81 Flakes from Selected Tested Sites*

FB Site #	Total #	Range (mm)	Mean (mm)	SD (mm)
Flake Length:				
13147	19	7-37	17.6	8.6
10916	8	12-65	29.0	16.8
7312	8	5-50	19.4	15.4
13346	8	7-44	21.6	12.3
13206	7	10-30	19.4	7.4
3929	8	12-39	22.1	9.3
13338	8	7-27	14.6	6.6
6085	15	6-60	21.0	15.8
Flake Width:				
13147	19	6-15	15.4	4.9
10916	8	8-30	22.1	13.2
7312	8	8-60	21.4	17.3
13346	8	6-30	16.3	9.1
13206	7	8-20	14.4	5.4
3929	8	8-28	15.5	6.4
13338	8	7-27	14.6	5.3
6085	15	6-40	17.1	10.3
Flake Thickness:				
13147	19	1-13	3.6	2.8
10916	8	2-19	5.9	5.9
7312	8	1-15	5.5	5.2
13346	8	3-10	6.0	3.4
13206	7	2-6	3.6	1.5
3929	8	2-12	5.4	4.1
13338	8	2-6	3.5	1.7
6085	15	1-15	4.9	4.4

* Includes only sites with seven or more whole flakes.

The variety of raw materials represented among the core and hammerstone assemblages is also indicative that lithic raw material was procured from elsewhere than the project area. Hammerstones were made from coarse-grained rocks including rhyolite, basalt, and quartzite. Rhyolite and basalt sources are found in the Franklin Mountains, and quartzite occurs along the alluvial fans of the Hueco and Franklin mountains (Mauldin 1994).

Even though the technology for manufacturing chipped stone tools apparently remained unchanged over a long period, a morphological change in projectile point types in the project area conforms to the regional trend. A total of nine of the 12 collected projectile points was temporally assignable (Table 51). All nine are associated with periods ranging from the Early Archaic to the Late Formative. Within the project area, which includes the larger Hueco Bolson and the southern Tularosa Basin, details of technological and stylistic change in projectile points are poorly known (Beckes et al. 1977; Carmichael 1986; Katz 1992; MacNeish 1993; O'Hara 1988), and a local chronology supported by radiocarbon dates is still far from being developed.

Table 51
Temporal Distribution of Identifiable Projectile Points

Site	Type	Material	Temporal Period	Total
FB 13147	Bajada-like	Chert	Early Archaic	1
FB 14501	Bajada-like	Chert	Early Archaic	1
FB 6086	Todsen/Chiricahua	Chert	Middle/Late Archaic	1
FB 6089	San Jose	Chalcedony	Middle/Late Archaic	1
FBH 98	San Pedro	Obsidian	Late Archaic/Early Formative	1
FB 6086	San Pedro-like	Welded tuff (?)	Late Archaic/Early Formative	1
FB 6084	Marcos-like	Chert	Late Archaic/Early Formative	1
FB10916	Marcos-like	Chert	Late Archaic/Early Formative	1
FB 6940	Toyah	Chert	Late Formative	1
			Total	*9*

Taxonomic categories recognized in the current project are based on comparative typologies from two primary sources: Beckes et al. (1977:43-77) and Carmichael (1986:86-103); and two secondary sources MacNeish (1991:192-285) and O'Hara (1988:191-196, 295-324). These typologies, in turn, bear resemblance to well-described typologies from areas adjacent to New Mexico as well as from the surrounding states and from northern Mexico. According to Katz (1992:II-5), "Carmichael (1986) has identified the primary types found in the area and matched these to exogenous types. MacNeish (1991) has provided a type identification key and descriptions of local and non local types." O'Hara (1988) employed Texas types and the Cochise and Oshara traditions with projectile points from the Border Star 1985 project, giving each type equal weighting.

Three main culture areas—the Trans-Pecos (Marmaduke 1978), the Cochise, and the Oshara (Irwin-Williams 1973)—are the principal sources of comparative typology commonly used in the El Paso and Fort Bliss area. The Trans-Pecos is considered an area that is transitional from Texas to the Desert Archaic. Within the Cochise culture area, the Ventana cave sequence has been tapped for comparative data in projectile point analyses of the study area (Carmichael 1986). Regardless of the extra-regional source of comparative data, comparisons are made with those types deemed most useful as temporal indicators by virtue of their consistency in the literature.

The problems with projectile point typological interpretation have been articulated by Katz (1992). In summing up the state of the projectile point typology studies in the area and their applicability to projectile point studies in Fort Bliss archeology, Katz (1992) has evaluated the typologies commonly used by researchers in the El Paso area. She observes that the Oshara tradition is based on multiple sites from which a single sequence was derived, is supported by very few dates, and is quite a long distance from the El Paso and Fort Bliss area. Although the Trans-Pecos sequence, which has been pieced together from radiocarbon dates and surface and cave material (Marmaduke 1978), is the most generalized and least reliable, it is, however, in the same region as Fort Bliss (Katz 1992). Katz (1992:II-48) sums up the reliability of the various chronologies in current use in the region as follows:

> Because of these qualitative differences, we consider that there are restrictions of the uses of each sequence. The Orogrande sequence and Lubbock Lake can be used freely for comparisons of dates and sequence of events. The Oshara and Bat Cave sequences will be used primarily for comparing the sequence of events. The date ranges, especially for Bat Cave, are considered suspect. Lastly, we can use the Trans-Pecos sequence for broad regional comparisons.

The variety of projectile points recovered during the current project reflects both the longevity of human occupation in the El Paso and Fort Bliss area and the effects of extra-regional cultural contact. As Beckes et al. (1977:77) aptly observe, ". . . broad similarities between point types are believed to indicate participation of the occupants of the study area in geographically extensive lithic traditions (Kelley 1959:288); or especially for ceramic period artifacts, indirect cultural exchange through trade."

The sample size from the current project is too small to be statistically meaningful in mathematical taxonomic modeling. Instead, an objective attempt has been made to assign the specimens to generally recognizable types that are known in the El Paso and Fort Bliss area and to regionally recognizable projectile point styles. Descriptions and photographs of projectile points from the area, contained in Beckes et al. (1977), Carmichael (1986), and O'Hara (1988) provide critical reference and comparative data. Thus, the small collection of surface projectile points has been characterized in terms of morphological attributes and temporal assignment.

Two Early Archaic projectile points resembling the Bajada style were collected during the current project (see Table 51 and Figure 123a and b). The Early Archaic points from the project area are generally characterized as being large, usually stemmed or corner-notched, often deeply serrated, and manufactured from a range of poor to good lithic material (Beckes et al. 1977; Carmichael 1986; Peter and Mbutu 1993). The Bajada type has been identified in northern New Mexico and the Four Corners area but distribution extends farther south and east. Bajada-like points are relatively uncommon in southern New Mexico (O'Hara 1988).

The Todsen/Chiricahua and the San Jose projectile points (see Figure 123c and d and Table 51) represent the Middle to Late Archaic periods in the project area (MacNeish 1993). The Todsen/Chiricahua projectile point style is distributed from eastern Arizona to the Four Corners area and to southeastern New Mexico

(O'Hara 1988). The San Jose projectile point type has been identified from the Puerco area of New Mexico and is distributed across northern New Mexico and the Four Corners area (O'Hara 1988). The San Jose type has also been identified in the Tularosa Basin and the Hueco Bolson (Beckes et al. 1977; Carmichael 1986; O'Hara 1977; Peter and Mbutu 1993).

The Late Archaic/Early Formative period is represented by four projectile points comparable to the Marcos (n=2) and San Pedro (n=2) styles. The "archetypes" for these projectile point styles are widely distributed from central Texas to Arizona (Beckes et al. 1977; Boisvert 1985; Carmichael 1986; O'Hara 1988). Marcos-style projectile points are commonly found in central Texas (O'Hara 1988). The San Pedro style projectile point is distributed from eastern Arizona into southeastern New Mexico and north to the Four Corners area (O'Hara 1988).

The Toyah is indicative of populations who likely inhabited the area during the Late Formative. The distribution of this arrow point style is typically eastward across West Texas and the Lower Pecos. In the El Paso area, the current interpretation of projectile points suggests unanswered questions. Local typology literature is replete with use of "type-likes," which is symptomatic of the underlying problem of applying extra-regional chronologies to local projectile points. Application of the types discussed in this report remains strictly heuristic.

Although ground stones are present throughout the project area, the ground stone sample recovered from the testing phase is very small, and inference can only be general at best. Morphological data drawn from ground stone analysis can, however, be used to make inferences about site function, and ground stone raw material data can shed insight on hunter-gatherer mobility. The size of the grinding implement and the grinding surface area have been used to correlate the intensity of grinding practices (Mauldin 1994). Processing wild plants required less grinding area than processing the presumably more voluminous cultivated cereals (Mauldin 1994). The scarcity of multiple-sided manos and the relative abundance of small-sized one-handed and single-sided manos in the project area is an indication of low intensity grinding. The radiocarbon dates and ceramic rim sherd typology put the majority of the dateable sites within the Late Mesilla period between A.D. 680-980 (see Table 43). Sites were used for food procurement as implied by chipped stone tools and for food processing as implied by the ground stone and ceramic assemblages. The presence of large, heavy metates, not easily portable, is indicative of either longevity of occupation or repeated occupation of the site by the same group, or of utilization of the ground stone as site furniture by different groups of site occupants over time (Binford 1979; Carmichael 1986:200).

All the ground stone raw material types identified occur locally within approximately 30 km of the project area. Quartzite occurs on the eastern flank of the Franklin Mountains (Carmichael 1986; Mauldin 1994). Limestone, less favorable for the manufacture of ground stones due to its fine-grained texture, is found in all of the mountainous areas around the project area. Sandstone is available throughout the surrounding Franklin and Organ mountains, and on Otero Mesa. Rhyolitic porphyry is from the mountains that flank the project area, particularly the Franklins (Carmichael 1986:183; Mauldin 1994). Thus, procurement of the lithic raw material did not require groups to travel outside the Hueco Bolson.

Twenty-three percent (n=14) of the ground stone fragments exhibit secondary use as fire-cracked rock, having been reused in hearths possibly as hearth stones or heating material. Overall, however, there are more burned caliche hearths than fire-cracked rock hearths in the project area. The possible lack of sources of suitable coarse-grained lithic materials on the valley floor within the project area may have necessitated the reuse of ground stones in some hearths.

Ceramic Assemblage

Sixteen of the 37 tested sites yielded 425 prehistoric ceramic sherds (Table 52). No sherds were recovered from 21 sites (53.8 percent). Assemblage sizes are typically small. The total number of sherds recovered from individual sites ranges from one to 135 (see Table 52). Four sites yielded a single sherd each, and five more sites yielded between two and 10 sherds each. Only four sites yielded more than 25 sherds each, with three of these occurrences being pot drops or single shattered pots. Centuries of exposure to the desert environment have reduced most sherds to sizes so small (overall dimensions ranging between 8 mm and 17 mm) that their diagnostic potential is significantly diminished. Single shattered pots or pot drops comprise 46.5 percent (n=198) of the sherd concentrations, thus greatly reducing the minimum number of vessels constituting the assemblage. Surface collections make up approximately 14 percent of the sample sherd assemblage, approximately 46 percent are from the eolian overburden, approximately 14 percent are from the interface between the eolian overburden and the Organ surface, and approximately 26 percent are from the subsurface.

Table 52
Ceramic Types by Site

FB#	El Paso Brownware	El Paso Brown rims	El Paso Bichrome rim	El Paso Polychrome Body	El Paso Polychrome Rims	Tucson Polychrome Body	Tucson Polychrome Rim	Chupadero B/w	Total
H 70	6								6
3389	13				4				17
3929	5								5
3994	1								1
7312	15	5	1						21
7823	1								1
10694	2								2
11616	55								55
13140	1							1	2
13147	119	6				9	1		135
13206	25								25
13338					1				1
13346	46	2							48
13920				95	4				99
14501	6								6
14502	1								1
Total	*296*	*13*	*1*	*95*	*9*	*9*	*1*	*1*	*425*
	69.7%	*3.1%*	*.2%*	*22.4%*	*2.1%*	*2.1%*	*.2%*	*.2%*	

Ceramic Typology

The 425 pieces from the ceramic assemblage consist of 296 (69.7 percent) unspecified brownware body sherds, 13 (3.1 percent) El Paso Brownware rims, 104 (24.5 percent) El Paso Polychrome body and rim sherds, 10 (2.3 percent) Tucson Polychrome body and rim sherds, one (.2 percent) El Paso Bichrome rim, and one (.2 percent) Chupadero Black-on-white sherd (see Table 52). These percentages are necessarily for sherds (versus complete pots) and therefore have little direct correlation with temporal occupation density patterns or usage patterns. For example, El Paso Polychrome is 24.5 percent of the sherd assemblage but 99 of the 104 El Paso Polychrome sherds are from one site.

Plain Brownware

The difficulties in distinguishing brownware body sherds has led to the use of an unspecified Brownware classification at Fort Bliss and elsewhere. The unpainted lower body parts of El Paso Bichrome and El Paso Polychrome may not be distinguishable from El Paso Plain brownware which is the most common ceramic type in the study area (Carmichael 1986; Lehmer 1948; Mauldin 1994; Mills 1991; Runyon and Hedrick 1973; Whalen 1977, 1978). However, on this project, 61.1 percent (n=181) of the brownware body sherds were recovered from sites associated with radiocarbon dates prior to A.D. 1000, thus preceding the manufacture of painted brownware in the area. Forty-six (15.6 percent) additional brownware sherds were from site FB 13346 (41EP4696) that also produced two El Paso Plain Brownware rims. Only 13 (6.7 percent) brownware body sherds were from a site sample (FB 3389 [LA 94392]) that also included only painted rims. These percentages, when considered with the fact that El Paso Plain brownware was produced 800 to 1,000 years before, and 800 to 1,300 years longer than, the painted pottery types evidenced on these sites, are strongly indicative that well over 90 percent of the plain brown body sherds are El Paso Plain (R. Giese, personal communication 1995).

El Paso Plain brownware is distinguishable from Jornada brown, the other type of brownware sometimes found in the area, by its unfloated coarse texture. Plain brownware sherds from the project area are characterized by coarse paste, crushed rock temper, core streaking, and occasional exterior surface carbonization. Although the sherds in the sample are generally coarse in texture, attempts at surface smoothing is evident on some of the sherds. Surface color shows little variability. The majority of the El Paso Plain brownware sherds range in color from brown to dark gray. No Jornada brown sherds were identified during this project.

El Paso Plain brownware was in use during the Mesilla (pithouse) phase from approximately A.D. 200 to approximately A.D. 1100, after which painted wares became more common (Seaman and Mills 1988). El Paso brown rims produced during the Mesilla phase are typically more pinched and straighter than those rims from the El Paso phase (compare Figures 125 and 126). One rim sherd exhibits a straight and markedly pinched rim typical of early Mesilla phase pottery (see Figure 125a). Thirteen of the rim sherds are straight but not distinctly pinched (see Figure 125) and are comparable to the Late Mesilla ceramic assemblage (Whalen 1980:23, Figure 11).

El Paso Bichrome

The single El Paso Bichrome sherd was recovered from FB 7312 (see Table 51). The rim sherd is painted black on local brownware. In the El Paso area, El Paso Bichrome can also occur as red on brown (Mills 1988:164; Runyon and Hedrick 1973). Type assignment for bichromes should be cautiously done because

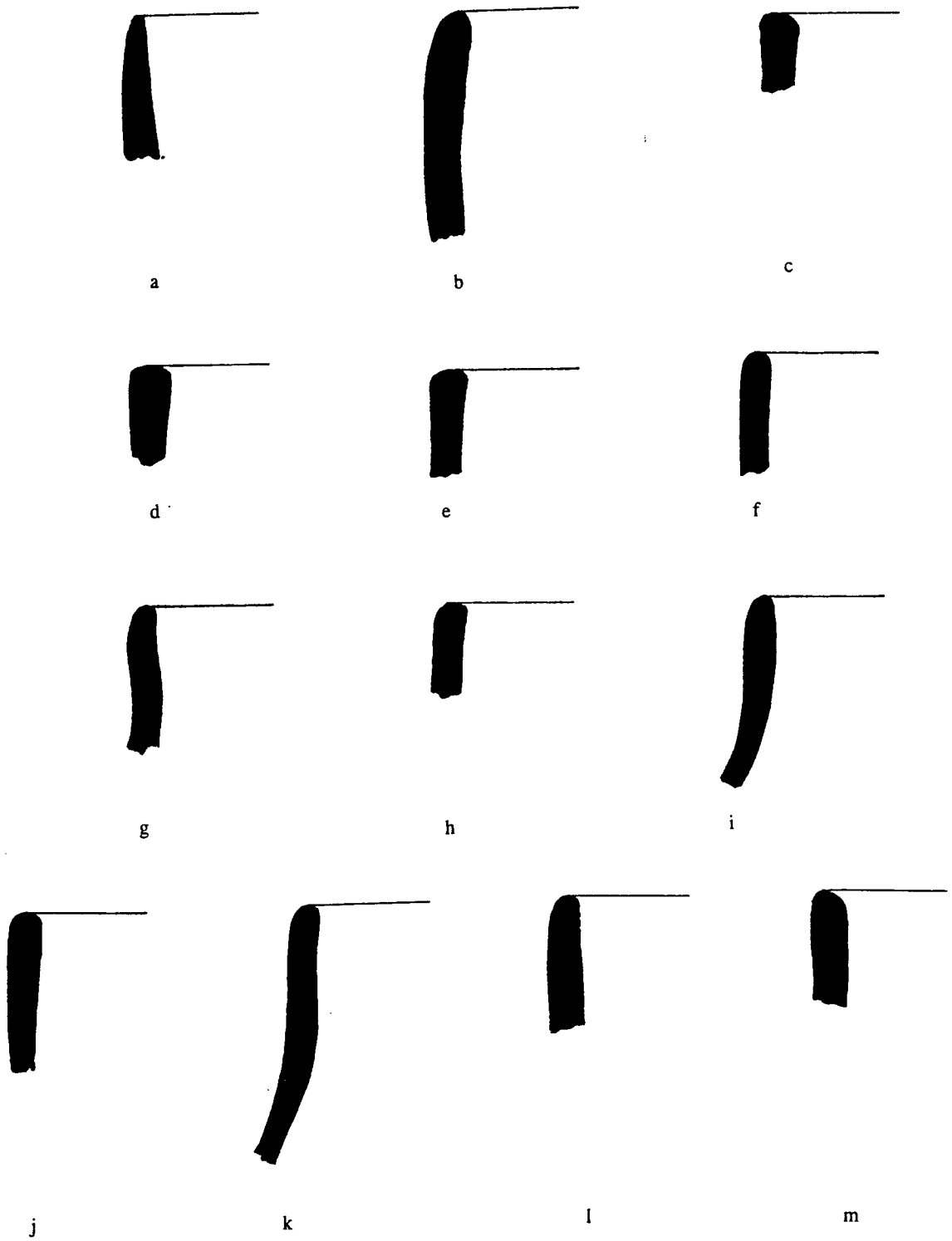


Figure 125. Profiles of El Paso Plain brownware rim sherds from surface collections and test excavations: (a, b, c, d, e) site FB 7312; (f, g, h, i, j, k) site FB 13147; and (l and m) site FB 13346. (Scale 1:1)

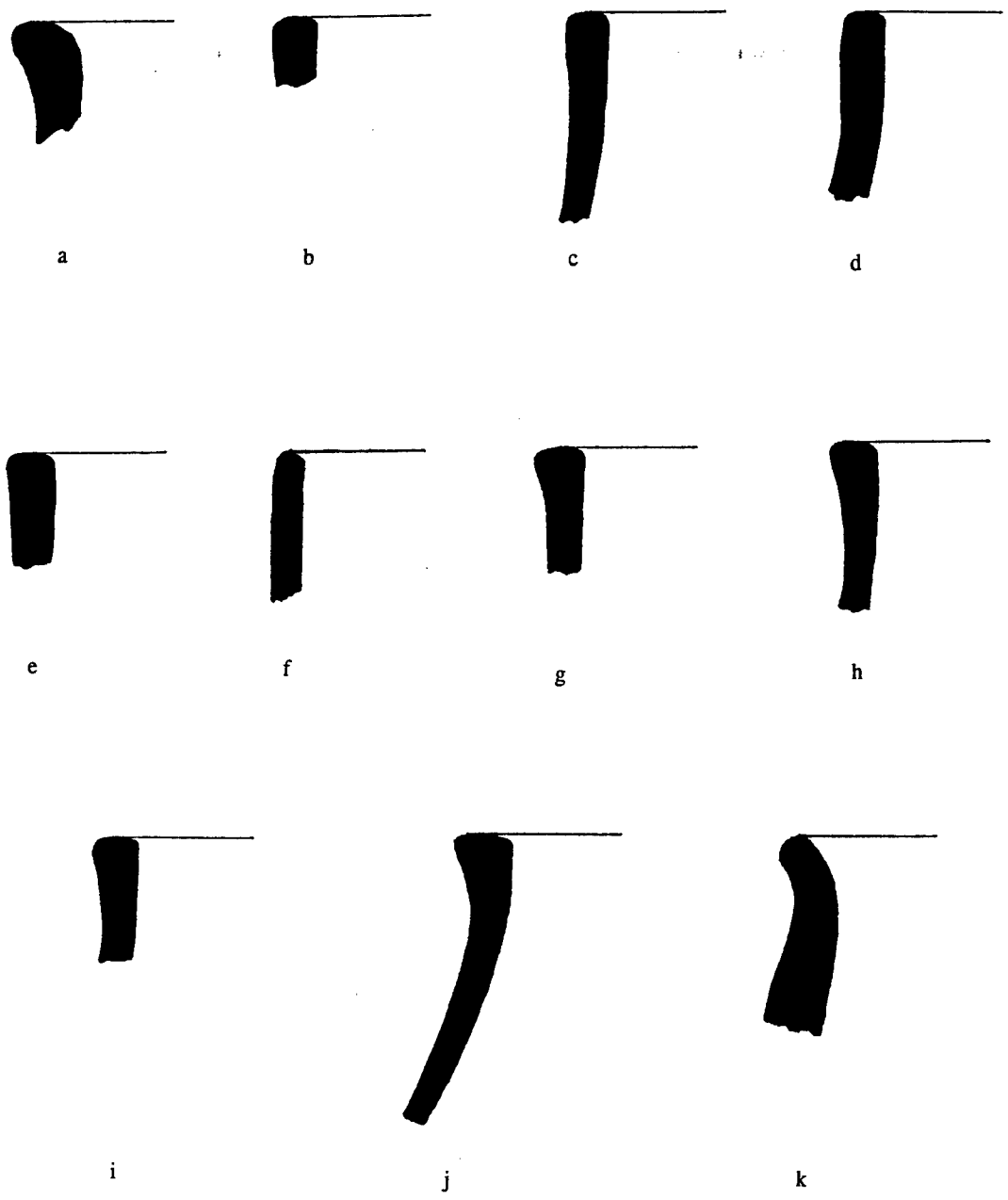


Figure 126. Profiles of rim sherds from surface collections and test excavations: (a) El Paso Bichrome from site FB 7312; (b, c, d, e) El Paso Polychrome from site FB 3389; (f) El Paso Polychrome from site FB 13338; (g, h, i, j) El Paso Polychrome from site FB 13920; and (k) Tucson Polychrome from site FB 13147. (Scale 1:1)

weathered polychrome sherds, where one color has been corroded away, can easily be misidentified as bichromes. In addition the red color is always a fugitive and may not be easily recognizable. Although El Paso Bichrome has not been independently securely dated, a comparison of rim morphology attributes indicates an overlap with late El Paso Plain brown and early El Paso Polychrome (Mills 1988). In Whalen's (1978) categories, the bichrome pottery was characterized as "later El Paso Brown." Whalen reported a radiocarbon date of A.D. 1000 in association with the "later El Paso Brown variant" (Whalen 1978:63). Mills (1988:165) observes that some of Whalen's "later El Paso Brown variant . . . would be called El Paso Bichrome."

El Paso Polychrome

Overall, 104 El Paso Polychrome sherds were recovered (see Table 52). The majority of the sherds were recovered from FB 13920 (41EP4699). All 99 sherds (95 body and four rim sherds) recovered from FB 13920 (41EP4699) were localized in a small cluster (70 cm in diameter) and their color and breakage pattern are indicative of a single shattered pot. Fifty-five of the sherds were recovered from the subsurface. A hearth on FB 13921 (41EP4700), which is located approximately 40 m from the pot drop at FB 13920 (41EP4699), yielded a corn cupule (Apendix J). The hearth at FB 13921 (41EP4700) has been radiocarbon dated to 610 $\pm$ 80 B.P. (A.D. 1270-1445). Four polychrome sherds were recovered from site FB 3389 (LA 94392) and one from FB 13338 (LA 106697). Unpainted brownware sherds from the same locus were categorized as El Paso Plain brownware, although they could have belonged to the same vessel as the painted rim sherds. El Paso phase vessels have many of the same attributes as El Paso Plain brownware, including coarse paste, crushed rock temper, and sherd surface and core colors. El Paso Polychrome rims, however are thickened and everted in contrast to the straight, pinched, or rounded El Paso Brown rims (compare Figures 125 and 126).

Chupadero Black-on-white

The Chupadero Black-on-white assemblage is represented by a single sherd recovered from the prehistoric component at FB 13140 (LA 106701). The polished outer surface is painted with a broad black band and framed hatching. It is hard-fired. The tempering material includes relatively small particles of quartz sand. Regionally, Chupadero Black-on-white is dated between A.D. 1150 and 1400 (Runyan and Hedrick 1987:46). The paucity of the ware has implications concerning the temporal range of the tested sites as will be discussed below.

Tucson Polychrome

Nine body sherds and one rim sherd from a Tucson Polychrome vessel (identified by Tom O'Laughlin) were recovered from a tank-disturbed surface at FB 13147 (41EP4697). The sherds were localized in a small area (4-x-5 m) and appear to be from the same vessel. The sherds are characterized by red, black, and white paint, and a markedly everted rim (see Figure 126). Tucson Polychrome originates from southeastern Arizona and was introduced into the El Paso area during the late (post-A.D. 1350) El Paso phase (Smiley 1977). It has been identified within close proximity to the project area on McGregor Range (Smiley 1977) and at Fire Cracker Pueblo (T. O'Laughlin, personal communication 1994).

Rim Morphology Variability

A total of 24 rim sherds (Table 53; see Figures 125 and 126) was recovered. Thirteen (54.2 percent) were unpainted and were classified as El Paso Plain brownware, one is El Paso Bichrome (4.2 percent), one a Tucson Polychrome (4.2 percent), and the remaining nine (37.5 percent) are El Paso Polychrome. Eleven (84.6 percent) of the El Paso Plain brown rim sherds are jar remnants, one (7.7 percent) is from a bowl, and one (7.7 percent) is from an indeterminate vessel type (see Table 53). All painted rim sherds, including the Tucson polychrome are from jars.

Table 53
Rim Sherd Index

FB#	Collection #	Rim Sherd Type	Vessel Type	RSI
7312	34	El Paso Brown	Unidentified	.8
13147	23	El Paso Brown	Jar	.8
13346	7	El Paso Brown	Jar	.9
13147	29	El Paso Brown	Jar	.9
13147	23-1	El Paso Brown	Jar	1.0
13346	11	El Paso Brown	Jar	1.0
3389	3	El Paso Polychrome	Jar	1.0
7312	25	El Paso Brown	Bowl	1.04
13338	4	El Paso Polychrome	Jar	1.05
13147	33	El Paso Brown	Jar	1.07
13147	23-3	El Paso Brown	Jar	1.1
13147	33	El Paso Brown	Jar	1.1
7312	44	El Paso Brown	Jar	1.2
7312	24	El Paso Brown	Jar	1.2
7312	44	El Paso Brown	Jar	1.2
3389	1	El Paso Polychrome	Jar	1.2
3389	2	El Paso Polychrome	Jar	1.2
13920	4	El Paso Polychrome	Jar	1.2
7312	34	El Paso Bichrome	Jar	1.3
3389	4	El Paso Polychrome	Jar	1.3
13920	7	El Paso Polychrome	Jar	1.5
13920	5	El Paso Polychrome	Jar	1.5
13920	12	El Paso Polychrome	Jar	1.7
13147	100	Tucson Polychrome	Jar	.63

Derivation of Rim Sherd Index (RSI) values (see Table 53) is based on a formula first suggested by West (1982) and later applied by Carmichael (1986) and Seaman and Mills (1988:170). Two rim thickness measurements are taken, the first at 2 mm below the rim surface and the second 15 mm below the rim surface. The rim sherd index is derived by dividing the first value by the second (Seaman and Mills 1988:170). The RSI values for El Paso Plain brown jars from the current project range from .8 to 1.2 (see Table 53). The RSI value (1.0) for the El Paso Plain brown bowl is within the range of El Paso Plain brown jars. El Paso Polychrome RSI values range from 1.0 to 1.7 with a mean at 1.3. The single El Paso Bichrome rim is within the RSI value range of El Paso Polychromes. The RSI value for the Tucson Polychrome (.63) falls clearly outside the range of both painted and unpainted El Paso brownware in the sample (see Table 53).

Compositional Analysis

In spite of the wide range of common characteristics in brownware ceramics from an extensive geographical area, compositional discriminative analytical studies have demonstrated variability in brownware clay sources. Past studies have shown variability in basic clay mineralogical constituents among sites within McGregor Range (Dulaney and Pigott 1977). At a regional level, Dulaney and Pigott (1977:275) observed that:

> It appears quite possible that all plain brownwares manufactured north of the Sierra Blanca region, east to beyond the Pecos River drainage, west to the Rio Grande, south to El Paso belong to only one basic type, with such minor variations as can be observed to be the result of differences in local mineral sources. If so, then tremendous potential exists for unraveling the complex and little understood relationships between these areas of southeastern New Mexico and western Texas by mineralogical and petrographic analyses of brownwares found on sites in these areas.

Several studies have addressed the problem by attempting to identify the clay sources of the prehistoric sherds. The studies focus primarily on two variables—trace minerals and particle sizes—and are based on the "assumption . . . that clay sources across the basin are sufficiently mineralogically diverse to permit identification of individual sources" (Dulaney 1977:266). Dulaney and Pigott (1977) combined petrographic and X-ray diffraction (XDF) studies. Bently (1992) used X-ray Fluorescence (XRF), and Burgett (personal communication 1994) used acid extraction to achieve similar goals. Bently is applying neutron activation, which identifies significantly more trace minerals than either XRF, Acid Extraction, or XRD (M. Bently, personal communication 1995).

Co-variation in nonplastic inclusions of plain brownware and locally available minerals indicates that variability in mineral constituents in plain brownware reflects variability in origins of the clay rather than temporal, functional, or stylistic differences (Dulaney and Pigott 1977:275). Trace elements can narrow the clay source to several broad areas but individual sites can only be approximated. In identifying clay sources, temporal difference is not expected to be a factor because plain brownware in the region is time-transgressive. "Sherds from sites known to differ in age but within the same areas do not seem to be substantially different and local sources of ceramic raw material do not appear to have changed over time" (Dulaney and Pigott 1977:285). Dulaney and Pigott (1977) noted:

> Sherds from earlier sites were compared to those from later sites to see if any changes in particle size percentages occurred over time; changes in mineral constituents would indicate changes in source areas. Statistically, no such changes were observed. This suggests that the prehistoric potters were consistent in their choice of source locations for their clays and in the methods they used to refine them.

Ceramic compositional analysis has the potential to contribute greatly toward elucidating prehistoric settlement patterns. By identifying areal sources, possibly villages, where the pottery was made, correlation can be made between seasonal sites, such as in the project area, to various villages. It is, therefore, recommended that at the completion of Phase III, sherd samples from the excavated sites be subjected to compositional analysis.

Discussion and Conclusions

The most common ceramic artifacts in the project area are El Paso Plain brownware sherds. Sherds from the unpainted lower body of El Paso bichromes and polychromes are indistinguishable from El Paso Plain brownware and may be lumped with the latter although the effects of this are minimal. On this project, the predominance of El Paso Plain brownware rim sherds and brownware sherds from sites dated to pre-A.D. 1000 preclude this possibility. Where plain brownware body sherds are determined to be from a polychrome pot drop, such as at FB 13920 (41EP4699), the body sherds have been categorized as belonging to a polychrome vessel.

Distribution of brownware in an extensive area of southern New Mexico and western Texas implies an extensive culture area in prehistoric times. Its wide distribution and extremely long temporal history masks intersite variability and thwarts attempts to refine chronology and reconstruct culture history.

Lack of intersite variability in sherd surface and core color is indicative of common firing conditions by occupants of different sites in the project area. Plain brownware refiring experiments by Dulaney and Pigott indicate that firing potential of fuels found in the project area may not have exceeded 650° C. The fuels found in the area (juniper, cedar, mesquite, grasses, and yucca stalks) burn at a rapid rate shortening the oxidation period (Dulaney and Pigott 1977:280). Brownware pottery from the project area is characteristic of ceramics fired under a limited oxidizing atmosphere. Some variation in surface color is, however, a result of fireclouds due to differential oxidation (Dulaney and Pigott 1977) or sooting (Mills 1991). The core of the majority of the brownware sherds is predominantly dark gray to black with little variation (see Table 52). This coloration is indicative of a low degree of oxidation. If soils containing organic matter were used, such organic matter would take much heat to burn and would result in the dark carbon streak in brownware sherd cores (Dulaney and Pigott 1977).

Similarity in the range of nonplastic inclusions (temper) between sites emphasizes the local origin of the clay. A natural presence of crushed rock particles of feldspar, quartz, and sand in the clay may have obviated any need for the intentional addition of tempering material. Nonplastic inclusions make the pot porous and easily breakable. In other parts of the world the problem is rectified by addition of gummy extracts to increase plasticity (Dulaney and Pigott 1977). If this were done to pottery from the project area it has not been demonstrated. Poor sorting and lack of bimodality of sand sizes generally indicates an absence of the deliberate addition of nonplastic inclusions except where airborne sand has introduced sand size bimodality in the clay sources such as those from playas. Runyan and Hedrick (1973:21) described seven different combinations of feldspars, quartz, sand, gypsum, and crushed sandstone, with minor amounts of mica, magnetite, and hematite, found in plain brownware in the El Paso area. Petrographic analysis of plain brownware sherds identified feldspars and quartz as the major nonplastic inclusions (Dulaney and Pigott 1977:269) and led to the conclusion that "these sherds represent vessels made by prehistoric populations from local materials, primarily illites, orthoclase, plagioclase, and quartz" (Dulaney and Pigott 1977:285). Sherds from the southern part of McGregor Range adjacent to the project area display traces of minerals of igneous origin as well as bimodal sand sizes (Dulaney and Pigott 1977). Because no petrographic analysis has been

conducted on sherds from the project area, their similarity to sherds from southern McGregor Range cannot be conclusively determined.

Functional characterization of the assemblage is greatly hampered by the lack of diagnostic sherds. The highly fragmentary nature of the sherds in the project area does not allow vessel reconstruction. Although the smoothed surface of a sherd (interior or exterior) has been used to distinguish bowls from jars (Mauldin 1994), it was felt that the sherds from the current project are too weathered to determine original surface texture. The differentiation of jars from bowls emphasized orifice attributes. Exterior carbonization on polychrome vessels implies a cooking function (Mills 1988; Wiseman 1984). Two El Paso Polychrome ollas recovered from a site in the foothills of the Sacramento Mountains on McGregor Range outside the project area contained ornaments, including turquoise, and evidently functioned as storage vessels (Smiley 1977). It has been speculated that the light weight of the ollas may have made them suitable for transporting light commodities such as pinyon nuts for long distances (Smiley 1977). Eighty percent of all trade ceramics at Casas Grandes in Chihuahua, Mexico, were El Paso Polychrome (Dulaney and Pigott 1977:283). This abundance led Di Peso to remark that El Paso Polychrome was the "tin can of prehistoric trade" (Di Peso 1974:623).

The rim sherd assemblage is characterized by a pronounced paucity of pinched rims (see Figure 125) suggesting that most of the sites in the project area that included brownware in the sherd assemblage were occupied during the late Mesilla phase. With the exception of one rim (see Figure 125a) which is distinctly pinched, and three more (see Figure 125f, g, and l) that are marginally pinched, all other plain brownware rims are morphologically similar to late El Paso brown rims (Whalen 1980:33; Figure 11). The lack of evidence for early El Paso Plain brown rims correlates to the absence of Early Mesilla radiocarbon dates in the project area (see Table 43). This would indicate the basin was not intensively used prior to approximately A.D. 600 during the early Mesilla phase barring a sampling bias (see Mauldin 1994 for a contrary view). Stable isotope data from Backhoe Trench (BT) 8 at the edge of FB 13147 (41EP4697) in PB7 indicate a marked increase in C_3 plants and a warming trend (Appendix H; Figure H-5) by 1550 $\pm$ 120 years ago or the early Mesilla phase. Nevertheless, even the small assemblage in the project area indicates that brownware technology lasted for a long time. Although its disappearance from the area was thought to coincide with the rise of pueblo communities (Lehmer 1948:80), it is possible that plain brownware lingered on in the Rio Grande pueblos until the beginning of the twentieth century (Dulaney and Pigott 1977:274; Seaman and Mills 1988). Dulaney and Pigott conclude that raw materials, combined with a primitive level of technology, dictated a plain brownware that was low fired and poorly oxidized with much sand and organic matter rendering it porous and easily broken (Dulaney and Pigott 1977). Lack of suitable raw materials may account for the time-transgressiveness of the conservative technology.

The typically small assemblages are most likely attributable to a late Mesilla phase demography, characterized by low overall population size (Carmichael 1986) and a mobile adaptive system. The adaptation system during the Mesilla phase was apparently more sedentary than the Archaic as evidenced by increasing numbers of pithouses and the possession of pottery. Fauna data corroborate an interpretation of low occupation rates. Only 11 of the tested sites produced faunal remains and only five of these produced more than 15 bones. The few faunal remains which were recovered from prehistoric contexts were dominated by lagomorphs and not more than two cottontail or jackrabbits were represented in any given context; remains from animals larger than lagomorphs were not recovered and smaller game is represented by a single rodent element. The prehistoric faunal assemblage suggests that hunting may not have been an important activity, that hunting was possibly opportunistic and by individuals, or that game was perhaps scarce and not easily hunted in the low basin environment (Appendix I).

The low typological diversity in the assemblage is primarily a result of the lack of evidence of intrusive wares in the project area. A single Chupadero Black-on-white and 10 Tucson Polychrome sherds constitute the entire recovered intrusive ware assemblage. The sample is not representative of the prehistoric ceramic population already documented within the boundaries of Fort Bliss Military Reservation. Significantly fewer types were identified during the current project than have been noted previously on McGregor Range (Carmichael 1986; Peter and Mbutu 1993; Smiley 1977:19), in Maneuver areas close to the Hueco Mountains (Mbutu and Peter 1996), near Orogrande (Mills 1988), and along Loop 375 on the northern periphery of El Paso (O'Laughlin 1990). The sample, however, compares well with Fort Bliss Project 90-11 (Mauldin 1994) from the same environment. The only intrusive ware recorded during Project 90-11 was Mimbres Black-on-white sherds. The paucity of Mimbres Black-on-white and Chupadero Black-on-white in assemblages from both the current study and Project 90-11 is indicative of the pre-pueblo nature of these basin floor assemblages. The presence of Tucson Polychrome, dated to post-A.D. 1350, indicates that pueblo period (Late Doña Ana/El Paso phase) populations were exploiting the basin as well, but at a less intensive scale than the Mesilla phase population.

The ceramic assemblage suggests a possible gradual increase of polychromes compared to brownwares, and by implication, during the transition from Late Mesilla to the El Paso phase. The distribution of RSI values shows a cluster of eight values from 1.2 to 1.3. These values include three El Paso Plain brownware, one El Paso Bichrome, and four El Paso Polychrome sherds and are representative of an overlap between the upper limits of the El Paso Plain brownware and the lower limits of the El Paso Polychrome. The overlap of RSI values between El Paso Plain brown and El Paso Polychrome is indicative of a gradual, rather than abrupt, dominance of painted El Paso brownware over plain brownware, as observed by Seaman and Mills (1988). A larger body of data is required to test this hypothesis. The rims in the cluster are morphologically similar with a characteristically flattened surface, indicative of a common repertoire of rim-forming techniques, the only difference being some are painted and others are not.

RECOMMENDATIONS

Introduction

The current project involved the evaluation of 38 archeological sites within nine 1-km^2 noncontiguous quadrats, which are designated as Patrol Bases for training exercises for use by the 7th Ranger Training Battalion. One site, FB 4332 (no LA number assigned), falls within the boundaries of an archeological district (No. 27) that is protected under the National Historic Preservation Act; this site was not tested. Test excavations were conducted for the remaining 37 sites. The primary focus of the testing investigations was to identify the eligibility of each resource for listing in the National Register of Historic Places (NRHP). NRHP eligibility status for the sites and recommendations for mitigation of adverse effects are presented.

The evaluation of archeological sites located on the Hueco Bolson desert floor within the Fort Bliss Military Reservation is made more difficult by an ever-changing coppice dune environment. The shifting dunes provide glimpses of archeological sites that may consist of only a hearth feature and a few associated artifacts or a palimpsest of prehistoric occupational debris that represents thousands of years of use of a particular area and that covers several hectares. Definition of site boundaries and establishment of contemporaneity of clusters of artifacts and features is challenging at best. Some (Camilli, 1986, 1986; Ebert 1986; Seaman et al. 1988) would argue that the concept of an archeological "site" should be abandoned and that the spatial patterning of artifacts and features should be examined in relation to the "landscape." Such an approach is essential to understanding the overall pattern of land use and resource use through time; however, the

concept of a "site" is still very important to the management of archeological resources. The "site" is recognized as a spatial entity where a prehistoric society conducted a large portion of its subsistence and social activities at a given point of time. A defined "site" is also conducive to the evaluation of the potential significance of proposed impacts that will affect well-defined areas.

The test excavation of 38 sites was therefore designed to determine the following: (1) the contextual integrity of the archeological sites, (2) the data potential of the sites in relation to regional research goals, and (3) the delineation of site boundaries. Of these three goals, the delineation of site boundaries, especially the horizontal limits, was most problematic; the dune environment precludes accurate boundary delineation within reasonable budgetary parameters. It should be noted, however, that the determination of contextual integrity or site data potential is difficult at best within the coppice dune environment. Spatial association of features and artifacts within dunal blowouts is hardly a guarantee that all are the result of a single behavioral event. Furthermore, clusters of features and artifacts in adjacent blowouts could represent socio-functional differentiation within a single occupation or they could represent multiple occupations separated by hundreds or thousands of years. The recognition of such patterns is dependent upon detailed investigations of such site contexts. Therefore, the evaluation of the 38 sites is dependent on our present perception of the data potential of each site. In most cases, the presence of well-defined features and associated artifacts in good stratigraphic context was the primary criterion. Nevertheless, it remains to be seen what lies beneath the adjacent dunes. If the backhoe trenching that was conducted is any indication, the data potential of these sites (beyond the data already recovered) is extremely limited. Admittedly, no screening of the soil matrix beneath the dunes was conducted; therefore, artifactual evidence may have been overlooked. However, the excavation of trenches revealed only two features. Such results do not indicate that the data potential of any of these sites may be worth the cost of a full data recovery effort. Phased investigations that may be terminated at any point that it is determined that additional investigations will yield redundant data may be a more reasonable approach.

Nature of Adverse Effects to Cultural Resources

Current

The primary land use of the project area is for air defense deployment (i.e., tactical offensive and defensive training, using tracked and wheeled vehicles). Cultural resources are damaged by cross-country maneuver activity (Department of the Army 1991:11). More often than not, hearths were found exposed in tank tracks. When a hearth is destroyed, through either erosion or tank traffic, much of its scientific value, including radiocarbon dating potential, is significantly reduced. When an isolated hearth that solely defines a site is destroyed, the loss of data about the site is complete. In addition, it has been documented that tanks alter the physical make-up of archeological deposits. In the northern area of Project 91-07 (Mauldin 1994), which has been impacted by tanks, the mean size of sherds recovered from site surfaces was smaller than those recovered from areas of less impact (Mauldin 1994:121).

Projected Impact

As stated in the original scope of work, the military undertaking will entail the excavation of body-sized trenches (approximately 2-x-1-x-.5 m) for each recruit. These trenches are usually excavated into the bottom toe of a coppice dune. In addition, one slit trench (122-x-61-x-122 cm) will be dug per training class in each Patrol Base. Consequently, one year of training 12 classes will impact 7,752 m^2 (4,080 m^3) or .09 percent of the land surface in the nine Patrol Bases. The present Platform of Instruction (POI) is for five years and

will probably continue for an additional five. A total of 77,520 m^2 (.86 percent) of Patrol Base areas will be disturbed to a depth of .5 m in 10 years of training. An estimated 17,220 m^2 of the disturbed land surface will be situated at the base of the dunes where old surfaces often containing in situ archeological deposits could be preserved. Although the impact is not significant in isolation, as long as tracked vehicle maneuvers continue, the combined effect will increase impact. If unprotected features (usually the sole constituent of a site) are severely damaged and/or destroyed, their scientific value is reduced considerably (Department of the Army 1991:29). However, these projected impacts will not occur for the 7th Ranger Training Battalion is no longer based at Fort Bliss.

Ineligible Sites Requiring No Further Work

A site is considered insignificant, and therefore ineligible for NRHP inclusion, if the cultural resources have been severely disturbed, i.e., exhibiting no intact depositional integrity, and it contains no subsurface cultural deposits. Sixteen sites are recommended as ineligible for inclusion in the NRHP (Table 54):

- Site FB 7820 (41EP2248) in Patrol Base 4 was mitigated, resulting in sufficient data being recovered to mitigate adverse effects to the cultural resources by the military. Military activities will have no effect upon cultural resources at this site.
- Sites FB 13146 (LA 106713) and FB 13338 (LA 106697) in Patrol Base 2; FB 3398 (LA 94361) in Patrol Base 3; FB 7823 (41EP2236) in Patrol Base 4; FB 13155 (41EP4694), FB 13345 (no TARL number assigned), and FB 13908 (no TARL number assigned) in Patrol Base 5; FBH 98 (41EP2226), FB 10694 (41EP4691), FB 11616 (41EP4692), and FB 11617 (no TARL number assigned) in Patrol Base 6; FB 13335 (41EP4698) in Patrol Base 7; FB 4525 (LA 95481) and FB 6089 (LA 96942) in Patrol Base 8; and FB 3996 (LA 94955) in Patrol Base 9 are considered ineligible because of severe erosion and because no subsurface deposits remain on the sites.

Sites of Unknown Eligibility Status Requiring Initial Testing or Additional Investigations

- Initial Testing—Fifteen new sites were recorded during the current project. Twelve of the newly recorded sites remain untested, with status for these 12 sites unknown (Appendix A). The sites should be tested so that the eligibility of each for inclusion in the NRHP can be determined:
  - FS 004 through FS 015.
- Additional Investigations (see Table 54):
  - Additional Testing—The allocation for the number of tests units to be excavated per site was based on estimated site area data from previous surveys. The sites subsequently have been mapped with the aid of a TDS instrument and the site area corrected. Consequently, additional test units are required to make the number of test units statistically representative of the revised site area and/or increased number of features. Therefore, eligibility status for nine of the tested sites remains unknown:
    - Five sites are recommended for additional testing: FB 3389 (LA 94392) in Patrol Base 1; FB 13921 (41EP4700) in Patrol Base 7; FB 13139 (LA 106700) and FB 13140 (LA 106701) in Patrol Base 8; and FB 3994 (LA 94953) in Patrol Base 9;
  - Phased Mitigation—The eligibility of site FBH 182 (41EP4690) in Patrol Base 6 remains uncertain. Given the possibility that historic structure foundations may be present as indicated by the quantity of window glass, nails, and other construction items, additional information is needed to properly evaluate the site. As a more cost-effective alternative to an additional testing phase, phased mitigation of site FBH 128 is recommended.

Table 54
Eligibility Status and Recommendations for 38 Evaluated Sites

PB#	FB Site #	State Site #	Site Area (m^2)	# of Test Units (m^2)	# of Onsite BHT	Eligibility Status	Recommendations
1	4332 [1]	none assigned	not tested	0	0	Eligible	Preserve/avoidance
	14502 [2]	LA 106715	868	2	1	Eligible	Preserve/avoidance
2	H 70	LA 97697	9300	3	2	Eligible	Mitigate
	3929	LA 94889	208	1	2	Eligible	Mitigate
	13145	LA 106712	252	1	1	Eligible	Mitigate
	13146	LA 106713	0	1	1	Ineligible	No further work
	13338	LA 106697	522	1	1	Ineligible	No further work
3	3389	LA 94392	1568	3	2	Unknown	Additional Testing
	3398	LA 94361	224	1	1	Ineligible	No further work
4	7820	41EP2248	960	2	1	Ineligible	No further work/Mitigated
	7823	41EP2236	3120	2	2	Ineligible	No further work
5	13155	41EP4694	432	2	1	Ineligible	No further work
	13206	41EP4695	3460	2	2	Eligible	Mitigate
	13345	none assigned	Non-site	0	3	Ineligible	No further work
	13346	41EP4696	27000	4	4	Eligible	Mitigate
	13908	none assigned	Non-site	0	1	Ineligible	No further work
6	H 98	41EP2226	12600	4	0	Ineligible	No further work
	H 182 [2]	41EP4690	960	2	0	Unknown	Phased Mitigation
	6940	41EP2227	4200	5	4	Eligible	Mitigate
	7312 [3] (+7313, 11614, 11649)	41EP2219	27660	14	15	Eligible	Preserve/avoidance
	10694	41EP4691	1017	2	2	Ineligible	No further work
	11616	41EP4692	617	2	2	Ineligible	No further work
	11617	none assigned	41	1	1	Ineligible	No further work
	14501 [2]	41EP4693	1080	2	3	Eligible	Mitigate
7	10916	41EP4702	9700	4	2	Eligible	Mitigate
	13147	41EP4697	76436	10	8	Eligible	Preserve/avoidance
	13335	41EP4698	1120	1	2	Ineligible	No further work
	13920	41EP4699	5400	3	2	Eligible	Mitigate
	13921	41EP4700	840	1	2	Unknown	Additional Testing
8	4525	LA 95481	940	2	1	Ineligible	No further work
	6084	LA 96937	4800	2	2	Eligible	Mitigate
	6085	LA 96938	6000	2	2	Eligible	Mitigate
	6086	LA 96939	8400	2	2	Eligible	Mitigate
	6089	LA 96942	13600	2	2	Ineligible	No further work
	13139	LA 106700	3200	2	2	Unknown	Additional Testing
	13140 [4]	LA 106701	10800	5	4	Unknown	Additional Testing
9	3994	LA 94953	14300	4	4	Unknown	Additional Testing
	3996	LA 94955	256	2	1	Ineligible	No further work
				99	88		

[1] site within protected green zone/not tested
[2] newly recorded site tested during current project
[3] three additional sites subsumed by FB 7312
[4] multicomponent prehistoric/historic site

Recommendations Summary:

Preserve/avoidance	4	No further work/Mitigated	1
Mitigate	12	No further work/Monitor	3
Phased Mitigation	1	No further work	12
Additional Testing	5		

Eligible Sites Requiring Mitigation

- Mitigation by Avoidance—It is recommended that adverse effects on cultural resources at four sites be mitigated through preservation by site avoidance (see Table 54):
  * Site FB 4332 (no LA number assigned) in Patrol Base 1 is at the edge of a protected district (Fort Bliss archeologists [monitors] recently erected an off-limits sign to include the site in the protected district. After consultation with Dr. Glen DeGarmo (Fort Bliss) and Mr. Tim Dalbey (Corps of Engineers, Fort Worth District), a consensus was reached not to test the site but to treat it as part of the protected district;
  * sites FB 14502 (LA 106715) in Patrol Base 1, FB 7312 (41EP2219) in Patrol Base 6, and FB 13147 (41EP4697) in Patrol Base 7 are extremely large sites located at the edge of three different Patrol Bases and would be costly to mitigate.
- Mitigation by Data Recovery—Twelve sites located in areas where avoidance is not feasible because of military training requirements should be mitigated via data recovery because of the potential for adverse effects to the sites (see Table 54):
  * FBH 70 (LA 97697), FB 3929 (LA 94889), and FB 13145 (LA 106712) in Patrol Base 2; FB 13206 (41EP4695) and FB 13346 (41EP4696) in Patrol Base 5; FB 6940 (41EP2227) and FB 14501 (41EP4693) in Patrol Base 6; FB 10916 (41EP4702) and FB 13920 (41EP4699) in Patrol Base 7; FB 6084 (LA 96937), FB 6085 (LA 96938), and FB 6086 (LA 96939) in Patrol Base 8.

Data Recovery Methodology for Sites Recommended for Mitigation

Data recovery methodology for each of the 15 sites recommended for mitigation will follow a standard format. Each site will be relocated and reconnoitered. The Phase II testing datum will be located and Phase II test excavations will be flagged. Additional datums may be established as required due to site shape irregularity or site size. For analysis purposes the site will be divided into square units as appropriate. Sites smaller than 5,000 m^2 will be divided into 10-x-10-m^2 analytical units. Sites 5,000 m^2 and larger will be divided into 20-x-20-m^2 analytical units. All corner elevations will be recorded.

Each analytical unit will be surveyed at two-meter transects beginning one meter from a side. All surface artifacts and features will be flagged, point provenienced, and drawn in plan view. A 1-x-1-m^2 excavation unit will be randomly placed in each analytical unit. Vertical excavation will continue in either 10-cm arbitrary levels or natural levels, whichever is least, until cultural materials are no longer present. Additional judgmental excavations may be added at the discretion of the archeologist.

All features will be excavated completely in either 10-cm arbitrary levels or cultural levels, whichever is least. Feature-associated artifact concentrations exceeding a density of two per level/locus will be excavated completely in 1-x-1-m by 10-cm maximum intervals, both horizontally and vertically, until artifact density drops below two artifacts per level/locus. All materials will be screened through ⅛" mesh. All excavated features will be pedestaled, drawn in plan view, and photographed for each 1-x-1-m by 10-cm level/locus or as appropriate for natural stratigraphic levels. The integrity of all features will be maintained until final plan and profile views are drawn, elevations below datum are taken, and photographs encompassing the entire feature have been completed. All surface artifacts and all artifacts from each level/locus will be identified and curated for laboratory analyses. Artifacts within a feature will be identified and curated separately from artifacts that are adjacent to, but not within, a feature.

A minimum of one radiocarbon dating sample will be collected from each undated feature if appropriate materials are available. Intact wood, charcoal, and charcoal chunks of any size will be collected. Approximately 500 grams of granular charcoal (charcoal/sand mixture) deposits will be collected. Samples for other chronometric dating procedures, including archaeomagnetic and obsidian hydration, will be taken if appropriate materials are available. Flotation and microbotanical samples of at least 10 liters each will be taken from each feature. If cultural stratigraphy is apparent, all possible samples will be taken from each cultural level or locus.

If cultural material evidence indicates the existence of features underneath dunes, the dune will be excavated to the extent necessary to mitigate the feature including backhoe removal of the dune overlay and excavation of the feature through the excavation procedure described above. To obtain detailed geomorphological information or to explore cultural stratigraphy not reasonably discernable by hand excavation, as many as two backhoe trenches, one meter in width by an appropriate length, may be placed at approximate right angles adjacent to, but not through, visible features or groups of features at the discretion of the archeologist. Backhoe trenching will be done in controlled 20-cm levels with .20 m^3 of fill screened through $^1/_8$" mesh from each 20-cm level by 10-m maximum trench length. Trench walls facing the feature(s) will be drawn in profile.

"Green District" Requiring Avoidance

As stated in Chapter 2, approximately one-fifth of Patrol Base 8 falls within a protected green district as designated by the Fort Bliss Cultural Management office. It is not surprising, therefore, that the density of sites (n=12) within the quadrant is markedly higher than the mean for the project area. Although in the previous survey report (Peter and Mbutu 1993:5-3), it was recommended that this area be avoided, it was, nevertheless, included among the areas to be cleared in the scope of work for Phase II investigations. Based on the high number of sites within the quadrant, none of which has been determined ineligible for listing in the NRHP, it is recommended again that the Patrol Base be moved elsewhere so that these sites will continue to be protected as part of the green district.

CONCLUSION

In conclusion, 38 sites located within nine Patrol Bases at Fort Bliss Military Reservation were evaluated for this project. One site, FB 4332 (no LA number assigned), which is located within an archeological district (No. 27) which is protected under the National Historic Preservation Act, was not tested. Of the 37 tested sites, one site dates entirely to the historic period, three sites were found to exhibit components that date to both the prehistoric and historic periods, and the remaining 33 sites are of prehistoric age. Based on data recovered during the current investigation, 16 of the sites are recommended as eligible for listing in the NRHP, 16 are recommended as ineligible for NRHP listing, and six sites remain potentially eligible (eligibility unknown); the status of the potentially eligible sites could not be determined from existing data. Recommendations for the 16 eligible sites include preservation by avoidance for four sites (FB 4332 [no LA number assigned], FB 7312 [41EP2219], FB 13147 [41EP4697]), and FB 14502 [LA 106715], and mitigation for the remaining 12 sites (FBH 70 [LA 97697], FB 3929 [LA 94889], FB 6084 [LA 96937], FB 6085 [LA 96938], FB 6086 [LA 96939], FB 6940 [41EP2227], FB 10916 [41EP4702], FB 13145 [LA 106712], FB 13206 [41EP4695], FB 13346 [41EP4696], FB 13920 [41EP4699], and FB 14501 [41EP4693]). Recommendations for the six potentially eligible sites include phased mitigation for one site (FBH 182 [41EP4690]) and additional testing for five sites (FB 3389 [LA 94392], FB 3994 [LA 94953], FB 13139 [LA 106700], FB 13140 [LA 106701], and FB 13921 [41EP4700]). No further work is recommended for the 16

sites which are recommended as ineligible for inclusion in the NRHP (FBH 98 [41EP2226], FB 3398 [LA 94361], FB 3996 [LA 94955], FB 4525 [LA 95481], FB 6089 [LA 96942], FB 7820 [41EP2248], FB 7823 [41EP2236], FB 10694 [41EP4691], FB 11616 [41EP4692], FB 11617 [no TARL number assigned], FB 13146 [LA 106713], FB 13155 [41EP4694], FB 13335 [41EP4698], FB 13338 [LA 106697], FB 13345 [no TARL number assigned], and FB 13908 [no TARL number assigned]).

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APPENDIX A

SURVEY RESULTS

PREVIOUSLY UNRECORDED SITES DISCOVERED DURING SURVEY

Six Patrol Bases (1, 3, 4, 6, 8, and 9) were resurveyed at 45 meter intervals. Previously unrecorded sites (n=15) were found in all Patrol Bases except Patrol Base 4. A single site (FB 14502) was recorded and tested in Patrol Base 1 (see Chapter 4; Figure 4). Similarly, two sites recorded in Patrol Base 6 (FBH 182 and FB 14501) were test-excavated (see Chapter 4, Figure 43). None of the remaining 12 sites recorded in other Patrol Bases during the resurvey has been tested. Until they have been tested, the NRHP-eligibility status for the sites will remain unknown. The following is an outline description of the untested sites.

Patrol Base 3, Maneuver Area 8 (4 Sites)

FS 012 is an artifact scatter consisting of unspecified brownware, Mimbres Black-on-white, and burned caliche. It is located approximately 20 m southeast of the northwest corner of the quadrat (see Figure 23). The site measures approximately 20-x-40-m.

FS 013 consists of burned caliche and five fire-cracked rock features in association with associated brown ware. Direct rims were observed on the site. The site is located approximately 30 m south of FS 012 along the western boundary of the quadrat. FS 013 measures approximately 20-x-20-m.

FS 014 is an artifact scatter consisting of lithics, undifferentiated brown ware, and El Paso Polychrome rims. No features were observed on the site surface. The site is located approximately 400 m south of FS 012 along the western boundary of the quadrat. The site area is approximately 100 m^2.

FS 015 consists of a 1-x-1-m fire-cracked rock feature with a charcoal stain. A mano was found in association with the feature. The site is located on the eastern edge of a dirt road on the southern boundary of the quadrat. The site measures approximately 40 m across.

Patrol Base 8, Maneuver Area 8 (5 Sites)

FS 004 is a burned caliche feature consisting of 40+ fragments. No other artifacts were located at this site. The site is located approximately 400 m to the northeast of FB 6089 (see Figure 96), and is approximately 80 m west of FS 005. It measures approximately 30 m in diameter.

FS 005 is an isolated feature consisting of 10 pieces of burned caliche. A core fragment was found in association with the feature. No other artifacts were found on the site area surface. The site is located approximately 80 m to the east of FS 004, and approximately 100 m north of FB 6085. It measures approximately 20 m in diameter.

FS 006 is an artifact scatter of burned caliche in association with chipped and ground stone artifacts. No distinct features were located during the survey. The site is located along the southern boundary of the quadrat and is approximately 150 m southeast of a large road intersection and about 50 m south of an east-west dirt road. It measures approximately 5,000 m^2.

FS 007 consists of at least five fire-cracked rock and burned caliche features. Charcoal staining was found on one of the features. Ground stone, ceramics, and lithics were also present on the site area surface. The site is located approximately 150 m northeast of FB 6085 and is approximately 100 m in diameter.

FS 008 consists of a fire-cracked rock (>50 pieces) feature. A ground stone was the only artifact found in association with the feature. FS 008 is located approximately 30 m south of an east-west road and approximately 300 m east of a large road intersection. The site measures 20 m in diameter.

FS 009 consists of a burned caliche feature and associated lithic scatter. Approximately 200 pieces of burned caliche and a slight stain constitute the feature. The site is located on the eastern edge of the quadrat (see Figure 117) approximately 500 m from the southeast corner. The site measures approximately 20 m^2.

FS 010 consists of two features. One is a burned caliche scatter and the other is a fire-cracked rock concentration. A metate fragment and a low density scatter of chipped stone were located. The site is located approximately 200 m northeast of FB 3994 and approximately 150 m from the western border of the quadrat. The site measures approximately 50 m in diameter.

FS 011 consists of a small fire-cracked rock feature and one ground stone fragment. No other artifacts were located in association with this feature. The site is located approximately 400 m northeast of FB 3994. The site measures approximately 5 m in diameter.

APPENDIX B

RADIOCARBON DATING RESULTS

BETA ANALYTIC INC.
RADIOCARBON DATING LABORATORY
CALIBRATED C-14 DATING RESULTS

Calibrations of radiocarbon age determinations are applied to convert BP results to calendar years. The short term difference between the two is caused by fluctuations in the heliomagnetic modulation of the galactic cosmic radiation and, recently, large scale burning of fossil fuels and nuclear devices testing. Geomagnetic variations are the probable cause of longer term differences.

The parameters used for the corrections have been obtained through precise analyses of hundreds of samples taken from known-age tree rings of oak, sequoia, and fir up to 7,200 BP. The parameters for older samples, up to 22,000 BP, as well as for all marine samples, have been inferred from other evidence. Calibrations are presently provided for terrestrial samples to about 10,000 BP and marine samples to about 8,300 BP.

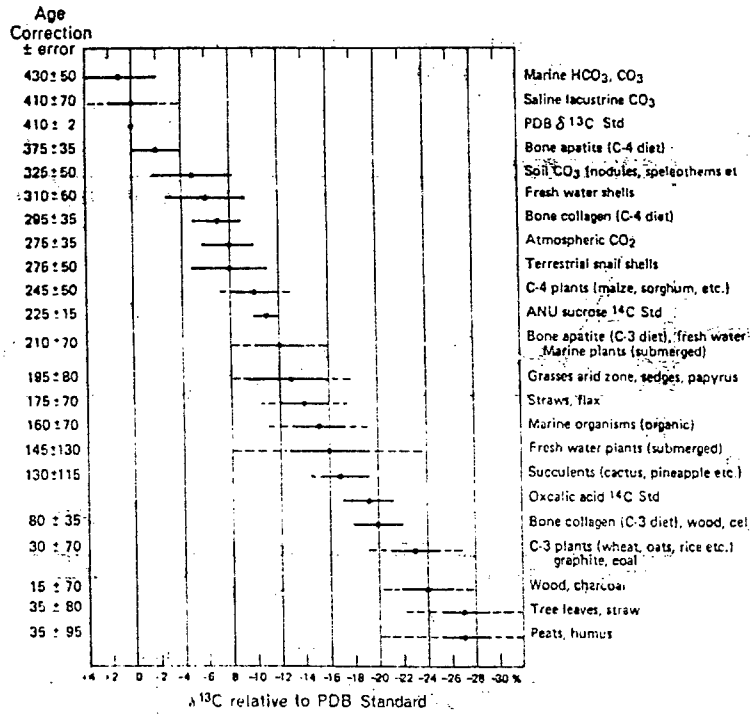
The Pretoria Calibration Procedure program has been chosen for these dendrocalibrations. It uses splines through the tree-ring data as calibration curves, which eliminates a large part of the statistical scatter of the actual data points. The spline calibration allows adjustment of the average curve by a quantified closeness-of-fit parameter to the measured data points. On the following calibration curves, the solid bars represent one sigma statistics (68% probability) and the hollow bars represent two sigma statistics (95% probability). Marine carbonate samples that have been corrected for $\delta^{13/12}C$, have also been corrected for both global and local geographic reservoir effects (as published in Radiocarbon, Volume 35, Number 1, 1993) prior to the calibration. Marine carbonates that have not been corrected for $\delta^{13/12}C$, have been adjusted by an assumed value of 0 ‰ in addition to the reservoir corrections. Reservoir corrections for fresh water carbonates are usually unknown and are generally not accounted for in those calibrations. In the absence of measured $\delta^{13/12}C$ ratios, a typical value of -5 ‰ was assumed for freshwater carbonates. There are separate calibration data for the Northern and Southern Hemisphere. Variables used in each calibration are listed below the title of each calibration page.

(Caveat: the calibrations assume that the material dated was living for exactly ten or twenty years (e.g. a collection of 10 or 20 individual tree rings taken from the outer portion of a tree that was cut down to produce the sample in the feature dated). For other materials, the maximum and minimum calibrated age ranges given by the computer program are uncertain. The possibility of an "old wood effect" must also be considered, as well as the potential inclusion of some younger material in the total sample. Since the vast majority of samples dated probably will not fulfill the ten/twenty-year-criterium and, in addition, an old wood effect or young carbon inclusion might not be excludable, these dendrocalibration results should be used only for illustrative purposes. In the case of carbonates, reservoir correction is theoretical and the local variations are real, highly variable and dependant on provenience. The age ranges and, especially, the intercept ages generated by the program must be considered as approximations.)

Derivation of a radiometric or accelerator dendro-calibrated (CALENDAR) date requires use of a CONVENTIONAL radiocarbon date (Stuiver and Polach)[1]. The conventional date is a basic radiocarbon date that has been normalized to the modern standard through the use of C13/C12 ratios* (analyzed or estimated). The statistical error (+/-) on an analyzed C13/C12 value is quite small and does not contribute significantly to the combined error on the date. However, use of an estimated C13/C12 ratio for an unknown sample may incur a very large combined error term. This is clearly illustrated in the figure below (Gupta & Polach; modified by J. Head)[2] where the possible range of C13/C12 values for a particular material type may be so large as to preclude any practical application or correction.

In cases where analyzed C13/C12 values are not available, we have provided (for illustration) dendro-calibrations assuming a mean "chart" value, but without an estimated error term.

Where a sample carbon reservoir different from the modern oxalic acid/wood modern standard (e.g. shell) is involved, a further correction must be employed; the necessary variables are displayed on the calibration sheet.



[1]Stuiver, M. and Polach, H.A., 1977. Discussion: Reporting of 14-C data, Radiocarbon, 19, 355-363.

[2]Gupta S.K. and Polach H.A., 1985. Radiocarbon dating practices at ANU Handbook,p.114. Radiocarbon Laboratory, Research School of Pacific Studies, ANU, Canberra.

*Radiocarbon is incorporated into various materials by different pathways and this introduces differing degrees of isotopic fractionation. The C13/C12 ratio of any material is the millesimal difference of the sample to the carbonate PDB standard and is directly related to the C14/C12 ratio. The degree of sample C-14 enrichment or depletion then is normalized to that of the modern standard.

EXPLANATION OF THE BETA ANALYTIC DENDRO-CALIBRATION PRINTOUT

CALIBRATION OF RADICARBON AGE TO CALENDAR YEARS

Laboratory Number: Beta-12345

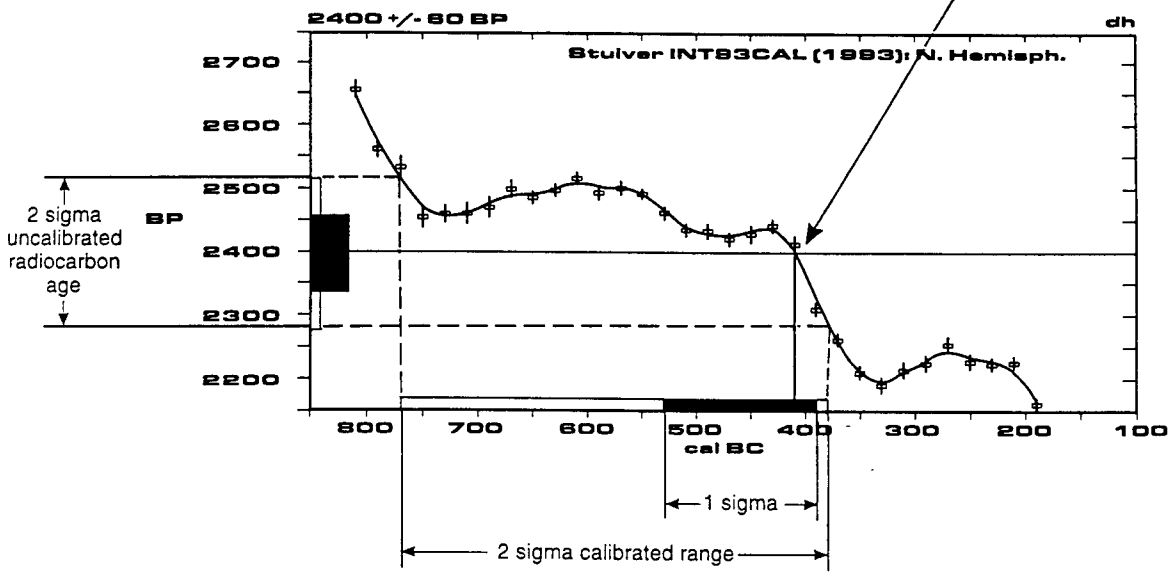
Radiocarbon age: **2400 +/- 60 BP** ← The uncalibrated radiocarbon age (± 1 sigma)

The recommended calibration age range to be used for interpretation → **Calibrated result: (2 sigma, 95% probability)** **cal BC 770 to 380**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 410 ← The intercept between the radiocarbon age & the calibrated calendar time scale curve

The calibration result of the radiocarbon age ± 1 sigma → 1 sigma calibrated result: (68% probability) cal BC 530 to 390



References:

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 33(1), p73-86
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Results prepared by:

Beta Analytic, Inc., 4985 S.W. 74th Court, Miami, Florida 33155

Reporting results (recommended):

1. List the radiocarbon age with its associated 1 sigma standard deviation in a table and designate it as such.
2. Discussion of ages in the text should focus on the 2 sigma calibrated range.

BETA ANALYTIC INC.
DR. J.J. STIPP and DR. M.A. TAMERS
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Dr. Duane E. Peter
Geo-Marine, Inc.

DATE RECEIVED: March 29, 1994
DATE REPORTED: April 26, 1994

			Radiometric C13/C12	C13 adjusted age
Beta-71723	02 (FB 3994 CN #8) (Charred Material)	1110 ± 70 BP	-24.6 o/oo	1120 ± 70 BP
Beta-71724	03 (FB 3929 CN #15) (Charred Material)	1040 ± 80 BP	-26.2 o/oo	1020 ± 80 BP
Beta-71725	04 (FB 3929 CN #9) (Charred Material)	980 ± 80 BP	-25.8 o/oo	970 ± 80 BP
Beta-71729	08 (FB 7312 CN #14) (Charred Material)	780 ± 60 BP	-26.8 o/oo	750 ± 60 BP
Beta-71735	14 (FB 13147 CN #43) (Charred Material)	1250 ± 70 BP	-26.7 o/oo	1230 ± 70 BP
Beta-71736	15 (13147 CN #37) (Charred Material)	3680 ± 80 BP	-25.5 o/oo	3670 ± 80 BP
Beta-71737	16 (FB 13206 CN #9) (Charred Material)	1090 ± 60 BP	-14.1 o/oo	1270 ± 60 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

BETA ANALYTIC INC.
DR. J.J. STIPP and DR. M.A. TAMERS
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Dr. Duane E. Peter

Beta-71738	17 (FB 13920 CN #18) (Charred Material)	1240 ± 80 BP	-26.1 o/oo	1230 ± 80 BP
Beta-71739	18 (FB 13921 CN #6) (Charred Material)	650 ± 80 BP	-26.9 o/oo	610 ± 80 BP

Note: by convention, two radiocarbon dates are the same if they are within two sigma of each other. The results have been reported with the attendant one sigma standard deviations.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

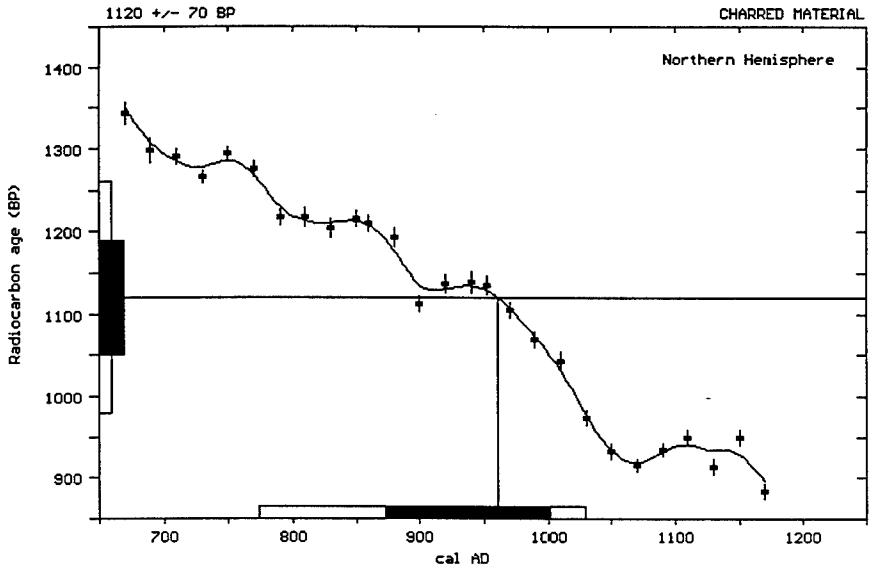
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.6:lab. mult=1)

Laboratory Number:	Beta-71723
Conventional radiocarbon age:	**1120 +/- 70 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 775 to 1030**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 960
1 sigma calibrated results: (68% probability)	cal AD 875 to 1000



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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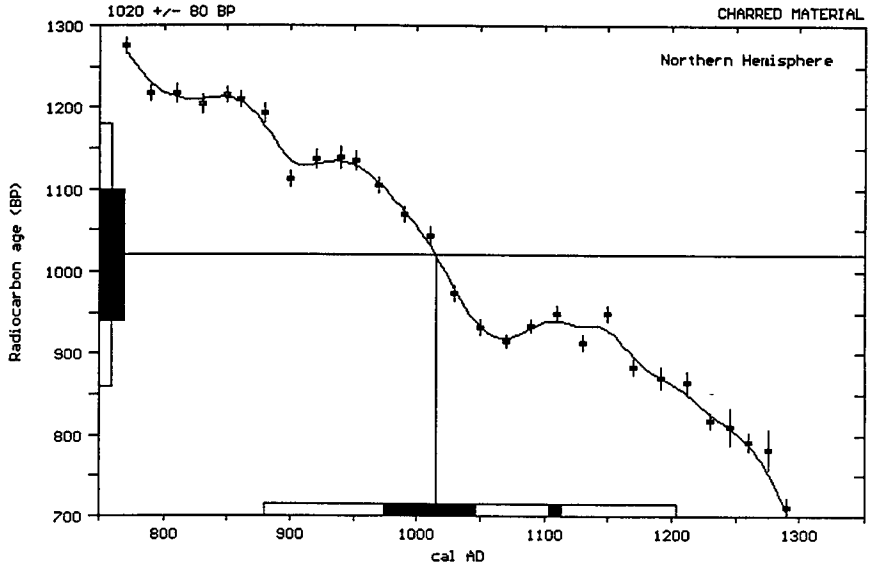
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.2:lab. mult=1)

Laboratory Number:	Beta-71724
Conventional radiocarbon age:	**1020 +/- 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 880 to 1205**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1015
1 sigma calibrated results: (68% probability)	cal AD 975 to 1045 and cal AD 1105 to 1115



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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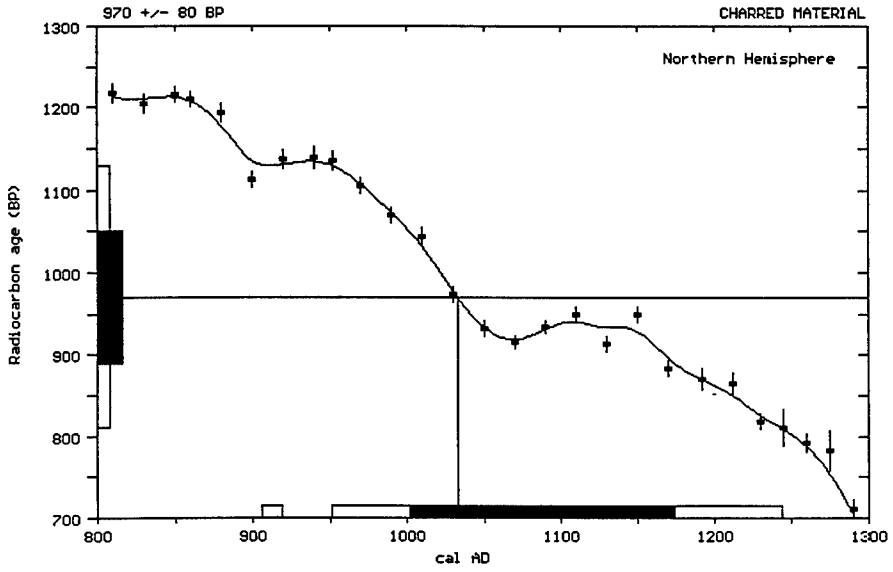
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.8:lab. mult=1)

Laboratory Number:	Beta-71725
Conventional radiocarbon age:	**970 +/- 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 905 to 920 and cal AD 950 to 1245**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1035
1 sigma calibrated results: (68% probability)	cal AD 1000 to 1175



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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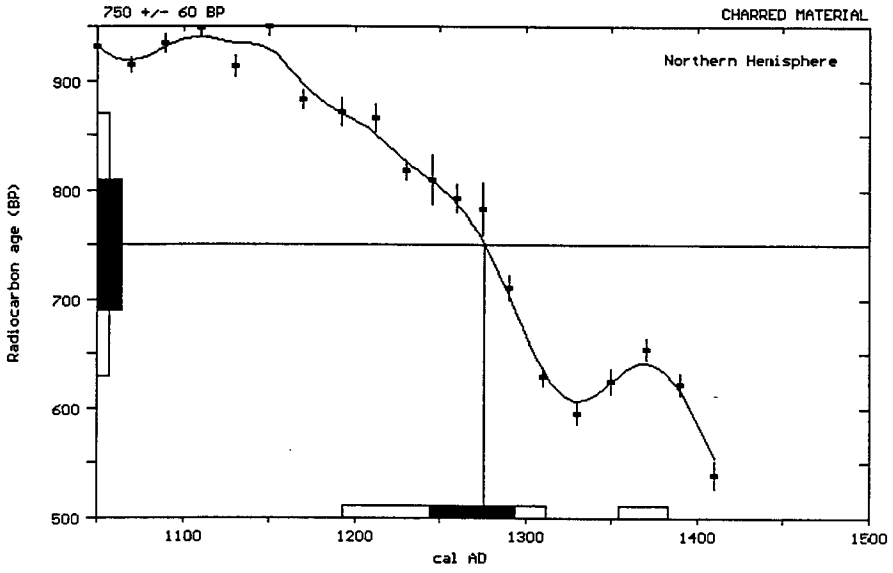
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.8:lab. mult=1)

Laboratory Number:	Beta-71729
Conventional radiocarbon age:	**750 +/- 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1195 to 1310 and cal AD 1355 to 1385**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1275
1 sigma calibrated results: (68% probability)	cal AD 1245 to 1295



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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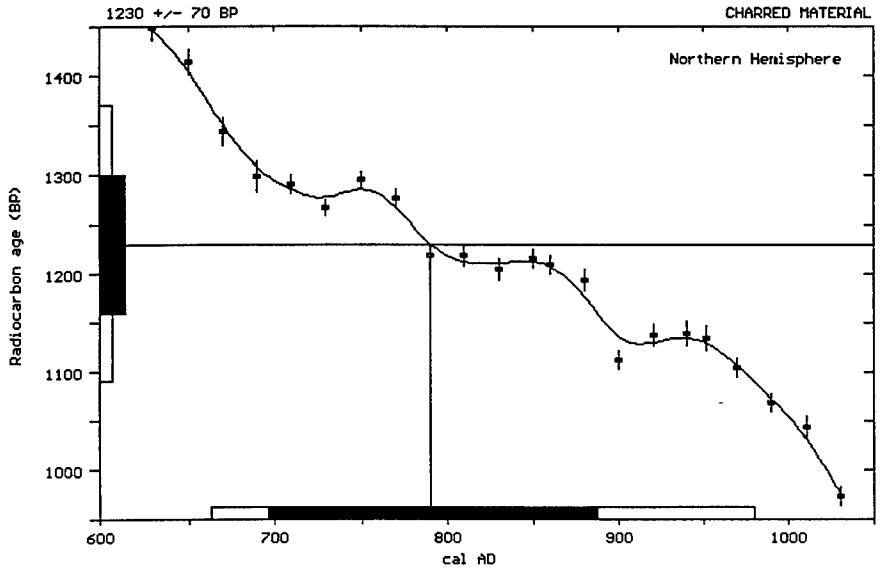
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.7:lab. mult=1)

Laboratory Number:	Beta-71735
Conventional radiocarbon age:	**1230 +/- 70 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 665 to 980**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 790
1 sigma calibrated results: (68% probability)	cal AD 695 to 885



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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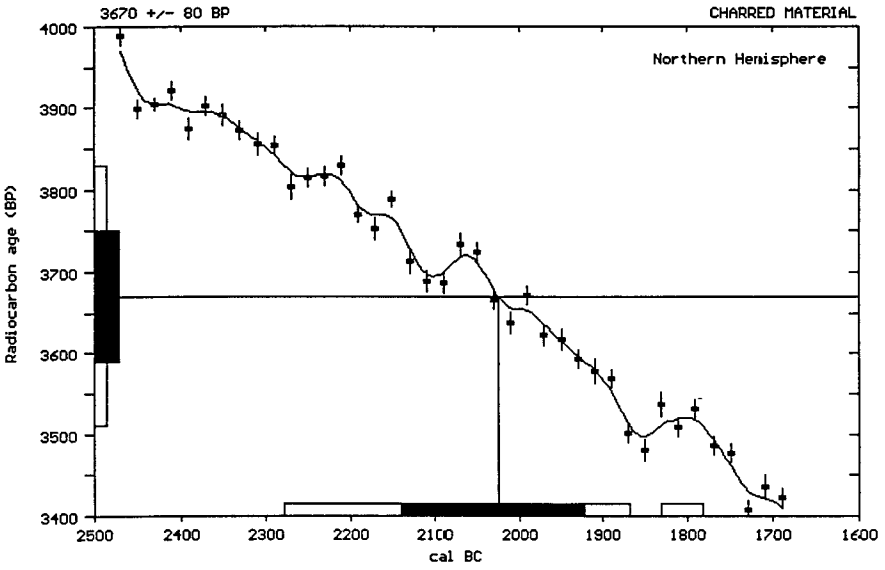
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.5:lab. mult=1)

Laboratory Number:	Beta-71736
Conventional radiocarbon age:	**3670 +/- 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 2280 to 1870 and cal BC 1830 to 1780**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 2025
1 sigma calibrated results: (68% probability)	cal BC 2140 to 1920



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-14.1:lab. mult=1)

Laboratory Number: Beta-71737

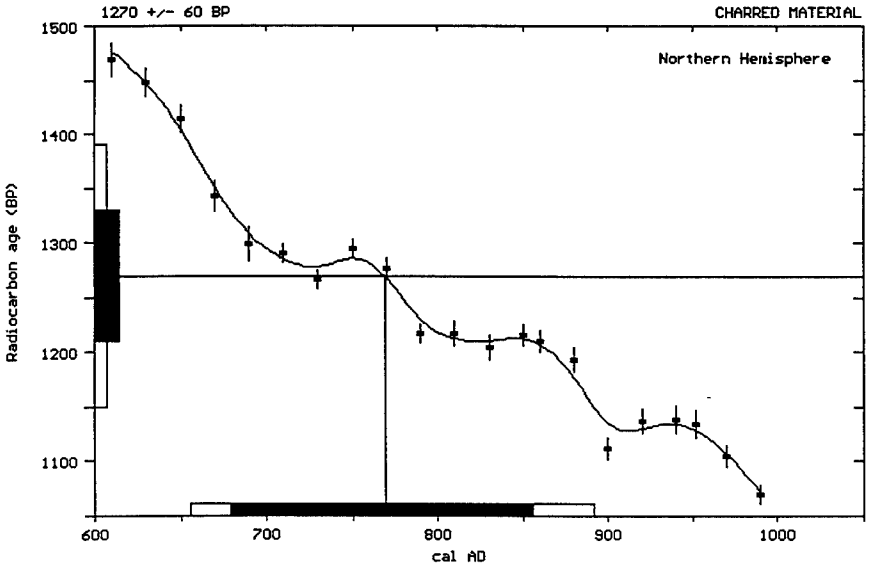
Conventional radiocarbon age: **1270 +/- 60 BP**

Calibrated results: (2 sigma, 95% probability) **cal AD 655 to 890**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal AD 770

1 sigma calibrated results: (68% probability) cal AD 680 to 855



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.1:lab. mult=1)

Laboratory Number: Beta-71738

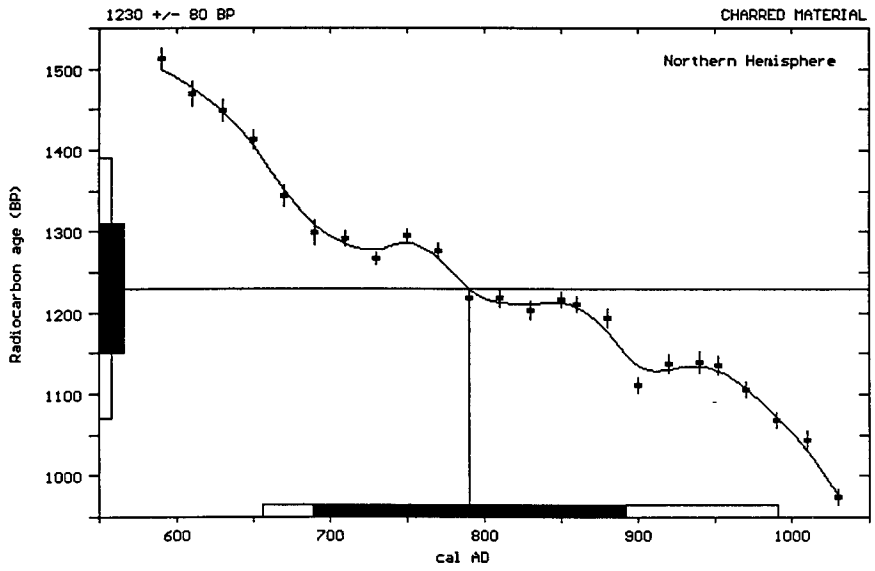
Conventional radiocarbon age: **1230 +/- 80 BP**

Calibrated results: (2 sigma, 95% probability) **cal AD 655 to 990**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal AD 790

1 sigma calibrated results: (68% probability) cal AD 690 to 890



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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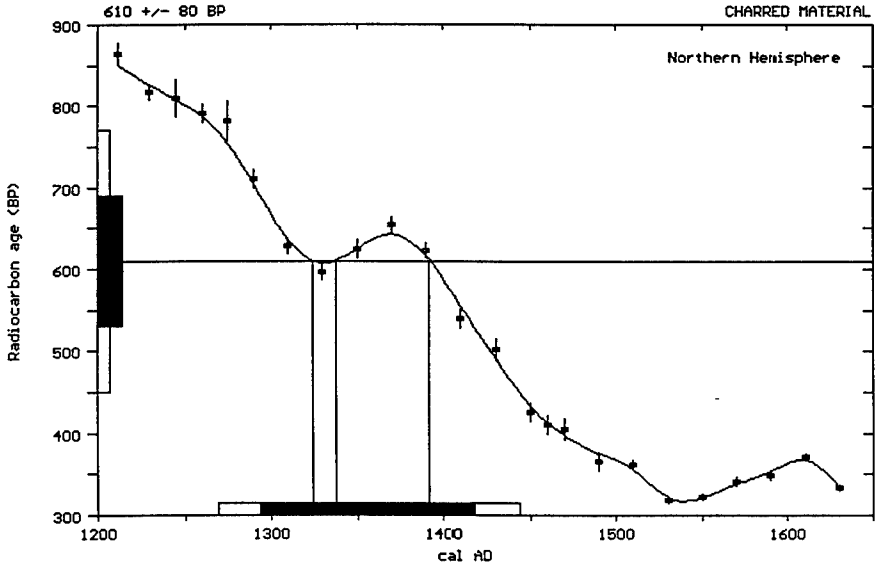
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.9:lab. mult=1)

Laboratory Number:	Beta-71739
Conventional radiocarbon age:	**610 +/- 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1270 to 1445**

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal AD 1325 and cal AD 1340 and cal AD 1390
1 sigma calibrated results: (68% probability)	cal AD 1295 to 1420



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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BETA ANALYTIC INC.
DR. J.J. STIPP and DR. M.A. TAMERS
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Dr. Duane E. Peter
Geo-Marine, Inc.

DATE RECEIVED: Auth. April 27, 1994
DATE REPORTED: May 24, 1994

			C13/C12	Radiometric C13 adjusted age
Beta-71726	05(FB 6085) CN#26 + CN#32 (Charred Material)*	1820 ± 110 BP	-25.0 o/oo	1820 ± 110 BP
Beta-71728	07(FB 6940) CN#9 + CN#11 (Charred Material)*	2870 ± 100 BP	-26.9 o/oo	2830 ± 100 BP
Beta-71731	10(FB 7312) CN#43 and CN#17 (Charred Material)*	1270 ± 100 BP	-24.7 o/oo	1280 ± 100 BP
Beta-71732	11(FB 7312) CN#16 + CN#57 (Charred Material)	1050 ± 60 BP	-27.6 o/oo	1000 ± 60 BP
Beta-71733	12(FB 10916) CN#28 + CN#29 (Charred Material)*	3690 ± 70 BP	-26.6 o/oo	3660 ± 70 BP
Beta-71734	13(FB 13147) CN#55 + CN#57 (Charred Material)	1050 ± 70 BP	-26.4 o/oo	1030 ± 70 BP

* Sample was pretreated with acid washes for removal of carbonates. It was not treated for secondary organic acids derived from overlying soils.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

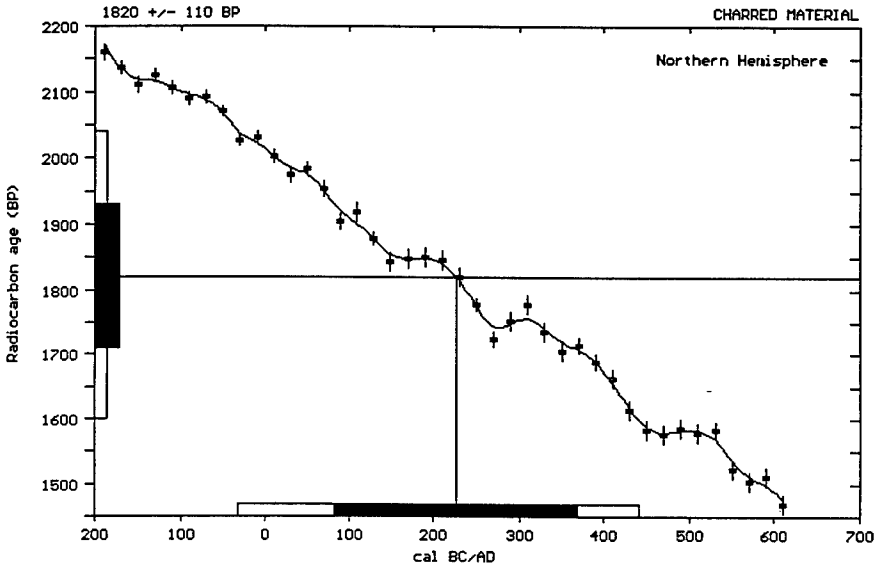
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.0:lab. mult=1)

Laboratory Number:	Beta-71726
Conventional radiocarbon age:	**1820 +/- 110 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 35 to cal AD 440**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 225
1 sigma calibrated results: (68% probability)	cal AD 85 to 370



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.9:lab. mult=1)

Laboratory Number: Beta-71728

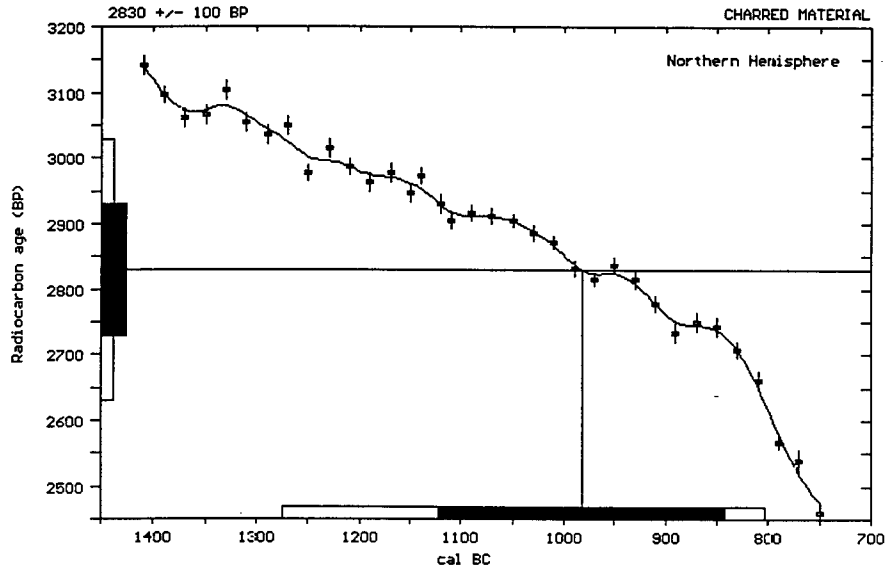
Conventional radiocarbon age: **2830 +/- 100 BP**

Calibrated results: (2 sigma, 95% probability) **cal BC 1275 to 805**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 980

1 sigma calibrated results: (68% probability) cal BC 1120 to 845



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.7:lab. mult=1)

Laboratory Number: Beta-71731

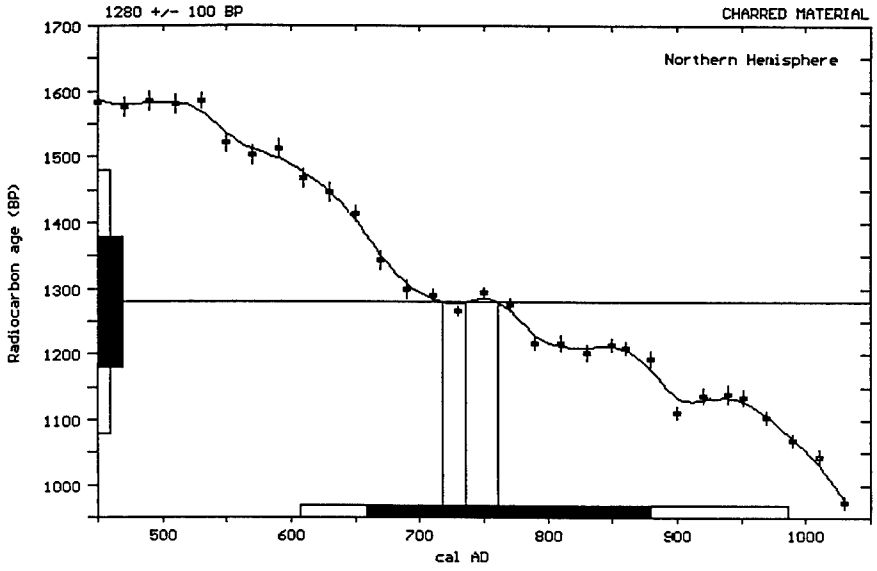
Conventional radiocarbon age: **1280 +/- 100 BP**

Calibrated results:
(2 sigma, 95% probability) **cal AD 605 to 985**

Intercept data:

Intercepts of radiocarbon age with calibration curve: cal AD 720 and
cal AD 735 and
cal AD 760

1 sigma calibrated results: cal AD 660 to 880
(68% probability)



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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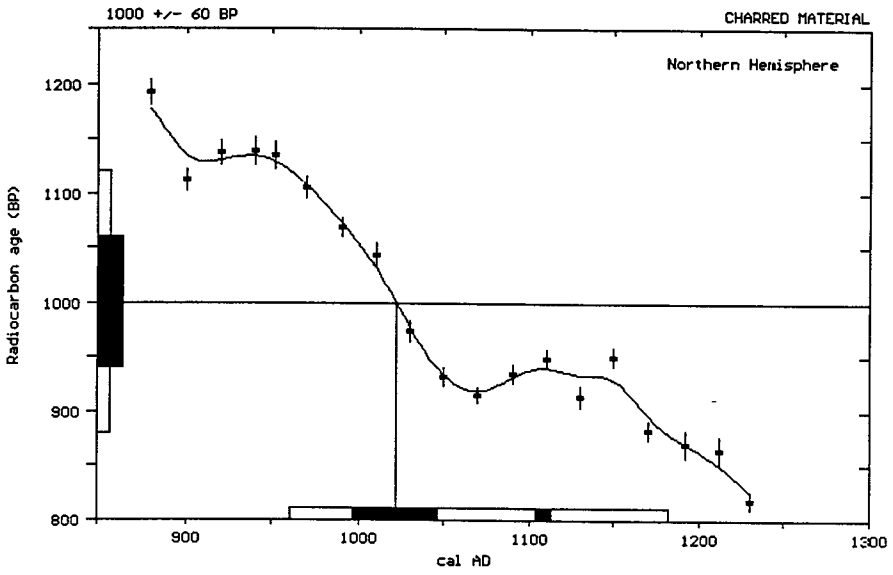
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-27.6:lab. mult=1)

Laboratory Number:	Beta-71732
Conventional radiocarbon age:	**1000 +/- 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 960 to 1180**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1020
1 sigma calibrated results: (68% probability)	cal AD 995 to 1045 and cal AD 1105 to 1115



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.6:lab. mult=1)

Laboratory Number: Beta-71733

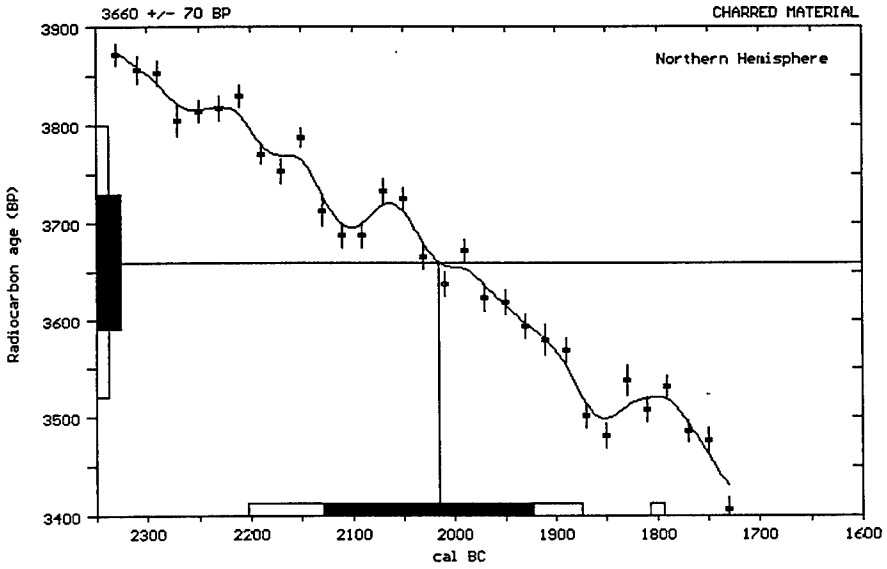
Conventional radiocarbon age: **3660 +/- 70 BP**

Calibrated results: (2 sigma, 95% probability) **cal BC 2205 to 1875 and cal BC 1805 to 1795**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 2015

1 sigma calibrated results: (68% probability) cal BC 2130 to 1920



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.4:lab. mult=1)

Laboratory Number: Beta-71734

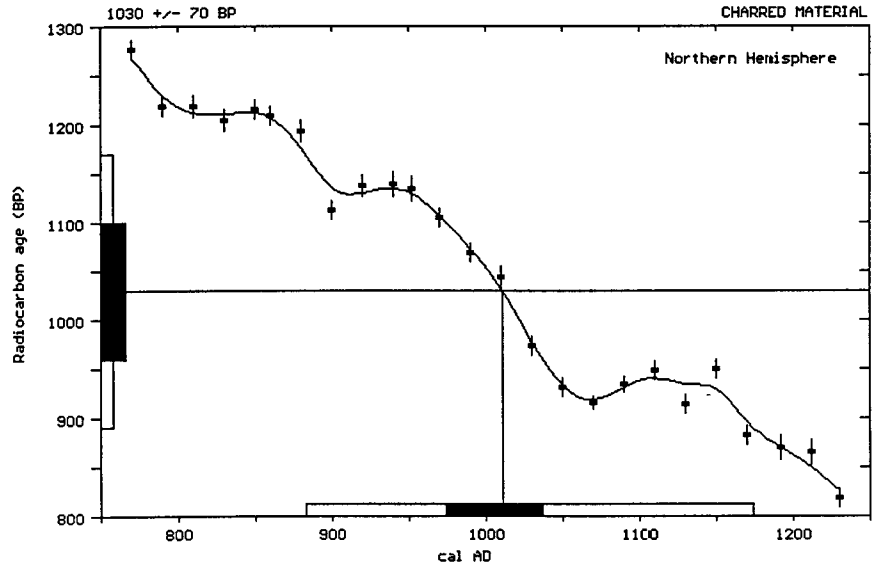
Conventional radiocarbon age: **1030 +/- 70 BP**

Calibrated results: (2 sigma, 95% probability) **cal AD 885 to 1175**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal AD 1010

1 sigma calibrated results: (68% probability) cal AD 975 to 1035



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@analytic.win.net

BETA ANALYTIC INC.
DR. J.J. STIPP and DR. M.A. TAMERS
UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Dr. Duane E. Peter
Geo-Marine, Inc.

DATE RECEIVED: Auth. May 23, 1994
DATE REPORTED: June 2, 1994

			Radiometric C13/C12	C13 adjusted age
Beta-71722	01 (FB H70 CN #13) (Charred Material)*	1240 ± 70 BP	-25.7 o/oo	1230 ± 70 BP
Beta-71730	09 (FB 7312 CN #15) (Charred Material)*	2120 ± 90 BP	-25.3 o/oo	2110 ± 90 BP

Note: the C13 adjusted ages were used to calibrate the radiocarbon ages to calendar years.

* The sample contained less than 1 gram of carbon and was given extended counting to increase precision.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.7:lab. mult=1)

Laboratory Number: Beta-71722

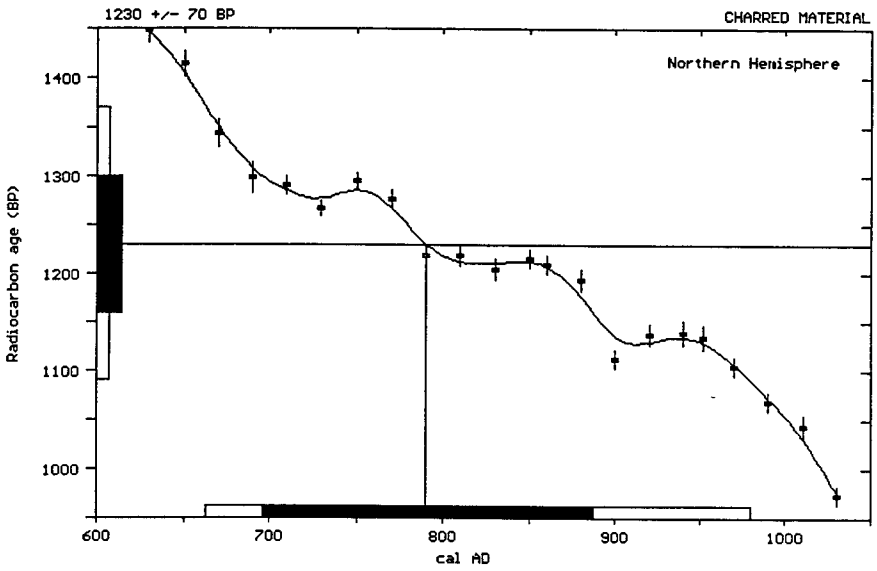
Conventional radiocarbon age: **1230 +/- 70 BP**

Calibrated results: (2 sigma, 95% probability) **cal AD 665 to 980**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal AD 790

1 sigma calibrated results: (68% probability) cal AD 695 to 885



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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4985 S.W. 74th Court, Miami, Florida 33155 ■ Tel: (305)667-5167 ■ Fax: (305)663-0964 ■ E-mail: beta@analytic.win.net

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.3:lab. mult=1)

Laboratory Number: Beta-71730

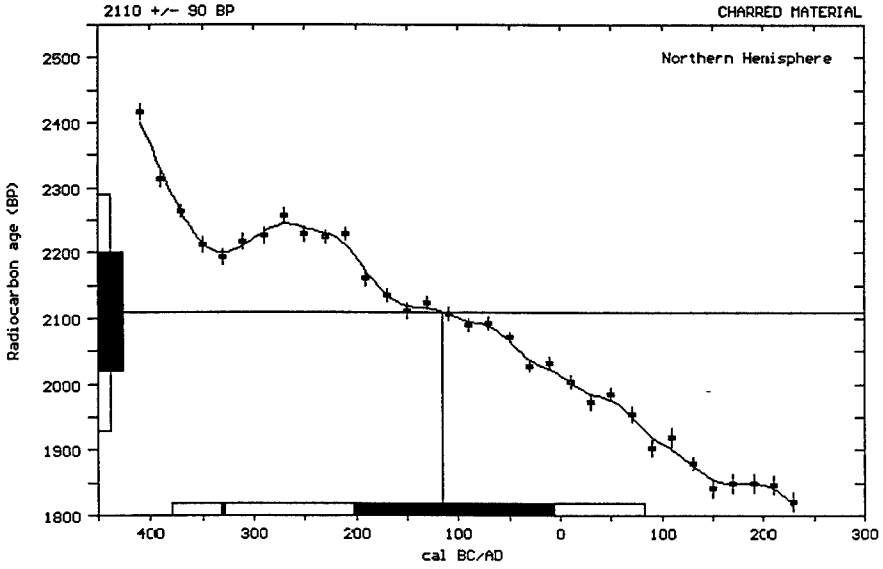
Conventional radiocarbon age: **2110 +/- 90 BP**

Calibrated results: (2 sigma, 95% probability) **cal BC 380 to cal AD 85**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 115

1 sigma calibrated results: (68% probability) cal BC 330 to 330 and cal BC 205 to 5



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Dr. Duane E. Peter

Geo-Marine, Inc.

DATE RECEIVED: May 23, 1994

DATE REPORTED: June 22, 1994

				AMS
			C13/C12	C13 adjusted age
Beta-71727 ETH-12346	06 (FB 6940 CN# 25 + CN# 15) (charred material)	2680 ± 55 BP	-23.2 o/oo	2710 ± 60 BP
Beta-71740 ETH-12347	19(FB 14502 CN#12 + CN#10) (charred material)	4560 ± 70 BP	-19.9 o/oo	4645 ± 70 BP

Note: the C13 adjusted ages were used to calibrate the radiocarbon ages to calendar years.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23.2:lab. mult=1)

Laboratory Number: Beta-71727

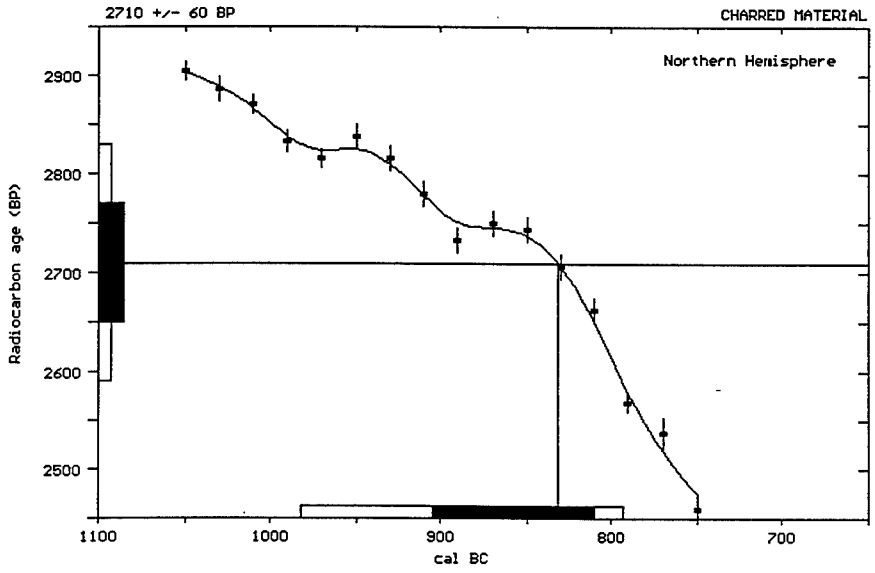
Conventional radiocarbon age: **2710 +/- 60 BP**

Calibrated results: (2 sigma, 95% probability) **cal BC 980 to 795**

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 830

1 sigma calibrated results: (68% probability) cal BC 905 to 810



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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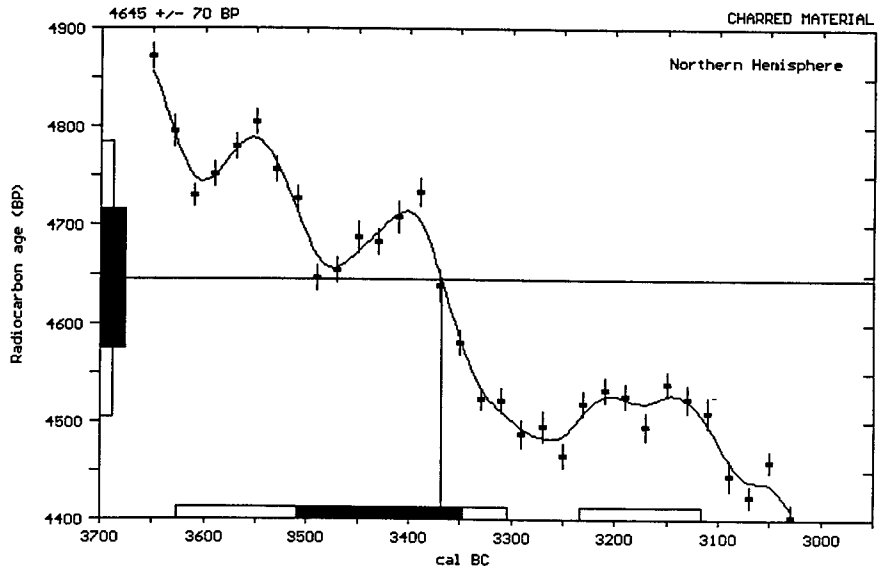
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-19.9:lab. mult=1)

Laboratory Number:	Beta-71740
Conventional radiocarbon age:	**4645 +/- 70 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 3625 to 3305 and cal BC 3235 to 3115**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 3370
1 sigma calibrated results: (68% probability)	cal BC 3510 to 3345



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

Beta Analytic Radiocarbon Dating Laboratory

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APPENDIX C

LITHIC ASSEMBLAGE ATTRIBUTES

Codes used in Appendix C

FB	Fort Bliss site number			
CN	Collection number			
Metate Type	1=Basin	2=Slab	0=Indeterminate	
Mano (hand)	1=One hand mano	2=Two hand mano	0=Indeterminate	
Mano (sides)	1=One sided mano	2=Two sided mano	0=Indeterminate	
C/S	Cross-section	1=Flat	2=Convex	
		3=Plano-convex	4=Concave	5=Double convex

Fort Bliss Lithic Typology Codes

Debitage/Chunk	201
Bipolar tested	207
Tested pebble/cobble	209
Flake, not utilized	211
Flake, utilized	213
Unimarginal retouch	221
Bimarginal retouch	231
Unifacial retouch	241
Bifacial retouch	251
Projectile point	259
Core	261
Core fragment	262
Angled hammerstone	265
Angled hammerstone fragment	266
Round hammerstone	267
Hammerstone fragment	268
Mano	271
Mano fragment	272
Metate	273
Metate fragment	274
Mano and Metate	275
Other ground stone	279
Fire-cracked rock	281
Burned caliche	283
Other lithic	299

Lithic Raw Material Types

Chert	01
Rancheria chert	02
Quartzite	03
Limestone	04
Rhyolite	05
Sandstone	06
Granitic rocks	07
Basalt	08
Vesicular basalt	09
Chalcedony	10
Obsidian	11
Other	15

Platform type codes used in this Appendix

Single platform	01
Opposed platform	02
Multiple platform	03
Bipolar platform	04

Table C-1
Chipped Stone

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
13147	211	1	0					14
13147	259	15						
13147	201	1	0					16
13147	211	1	0	7	12	1		
13147	201	1	0					7
13147	201	1	0					3
13147	211	1	0	15	25	6		
13147	201	1	0					15
13147	211	1	0	15	8	2	1	
13147	201	1	0					
13147	201	1	0					21
13147	211	1	0	25	12	5	1	
13147	211	1	0	37	13	6	1	
13147	201	1	0					22
13147	211	11	0	8	6	1		
13147	201	1	0					9
13147	201	1	0					9
13147	201	1	0					15
13147	211	1	0	17	15	2		
13147	211	15	0	23	13	4	1	
13147	201	1	0					22
13147	201	1	0					16
13147	211	1	0	11	18	2	1	
13147	211	1	20	15	20	2		
13147	211	1	0	17	15	5	1	
13147	201	3	0					23
13147	201	2	0					18
13147	201	1	0					16
13147	211	1	0	13+	22	2	1	
13147	201	3	0					29
13147	201	1	0					21
13147	201	4	0					14
13147	211	1	0	11+	17	-		
13147	211	1	0	12	9	1	1	
13147	202	2	0					7
13147	211	1	0	13	9		2	

Table C-1 (cont'd)

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
13147	211	1	0					13
13147	211	1	100	12	18	3	1	
13147	201	1	0					8
13147	211	1	0	12	21	2	1	
13147	211	1	0	11	6	?	1	
13147	201	1	0					17
13147	211	3	0	29	12	5	1	
13147	211	5	10	35	45	13	3	
13147	259	1	20	15+	27			
13147	259	1	0	62	17			
13147	241	4	0	115	80			
13147	267	15	0					
13147	201	1	0					16
13147	211	2	0	13+	20			
13147	211	1	45	21	15	4	1	
13147	211	1	0	16	15			
13147	265	4	0	63	40			
13147	211	1	0	6+	13			
13147	211	1	30	8+	10			
13147	241	3	0					80
10916	211	2	75	15+	12	4		
10916	211	1	0	21	17	2	2	
10916	211	1	0	27+	39	4	2	
10916	211	1	0	42	30	6	1	
10916	211	5	0	7+	10			
10916	211	1	0	25	25	7	2	
10916	211	2	0	20	11	3		
10916	201	2	0					9
10916	201	1	0					7
10916	211	1	0	22	17	3	3	
10916	211	1	0	22+	11+	1		
10916	201	1	0					12
10916	211	1	0	18+	15	6		
10916	211	2	70	65	50	19	3	
10916	201	2	60					9
10916	211	1	0	17+	20	3	3	
10916	211	1	0	25	19	5	3	
10916	201	1	0					7

Table C-1 (cont'd)

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
10916	211	1	0	12	8	2	2	
10916	201	1	0					6
10916	259	1	0	42	20	5		
7312	211	1	0	25+	21	4	1	
7312	201	1	0			6		
7312	211	2	0	11	12	12	1	
7312	259	1	0					30
7312	201	1	0					6
7312	211	1	0	10+	5	1	3	
7312	201	5	0					11
7312	201	1	0					8
7312	211	1	0	5	8	1		
7312	211	8	0	16	15	4	1	
7312	211	1	0	11	12	3	2	
7312	211	15	5	35	22	5	3	
7312	211	1	0	12+	15	2	3	
7312	211	1	100	8+	10	2		
7312	211	1	0	19	9	2	3	
7312	211	8	70	40+	30	8		
7312	201	1	0					12
7312	211	1	0	5+	7	1		
7312	211	1	0	8	14	2	3	
7312	262	3	50	40+	50	33	3	
7312	259	1	0	27+	25	6		
7312	211	15	0	50	60	15		
7312	211	1	0	27+	20	8		
13346	211	1	0	20	11	3	2	
13346	211	1	0	12	10	3	1	
13346	211	1	0	10	13	3	1	
13346	201	1	0			9		
13346	211	2	0	28	18	5	1	
13346	211	1	0	22	12	5	2	
13346	211	2	0	44	30	12	3	
13346	201	1	0					7
13346	261	8						
13346	201	11	100					11
13346	211	1	0	7	6	10		

Table C-1 (cont'd)

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
13346	201	2	0					2
13346	241	1	0	30	30	7		
13206	211	1	100	14+	12	4		
13206	201	1	0					18
13206	211	1	0	14	8	2		
13206	211	1	100	30	20	3		
13206	211	1	0	22	12	4	1	
13206	211	1	0	15+	22	5	1	
13206	211	1	0	12+	12+	2		
13206	211	1	0	19	8	3	3	
13206	201	3	25					9
13206	201	1	0					13
13206	211	1	0	14	14	2	4	
13206	211	1	0	10	19	5	1	
13206	211	1	0	14+	9			1
13206	211	1	25	27	20	6	2	
13155	211	5	60	13	15	4	1	
13155	201	5						24
13155	201	5						13
13155	201	3	0					29
13155	211	8	0	12	15	4	2	
13155	202	3	0					20
13155	201	1	0	22	23	3	3	
13155	211	11	10	10	10	2	3	
3929	201	1	0					11
3929	211	3	0	29	21	12	1	
3929	211	15	0	7+	6	2		
3929	211	15	0	21	12	4	1	
3929	201	1				22		
3929	211	1	0	23	12	3	1	
3929	209	11	90				1	
3929	211	1	0	14	11	2	2	
3929	211	11	15	13	16	2	1	
3929	211	1	0	12	8	2	2	
3929	262	1	0	60	34		3	
3929	211	15	0	20+	12	5		
3929	211	11	100	26	16	7		
3929	262	2	0	17	46		1	

Table C-1 (cont'd)

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
3929	267	3	85	55	45	32		
3929	267	3	98	68	60	55		
3929	211	1	15	39	28	11	1	
3929	201	2	0					37
6940	211	1	0	15	9	4	1	
6940	211	1	0	9+	9	1		
6940	262	1	0	30	15	13	2	
6940	201	1	0					8
6940	201	1	0					16
6940	211	1	15	26	20	5	2	
6940	259	1	0	27	8	3		
14501	201	9	0					34
14501	211	1	0	19	12	4	2	
14501	211	1	0	10	9	1	1	
14501	201	9	0					19
14501	211	1	0	13	7	1	1	
14501	259	1	0	35	10	4		
14501	201	1	0					8
14501	201	1	0					11
13338	211	1	0	10	10	3	2	
13338	211	1	0	16	9	4	2	
13338	211	1	0	18	11	3	2	
13338	211	1	0	27	18	6	2	
13338	211	1	5	13	8	2	3	
13338	201	1	0				2	19
13338	262	1	0				2	35
13338	201	1	15					12
13338	211	1	0	21+	14	6		
13338	211	1	0	18	22	6	3	
13338	211	1	0	7	7	2		
13338	211	1	0	8	10	2	2	
6085	201	1	0					18
6085	201	1	20					9
6085	201	1	0					14
6085	201	1	0					15
6085	211	1	0	7	7	1		
6085	211	1	0	11	10	2	2	
6085	211	1	0	16	18	5	2	

Table C-1 (cont'd)

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
6085	201	4	40					15
6085	201	1	0					7
6085	211	1	0	25	19	9	3	
6085	262	1	0	38	22	12	3	
6085	241	2	25	60	30	15		
6085	211	2	75	44	20	6	3	
6085	201	1	0					8
6085	211	1	0	20	15		2	6
6085	211	1	0	10	8	4		
6085	201	1	0					9
6085	211	1	0	22	20	3	3	
6085	211	1	20	30	40	10	2	
6085	201	1	0					7
6085	201	1	0				3	30
6085	201	1	0					10
6085	201	1	0					16
6085	201	2	0					4
6085	201	9	0					15
6085	201	1	0					35
6085	211	2	0	12	30	4	2	
6085	201	1	0					7
6085	201	1	0					10
6085	201	1	30					18
6085	201	1	0					5
6085	201	1	0					6
6085	201	1	0					8
6085	201	1	0					18
6085	211	1	0	13	6	1		
6085	201	1	0					8
6085	201	1	0					8
6085	211	1	0	4+	8	1		
6085	211	1	0	8	9	2	2	
6085	211	1	0	6	6	1		
6085	211	1	0	13	12	2	3	
6085	201	1	5					5
6085	211	1	60	10+	6	1		
6085	201	1	0					5
6085	201	1	0					4

Table C-1 (cont'd)

FB#	Artifact Type	Raw Material	Flake					Debris Max Length (mm)
			% Cortex	Length (mm)	Width (mm)	Thickness (mm)	Platform Type	
6085	211	1	0	8+	5	1		
3994	241	6	15	52	50	8		
3994	211	1	40	17+	15	4		
3994	259	1	0	13	20	4		
3994	211	1	30	10+	10			
3994	211	1	0			11		
3994	211	1	40	6+	6	2		
13139	262	3	30	60	40	16	2	
13139	211	1	30	17	9	3		
14502	201	1	0					7
13920	201	1	0					8
13920	241	1	0	39	40	11	3	
13920	221	1	0	43	15	3	2	
7823	201	11	0					14
6084	251	1	25	23	32	12		
6084	201	1	0					9
6084	261	4	35	30	40	42	2	
6084	221	1	0	28+	16	3		
6084	259	1	0	36+	25	6		
6086	259	15	0	30	10	4		
6086	259	1	0	35	17	4		
6089	211	1	0	33	11	6	2	
6089	211	1	0	9+	6	1		
6089	211	1	0	18	9	1	2	
6089	259	10	0	22	12	4		
4525	201	5	0			8		
H98	259	11	0	24	11	3		
H70	211	1	100	13	29	6	1	
H70	211	2	0	4	5	1	0	
H70	211	2	0	9	10	2	1	
H70	211	1	0	10	5	1	0	
H70	221	2	40	97	71	24	0	
H98	261	1						27
13140	201	1						20
13140	211	1		12	13	3		
13140	211	9		17	21	5	0	
10694	211	1	0	11+	14	2	0	

Table C-2
Ground Stone

FB#	Artifact Type	Metate Type	Mano Hand	Mano Side	Raw Material	Length	Width	Thickness	Weight (g)	Cross Section
14502	279	0	0	0	3	0	0	0	1.8	0
14502	279	0	0	0	3	0	0	0	4.9	0
14502	279	0	0	0	3	0	0	0	2.1	0
14502	272	0	0	1	3	0	0	0	49.1	1
14502	272	0	0	0	3	0	0	0	167.0	2
14502	272	0	1	0	3	92	0	0	300	2
3929	272	0	0	0	3	102	70	73	1000	2
3929	274	0	0	0	3	0	0	0	1300	1
13145	274	0	0	0	3?	0	0	0	179.4	1
13145	274	0	0	0	3?	0	0	0	106.9	1
H70	271	0	2	2	3	160	120	35	900	3
H70	274	1	0	0	3	180+	150	50	340	4
H70	274	1	0	0	3	310+	20	58	427	4
7820	272	0	0	1	3	0	0	32	125.3	5
7820	272	0	0	1	3	0	0	33	76.4	5
7820	272	0	0	1	3	0	0	22	38.6	1
13155	279	0	0	0	3	0	0	21	14.5	0
13155	274	0	0	0	15	0	0	41	58.6	0
13155	274	0	0	0	15	0	0	0	22.3	0
13346	279	0	0	0	3	0	0	18	31.4	0
13346	279	0	0	0	3	0	0	0	27.5	0
13346	279	0	0	0	3	0	0	0	7.6	0
13346	272	0	0	1	3	0	0	22	84.5	3
7312	279	0	0	1	3	220+	80	81	1000	2
7312	271	0	1	1	3	105	80	27	303	2
7312	271	0	1	1	3	107	90	32	700	2
7312	274	0	0	0	15	0	0	12	15.5	1
7312	271	0	1	1	15	90	78	36	500	2
7312	279	0	0	0	7?	0	0	0	75.2	0
7312	272	0	0	0	15	0	0	0	8.8	0
7312	272	0	0	1	3	0	0	30	145	1
7312	274	1	0	0	3	0	0	64	300+	4
7312	273	1	2	1	3	115	90	74	1600	¼
7312	273	1	0	0	3	510	80	25	0	4
6940	274	0	0	0	3	0	0	0	220	0
13147	279	0	0	1	3?	0	0	0	121.3	1
13147	274	1	0	0	6	0	0	16	103.5	4
13147	279	0	0	0	15	0	0	0	50	0

Table C-2 (cont'd)

FB#	Artifact Type	Metate Type	Mano Hand	Mano Side	Raw Material	Length	Width	Thickness	Weight (g)	Cross Section
13147	274	2	0	0	4	0	0	21	127.6	1
13147	279	0	0	0	3	0	0	0	74.7	0
13147	274	1	0	0	3	0	0	46	240.2	4
13147	274	0	0	0	3	0	0	26	95.6	0
13147	279	0	0	0	3	0	0	0	30.0	0
13147	279	0	0	0	3	0	0	0	28.9	0
13147	279	0	0	0	3	0	0	0	6.2	0
13147	279	0	0	0	3	0	0	0	1.3	0
10916	274	2	0	0	6	0	0	20	600	1
13920	279	0	0	0	3	0	0	0	202.5	0
13920	279	0	0	0	3	0	0	0	70.8	0
13920	272	0	0	1	3	0	0	0	63.1	0
4525	272	0	0	0	3	0	0	0	21.6	0
6084	274	0	0	0	3	0	0	49	500	0
6085	274	0	0	0	3	0	0	0	111	0
6086	272	0	1	2	3	70+	85	32	311	2/4
13139	274	0	0	0	3	0	0	32	1100	4/4
13140	271	0	1	1	3	117	113	31	800	3
13140	279	0	0	0	6	0	0	0	104	0
13140	272	0	1	1	3	113	76	46	600	0
13140	279	0	2	1	5	240	56	50	1250	6
3994	279	0	0	0	3	0	0	0	0	0

APPENDIX D

CERAMIC ASSEMBLAGE ATTRIBUTES

Ceramic Typology Codes:

Unspecified Brown	101
El Paso Brown (Rim)	104
El Paso Bichrome (Rim)	106
El Paso Polychrome	107
El Paso Polychrome (Rim)	108
Other Known (Tucson Polychrome)	189

Surface Treatment

0 = Indeterminate
1 = Smoothed
2 = Smoothed + Striations
3 = Not Smoothed
4 = Wiped
5 = Parallel Incision/narrow band
6 = burned
7 = Weathered
8 = Single linear incision
9 = Faint corrugation
10 = Punctations
11=Polished
12= Indeterminate

Temper

1 = Sand; quartz grains visible
2 = Sand + muscovite (flecks)
3 = Sand + biotite (flecks)
4 = Well sorted and rounded quartz/sand grains
5 = few, relatively small quartz sand

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13147	189	500	5	5.2	1	2.5YR4/8	1	2.5YR4/8 10YR2/1	10YR4/1	1
13147	189	550	6	7.7	1	2.5YR4/8	1	2.5YR4/8 10YR2/1 7.5YR8/1	10YR4/1	1
13147	189	520	5	4.4	3	7.5YR5/3	1	2.5YR4/8 10YR2/2 7.5YR8/1	10YR4/1	2
13147	189	200	5	1.4	1	2.5YR4/8	1	2.5YR4/8 10YR2/2	10YR4/1	2
13147	189	500	5	4.3	3	7.5YR5/3	1	2.5YR4/8 10YR2/2 7.5YR8/1	10YR4/1	2
13147	189	300	5	2.0	1	2.5YR4/8	1	2.5YR4/8	10YR4/1	2
13147	189	600	6	6.8	3	7.5YR5/3	1	2.5YR4/8 10YR2/2	10YR4/1	2
13147	189	150	4	1.1	3	7.5YR5/3	1	2.5YR4/8 10YR2/2	10YR4/1	2
13147	189	800	6	7.7	1	2.5YR4/8	1	2.5YR4/8	10YR4/1	2
13147	189	350	6	3.4	3	7.5YR5/3	1	2.5YR4/8 10YR2/2	10YR4/1	2
13147	101	200	6	2.7	3	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	300	6	3.3	1	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	75	5	.6	1	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	510	6	5.4	4	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	90	6	.9	3	7.5YR5/3	5	7.5YR5/3	7.5YR2.5/1	1
13147	101	275	4	1.9	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	105	3	.6	1	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	50	4	.5	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	150	5	1.5	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	160	4	1.2	1	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	700	5	5.7	1	7.5YR5/3	3	7.5YR5/3	7.5YR4/3	3
13147	101	400	5	3.7	1	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	150	5	1.6	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	80	5	.6	1	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	200	6	1.7	0/7	7.5YR5/3	0/7	7.5YR5/3	7.5YR2.5/1	1
13147	101	500	6	5.0	0/7	7.5YR5/3	0/7	7.5YR5/3	7.5YR2.5/1	1
13147	101	30	5	.2	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	100	5	.8	0	7.5YR5/3	0	7.5YR5/3	7.5YR4/1	3
13147	101	450	5	5.9	3/7	7.5YR5/3	1	7.5YR5/3	7.5YR4/1	3
13147	101	310	3	3.1	3/6/8	7.5YR2.5/1	3/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	55	5	.5	0	7.5YR5/3	0	7.5YR5/3	10YR4/1	2
13147	101	300	4	3.0	3/6	7.5YR2.5/1	3/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	125	5	1.0	3	7.5YR5/3	3	7.5YR5/3	10YR4/1	2
13147	101	300	4	1.9	3/6	7.5YR2.5/1	3/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	80	5	.6	3	7.5YR5/3	3	7.3YR5/3	10YR4/1	2
13147	101	230	5	2.3	3	7.5YR5/3	1	7.5YR5/3	10YR4/1	2
13147	101	320	5	2.8	3	7.5YR5/3	1	7.5YR5/3	7.5YR4/3	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13147	101	150	5	1.4	0	7.5YR5/3	0	7.5YR5/3	7.5YR4/3	1
13147	101	1200	4	10.4	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	325	4	2.3	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	80	4	.6	3	7.5YR5/3	7	7.5YR5/3	10YR4/1	1
13147	101	150	5	1.4	3	7.5YR5/3	1	10YR4/1	7.5YR3/3	1
13147	101	250	4	1.8	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	90	4	.7	3	7.5YR5/3	1	10YR4/1	7.5YR3/3	1
13147	101	70	4	.5	1	7.5YR5/3	1	7.5YR5/3	7.5YR4/3	1
13147	101	190	5	1.9	7	7.5YR5/3	1	10YR4/1	7.5YR3/3	1
13147	101	300	5	2.6	7	7.5YR5/3	1	10YR4/1	7.5YR3/3	1
13147	104	410	4	4.1	1/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	70	4	.5	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	850	5	8.0	1/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	240	4	1.8	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	30	0	.2	0	7.5YR5/3	0	7.5YR5/3	7.5YR5/4	1
13147	101	320	3	2.3	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	75	4	.5	0	7.5YR2.5/1	0	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	80	8	.6	0	7.5YR2.5/1	0	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	205	5	2.3	2	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	80	4	.6	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	125	5	1.3	7	7.5YR5/3	1	10YR4/1	7.5YR4/3	1
13147	101	130	3	.8	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	60	5	.5	0	7.5YR5/3	0	7.5YR5/3	7.5YR5/3	1
13147	101	75	0	.5	0	7.5YR5/3	0	7.5YR5/3	7.5YR5/3	1
13147	101	100	4	.9	0	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	104	600	4	4.9	2/4	7.5YR5/3	3	10YR4/1	7.5YR2.5/1	1
13147	101	200	4	2.2	4	7.5YR2.5/1	1/7	7.5YR5/3	7.5YR2.5/1	1
13147	104	1100	4	11.5	3/4	7.5YR2.5/1	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	230	5	2.5	3	7.5YR2.5/1	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	400	4	2.5	3	7.5YR2.5/1	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	120	4	.9	1	7.5YR2.5/1	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	600	4	5.0	4	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	95	5	.8	0	7.5YR2.5/1	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	75	4	.8	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	120	4	.9	1	7.5YR2.5/1	7	7.5YR5/3	7.5YR2.5/1	1
13147	101	165	4	1.2	1	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	325	5	3.2	1	7.5YR2.5/1	3	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	380	4	2.6	4	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	175	4	1.3	4	7.5YR5/3	1	10YR4/1	10YR4/1	1
13147	101	40	4	.4	0	7.5YR2.5/1	0	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	155	3	1.1	4	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	30	3	.2	0	7.5YR2.5/1	0	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	55	3	.4	0	7.5YR5/3	0	7.5YR5/3	10YR4/1	1
13147	101	80	3	.6	1	7.5YR5/3	7	7.5YR5/3	7.5YR2.5/1	1
13147	101	120	4	.9	4	7.5YR5/3	1	7.5YR5/3	10YR4/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13147	101	200	4	1.6	2	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	150	4	1.2	7	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	300	3	1.7	4	7.5YR2.5/1	1/7	7.5YR5/3	7.5YR2.5/1	2
13147	101	600	5	5.4	3	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	3
13147	101	340	4	2.4	3	7.5YR2.5/1	3	7.5YR5/3	7.5YR2.5/1	3
13147	101	130	3	.9	1	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	75	3	.5	0	7.5YR2.5/1	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	80	5	.6	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	300	4	2.1	2	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	0
13147	101	60	3	.4	0	7.5YR2.5/1	0	7.5YR2.5/1	7.5YR2.5/1	0
13147	101	400	3	2.5	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	0
13147	101	100	5	.8	2	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	180	4	1.4	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	350	5	3.2	4	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	250	4	1.9	4/6	7.5YR2.5/1	1/6	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	210	5	1.8	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	190	5	1.9	1	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	100	3	.5	4	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	375	4	2.7	9	7.5YR5/3	3	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	400	5	3.9	2	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	120	5	1.1	2	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
13147	101-	120	4	.8	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	104	280	4	2.6	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	104	250	4	2.3	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	104	300	4	2.6	3	7.5YR2.5/1	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	200	4	1.7	3/7	7.5YR5/3	1/7	7.5YR5/3	7.5YR2.5/1	1
13147	101	150	4	1.3	3	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	900	5	8.0	2	7.5YR5/3	1	10YR4/1	7.5YR2.5/1	4
13147	101	300	4	2.6	9	7.5YR2.5/1	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	280	5	2.2	3	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	145	3	.9	3	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	75	4	.5	0	7.5YR5/3	0	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	300	4	2.7	2	7.5YR5/3	1	10YR4/1	7.5YR2.5/1	4
13147	101	400	5	3.1	4	7.5YR5/3	1	10YR4/1	7.5YR2.5/1	2
13147	101	400	5	3.8	2	7.5YR5/3	1	10YR4/1	7.5YR2.5/1	1
13147	101	50	4	.3	0	7.5YR5/3	0	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	150	5	1.2	1	7.5YR5/2.5	3	7.5YR5/3	7.5YR2.5/1	1
13147	101	100	4	.8	1	7.5YR5/3	1	10YR4/1	7.5YR2.5/1	1
13147	101	200	3	1.4	2	7.5YR5/3	3	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	400	5	3.1	1	7.5YR5/3	3	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	300	5	2.9	3	7.5YR5/3	3	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	125	4	2.0	3	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	600	4	4.3	4	7.5YR5/3	1	10YR4/1	7.5YR2.5/1	2
13147	101	650	5	5.5	4	7.5YR5/3	1	7.5YR2.5	7.5YR2.5/1	2
13147	101	300	4	2.5	4	7.5YR2.5/1	1	7.5YR5/3	7.5YR2.5/1	2

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13147	101	250	5	2.6	4	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	2/3
13147	101	180	4	1.5	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	400	4	2.9	4	7.5YR2.5	1	7.5YR2.5/1	7.5YR2.5/1	1
13147	101	80	4	.8	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
13147	101	180	4	1.3	1	7.5YR5/3	1	7.5YR2.5/1	7.5YR2.5/1	3
13147	101	110	4	1.1	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	3
13147	101	125	4	.9	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
13147	101	125	4	1.1	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
11616	101	125	4	1.2	1	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
11616	101	135	3	.9	4	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
11616	101	125	5	.9	10	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
11616	101	60	5	.6	0	7.5YR5/3	0	7.5YR5/3	7.5YR5/3	1
11616	101	100	3	.7	1	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
11616	101	400	4	3.1	4	7.5YR2.5/1	3	7.5YR2.5/1	7.5YR2.5/1	1
11616	101	150	3	1.1	2	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
11616	101	210	6	1.7	0	7.5YR5/3	7	7.5YR5/3	7.5YR2.5/1	1
11616	101	75	4	.6	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
11616	101	80	4	.6	3	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
11616	101	50	4	.4	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
11616	101	225	4	1.8	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
11616	101	250	4	2.1	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
11616	101	100	4	.6	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
11616	101	100	3	.7	2	7.5YR5/3	7	7.5YR5/3	7.5YR2.5/1	1
11616	101	30	3	.2	0	7.5YR5/3	0	7.5YR5/3	7.5YR2.5/1	1
11616	101	175	4	1.8	2	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	2
11616	101	220	5	1.6	7	10YR4/1	1	10YR4/1	10YR4/1	1
11616	101	200	3	1.3	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	150	5	1.2	1	7.5YR5/4	7	7.5YR5/4	7.5YR2.5/1	1
11616	101	125	3	.7	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	440	6	4.9	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	1
11616	101	400	5	3.3	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	1
11616	101	155	4	1.3	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	100	3	.6	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	300	5	2.8	2	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	85	3	.6	4	7.5YR5/3	1	7.5YR5/3	7.5YR2.5/1	1
11616	101	80	3	.4	4	10YR4/1	7	7.5YR5/3	10YR4/1	1
11616	101	205	5	1.9	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	2
11616	101	180	5	1.6	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	2
11616	101	225	4	1.8	4	10YR4/1	3	10YR4/1	7.5YR2.5/1	2
11616	101	150	4	1.1	4	10YR4/1	3	10YR4/1	7.5YR2.5/1	1
11616	101	75	4	.6	4	10YR4/1	3	10YR4/1	7.5YR2.5/1	2
11616	101	310	4	2.4	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	2
11616	101	225	4	1.6	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	210	4	1.5	4	10YR4/1	7	10YR4/1	7.5YR2.5/1	2
11616	101	125	4	.9	4	10YR4/1	3	7.5YR2.5/1	7.5YR2.5/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
11616	101	100	5	.8	0	10YR4/1	0	10YR4/1	7.5YR2.5/1	1
11616	101	80	5	.7	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	150	4	1.4	0	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	125	4	.9	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	730	5	6.6	4	7.5YR5/4	1	7.5YR5/4	7.5YR2.5/1	2
11616	101	115	5	1.1	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	2
11616	101	50	4	.4	4	10YR4/1	0	7.5YR5/4	7.5YR2.5/1	2
11616	101	60	4	.5	4	10YR4/1	0	10YR5/4	7.5YR2.5/1	2
11616	101	150	3	1.1	4	10YR4/1	1	10YR5/4	7.5YR2.5/1	2
11616	101	90	3	.6	4	10YR4/1	0	7.5YR2.5/1	7.5YR2.5/1	2
11616	101	50	4	.4	4	10YR4/1	0	7.5YR2.5/1	7.5YR2.5/1	2
11616	101	300	4	2.2	4	10YR4/1	3	10YR4/1	7.5YR2.5/1	2
11616	101	600	3	4.1	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	1
11616	101	200	4	1.3	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	2
11616	101	225	4	1.6	4	10YR4/1	3	10YR4/1	7.5YR2.5/1	2
11616	101	400	4	2.7	4	10YR4/1	3	7.5YR5/3	7.5YR2.5/1	2
11616	101	405	4	2.8	4	10YR4/1	3	7.5YR2.5/1	7.5YR2.5/1	2
11616	101	100	4	.7	4	10YR4/1	0	7.5YR2.5/1	7.5YR2.5/1	2
13920	107	600	4	5.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	880	4	6.5	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	300	5	2.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	320	4	2.5	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	900	4	7.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	250	4	2.7	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	410	5	3.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	175	4	1.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	48	3	.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	200	4	1.9	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	170	4	1.6	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	130	5	1.0	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	102	4	.6	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	160	5	1.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	103	3	.6	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	50	3	.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	95	3	.5	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	60	3	.4	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	600	4	4.5	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	400	4	2.5	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	90	3	.7	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	75	3	.4	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	210	4	1.9	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	120	4	.8	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	375	4	3.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	225	4	1.9	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	113	4	1.0	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13920	107	122	4	1.0	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	60	4	.5	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	270	3	1.8	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	37	3	.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	31	3	.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	150	5	1.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	102	4	.7	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	48	3	.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	67	3	.6	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	200	5	2.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	600	5	5.3	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	670	4	6.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	348	4	2.8	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	780	4	6.4	4	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	500	5	4.5	3	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	230	7	3.6	3	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	470	4	4.2	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	530	3	4.6	1	10YR4/1	1	7.5YR5/4	7.5YR2.5/1	1
13920	107	410	5	3.5	1	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	314	4	2.5	3	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	1200	6	16.6	1	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	205	4	3.4	3	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	395	4	3.2	2	10YR4/1	1	10YR4/3	7.5YR2.5/1	1
13920	107	100	3	.6	1	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	130	4	.4	1	10YR4/3	1	10YR4/1	7.5YR2.5/1	1
13920	107	110	3	.8	4	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	96	4	.9	1	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	245	4	1.6	3	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	206	4	1.6	3	10YR4/3	1	10YR4/3	7.5YR2.5/1	1
13920	107	600	5	4.4	3	10YR4/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13920	107	380	5	3.1	3*	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	1
13920	107	117	4	1.2	3	10YR4/3	1	10YR4/1	7.5YR2.5/1	1
13920	107	63	3	.3	1	10YR4/3	3	10YR4/3	7.5YR2.5/1	1
13920	107	112	3	.7	3	10YR4/3	1	10YR4/1	7.5YR2.5/1	1
13920	107	36	3	.2	0	0	0	0	0	1
13920	107	218	4	1.5	3	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	1
13920	107	239	3	1.0	3	10YR4/1	3	10YR4/3	7.5YR2.5/1	1
13920	107	800	4	6.4	4	10YR4/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13920	107	443	4	3.4	3	10YR4/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13920	107	150	3	.8	3	10YR4/3	1	10YR4/1	7.5YR2.5/1	1
13920	107	390	4	2.6	12	0	0	0	0	1
13920	107	620	3	4.8	3	10YR4/3	11	10YR4/1 2.5YR4/8	7.5YR2.5/1	1
13920	107	300	3	2.0	3	10YR4/3	11	10YR4/1 2.5YR4/8	7.5YR2.5/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13920	107	400	4	2.8	3	10YR4/3	11	10YR4/1 2.5YR4/8	7.5YR2.5/1	1
13920	107	295	3	2.2	3	10YR4/3	11	10YR4/1 2.5YR4/8	7.5YR2.5/1	1
13920	107	590	4	5.2	3	10YR4/3	11	10YR4/1 2.5YR4/8	7.5YR2.5/1	1
13920	107	105	4	.8	3	10YR4/3	11	10YR4/1 10YR4/3	7.5YR2.5/1	1
13920	107	94	4	.8	3	10YR4/1	1	10YR4/1 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	185	4	1.2	3	10YR4/1	11	10YR4/1 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	170	3	1.0	3	10YR4/3	1	10YR4/1 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	425	4	3.8	3	10YR4/3	3	10YR4/3 10YR4/1	7.5YR2.5/1	1
13920	107	162	4	1.2	3	10YR4/3	1	10YR4/3 10YR4/1	7.5YR2.5/1	1
13920	107	194	3	1.3	3	10YR4/3	11	10YR4/1 10YR4/3	7.5YR2.5/1	1
13920	107	500	4	3.6	3	10YR4/3	1	10YR4/1 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	70	4	.5	1	10YR4/3	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	154	3	1.1	3	10YR4/3	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	196	5	2.1	9	10YR4/3	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	650	6	4.8	3	10YR4/3 7.5YR2.5/1	11	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	100	4	.9	1	10YR4/1	1	10YR4/1 10YR4/3	7.5YR2.5/1	1
13920	107	170	3	1.1	3	10YR4/3	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	218	5	1.9	3	10YR4/3	11	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	245	4	1.8	3	10YR4/3	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	107	195	4	1.3	3	10YR4/3	11	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	108	1600	8	13.5	11	10YR4/3 7.5YR2.5/1	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	108	500	7	4.5	11	10YR4/3 7.5YR2.5/1	1	10YR4/3 7.5YR2.5/1	7.5YR2.5/1	1
13920	108	250	6	2.7	11	7.5YR2.5/1	11	7.5YR2.5/1	7.5YR2.5/1	1
13920	108	500	6	4.8	3	10YR4/1	1	10YR4/1	7.5YR2.5/1	1
13920	107	700	5	8.9	1	10YR5/1	1	7.5YR5/4	10YR4/1	1
3389	108	225	6	2.7	1	10YR4/3	11	7.5YR2.5/1 7.5YR4/3	10YR4/1 7.5YR2.5/1	1
3389	108	150	5	1.5	1	10YR4/1	11	7.5YR2.5/1	10YR4/1	1
3389	108	1000	5	10.5	1	10YR4/1	3	7.5YR2.5/1 7.5YR4/3	10YR4/1	1
3389	108	600	5	6.9	11	7.5YR2.5/1 7.5YR3/3	11	7.5YR2.5/1 7.5YR4/3	10YR4/1 7.5YR2.5/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
3389	101	250	5	2.2	3	7.5YR4/4	1	7.5YR4/3	7.5YR4/3	1
3389	101	61	5	.6	0	7.5YR4/4	3	7.5YR4/3	7.5YR4/3	1
3389	101	63	0	0	0	0	0	0	7.5YR2.5/1	1
3389	101	650	5	6.4	3	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1
3389	101	1200	5	13.1	3	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1
3389	101	1400	5	12.3	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	204	6	2.5	1	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	580	5	4.9	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	115	5	1.3	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	48	3	.3	0	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	1000	7	9.6	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	160	4	1.5	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3389	101	184	4	1.4	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
3929	101	250	0	0	0	0	3	7.5YR2.5/1	7.5YR2.5/1	1
3929	101	100	4	1.0	3	7.5YR5/4	3	7.5YR5/4	7.5YR4/4	1
3929	101	90	5	1.8	3	7.5YR5/4	3	7.5YR5/4	7.5YR5/4	1
3929	101	490	5	4.7	5	7.5YR5/4	3	7.5YR5/4	7.5YR2.5/1	1
3929	101	1300	5	12.8	5	7.5YR5/4	3	7.5YR/4	7.5YR2.5/1	1
14501	101	65	2	.4	3	7.5YR5/3	3	7.5YR3/1	7.5YR2.5/1	1
14501	101	4820	5	48.4	3	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
14501	101	1800	6	23	3	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
14501	101	740	4	6.1	9	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
14501	101	900	5	9.6	3	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
14501	101	295	5	3.4	3	7.5YR4/1	3	7.5YR4/1	7.5YR2.5/1	1
14502	101	200	5	2.5	3	7.5YR5/3	3	7.5YR5/3	7.5YR5/3	1
10694	101	106	0	0	0	7.5YR5/3	0	7.5YR3/1	7.5YR2.5/1	1
10694	101	208	4	1.5	3	7.5YR5/3	3	7.5YR3/1	7.5YR2.5/1	1
13338	104	295	4	1.9	3	7.5YR5/3	3	7.5YR5/3	7.5YR2.5/1	1
7823	101	110	0	0	0	7.5YR5/2	0	7.5YR5/2	7.5YR2.5/1	1
13346	101	405	5	3.3	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	110	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13346	101	574	4	4.7	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	192	4	1.5	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	184	4	1.6	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	150	4	1.0	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	152	5	1.4	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	200	3	1.6	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	280	4	2.5	5	7.5YR4/4	3	7.4YR4/4	7.5YR2.5/1	1
13346	101	193	4	1.7	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	214	4	1.8	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	325	6	3.6	9	7.5YR4/4	9	7.5YR4/4	7.5YR2.5/1	1
13346	101	207	4	1.5	9	7.5YR4/4	9	7.5YR4/4	7.5YR2.5/1	1
13346	303	670	4	5.9	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	119	3	.9	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	150	4	1.3	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13346	101	270	4	2.6	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	700	6	7.9	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	69	0	0	3	7.5YR4/4	0	0	7.5YR2.5/1	1
13346	101	34	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13346	101	90	4	.4	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	104	4	.8	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	80	0	0	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	20	0	.3	0	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	54	4	.6	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	89	3	.4	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	93	3	.8	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	200	5	1.8	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	104	3	.8	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	98	3	.9	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	50	0	0	0	0	0	0	7.5YR2.5/1	1
13346	101	125	3	.8	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	51	0	.3	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	80	5	.7	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	78	0	.6	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13346	101	80	3	.6	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	300	3	1.8	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	127	3	1.0	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	112	3	.7	0	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	150	3	1.0	5	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	100	4	.8	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	125	3	.9	9	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	60	0	.7	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13346	101	50	0	0	0	0	0	0	7.5YR2.5/1	1
13346	101	170	3	1.1	3	7.5YR5/4	3	7.5YR5/3	7.5YR2.5/1	1
13346	104	380	5	4.1	2	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1
13346	104	400	6	4.1	4	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13346	101	100	6	.9	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13206	101	105	4	1.1	3	7.5YR4/4	3	7.5YR4/3	7.5YR2.5/1	1
13206	101	215	5	2.5	3	7.5YR4/4	3	7.5YR4/3	7.5YR2.5/1	1
13206	101	60	3	.4	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	75	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	160	0	1.4	0	7.5YR4/3	0	7.5YR4/3	7.5YR2.5/1	1
13206	101	200	5	2.0	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13206	101	90	4	.8	3	7.5YR4/3	3	7.5YR4/3	7.5YR2.5/1	1
13206	101	200	5	2.3	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13206	101	145	3	1.0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	80	4	.8	3	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1
13206	101	130	4	1.2	3	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1
13206	101	215	4	1.3	3	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1
13206	101	900	5	7.8	3	7.5YR4/4	1	7.5YR4/4	7.5YR2.5/1	1

FB #	Type Code	Area (mm^2)	Maximum Thickness (mm)	Weight (g)	Interior Treatment	Color	Exterior Treatment	Color	Core color	Temper
13206	101	210	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	224	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	146	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	260	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	125	4	1.0	3	7.5YR4/4	3	7.5YR4/4	7.5YR2.5/1	1
13206	101	0	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	123	4	1.0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	117	5	1.4	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	128	3	.8	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	104	220	5	2.0	3	7.5YR4/3	1	7.5YR2.5/1	7.5YR2.5/1	1
13206	101	150	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
13206	101	92	4	.6	3	7.5YR4/3	3	7.5YR4/3	7.5YR2.5/1	1
7312	104	425	3	4.0	4	7.5YR4/3	3	7.5YR4/3	7.5YR2.5/1	2
7312	106	300	8	4.1	1	7.5YR2.5/1	11	7.5YR2.5/1 7.5YR4/3	10YR4/1	4
7312	104	250	6	2.9	3	7.5YR4/3	1	7.5YR4/3	10YR4/1	1
7312	104	155	6	1.7	3	7.5YR4/3	1	7.5YR4/3	10YR4/1	1
7312	104	1500	5	16.9	1	7.5YR2.5/1	1	7.5YR2.5/1	7.5YR2.5/1	4
7312	104	400	14	3.3	1	7.5YR4/3	1	7.5YR2.5/1	7.5YR2.5/1	1
7312	101	800	6	7.4	3	7.5YR4/3	2	7.5YR4/3	7.5YR2.5/1	1
7312	101	89	3	.8	0	7.5YR4/4	0	7.5YR4/2	7.5YR2.5/1	1
7312	101	800	6	8.6	0	7.5YR4/4	0	7.5YR4/4	7.5YR4/4	1
7312	101	23	0	.1	0	0	0	0	0	1
7312	101	100	2	.6	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
7312	101	370	5	3.3	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
7312	101	93	0	0	0	0	0	0	0	1
7312	101	102	4	.9	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
7312	101	86	3	.7	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
7312	101	250	5	2.7	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
7312	101	320	0	0	0	0	0	0	7.5YR4/4	1
7312	101	54	0	0	0	0	0	0	7.5YR2.5/1	1
7312	101	200	4	.7		0	0	0	7.5YR2.5/1	1
7312	101	60	4	.6	0	0	0	0	7.5YR2.5/1	1
7312	101	78	0	0	0	7.5YR4/4	0	7.5YR4/4	7.5YR2.5/1	1
3994	101	150	5	1.2	0	7.5YR4/4	0	7.5YR5/3	7.5YR5/2	1
H70	101	600	6	5.9	4	7.5YR5/3	3	7.5YR5/3	10YR4/1	1
H70	101	1100	7	15	4	7.5YR5/3	3	7.5YR5/3	10YR4/1	1
H70	101	40	5	3.6	4	7.5YR5/2	3	7.5YR5/2	10YR4/1	1
H70	101	500	6	5.0	4	7.5YR5/3	3	7.5YR5/3	10YR4/1	1
H70	101	250	5	3.1	3	7.5YR5/2	3	7.5YR5/2	10YR4/1	1
H70	101	80	5	.8	4	7.5YR5/3	3	7.5YR5/3	10YR4/1	1
13140	101	170	5	1.5	0	7.5YR5/4	0	7.5YR5/4	7.5YR5/4	1
13140	131	150	5	1.4	4	7.5YR5/2	1	7.5YR5/1	7.5YR5/1	5

APPENDIX E

BACKHOE TRENCH TESTING RESULTS

by
Stephen K. Mbutu

OBJECTIVES

According to the scope of work, backhoe trenches were to be excavated as part of the testing procedures at the 37 sites. The primary objectives of the backhoe trenching were (1) to delineate the stratigraphic context of the cultural deposits in order to evaluate the site's post-depositional history, preservation, and integrity; (2) to determine relationship between site boundaries as delineated by surface artifact distribution and by the subsurface extent of cultural deposits; (3) assess the extent to which coppice dunes mask and, therefore, preserve cultural deposits; (4) to determine if cultural deposits exist beyond site surface boundaries by trenching off-site locales exhibiting geomorphic surfaces suspected of containing deep soil strata; and (5) to collect soil samples for environmental data analyses.

METHODOLOGY

A rubber tire backhoe with a 1-m wide blade was used. The majority of the trenches were excavated at the periphery of the site. Ideally, trench orientation was planned perpendicular to the long axis of the dune alignment but through the narrowest part of the dune. Trenches cross-sectioned the dune down the middle from the apex to the petrocalcic horizon (Figure E-1). Each dune was approached from the backside and excavated away from or parallel to the site. Depending on dune orientation, a few trenches were excavated across interdune saddle areas of sand accumulation. The backdirt was piled on either side of trench away from the site. All trenches were back-filled at the end of the project.

The number of trenches at each site was determined by the size of the site and ranged from one at several sites to 15 at site FB 7312. Five trenches were excavated at selected off-site locales within PB 1, PB 2, PB 3, PB 6, and PB 7. Stratigraphic sections were measured and described for all the trenches (Table E-1) and a representative sample (n=40) profiled. Trenches were mapped onto the site contour map using a Total Data System. Soil samples were taken from selected trenches for pollen and laboratory studies (see Appendix H).

RESULTS

A total of 93 trenches (see Table E-1) was excavated for a total of 903.1 linear meters. The trenches averaged 2.1 m in depth and a total of 1,896.5 m^3 of soil was excavated. Four major soil horizons (three paleosols and the historic eolian overburden) were delineated in backhoe trenches excavated during the current project. The paleosols include, from the youngest to the oldest, the Organ, Isaacks' Ranch, and La Mesa (Monger 1993; see Figure E-1).

Historic Eolian Overburden

The historic eolian sand stratum is composed of cross-bedded recent sediments deposited above the first buried soil (see Figure E-1). The eolian overburden correlates to the Entisol (Torripsamments) or youthful soil of McGregor Range (see Figure 1) adjacent to the current project area to the north (Pigott 1977). Within this stratum, the eolian aggradation process exceeds pedogenic process and no significant soil master horizons with depth have developed (Hubbard 1988). The stratum is characterized by loose, fresh-appearing, recently deposited eolian sand sheet, minimal disturbance of primary sedimentary structures by bioturbation, and lack of features indicative of soil development. The sand mantle is widespread in the study area except in localized deflation depressions. The average depth of coppice dune eolian overburden in the project area is 95.6 cm but some tall dunes can attain depths of nearly 2 m (see Table E-1). On 28 percent (n=26) of the trenches, the overburden rests upon the A-horizon (Figure E-2), but lies unconformably upon a mid-Holocene soil (the youngest paleosol) in the remainder of the trenches. It correlates to (1) the most recent Quaternary



Figure E-1. Backhoe Trench 5 profile, site FB 7312. Typical stratigraphy of the project area.

Table E-1
Strata Data from Backhoe Trench Profiles

		Backhoe Trench			Historic Eolian Overburden		A-Horizon		Organ		Isaacks' Ranch		La Mesa	
PB #	FB #	Number	Length (m)	Depth (m)	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm
1	14502	1	7.5	2.0	7.5YR 5/6	72	7.5YR 5/4		7.5YR 6/3	70			7.5YR 7/3	48
1	Off-site	1	9.5	1.2	7.5YR 5/6	3			7.5YR 6/4	70			7.5YR 8/2	20
2	H70	1	9.6	1.6	7.5YR 5/6	70			7.5YR 6/6	60			7.5YR 7/3	20
2	H70	2	10.4	2.7	7.5YR 5/6	150			7.5YR 7/3	20			7.5YR 8/3	100
2	3929	1	7.5	2.0	7.7YR 5/6	90	7.5YR 4/4	15	7.5YR 5/6	70			7.5YR 6/4	20
2	3929	2	8.0	2.3	7.5YR 5/6	80			7.5YR 5/4	82	7.5YR5/4	54		
2	13145	1	9.7	3.3	7.5YR 5/6	140			7.5YR 6/6	156			7.5YR 7/4	36
2	13146	1	9.2	1.8	7.5YR 5/6	113		6	7.5YR 5/4	70			7.5YR 6/4	28
2	13338	1	9.8	2.8	7.5YR 5/6	120			7.5YR 5/8	80			7.5YR 8/2	55
2	Off-site	1	7.7	2.6	7.5YR 5/4	102			7.5YR 4/4	70			7.5YR 6/4	88
3	3389	1	12.9	2.3	7.7YR 5/6	140	7.5YR 4/4	6	7.5YR 6/4	50			7.5YR 7/3	30
3	3389	2	9.2	2.7	7.5YR 5/6	130			7.5YR 6/6	70			7.5YR 6/6	70
3	3398	1	7.9	1.9	7.5YR 5/6	110	7.5YR 5/4	5	7.5YR 6/4	42			7.5YR 7/4	30
3	Off-site	1	6.9	0.7	7.5YR 5/6	2			7.5YR 6/4	40			7.5YR 8/3	30
4	7820	1	21.4	3.1	7.5YR 5/6	20			7.5YR 5/4	35			7.5YR 8/2	100
4	7823	1	7.2	2.1	7.5YR 5/6	150	7.5YR 5/8	7	7.5YR 7/6	58			7.5YR 7/4	19
4	7823	2	7.3	2.2	7.5YR 5/6	130	7.5YR 5/4	10	7.5YR 6/6	58			7.5YR 6/6	30
5	13155	1	7.7	2.4	7.5YR 5/4	90			7.5YR 6/4	100	75YR6/4	40	7.5YR 7/4	4
5	13206	1	10.5	2.3	7.5YR 5/4	108			7.5YR 5/4	36			7.5YR 7/3	80
5	13206	2	12.0	2.5	7.5YR 5/4	82			7.5YR 5/4	94			7.5YR 6/4	50
5	13345	1	4.3	.4	7.5YR 5/6	15								
5	13345	2	5.4	.5	7.5YR 5/6	8								
5	13345	3	3.0	.50	7.5YR 5/6	19								
5	13346	1	8.8	1.7	7.5YR 5/6	60			7.5YR 6/4	50			7.5YR 7/4	60

Table E-1 (cont'd)

		Backhoe Trench			Historic Eolian Overburden		A-Horizon		Organ		Isaacks' Ranch		La Mesa	
PB #	FB #	Number	Length (m)	Depth (m)	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm
5	13346	2	13.5	2.6	7.5YR 5/6	140	7.5YR 4/6	16	7.5YR 5/8	40			7.5YR 7/4	96
5	13346	3	13.3	3.4	7.5YR 5/6	170			7.5YR 6/6	90	7.5YR8/4	20	7.5YR 8/4	40
5	13346	4	16.6	3.2	7.5YR 5/6	110			7.5YR 6/4	70	7.5YR8/2	60	7.5YR 8/2	40
5	13908	1	8.0	1.3	7.5YR 5/6	70			7.5YR 6/4	63				
6	6940	1	7.0	2.1	7.5YR 5/6	144			7.5YR 5/4	40			7.5YR 6/4	12
6	6940	2	12.4	1.6	7.5YR 5/6	80			7.57YR 6/4	46			7.5YR 6/4	19
6	6940	3	9.6	1.1	7.5YR 5/6	53			7.5YR 6/6	58				
6	6940	4	7.5	1.7	7.5YR 5/6	80			7.5YR 6/6	90				
6	7312	1	5.0	1.4	7.5YR 5/4	36			7.5YR 6/4	30	7.5YR6/6	26		
6	7312	2	6.0	1.7	7.5YR 5/4	64			7.5YR 5/4	160			7.5YR 6/4	32
6	7312	3	12.5	1.2	7.5YR 5/6	20			7.5YR 6/4	103	7.5YR6/6	33		
6	7312	4	15.1	1.4	7.5YR 5/6	50			7.5YR 6/6	98	7.5YR6/6	24		
6	7312	5	12.6	1.3	7.5YR 5/6	90			7.5YR 5/8	80	7.5YR6/4	50		
6	7312	6	7.0	2.1	7.5YR 5/4	200			7.5YR 6/4	144			7.5YR 8/2	38
6	7312	7	5.0	2.9	7.5YR 5/6	124			7.5YR 6/3	60				
6	7312	8	13.2	1.2	7.5YR 5/6	47		5	7.5YR 5/6	60	7.5YR6/4	14		
6	7312	9	22.4	1.5	7.5YR 5/6	50	7.5YR 4/3	14	7.5YR 5/4	21	7.5YR6/4	15		
6	7312	10	12.6	2.0	7.5YR 5/6	90	7.5YR 5/6	6	7.5YR 6/6	63	7.5YR6/4	27		
6	7312	11	16.5	1.3	7.5YR 5/6	60	7.5YR 5/4	10	7.5YR 5/6	41				
6	7312	12	22.5	1.1	7.5YR 5/6	40			7.5YR 5/6	47	7.5YR5/4	25		
6	7312	13	22.5	0.8	7.5YR 5/6	43	7.5YR 5/4	10	7.5YR 5/6	14	7.5YR6/6	20		
6	7312	14	12.6	1.1	7.5YR 5/6	45	7.5YR 5/4	7	7.5YR 6/4	23	7.5YR6/4	10		
6	7312	15	18.3	1.2	7.5YR 5/6	48	7.5YR 5/4	10	7.5YR 6/6	29				
6	10694	1	9.5	1.3	7.5YR 5/6	17			7.5YR 6/4	23			7.5YR 8/3	14

Table E-1 (cont'd)

		Backhoe Trench			Historic Eolian Overburden		A-Horizon		Organ		Isaacks' Ranch		La Mesa	
PB #	FB #	Number	Length (m)	Depth (m)	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm
6	10694	2	5.0	1.3	7.5YR 5/4	40	7.5YR 5/4	10	7.5YR 6/4	60			7.5YR 6/4	12
6	11616	1	18.8	1.7	7.5YR 5/6	96			7.5YR 5/4	56	7.5YR7/4	16		
6	11616	2	8.6	1.0	7.5YR 5/6	30			7.5YR 6/6	63	7.5YR6/6	3		
6	11617	1	7.0	1.6	7.5YR 5/6	27			7.5YR 5/8	107			7.5YR 8/3	10
6	14501	1	5.5	1.7	7.5YR 6/6	110			7.5YR 5/4	46			7.5YR 6/4	20
6	14501	2	12.0	1.6	7.5YR 5/6	65			7.5YR 5/4	81			7.5YR 8/2	17
6	14501	3	12.0	1.5	7.5YR 5/4	60			7.5YR 5/4	100				
6	Off-site	1	7.9	2.5	7.5YR 5/6	25			7.5YR 5/8	225				
7	10916	1	7.0	2.5	7.5YR 6/4	170	7.5YR 6/4	12	7.5YR 6/3	40			7.5YR 6/3	32
7	10916	2	7.0	2.6	7.5YR 6/6	130	7.5YR 6/3	9	7.5YR 6/3	60			7.5YR 7/3	16
7	13147	1	7.0	3.2	7.5YR 5/4	140			7.5YR 6/4	40			7.5YR 6/4	60
7	13147	2	6.4	1.9	7.5YR 5/4	110			7.5YR 5/4	60			7.5YR 6/4	30
7	13147	3	3.6	0.9	7.5YR 5/6	18			7.5YR 8/2	40			7.5YR 8/2	52
7	13147	4	5.6	2.8	7.5YR 5/4	36	7.5YR 5/4	60	7.5YR 6/4	20			7.5YR 6/4	160
7	13147	5	6.4	3.4	7.5YR 5/4	134			7.5YR 5/4	24			7.5YR 8/2	266
7	13147	6	6.8	2.2	7.5YR 5/6	200			7.5YR 8/2	140			7.5YR 8/3	20
7	13147	7	7.0	3.6	7.5YR 6/4	160			7.5YR 6/4	60	10YR6/4	140		
7	13147	8	5.0	3.4	7.5YR 5/6	40			7.5YR 7/3	280	7.5YR7/3	10	???	
7	13335	1	7.2	3.8	7.5YR 5/6	142			7.5YR 6/6	60			7.5YR 8/2	160
7	13335	2	5.0	2.1	7.5YR 5/4	114			7.5YR 6/4	110			7.5YR 6/4	10
7	13920	1	6.8	3.8	7.5YR 5/4	100			7.5YR 6/4	64			7.5YR 8/2	120
7	13920	2	7.0	2.6	7.5YR 5/6	156	7.5YR 5/4	16	7.5YR 5/8	62			7.5YR 6/4	30
7	13921	1	7.1	2.4	7.5YR 5/4	130			7.5YR 6/4	50			7.5YR 8/2	20
7	13921	2	6.0	2.9	7.5YR 5/6	104			7.5YR 6/3	56			7.5YR 8/2	22

Table E-1 (cont'd)

		Backhoe Trench			Historic Eolian Overburden		A-Horizon		Organ		Isaacks' Ranch		La Mesa	
PB #	FB #	Number	Length (m)	Depth (m)	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm	Munsell Color	Depth/ cm
8	4525	1	9.1	1.8	7.5YR 5/6	99			7.5YR 6/6	96			7.5YR 8/4	12
8	6084	1	9.9	3.1	7.5YR 5/6	110			7.5YR 6/6	60	7.5YR6/4	130		
8	6084	2	8.0	2.7	7.5YR 5/6	98			7.5YR 5/4	64	7.5YR6/4	26		
8	6085	1	9.0	2.2	7.5YR 5/6	120	7.5YR 4/6	10	7.5YR 5/8	88	7.5YR7/4	10	7.5YR 8/2	16
8	6085	2	18.3	2.7	7.5YR 5/6	140			7.5YR 6/4	85.0			7.5YR 8/2	10
8	6086	1	9.6	2.5	7.5YR 5/6	110			7.5YR 6/6	90			7.5YR 8/2	50
8	6086	2	8.6	2.7	7.5YR 5/6	117			7.5YR 6/4	62	7.5YR6/3	13	7.5YR 8/2	25
8	6089	1	8.1	2.2	7.5YR 5/6	130			7.5YR 6/4	40	7.5YR6/4	25		
8	6089	2	11.4	2.2	7.5YR 5/6	110	7.5YR 5/4	15	7.5YR 6/4	20				
8	13139	1	9.0	2.3	7.5YR 5/4	115	7.5YR 5/4	9	7.5YR 7/3	70			7.5YR 7/3	30
8	13139	2	8.0	2.2	7.5YR 5/4	120			7.5YR 6/4	60			7.5YR 6/4	22
8	13140	1	10.2	2.6	7.5YR 5/6	120	7.5YR 4/6	10	7.5YR 4/6	62	7.5YR6/4	30	7.5YR 7/4	40
8	13140	2	8.0	2.0	7.5YR 5/6	130	7.5YR 5/4	12	7.5YR 6/4	38			7.5YR 7/3	10
8	13140	3	14	2.5	7.5YR 5/4	150	7.5YR 5/4	9	7.5YR 5/4	80			7.5YR 6/4	10
8	13140	4	8.0	2.4	7.5YR 5/6	160			7.5YR 6/4	70			7.5YR 7/3	30
9	3994	1	13.8	2.7	7.5YR 5/6	110			7.5YR 5/8	50	7.5YR6/6	25	7.5YR 8/3	40
9	3994	2	10.0	0.4	7.5YR 5/8	240			7.5YR 5/6	82			7.5YR 7/4	144
9	3994	3	10.3	2.6	7.5YR 5/6	140	7.5YR 5/4	12	7.5YR 5/8	38			7.5YR 7/4	100
9	3994	4	8.0	1.9	7.5YR 5/6	130	7.5YR 5/4	10	7.5YR 6/3	33	7.5YR8/2	30		
9	3996	1	9.6	2.4	7.5YR 5/6	118			7.5YR 6/4	93			7.5YR 8/3	15
9	Off-site	1	9.9	2.2	7.5YR 5/6	110			7.5YR 5/6	78			7.5YR 8/3	20

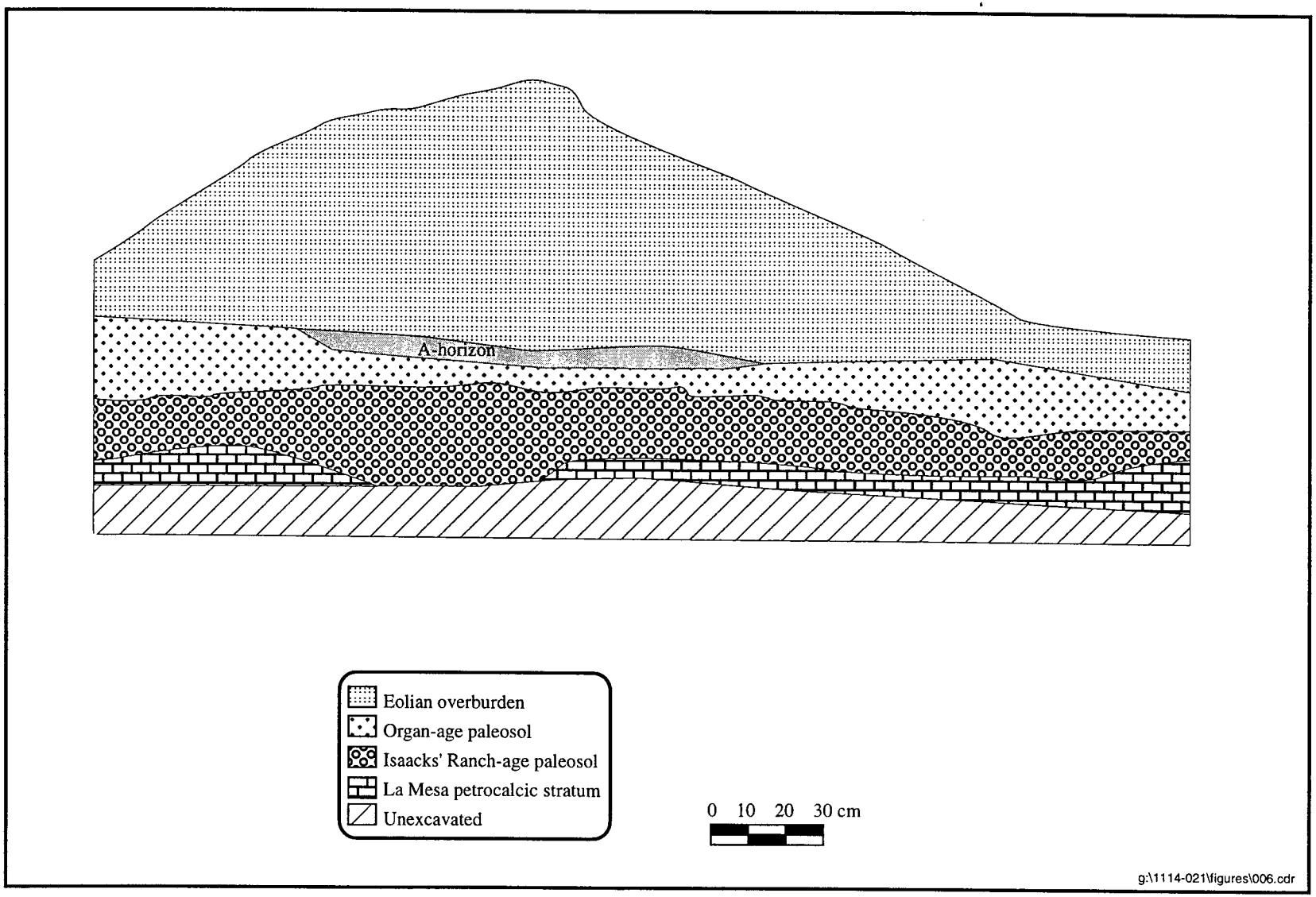


Figure E-2. Backhoe Trench 1, profile of east wall, site FB 6085.

deposits (Q4 Unit) that were documented in the Ground-Based Free Electron Laser Technology Integration Experiment (GBFEL-TIE) project area (Blair et al. 1990:168) 35 km to the north (see Figure 1); (2) the most recent deposits recorded during the USDA-SCS Desert Project near Las Cruces (Gile et al. 1981) (see Figure 1); and (3) the coppice dune-related historic blow sand (C) in the Loop 375 Project area just south of the current project area (Hubbard 1988; Monger 1988).

The eolian overburden has been accumulating solely during approximately the last 100 years and today forms a veneer of siliciclastic eolian loamy sands and sandy loams currently being modified by active processes of deflation and sedimentation (Blair et al. 1990; Hubbard 1988; Monger 1993). The maximum effect of wind erosion takes place in the spring when the wind velocities are high and soil moisture very low (Blair et al. 1990; Monger 1993:30).

The current erosional and depositional cycle was triggered by the most recent soilscape destabilization in the project area caused by deterioration of desert grassland cover due to nineteenth-century ranching practices. Land surveys of 1857 and 1885, as well as journals of explorers dating from this time and earlier, consistently describe the floors of the Tularosa Basin, Jornada del Muerto, and the southern Rio Grande rift basins as relatively flat and containing a thick grama grass cover (Blair et al. 1990; Buffington and Herbal 1965; Gardner 1951; Gile 1966; York and Dick-Peddie 1969). Introduction of large numbers of cattle caused the elimination of the protective cover on sandy sediment, making it prone to soil erosion and encroachment by desert scrub plants composed primarily of mesquite and saltbush. The prolific growth of mesquite in loose sandy conditions was accelerated by rapid seed dispersal through cattle droppings (Campbell 1929; Gardner 1951; Melton 1940). Land surveys of 1922 (Gile 1966) and early twentieth-century scientific articles (Campbell 1929; Melton 1940) described the widespread dominating character of mesquite coppice dunes in south central New Mexico (Blair et al. 1990).

Organ-age Paleosol

The most recent paleosol underlies the historic eolian siliciclastic overburden (see Figures E-1 and E-2). The paleosol consists of a weakly developed and discontinuous, darkened A horizon (mean thickness=12 cm) underlain by either a slightly reddened and clay-enriched Haplargids (Bw) horizon or a carbonate enriched horizon (Bk) (cf. Blair et al. 1990; Pigott 1977). In the project area the Organ-age horizon has been classified as the Hueco-Wink association soil (Jaco 1971). The Organ-age horizon correlates to: (1) the Q3 Unit or Paleosol 1 in the GBFEL-TIE project (Blair et al. 1990); (2) the Organ (Fillmore) alluvium in the Desert Project area (Gile et al. 1981); (3) the Pedon 2 near Pendejo cave northeast of Orogrande (Khresat 1993); and (4) the weak B horizon (2Bwb) and the B horizon containing calcium carbonate (2Bkb) in the Loop 375 project area (Monger 1988). Most of the A horizon soils and a significant percentage of the Organ-age deposits have been removed by severe wind erosion causing variability in stratum thickness (average thickness=66 cm) throughout the project area (see Table E-1). Intrasite variability of Organ-age deposits was also recorded in the large sites such as FB 7312 and FB 13147 (see Table E-1).

The Organ-age paleosol is characterized by a soft to slightly dry consistence and a single-grain or weak-to-moderately developed subangular blocky structure (Blair et al. 1990). In comparison to the eolian overburden the primary sedimentary structures have been altered (see Figure E-1) by extensive bioturbation, and due to pedogenesis, exhibit greater carbonate content and a redder hue than the eolian overburden. Pedogenic carbonates occur as disseminations, filaments, root casts, and rare detrital concretions. In the GBFEL-TIE project area, pedogenic carbonate content ranges from 2.5 to 9.9 percent (4.4-15.1 g/cc) (Blair et al. 1990), and 6-10 percent in areas of Fort Bliss adjacent to the current project area (Monger 1993:17). Weak expression of macroscopic carbonate is characteristic of the Stage I soil carbonate morphogenetic sequences of Gile et al. (1966). Commonly occurring pipes (Gile et al. 1966) penetrate through the Organ-age deposits to or through the underlying horizon.

The Organ-age sediments were deposited and underwent pedogenesis during the middle and late Holocene following a period of hyperaridity (the altithermal [Antevs 1955; Khresat 1993]) and destabilization (Blair et al. 1990). By ca. 8,000 years ago, a shift toward aridity is indicated by a change from C-4 dominated grassland to C-3 desert scrub on the alluvial fans of the Organ Mountains (Monger 1993:140) and by the upslope migration of juniper and pinion pine woodlands from the basin floor in south central New Mexico (VanDevender and Spaulding 1979). Within the USDA-SCS Desert Project area (see Figure 1), the Fillmore alluvium Organ deposits have yielded ^{14}C dates ranging from 7,300 to 1,000 B.P. Corresponding deposits (Q3 or Paleosol 3) within the GBFEL-TIE project area have yielded ^{14}C dates between 4,000 and 750 years B.P. All subsurface cultural deposits identified during the current project are contained within the limits of the Organ-age stratigraphic parameters. In the current project area, charcoal from hearths uncovered in Organ-age deposits exhibiting Stage I carbonate morphology have yielded 19 ^{14}C dates ranging from 3630 B.C. to A.D. 1445.

Isaacks' Ranch-Age Paleosol

In the current project area Isaacks' Ranch-age deposits stratigraphically underlie the Organ-age paleosol (see Figure E-1; Appendix H). Isaacks' Ranch paleosol occurs as a predominantly argillic (7.5YR 6/4) horizon (Btk) at site FB 13140 Backhoe Trench (BT) 1 and site FB 6084 BT 1 (Figure E-3) and BT 2, and as a caliche nodules lag horizon (Bk) at FB 7312 BT 6 (Figure E-4). The calcium carbonate lag nodules (1) exhibit the Stage II carbonate morphology of the Isaacks' Ranch (Leasburg alluvium) in the USDA-SCS Desert Project (Gile et al. 1981); (2) correlate to Q2 or paleosol 2 in the GBFEL-TIE project area (Blair et al. 1990:168); (3) correlate to the Pedon 2 in the depression at the foot of the Otero Mesa escarpment below Pendejo Cave near Orogrande (Khresat 1993); and (4) correlate to 3Btkb and 3Bkb in the Loop 375 Project area (Monger 1988).

Isaacks' Ranch-age paleosol was identified at 28 percent (n=26) of all the trenches. In 88 percent (n=23) of the trenches containing the paleosol, the horizon is dominated by caliche nodules. The horizon thickness (mean=35 cm) varies from locale to locale. Both the Organ and Isaacks' Ranch paleosols lack the primary sedimentary structures (cross-bedding) characteristic of the historic eolian overburden. The two horizons are, however, distinguishable from each other by their color, consistency, structure, and the relative content of calcium carbonate and clay present. In the GBFEL-TIE project area, the Btk horizon of Isaacks' Ranch exhibits a redder hue, a harder dry consistency, angular blocky structure, and has greater calcium carbonate (20-75 g/cc) and clay content than the Organ horizon (Blair et al. 1990). The Isaacks' Ranch paleosol is devoid of the A horizon due to severe erosion and microbial decomposition in contrast to the Organ-age horizon over which an intermittent A horizon exists.

The initial deposition of Isaacks' Ranch sediments took place during a pluvial to interpluvial (following the last maximum glaciation at 18,000 B.P.) transition of reduced precipitation (Hawley et al. 1976; Lanner and VanDevender 1981; Martin and Mehringer 1965; Wells 1979). The deposition process was accelerated by the loss of vegetation cover due to the decline in effective precipitation (Gile et al. 1981). In the GBFEL-TIE project area the beginning of Isaacks' Ranch-age (Q2 or Paleosol 2) sediments is characterized by a period of instability resulting from the lower precipitation that triggered widespread eolian sedimentation, less arroyo and arroyo-mouth pond deposition, lower widespread loose sand, less discharge from the Jarilla drainage basins, and dwindling of the lakes (Blair et al. 1990). Subsequently, Isaacks' Ranch horizon was formed during a period of stabilization when climatic amelioration and vegetation growth ca. 15,000-9,000 B.P. provided optimal conditions for soil development (Blair et al. 1990:). Development of an argillic paleosol of Isaacks' Ranch suggests more effective precipitation was available for clay illuviation (Gile 1975; Khresat 1993). A sample from the Isaacks' Ranch unit in the GBFEL-TIE project area yielded a date of 9,500 B.P. (Blair et al. 1990).

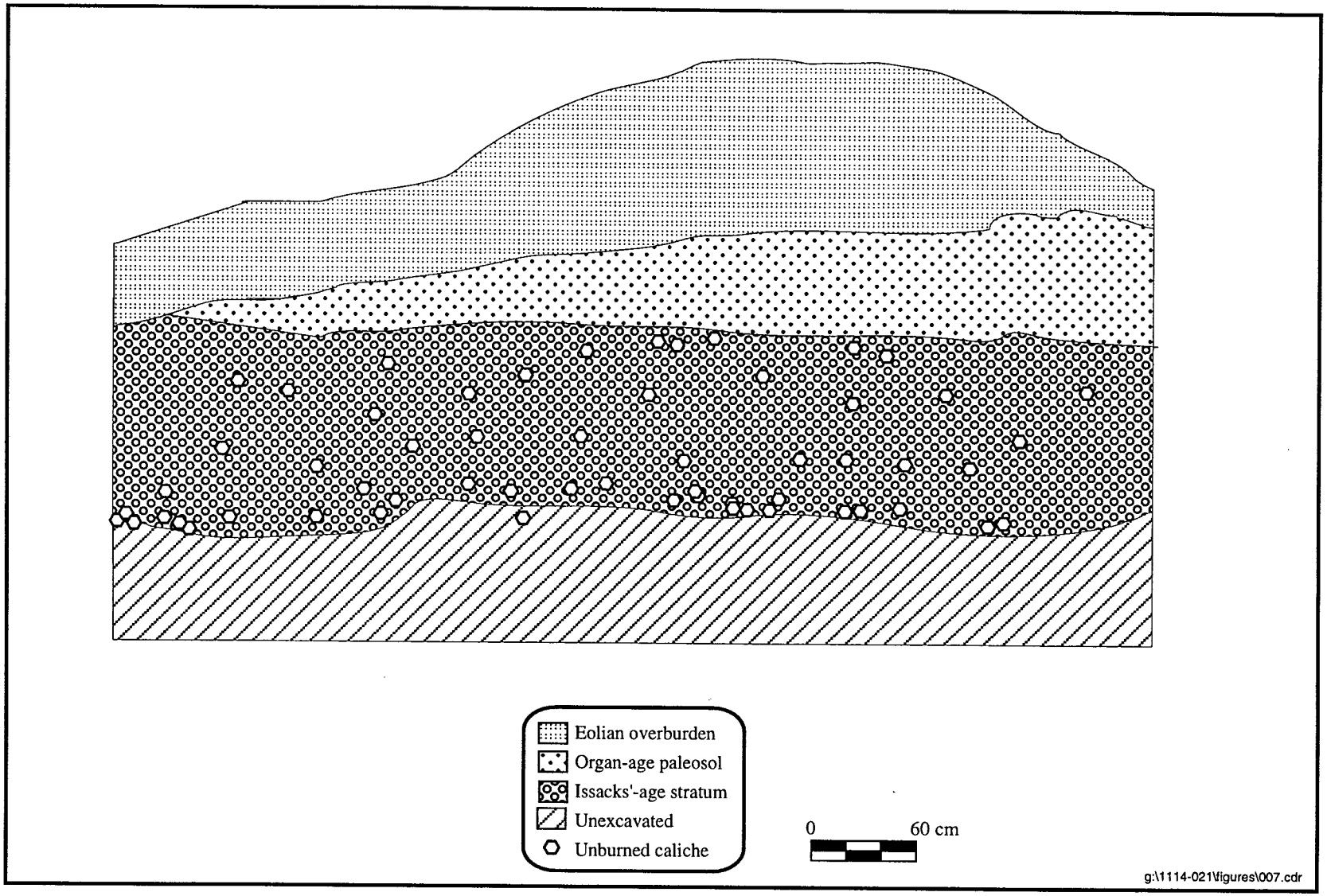


Figure E-3. Backhoe Trench 1, profile of northeast wall, site FB 6084.

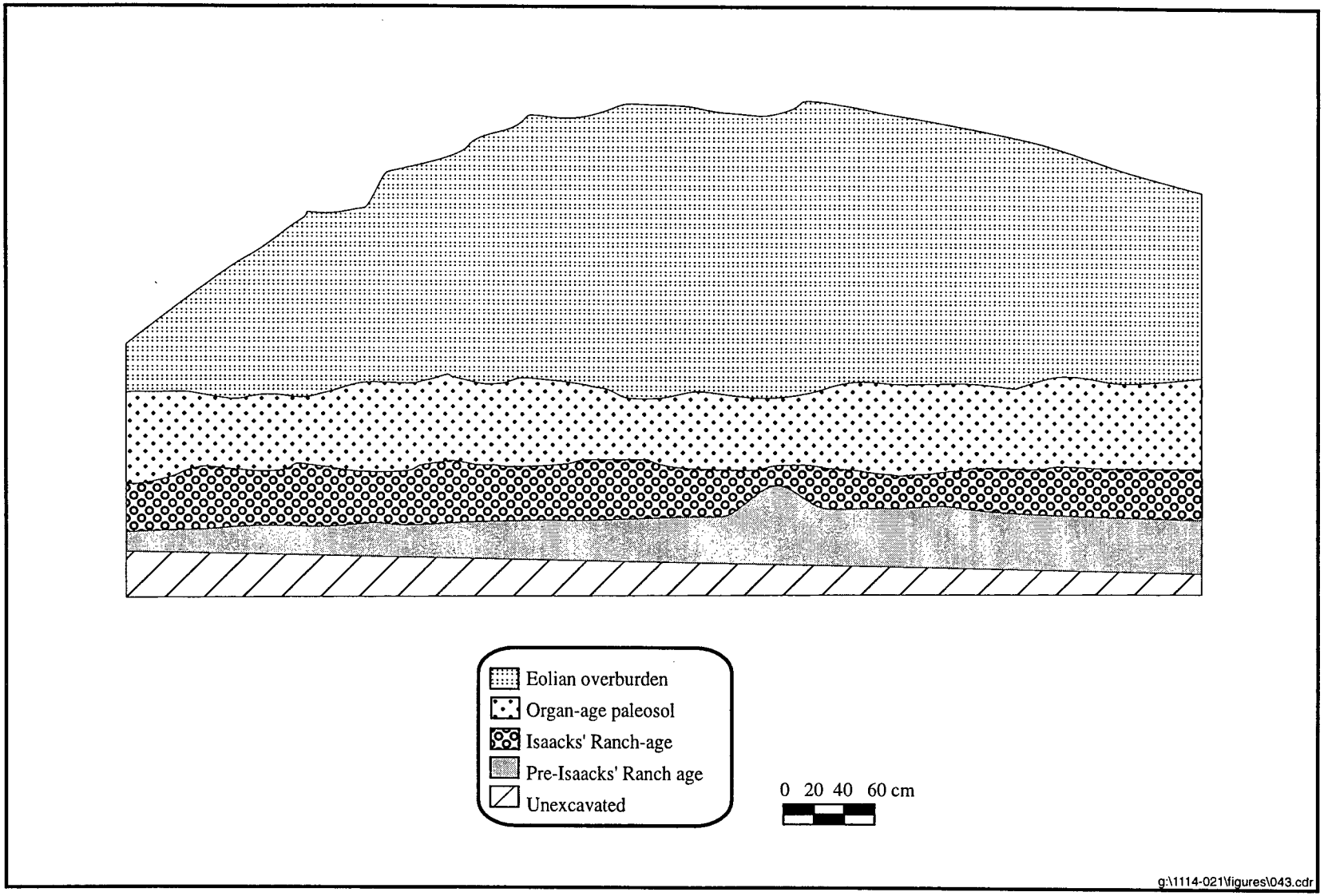


Figure E-4. Backhoe Trench 6, profile of east wall, site FB 7312.

The post-8,000 B.P. period of landscape destabilization (mid-Holocene Altithermal) resulted in an extensive erosion of Isaacks' Ranch soil horizon. Blair et al. (1990) interpreted the lack of preserved A-horizon and the sharp irregular surface over Isaacks' Ranch horizon to indicate that its surface has been truncated by erosion throughout the GBFEL-TIE study area. The presence of relict wind erosional landforms north of the GBFEL-TIE project area suggests that extensive wind erosion occurred before the initial Q3 (Organ-age) sedimentation (Blair et al. 1990). In the current project area occurrence of Isaacks' Ranch-age soil horizon as collapsed calcium carbonate lag nodules is indicative of severe winnowing (see Appendix H) consistent with a hyperarid climate scenario. Stratum thickness varies within the same site and between Patrol Bases, and is often non-existent. No cultural deposits in either primary or secondary contexts were encountered in association with Isaacks' Ranch paleosol.

La Mesa

The La Mesa indurated caliche (Km horizon) formed in sediment deposited during the early to middle Pleistocene. The La Mesa geomorphic surface is estimated to be approximately 400,000 to 500,000 years old based on a combination of radiometric and paleontological evidence (Gile et al. 1981; Machette 1985). The characteristically laminar petrocalcic horizon (see Figure E-1) caps the Camp Rice fluvial facies (Gile et al. 1981; Monger 1993:13; Seager et al. 1987). The deposits may initially have formed in the shallow depths of an expansive and long-lived lacustrine environment, Lake Cabeza de Vaca, which was fed by the ancestral Rio Grande between ca. two million and 400,000 years B.P. (Pigott 1977). The laminar Stage IV carbonate morphology (Gile et al. 1966) forms after a calcite-plugged horizon impedes the moisture from wetting fronts, and causes a wetting effect to move laterally across the top of a horizon creating calcite solution and recementation of the indurated caliche (Monger 1993).

Although stratigraphically the La Mesa underlies the Isaacks' Ranch-age deposits (see Figure E-1), in 73 percent (n=68) of the trenches, the Isaacks' Ranch horizon was absent, and the Organ-age deposits lay unconformably over the La Mesa (Figure E-5). The La Mesa deposits are correlative to the petrocalcic horizon identified in adjacent areas of Fort Bliss (Monger 1993:III-6) and horizon 4Bkmb in the Loop 375 project area (Monger 1988). In interdune deflation depressions the La Mesa is undergoing degradation by wind erosion. Jornada II (Q1 Unit or Paleosol 3) underlying Isaacks' Ranch deposits in the GBFEL-TIE project area (Blair et al. 1990:168) has no analog in the current project area in spite of the close proximity (35 km) between the two project areas. The lithological variability appears to correlate to elevational differences and to reflect local depositional history between the Jarilla piedmont topography (GBFEL-TIE) and the Hueco Bolson valley floor (current project) sediments. Similarly, Jornada I and II horizons have been identified in higher elevation piedmonts and alluvial fan areas of Fort Bliss to the north and south on the slopes of the Organ (Jornada I and II) and the Hueco mountains (Jornada I) (Monger 1993). Jornada II paleosol was identified in the USDA-SCS Desert Project area (Gile et al. 1981). As in the current project area, no Jornada surfaces have been identified in other areas of Fort Bliss on the Hueco Bolson floor (see Appendix H).

Along intrabasin playa ridges within the project area, the La Mesa is occasionally exposed at the surface but more often lies at a relatively shallow depth. It is exposed on the Meyer Range roadbed southwest of PB 3, and on top of the playa ridge at FB 13147 in PB 7. In contrast to the Organ-age horizon surface in the project area which is remarkably flat, the slightly undulating La Mesa surface was exposed in backhoe trenches at PB 1, PB 2, PB 3, and PB 7. The La Mesa petrocalcic horizon is also close to the surface (75 cm below surface) in the relatively duneless grassy areas of PB 1 (off-site BT 1), PB 3 (off-site BT 1, and PB 4 (Site FB 7820, BT 1). A Side-looking Airborne Radar (SLAR) image analysis of Fort Bliss maneuver areas depicts these predominantly flat and relatively duneless grasslands as black patches (Kipp 1993:70).

The La Mesa was intersected in 62 of the 93 trenches. Trench 1 at FB 7820 cut through the La Mesa into the pedogenically unmodified layers of Camp Rice deposits consisting of clays and sands mixed with gravels



Figure E-5. Backhoe Trench 3 profile, site FB 3994.

that cap the Santa Fe Group fluvial and lacustrine Miocene-to-Pleistocene deposits constituting most of the basin fill (Blair et al. 1990:169; Hubbard 1988; Seager 1980). Pipes or funnel-shaped columns, created when local concentrations of water act on soils of variable permeability (Gile et al. 1981; Hubbard 1988), penetrate the indurated caliche into the Camp Rice Formation (site FB 7820, BT 1).

IMPLICATIONS OF STRATIGRAPHY ON CULTURAL RESOURCE CONTEXTS

The cyclical climatic trend that has characterized the project area since the Pleistocene-Holocene transition has resulted in a landscape evolutionary history punctuated by alternating periods of landscape stabilization and destabilization. Periods of landscape destabilization have significantly affected post-depositional contexts of cultural deposits.

By approximately 15,000 B.P., pluvial effects associated with the last glacial maximum had declined considerably enough to create vegetation loss and soilscape destabilization (Blair et al. 1990). These conditions set in motion the initial deposition of eolian sands constituting the Isaacks' Ranch stratum in the project area. From 15,000 to 8,000 B.P., the landscape underwent a period of relative stability and the surface was dominated by C-4 plant (grass) cover. The relatively stable conditions were optimal for in situ soil genesis evidenced by illuviated clay typical of Isaacks' Ranch paleosol exposed at FB 6084 BT 1 and BT 2, and at FB 13140 BT 1. The earliest human (Paleo-Indian) occupation of the project area began approximately 10,000 B.P. on a stabilizing Isaacks' Ranch soilscape still undergoing pedogenesis. Landscape stability, however, lasted only until 8,000 B.P. when a shift toward aridity is evidenced by replacement of C-4 grasses by C-3 desert scrub plants (Monger 1993). This mid-Holocene cycle of hyperaridity is coeval with the Altithermal (Antevs 1955; Khresat 1993). The severity and extent of landscape destabilization is evidenced by (1) absence of the A horizon of Isaacks' Ranch solum, (2) existence of a lag horizon of calcium carbonate nodules which represents a truncated, winnowed, and "collapsed" soil stratum such as exposed in BT 6 at site FB 7312 (see Figure E-4), and (3) complete absence of the Isaacks' Ranch stratum from the stratigraphy (see Figure E-5). Any Paleo-Indian cultural deposits contained in the Isaacks' Ranch stratum would have been accordingly adversely affected causing some deposits to either be completely eroded away or remain in the collapsed caliche lag nodules. No artifacts, however, were observed in the winnowed lag caliche at any of the trenches even after careful examination. The probability still remains, however, of Paleo-Indian cultural deposits being preserved at various locales of the project area where a well-preserved argillic (Btkb) horizon still exists, for example in the area around site FB 6084 within Patrol Base 8.

The mid-Holocene hyperaridity created conditions favorable for widespread eolian sand accumulation in the project area. A period of climatic amelioration and landscape stability that followed provided optimal conditions for the Organ-age soil genesis on a truncated Isaacks' Ranch surface. Organ-age pedogenesis continued until approximately 100 years ago. Thus the Organ stratigraphy spans most of the Archaic, all of the Formative, all of the Protohistoric, and into the early Historic period prior to the introduction of large scale ranching in the project area around 1895. Radiocarbon dates of features test-excavated during the current project range from 3630 B.C. to A.D. 1445 (see Table 43). Introduction of large scale ranching is partially responsible for the prevailing cycle of landscape destabilization. Throughout the project area all prehistoric cultural features and artifacts still in primary context were found in the Organ stratum. In the majority of cases the top of the Organ has been eroded and the cultural features, including a variety of hearths and remnants of small burned brush structures, have been exposed and truncated by wind erosion. In some severe cases the fire-cracked rocks or burned caliche features are disarticulated, eroded out of context, and scattered on the truncated erosional surface (Figure E-6). Prehistoric artifacts found in interdune deflation depressions where the entire Organ and Isaacks' Ranch paleosols have been eroded and the La Mesa surface exhumed, could belong to any phase of the prehistoric occupation of the area. The high ratio of artifacts recovered from the surface and the eolian overburden (see Tables 2 through 36) compared to artifacts recovered from the subsurface is indicative of the rate and extent of the prevailing eolian alteration of the landscape.

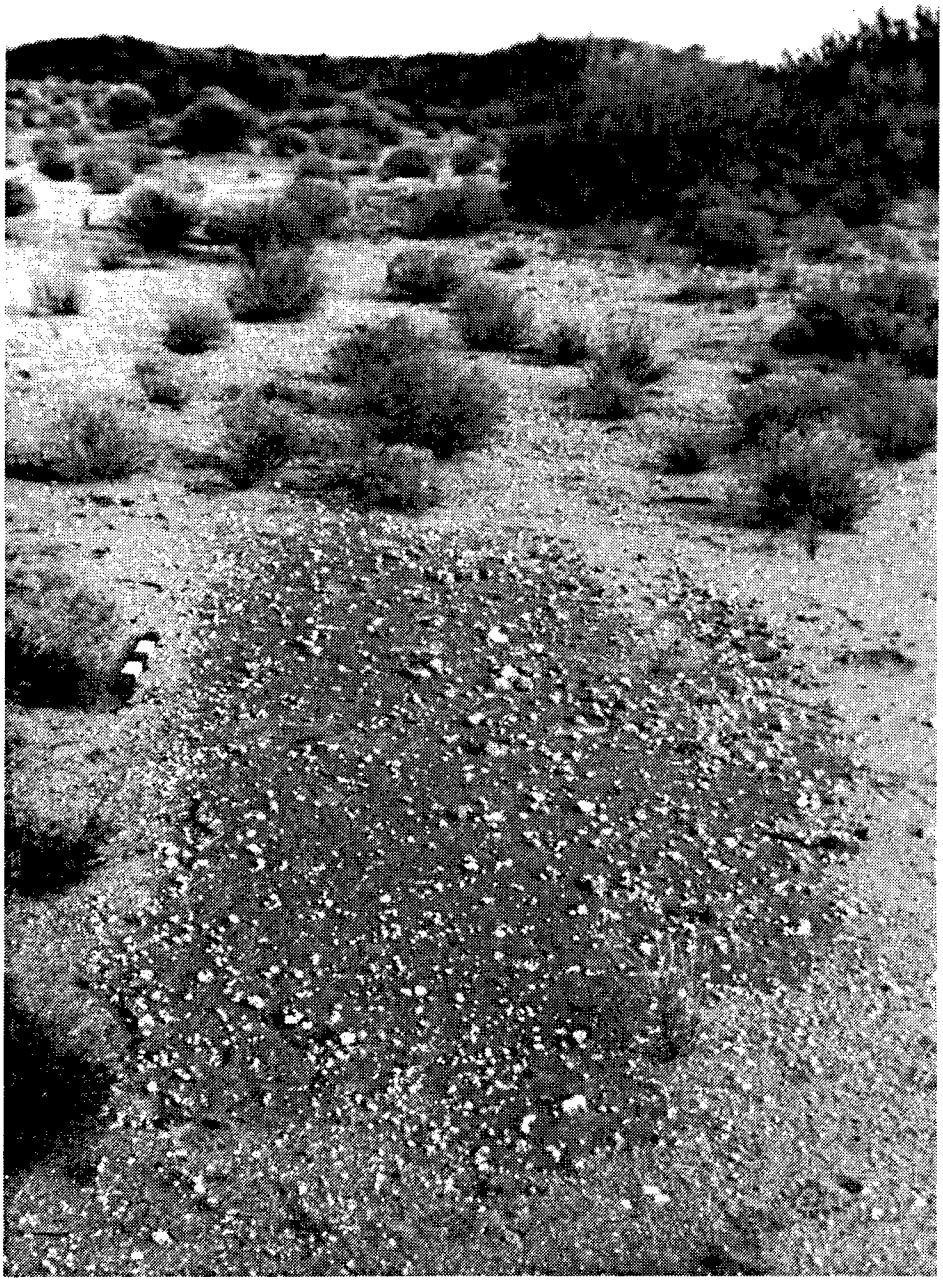


Figure E-6. A disarticulated burned caliche hearth, site FB 3389.

Stratigraphic contexts of domestic faunal remains and historic artifacts provide further evidence that the coppice dunes (1) are of a recent origin and (2) have been growing at a rapid rate. At the base of the majority of the trenched dunes, the Organ paleosurface was remarkably flat and gave no impression that an earlier generation of dunes had existed (see Figures E-1, E-2, and E-4). In the majority of the backhoe trenches, mesquite roots were confined to the eolian overburden, rarely penetrating into Organ paleosol. Backhoe Trench 1 profile at site FB 6086 exposed cattle bones at the interface of a coppice dune and the Organ surface (Figure E-7). At site FB 13140, BT 1, cranial and jaw bones of a coyote were exposed in a historic hearth buried under 110 cm of coppice dune deposits (Figure E-8). The large volume of eolian overburden covering a post-1940 military style metal bed frame exposed at FBH 70 (Figure E-9) is indicative of the rapid growth of the mesquite stabilized coppice dunes.

The extent of in situ cultural deposits masked by the coppice dunes is markedly less than expected. Only four dunes were found to cover archeological deposits. A burned caliche and stain feature, radiocarbon dated to 2280-1780 B.C. (see Table 43) was exposed in Organ-age deposits underneath a dune in BT 6 at site FB 13147 (Figure E-10). Backhoe Trench 2 at FB 7312, excavated in an interdune area of sand accumulation, exposed a small stain feature (Figure E-11). The cattle bone from FB 6086 and the coyote cranium bones from FB 13147 have been discussed. The paucity of cultural deposits identified in backhoe trenches may be a reflection of a methodological bias. During trenching, monitoring was done primarily for features but trench fill was not screened for either artifacts or faunal and macrobotanical remains. This problem should be addressed during the mitigation phase by limiting backhoe excavation in dune deposits to approximately 40 cm above the Organ paleosol and by hand excavating and screening part of this trench fill from this depth down to the top of the Organ surface.

Backhoe trenches did not expose any subsurface cultural deposits in primary contexts that were beyond site boundary parameters delineated by surface artifact manifestation. On the contrary, the lateral extent of subsurface deposits appears to be more limited than the distribution of surface artifact scatter, and delineating site boundaries on the basis of surface artifact scatter alone exaggerates the site area. None of the off-site backhoe trenches exposed any cultural features or artifacts. Sites in the project area are discrete activity areas rather than a continuous archeological phenomenon over large areas of the landscape.

The remarkable absence of an archeological manifestation in Eolian Alteration Mapping Unit 3 areas of the project area (PB 1, PB 3, and PB 4) requires further attention. Mapping Unit 3 (Monger 1993) is characterized by flat, relatively duneless grassy areas. On 1:25,000 topographical maps the areas appear as patches in the expansive dune fields much the same way recent and current military "drop zones" are depicted. Backhoe trenches revealed the presence of a considerably thin (20 cm in PB 1) overburden and the La Mesa surface was exposed at a depth of less than 75 cm. No Isaacks' Ranch deposits were recorded in any of the trenches. A resurvey of PB 1 and PB 3, which were previously surveyed by Carmichael in 1979 (Carmichael 1986), and of PB 4, which was previously surveyed by Whalen in 1976 (Whalen 1977) confirmed the absence of archeological sites (except one hearth recorded in PB 4 by Whalen and excavated during the current project) in Mapping Unit 3 areas of these particular patrol bases. During the mitigation phase more trenching should be done to confirm the absence of subsurface archeological deposits; the results may serve as a predictive model for similar geomorphic surfaces within the Fort Bliss Military Reservation.

More work is required to systematically identify, delineate, and map the distribution of the Isaacks' Ranch paleosol and collect more data on which to build a predictive model for identifying paleosol types with potential for Paleo-Indian occupations. The next research phase should address the current problem of distinguishing an Isaacks' Ranch paleosol with a Stage II carbonate morphology from a La Mesa surface with Stage III carbonate morphology in the project area.

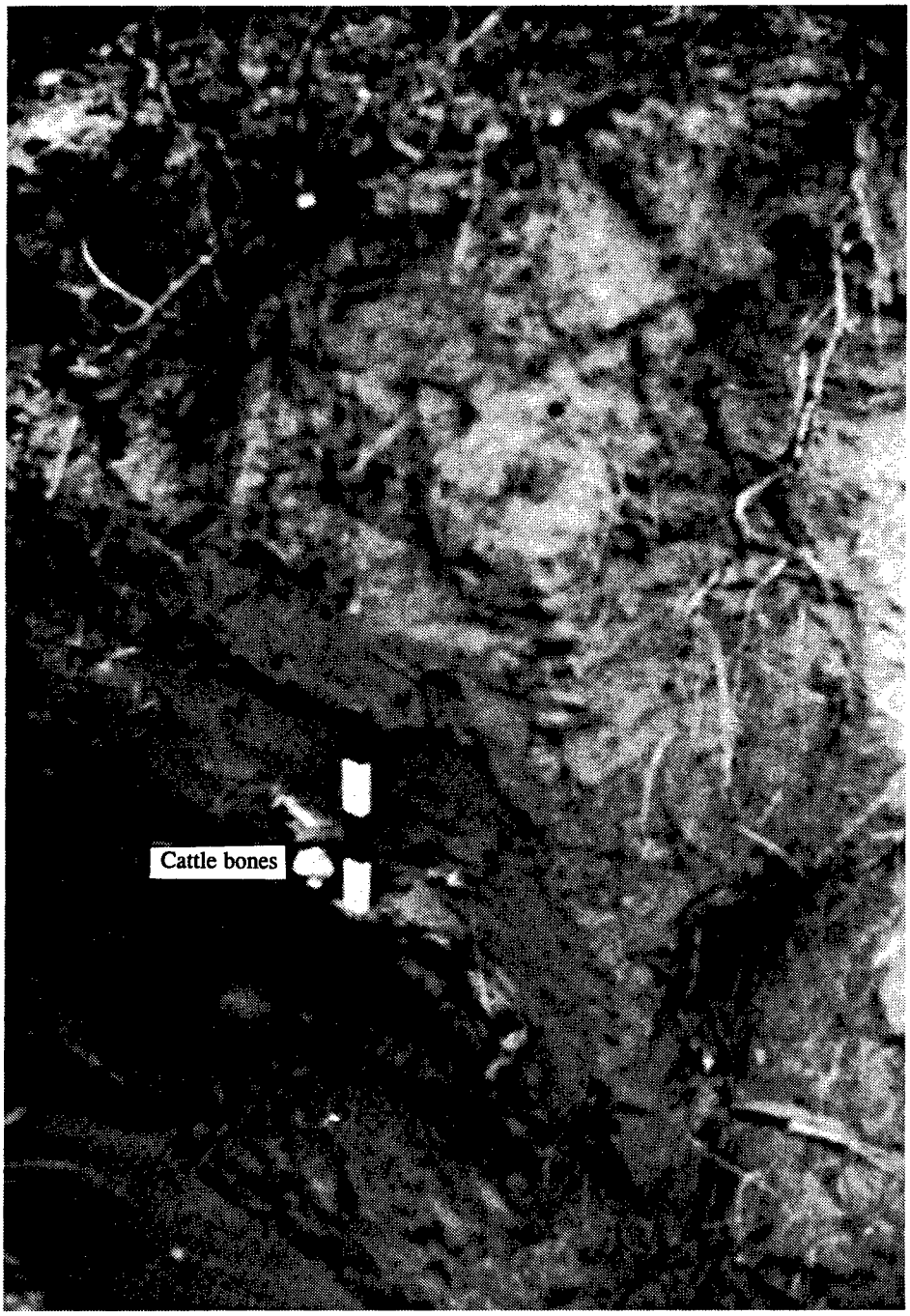


Figure E-7. Stratigraphic position of cattle bones in Backhoe Trench 1, site FB 6086.



Figure E-8. Remains of a coyote cranial and jaw bones in a historic hearth. Backhoe Trench 1, site 13140.

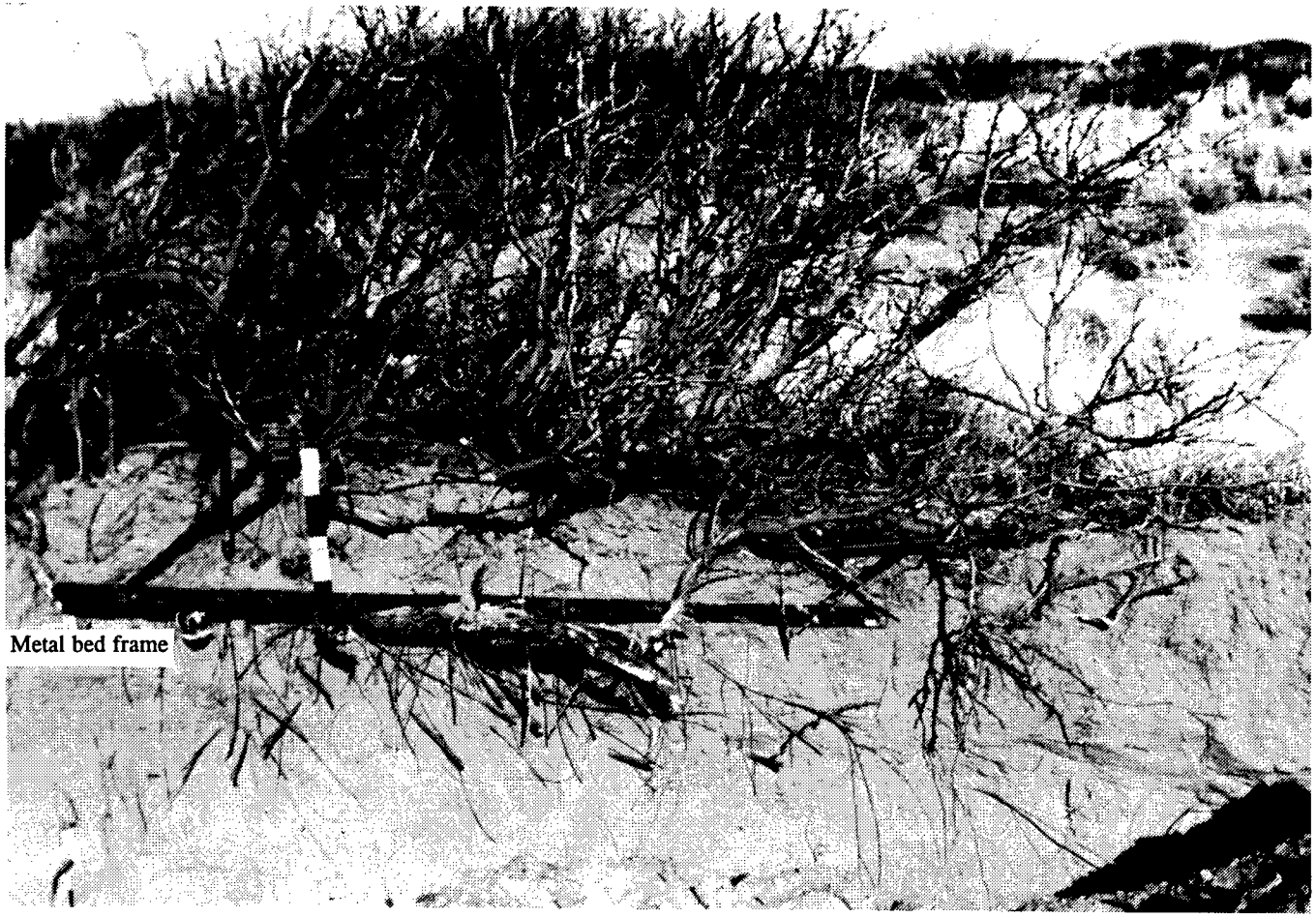


Figure E-9. A military style metal bedframe buried in coppice dune sediments. Backhoe Trench 1, site FBH 70.

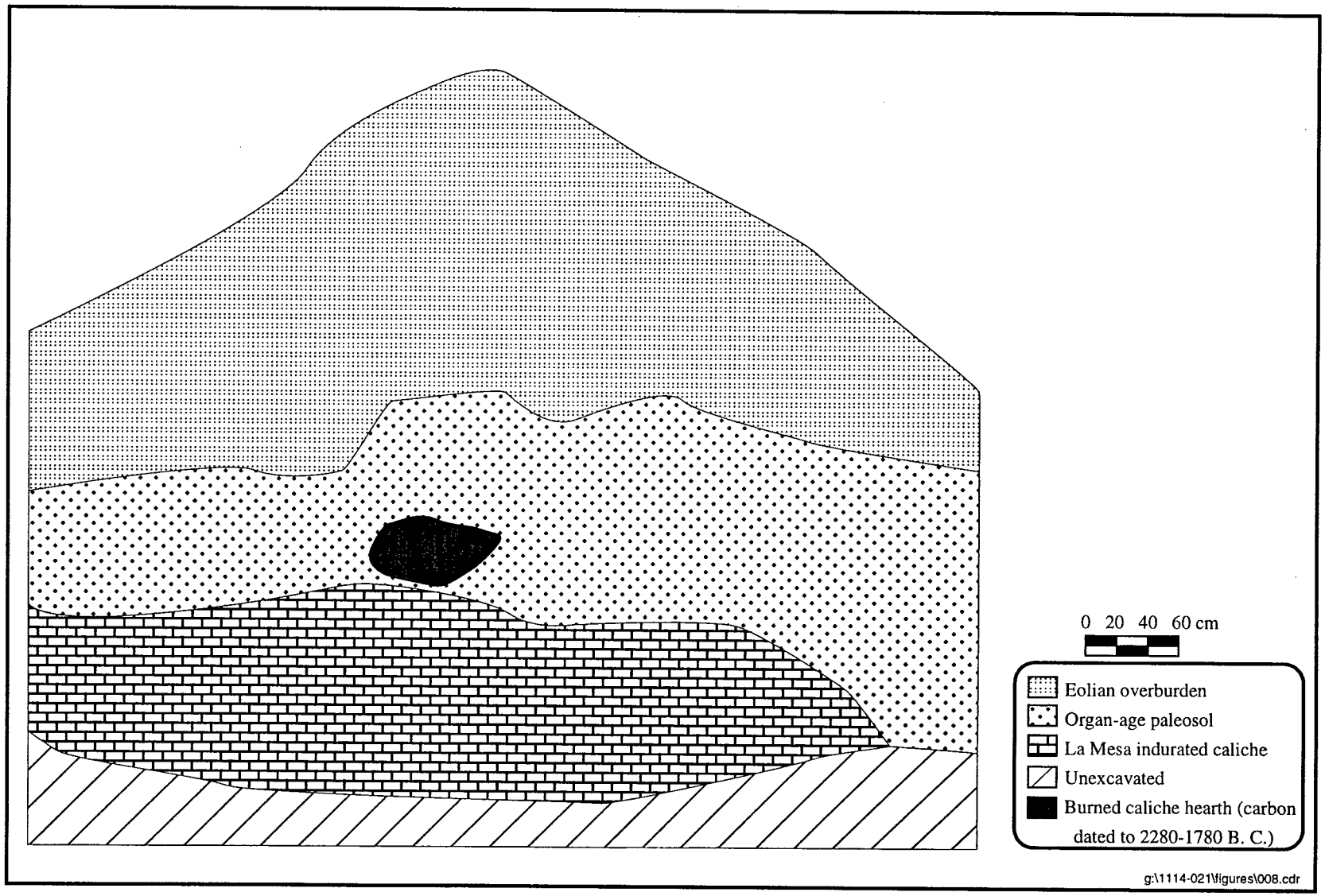


Figure E-10. Backhoe Trench 6 profile, site FB 13147.

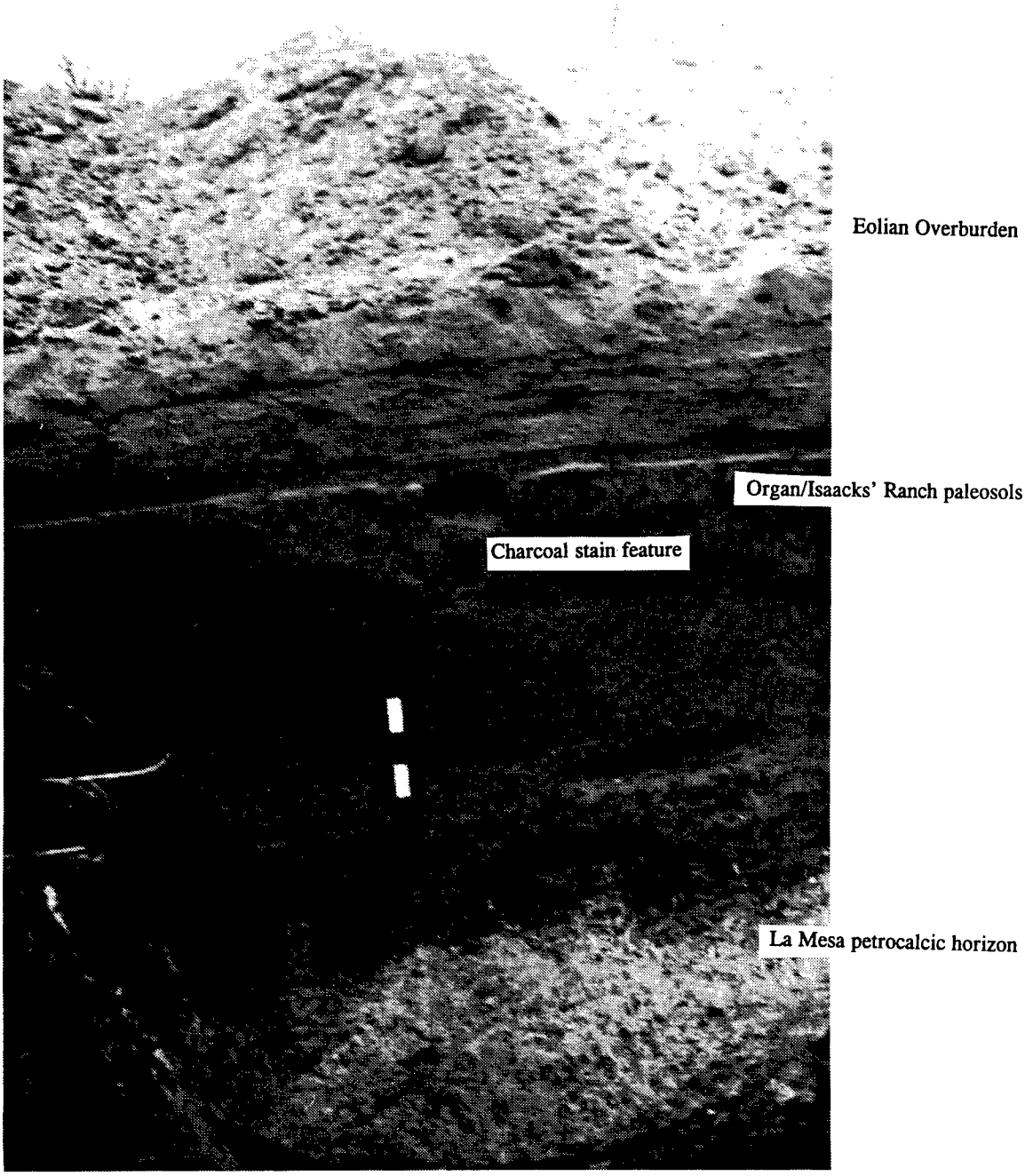


Figure E-11. Backhoe trench #2 profile, site FB 7312.

A major research goal during the next phase should be to identify the three developmental stages within the Organ paleosol correlative to Organ I (dated 7,000-2,200 B.P.), Organ II (dated 2,100-1,100 B.P.) and Organ III (dated 1,100-100 B.P.) described along the Organ Mountain fault (Gile 1986:1-4) and in areas of Fort Bliss adjacent to the current project (Monger 1993:17). Stable isotope determination; sediment, pollen, and phytolith analyses; and chronometric dating of these deposits have potential for paleoclimatic data which combined with radiocarbon dates from archeological hearths will make significant contributions not only toward refining culture chronology but also in elucidating diachronic adaptive strategy in the study area from the Archaic to the El Paso phase. The local downthrown tectonic fault troughs within the project area that have been rapidly filling from sheet wash and eolian sediments for thousands of years provide potential sources for environmental data.

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APPENDIX F

HISTORIC ASSEMBLAGE ATTRIBUTES

400 Civilian Historic

Glass
401 general glass category
402 bottle
403 window
404 tumbler, cup
405 lamp
406-409 Empty
410 Other glass

Metal
411 general metal
412 can diagnostic
413 can nondiagnostic
414 nail (specify)
415 hardware
416 civilian cartridges
417-428 Empty
429 other diagnostic metal
430 other nondiagnostic metal

Ceramic
431 general ceramic category
432 bowl
433 plate
434 mug
435 bottle
436 pitcher
437-445 Empty
446 Other Ceramic

Architecture/Building Materials
447 general
448 fired brick
449 adobe
450 plaster/mortar
451 concrete
452 wood
453 building stone (unshaped)
454 building stone (shaped)
455-461 Empty
462 Other Building

Miscellaneous
463 general misc
464 unmodified bone
465 modified bone
466 leather
467 cloth
468-478 Empty
479 other (specify)

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	0	2	21.0	35.0	1	G	12	402	1	0	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NE	86345.27	41055.22	0	2	27.0	35.0	3	G	13	412	1	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NE	86345.27	41055.22	0	2	27.0	35.0	3	G	13	402	6	0	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NE	86345.27	41055.22	0	3	35.0	37.0	5	G	14	411	1	0	625	JP	Tobacco tin lid	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NE	86345.27	41055.22	0	3	35.0	37.0	5	G	14	412	1	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NE	86345.27	41055.22	0	3	35.0	37.0	5	G	14	417	1	0	625	JP	Stove part?	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NE	86345.27	41055.22	0	3	35.0	37.0	5	G	14	402	5	0	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	0	3	35.0	35.0	7	G	15	412	2	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	0	3	35.0	43.0	9	G	16	402	2	1	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	0	3	35.0	43.0	9	G	16	402	3	2	625	JP	Purple	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	0	3	35.0	43.0	9	G	16	402	2	3	625	JP	Milk (white)	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	0	3	35.0	43.0	9	G	16	412	1	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	0	3	35.0	43.0	9	G	16	422	1	0	625	JP	White Glazeware	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	3	35.0	42.0	11	G	17	402	3	0	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	3	35.0	42.0	11	G	17	412	1	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	0	4	35.0	40.0	13	G	18	411	1	0	625	JP	Tobacco can lid	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	0	4	35.0	40.0	13	G	18	423	1	0	625	JP	Porcelain mug	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	1	5	40.0	50.0	15	G	19	413	1	1	625	JP	Nail	0	0	1.5
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	1	5	40.0	50.0	15	G	19	413	1	2	625	JP	Nail	0	0	2.5
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	1	5	40.0	50.0	15	G	19	402	8	0	625	JP	Aqua	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	1	5	40.0	50.0	15	G	19	337	9	0	625	JP	Bone	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	2	6	50.0	60.0	17	G	20	422	1	0	625	JP	Gold leaf wht glzware	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	2	6	50.0	60.0	17	G	20	413	1	0	625	JP	Fence nail	0	0	1.3
8	8641.0	NM	13140	1	0	2X2	SE	86345.27	41055.22	2	6	50.0	60.0	17	G	20	402	1	0	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	337	8	0	625	JP		0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	412	5	0	625	JP	Nondiag metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	402	19	1	625	JP	Aqua	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	402	9	2	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	402	1	3	625	JP	Milk	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	403	1	0	625	JP	Window	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	420	2	0	625	JP	Ceramic	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	411	1	0	625	JP	Diag can metal	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	413	3	1	625	JP	Nails	0	0	2.5
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	413	2	2	625	JP	Nails	0	0	1.5
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	413	1	3	625	JP	Fence nail	0	0	0.8
8	8641.0	NM	13140	1	0	2X2	NW	86345.27	41055.22	0	4	42.0	49.0	19	G	21	416	1	0	625	JP	Bullet (.22?)	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	1	5	51.0	55.0	23	G	23	422	1	0	625	JP	Gold leaf wht glazware	0	0	0.0
8	8641.0	NM	13140	1	0	2X2	SW	86345.27	41055.22	1	5	51.0	55.0	23	G	23	402	1	0	625	JP	Aqua	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	412	86	0	625	PH	Nondiag metal	0	0	0.0

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	402	8	1	625	PH	Purple	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	402	1	2	625	PH	Dk grn burned	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	402	4	3	625	PH	Amber	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	402	29	4	625	PH	Clear	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	402	1	5	625	PH	Pst 03 neck medicine	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	402	1	6	625	PH	Panel "...ectoral"	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	403	8	0	625	PH	Window	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	404	1	0	625	PH	Tumbler	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	417	5	0	625	PH	Nondiag lead, wire	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	413	1	1	625	PH	Nail	0	0	1.5
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	413	3	2	625	PH	Nail	0	0	2.5
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	413	3	3	625	PH	Nail	0	0	3.5
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	413	3	4	625	PH	Nail	0	0	4.5
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	413	6	5	625	PH	Fence nails	0	0	1.2
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	415	1	1	625	PH	WRA Co .32 S&W	0	0	
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	415	1	2	625	PH	REM-UMC .32 S&W L	0	0	
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	416	1	1	625	PH	Safety pin	0	0	
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	416	1	2	625	PH	Buttin	0	0	
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	416	2	3	625	PH	Fasteners	0	0	
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	420	2	3	625	PH	White glazeware	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	420	1	2	625	PH	Brown glazeware	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	420	3	3	625	PH	Porcelain/supervit	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	0	1	13.0	18.0	2	G	1	434	1	0	625	PH	Textile	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	412	181	0	625	PH	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	417	4	0	625	PH	Nondiag metal	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	413	4	1	625	PH	Nails unknown length	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	413	6	2	625	PH	Fence nails	0	0	1.3
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	413	16	3	625	PH	Nails	0	0	1.5
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	413	10	4	625	PH	Nails	0	0	2.5
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	413	1	5	625	PH	Nail	0	0	3.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	415	1	1	625	PH	WRA Co .41 L D.A.	0	0	.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	415	1	2	625	PH	REM UMC .45 Colt	0	0	
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	415	1	3	625	PH	WRA Co .38 W.C.	0	0	
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	416	1	1	625	PH	Battery top	0	0	
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	416	1	2	625	PH	Fastener brass	0	0	
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	416	1	3	625	PH	Square bolt	0	0	
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	416	1	4	625	PH	Bullet	0	0	
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	433	1	0	625	PH	Leather	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	337	29	0	625	PH	Bone	0	0	0.0

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	435	1	0	625	PH	Button shell	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	425	1	0	625	PH	Doll foot	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	402	6	1	625	PH	Amber	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	402	16	2	625	PH	Dk grn body	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	402	1	3	625	PH	Dk grn champag neck	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	402	1	4	625	PH	Dk grn champag base	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	4	G	2	402	1	5	625	PH	Clear	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SW	86362.10	41055.72	2	2	18.0	54.0	6	G	3	337	1	0	625	PH		0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	337	9	0	625	PH		0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	435	3	0	625	PH	Buttons	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	412	21	0	625	PH	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	416	1	1	625	PH	Barrel band	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	416	1	2	625	PH	Single strand barb wire	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	416	4	3	625	PH	Wire	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	416	2	4	625	PH	Lead blobs	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	416	1	5	625	PH	Large wing nut bolt	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	416	1	6	625	PH	Bullet (.22?)	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	411	1	0	625	PH	Can bottom crimped	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	413	16	1	625	PH	Unknown length	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	413	11	2	625	PH		0	0	2.5
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	413	2	3	625	PH		0	0	1.5
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	413	3	4	625	PH	Fence nails	0	0	1.
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	413	2	5	625	PH	Square nails	0	0	1.5
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	413	1 2	6	625	PH	Round	0	0	4.5
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	415	1	1	625	PH	REM UMC .32L S&W	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	SE	86362.10	41055.72	2	2	12.0	32.0	10	G	4	415	1	2	625	PH	REM UMC .32 ACF	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	2	2	12.0	32.0	10	G	4	402	3	1	625	JP	Amber	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	2	2	12.0	32.0	10	G	4	402	7	2	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	2	2	12.0	32.0	10	G	4	402	3	3	625	JP	Aqua	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	2	2	12.0	32.0	10	G	4	402	2	5	625	JP	Dk grn chmpg bse frg	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	2	2	12.0	32.0	10	G	4	402	6	6	625	JP	Dk grn chmpg body	0	0	0.0
8	8641.0	NM	13140	2	0	2X2	WU	86362.10	41055.72	2	2	12.0	32.0	10	G	4	403	7	0	625	JP	Window	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	411	25	1	625	JP	25+ Crimped cans	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	412	450	0	625	JP	Can bits	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	411	8	2	625	JP	Solder seal cans	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	411	1	3	625	JP	Square lid	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	413	1	1	625	JP	Nail	0	0	1.5
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	413	1	2	625	JP	Nail	0	0	2.5
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	413	1	3	625	JP	Nail	0	0	4.5

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	416	1	0	625	JP	Shutter latch	0	0	.0.
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	417	1	0	625	JP	Strainer?	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	27	1	625	JP	Purple	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	1	2	625	JP	Dk green	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	4	3	625	JP	Amber body	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	1	4	625	JP	Abm"Vaselin..Cheese"	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	2	5	625	JP	Amber base	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	1	6	625	JP	Clear screw top neck	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	1	7	625	JP	Clr whole pre 03 med	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	15	8	625	JP	Aqua body	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	WU	86288.79	41125.76	0	1	6.0	10.0	25	G	24	402	2	9	625	JP	Pur necks pst 03 liq	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	433	5	0	625	JP	Leather	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	412	88	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	416	1	1	625	JP	Stove burner	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	416	1	2	625	JP	Fastener	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	413	1	1	625	JP		0	0	3.5
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	413	1	2	625	JP		0	0	1.5
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	402	4	1	625	JP	Aqua	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	402	1	2	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	402	3	3	625	JP	Amb"Vaselin.Cheesbro"	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	402	1	4	625	JP	Amb screwtop neck	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	2	10.0	20.0	27	G	25	402	1	5	625	JP	Amb base	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	2	19.0	20.0	29	G	26	411	1	0	625	JP	Solder seal can lid	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	2	19.0	20.0	29	G	26	413	1	0	625	JP	Nail	0	0	1.5
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	2	19.0	20.0	29	G	26	412	37	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	411	1	2	625	JP	Solder seal can	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	411	1	1	625	JP	Paint can lid	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	402	5	1	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	402	16	2	625	JP	Amb Vaselin New York	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	402	1	3	625	JP	Amb base	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	402	2	4	625	JP	Amb necks diff bottl	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	412	107	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	2	12.0	20.0	33	G	27	337	3	0	625	JP	Bone	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	2	15.0	20.0	35	G	28	412	125	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	2	15.0	20.0	35	G	28	411	2	1	625	JP	Solder seal can lids	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	2	15.0	20.0	35	G	28	411	1	2	625	JP	Brass screw top lid	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	2	15.0	20.0	35	G	28	402	3	1	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	2	15.0	20.0	35	G	28	402	1	2	625	JP	Amb neck screwtop	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	3	20.0	22.0	37	G	29	337	7	0	625	JP	Bone	0	0	0.0

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	3	20.0	22.0	37	G	29	402	2	0	625	JP	Clr panel "..owder"	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	0	3	20.0	22.0	37	G	29	412	10	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	3	20.0	27.0	39	G	30	337	1	0	625	JP	Bone	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	3	20.0	27.0	39	G	30	402	1	0	625	JP	Amber	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	3	20.0	27.0	39	G	30	403	1	0	625	JP	Window	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	3	20.0	27.0	39	G	30	413	1	0	625	JP	Nail	0	0	2.0
8	8641.0	NM	13140	4	2	2X2	NW	86288.79	41125.76	0	3	20.0	27.0	39	G	30	412	18	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	402	1	1	625	JP	Aqua	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	402	1	2	625	JP	Dk grn burned	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	337	1	0	625	JP	Bone	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	411	1	0	625	JP	Solder seal can lid	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	413	1	0	625	JP	Nail	0	0	1.5
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	416	1	0	625	JP	Dog leash fastener	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	NE	86288.79	41125.76	0	3	20.0	23.0	41	G	31	412	43	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	23.0	43	G	32	402	2	1	625	JP	Amb body	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	23.0	43	G	32	402	1	2	625	JP	Amb neck screwtop	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	22.0	43	G	32	412	28	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	22.0	43	G	32	337	1	0	625	JP	Bone	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	22.0	43	G	32	411	2	0	625	JP	Solder seal can lids	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	22.0	43	G	32	413	1	1	625	JP	Nail	0	0	3.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	0	3	20.0	22.0	43	G	32	413	1	2	625	JP	Nail	0	0	4.5
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	413	1	1	625	JP	Unknown total length	0	0	0.8
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	413	1	2	625	JP		0	0	4.5
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	413	1	3	625	JP		0	0	1.5
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	415	1	0	625	JP	WRA Co .25-35 WCF	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	416	1	0	625	JP	Washer	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	402	3	0	625	JP	Clear burned	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SW	86288.79	41125.76	1	4	22.0	30.0	45	G	33	412	8	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	337	4	0	625	JP	Bone	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	412	6	0	625	JP	Nondiag can metal	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	402	1	1	625	JP	Clear	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	402	1	2	625	JP	Amb burned	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	403	2	0	625	JP	Window	0	0	0.0
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	413	1	1	625	JP	Nail	0	0	1.5
8	8641.0	NM	13140	4	2	2X2	SE	86288.79	41125.76	1	4	22.0	30.0	47	G	34	413	1	2	625	JP	Nail	0	0	4.5
8	8641.0	NM	13140	5	3	1X2	S	86320.77	41121.33	0	1	29.0	30.0	32	G	10	412	2	0	625	JP	Nondiag metal	0	0	0.0
8	8641.0	NM	13140	5	3	1X2	S	86320.77	41121.33	0	2	30.0	38.0	38	G	11	433	21	0	625	JP	Leather	0	0	0.0
8	8641.0	NM	13140	0	0			0.00	0.00	0		0.0	0.0	61	N	37	402	1	0	401	VG	Ink bottle screwtop	0	0	0.0
8	8641.0	NM	13140	0	0			0.00	0.00	0		0.0	0.0	51	N	36	402	1	0	401	JP	Aq bse "WF&S 4 Mil	0	0	0.0

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
8	8641.0	NM	6086	2	0	2X2	NE	86640.91	41356.04	0	1	37.0	42.0	1	G	1	579	1	0	625	PH	Bullet	0	0	28.3
6	7933.0	TX	6940	1	1	2X2	NE	79671.60	33343.87	2	FC	24.0	38.0	13	G	5	479	1	0	479	PH	Nondiag metal	0	0	16.0
6	7933.0	TX	7312	3	3	2X2	SW	79187.22	33021.00	0	1	9.0	11.0	7	G	6	479	2	0	625	MS	Nondiag metal	0	0	41.1
6	7933.0	TX	H182					79791.00	33434.03	0	0	0.0	0.0	51	G	25	417	1	0	479	PH	Opener?	0	0	0.0
6	7933.0	TX	H182					79792.77	33435.83	0	0	0.0	0.0	53	G	26	415	1	0	479	PH	.32 U.M.C. S&W	0	0	0.0
6	7933.0	TX	H182					79792.77	33435.83	0	0	0.0	0.0	55	G	27	415	1	0	479	PH	.32-20 U.M.C.	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SE	79780.68	33435.63	0	0	17.0	17.0	1	G	1	416	1	0	479	JP	Skeleton key	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	0	19.0	19.0	3	G	2	413	1	0	479	JP	Wire nail 2 in.	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	0	19.0	19.0	5	G	3	413	1	0	479	JP	Galvanized tack .5in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	0	19.0	19.0	7	G	4	416	1	0	479	JP	Wire	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	9	G	5	413	1	0	479	JP	Wire nail 1.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	11	G	6	413	1	0	479	JP	Wire nail 2.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	13	G	7	413	1	0	479	JP	Wire nail 4.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	15	G	8	413	1	0	479	JP	Wire nail 2.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	17	G	9	413	1	0	479	JP	Roof tack 0.8 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	19	G	10	413	1	0	479	JP	Wire nail	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	21	G	11	403	1	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	23	G	12	403	1	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	25	G	13	403	1	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	27	G	14	403	1	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	29	G	15	413	1	0	479	JP	Wire nail 1.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	31	G	16	403	1	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	33	G	17	413	1	0	479	JP	Wire nail 1.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	0	19.0	19.0	35	G	18	413	1	0	479	JP	Wire nail 3.5 in+	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	0	9.0	9.0	37	G	19	403	1	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	0	9.0	9.0	39	G	20	413	1	0	479	JP	Wire nail 2.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	1	19.0	25.0	41	G	21	413	3	1	479	JP	Wire nails 1.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	1	19.0	25.0	41	G	21	413	4	2	479	JP	Wire nails 2.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	1	19.0	25.0	41	G	21	413	1	3	479	JP	Wire nails 4.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	1	19.0	25.0	41	G	21	403	2	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NE	79780.68	33435.63	0	1	19.0	25.0	41	G	21	416	3	0	479	JP	Wire	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	1	19.0	25.0	43	G	22	413	1	1	479	JP	Wire nail 1.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	1	19.0	25.0	43	G	22	413	1	2	479	JP	Wire nail 2.5 in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	1	19.0	25.0	43	G	22	417	6	0	479	JP	Nondiag metal	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	NW	79780.68	33435.63	0	1	19.0	25.0	43	G	22	403	20	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SE	79780.68	33435.63	0	1	17.0	25.0	45	G	23	413	1	0	479	JP	Wire nail 4+ in	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SE	79780.68	33435.63	0	1	17.0	25.0	45	G	23	415	1	0	479	JP	Cartridge .22 "U"	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SE	79780.68	33435.63	0	1	17.0	25.0	45	G	23	412	6	0	479	JP	Nondiag metal	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SE	79780.68	33435.63	0	1	17.0	25.0	45	G	23	402	1	0	401	JP	Clear	0	0	0.0

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	1	9.0	25.0	47	G	24	413	1	1	479	JP	Wire nail	0	0	1.50
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	1	9.0	25.0	47	G	24	413	1	2	479	JP	Roof tack	0	0	0.8
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	1	9.0	25.0	47	G	24	413	1	3	479	JP	Wire nail	0	0	2.5
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	1	9.0	25.0	47	G	24	417	4	0	479	JP	Nondiag metal	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	1	9.0	25.0	47	G	24	411	1	0	479	JP	Solder seal	0	0	0.0
6	7933.0	TX	H182	1	1	2X2	SW	79780.68	33435.63	0	1	9.0	25.0	47	G	24	403	2	0	401	JP	Window glass	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	0	41.0	41.0	2	G	28	402	8	1	401	PH	Purple body	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	0	41.0	41.0	2	G	28	402	2	2	401	PH	Clear body	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	0	41.0	41.0	2	G	28	402	1	3	401	PH	Aqua base "971"	0	0	2.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	0	38.0	38.0	4	G	29	402	9	1	401	PH	Purple body	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	0	38.0	38.0	4	G	29	402	5	2	401	PH	Clear body Dr. Pepper	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	0	38.0	38.0	4	G	29	402	1	3	401	PH	Amber body	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	0	38.0	38.0	4	G	29	402	1	4	401	PH	Lt green body C. Cola	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	1	41.0	46.0	6	G	30	402	14	0	401	PH	Purple	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	1	41.0	46.0	6	G	30	411	1	0	479	PH	Crimped base	0	0	2.75
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	1	41.0	46.0	6	G	30	415	1	0	479	PH	.22 "U"	0	0	
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	1	41.0	46.0	6	G	30	412	6	0	479	PH	Nondiag metal	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	1	79777.19	33426.85	0	1	41.0	46.0	6	G	30	417	2	0	479	PH	Wire	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	1	38.0	43.0	8	G	31	402	4	1	401	PH	Clear ..."EPSI"	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	1	38.0	43.0	8	G	31	402	1	2	401	PH	Clear patenated	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	1	38.0	43.0	8	G	31	402	1	3	401	PH	Lt green (Coke)	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	2	79777.19	33426.85	0	1	38.0	43.0	8	G	31	402	16	4	401	PH	Purple thick	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	3	79777.19	33426.85	0	1	26.0	35.0	10	G	32	402	6	1	401	PH	Coke	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	3	79777.19	33426.85	0	1	26.0	35.0	10	G	32	402	1	2	401	PH	Purple	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	3	79777.19	33426.85	0	1	26.0	35.0	10	G	32	412	2	0	479	PH	Nondiag can	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	4	79777.19	33426.85	0	1	15.0	22.0	12	G	33	417	2	0	479	PH	Nondiag metal	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	4	79777.19	33426.85	0	1	15.0	22.0	12	G	33	402	6	1	401	PH	Coke	0	0	0.0
6	7933.0	TX	H182	2	1B	1X4	4	79777.19	33426.85	0	1	15.0	22.0	12	G	33	402	1	2	401	PH	Purple	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	3	79777.19	33426.85	1	2	35.0	45.0	16	G	34	402	5	1	401	PH	Coke	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	3	79777.19	33426.85	1	2	35.0	45.0	16	G	34	402	1	2	401	PH	Purple	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	2	79777.19	33426.85	1	2	43.0	56.0	20	G	35	402	7	1	401	PH	Purple	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	2	79777.19	33426.85	1	2	43.0	56.0	20	G	35	402	1	2	401	PH	Lt green Coke	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	3	79777.19	33426.85	1	2	35.0	45.0	22	G	36	402	16	1	401	PH	Lt green Coke	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	4	79777.19	33426.85	1	2	35.0	45.0	24	G	37	402	4	1	401	PH	Purple	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	4	79777.19	33426.85	1	2	35.0	45.0	24	G	37	402	3	2	401	PH	Lt green Coke	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	3	79777.19	33426.85	2	3	22.0	36.0	26	G	38	402	1	0	401	PH	Lt green Coke	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	4	79777.19	33426.85	2	3	35.0	43.0	28	G	39	402	1	1	401	PH	Coke	0	0	0.0
6	7933.0	TX	H182	2	2	1X4	4	79777.19	33426.85	2	3	35.0	43.0	28	G	39	402	2	2	401	PH	Clear	0	0	0.0
2	8242.5	NM	H70	0	0			83549.42	43191.92	0	0	0.0	0.0	19	G	17	414	1	0	479	PH	Axe head	0	0	0.0

PB	Quad	State	Site	Blk	Feat	Size	UT	UTM East	UTM North	Zone	Level	Top	Btm	Coll	P	Bag	AC	Qnt	Ext	Origac	NM	Comments	MT	Cort	Length
2	8242.5	NM	H70	2	0	2X2		83523.67	43121.81	0	1	11.0	34.0	3	G	2	337	34	0	625	PH	Entire unit/avg lgth	0	0	14.0
2	8242.5	NM	H70	2	0	2X2	SE	83523.67	43121.81	2	2	34.0	72.0	7	G	3	337	1	0	625	PH		0	0	12.0
2	8242.5	NM	H70	2	0	2X2	SW	83523.67	43121.81	2	2	34.0	44.0	11	G	5	337	24	0	625	PH	Avg length	0	0	15.0
2	8242.5	NM	H70	2	0	2X2	SW	83523.67	43121.81	2	3	45.0	54.0	17	G	7	337	1	0	625	PH		0	0	12.0
2	8242.5	NM	H70	3	0	2X2	NW	83548.71	43244.72	0	0	26.0	26.0	4	G	9	414	1	0	479	PH	Axe head	0	0	0.0
2	8242.5	NM	H70	3	0	2X2	SE	83548.71	43244.72	0	0	26.0	26.0	6	G	10	412	1	0	479	PH	Nondiag can metal	0	0	0.0
2	8242.5	NM	H70	3	0	2X2	SE	83548.71	43244.72	0	0	26.0	26.0	6	G	10	411	1	0	479	PH	Crimped can lid	0	0	0.0
2	8242.5	NM	H70	3	0	2X2	NE	83548.71	43244.72	0	2	19.0	34.0	8	G	11	416	1	0	479	PH	Bottle cap	0	0	0.0
2	8242.5	NM	H70	3	0	2X2	SE	83548.71	43244.72	0	2	29.0	34.0	10	G	12	416	1	0	479	PH	Bottle cap	0	0	0.0
2	8242.5	NM	H70	3	0	2X2	NW	83548.71	43244.72	2	3	34.0	44.0	12	G	13	435	1	0	479	PH	Shell button	0	0	0.0
2	8242.5	NM	H70	3	0	2X2	NE	83548.71	43244.72	2	3	34.0	44.0	18	G	16	435	1	0	479	PH	Shell button	0	0	0.0
6	7933.0	TX	H98	1	0	2X2	SW	79761.84	33810.91	0	0	21.0	0.0	1	G	1	411	1	0	479	PH	Tobacco tin 1 hinge	0	0	0.0
6	7933.0	TX	H98	1	0	2X2	NW	79761.84	33810.91	0	0	21.0	0.0	3	G	2	402	1	0	401	PH	Neck post 1903 crown	0	0	0.0
6	7933.0	TX	H98	1	0	2X2	NE	79761.84	33810.91	0	0	21.0	0.0	5	G	3	416	1	0	479	PH	Metal band (barrel?)	0	0	0.0
6	7933.0	TX	H98	1	0	2X2	SE	79761.84	33810.91	0	0	21.0	0.0	7	G	4	406	1	0	401	PH	Headlight	0	0	0.0
6	7933.0	TX	H98	1	0	2X2	NW	79761.84	33810.91	0	0	21.0	0.0	9	G	5	416	1	0	479	PH	Metal bands	0	0	0.0
6	7933.0	TX	H98	1	0	2X2		79761.84	33810.91	0	1	21.0	24.0	11	G	6	402	1	0	625	PH	Purple	0	0	0.0
6	7933.0	TX	H98	1	0	2X2		79761.84	33810.91	0	1	21.0	24.0	11	G	6	416	2	0	625	PH	Barrel band	0	0	0.0
6	7933.0	TX	H98	1	0	2X2		79761.84	33810.91	0	1	21.0	24.0	11	G	6	411	1	0	479	PH	Can base	0	0	2.5
6	7933.0	TX	H98	1	0	2X2	NW	79761.84	33810.91	0	2	22.0	34.0	13	G	7	337	1	0	625	PH	Rodent bone	0	0	0.0
6	7933.0	TX	H98	2	1	2X2	SW	79781.14	33827.34	0	0	16.0	0.0	2	G	13	421	1	0	479	JP	Brown glazeware	0	0	0.0
6	7933.0	TX	H98	2	1	2X2	SW	79781.14	33827.34	0	0	16.0	0.0	4	G	14	421	1	0	479	JP	Brown glazeware	0	0	0.0
6	7933.0	TX	H98	2	1	2X2	SW	79781.14	33827.34	0	0	16.0	0.0	6	G	15	421	1	0	479	JP	Brown glazeware	0	0	0.0
6	7933.0	TX	H98	2	1	2X2	NW	79781.14	33827.34	0	0	16.0	0.0	8	G	16	421	1	0	479	JP	Brown glazeware	0	0	0.0
6	7933.0	TX	H98	2	1	2X2	WU	79781.14	33827.34	0	1	14.0	17.0	10	G	17	421	2	0	625	JP	Brown glazeware rims	0	0	0.0
6	7933.0	TX	H98	2	1	2X2	WU	79781.14	33827.34	0	1	14.0	17.0	10	G	17	412	166	0	625	JP	Nondiag can metal	0	0	0.0
6	7933.0	TX	H98	2	2	2X2	NW	79781.14	33827.34	0	2	17.0	20.0	16	G	18	412	3	0	625	JP	Nondiag can metal	0	0	0.0
6	7933.0	TX	H98	2	2	2X2	NW	79781.14	33827.34	0	2	17.0	20.0	16	G	18	435	3	0	625	JP	Hist charcoal	0	0	0.0
6	7933.0	TX	H98	3	0	2X2	NW	79703.48	33816.71	0	0	25.0	0.0	15	G	8	411	12	0	479	PH	1 Hng tobac, hit cans	0	0	0.0
6	7933.0	TX	H98	3	0	2X2	SW	79703.48	33816.71	0	NE	27.0	0.0	17	G	9	411	1	0	479	PH	Tobacco tin 1 hinge	0	0	0.0
6	7933.0	TX	H98	3	0	2X2	SW	79703.48	33816.71	0	0	27.0	0.0	19	G	10	411	1	0	479	PH	Tobacco tin 1 hinge	0	0	0.0
6	7933.0	TX	H98	3	0	2X2	WU	79703.48	33816.71	0	1	23.0	27.0	21	G	11	411	15	0	625	PH	H.I.T. Tin	0	0	0.0
6	7933.0	TX	H98	3	0	2X2	WU	79703.48	33816.71	0	1	23.0	27.0	21	G	11	402	5	0	625	PH	Clear glass	0	0	0.0
6	7933.0	TX	H98	3	0	2X2	NE	79703.48	33816.71	0	2	11.0	37.0	23	G	12	402	4	0	625	PH	Clear glass	0	0	0.0
6	7933.0	TX	H98	4	0	2X2	SW	79727.14	33785.90	0	1	24.0	24.5	20	G	20	412	30	0	625	PH	Nondiag metal	0	0	0.0

APPENDIX G

ARCHAEOMAGNETIC DATING RESULTS

MUSEUM OF NEW MEXICO
Office of Archaeological Studies

Laboratory of Anthropology
Museum of Indian Arts and Culture
Museum of Fine Arts
Museum of International Folk Art
Palace of the Governors
Museum of New Mexico Press
New Mexico State Monuments
Office of Archaeological Studies

December 23, 1994

Dwayne Peter
Geo-Marine, Inc.
550 E 15th St.
Plano, TX 75074

Dear Mr. Peter:

Enclosed are the results from two archaeomagnetic samples from Fort Bliss (FB972 and FB973) and an invoice for this work. The results are displayed on a table.

I am also enclosing a copy of Dan Wolfman's article "Archeomagnetic Dating in Arkansas and the Border Areas of Adjacent States" (*In* Arkansas Archeology in Review, edited by N. Trubowitz and M. Jeter, pp. 277-300, *Arkansas Archeological Survey Research Series* No. 15 [1982]), which includes a good brief introduction to archaeomagnetic dating. Two other articles that Dan has authored which include more detailed information on archaeomagnetic dating are "Geomagnetic Dating Methods in Archaeology" (in *Advances in Archaeological Method and Theory*, Volume 7, edited by M. B. Schiffer, pp. 363-458, Academic Press, New York [1984]) and "Retrospect and Prospect" (in *Archaeomagnetic Dating*, edited by J. L. Eighmy and R. S. Sternberg, pp. 313-364, University of Arizona Press, Tucson [1990]).

As you know, these sites did not yield good enough alpha-95 values to obtain any dates. FB972 was taken from an oxidized orange area that was not very well defined but appeared to be a firepit of some type. FB973 was a half egg-shaped hearth that appeared to be blackened but not well oxidized. A reason for the "bad" alpha-95 values (greater than 4°) might be the soil in the Fort Bliss area. The soil appears to be very sandy, which does not allow strong magnetization. The weak initial intensities of these two samples, at 1.2E-04 Gcm^3/g (FB972) and 1.3E-04 Gcm^3/g (FB973), support this hypothesis.

If you have any questions or comments, please do not hesitate to contact me.

Sincerely,

J. Royce Cox
Archaeomagnetic Dating Laboratory

Enclosures

Table 1. Fort Bliss Archaeomagnetic Sample Results

SAMPLE NO.	SITE	FEATURE	INC.	DEC.	VGP LAT.	VGP LONG.	α_{95}	δ_p	δ_m	N	DEMAG	EST. DATE	AM DATE	COL
FB972	3929FB	fire pit?	61.5	0.0	79.4	253.9	19.5	23.2	30.1	8/8	NRM	Jornada Mogollon		JC
FB973	13921FB	Test unit 1, Feat. 1, hearth	48.5	8.6	82.2	0.8	15.3	13.2	20.1	8/8	100	El Paso Polychrome		JC

ARCHEOMAGNETIC SAMPLE FIELD DATA FORM

Daniel Wolfman
Office of Archaeological Studies
Museum of New Mexico
P. O. Box 2087
Santa Fe, NM 87504

Tel. No. (505) 827-6343

DATE COLLECTED: 1/24/94 SAMPLE DESIGNATION: ~~3929 FB~~ FB3929

SITE NAME: SITE NO.

SITE LOCATION: PB2 OTERO COUNTY NM

SITE LAT. & LONG. UTM N 3543207.736 E 382602.827 COLLECTOR JC

FEATURE DESIGNATION (&/or NO.) HEARTH?

CULTURAL AFFILIATION (Period, Phase, associated material culture diagnostics, etc.)

~~MOGOLLON~~ ~~JORNADA~~ JORNADA MOGOLLON

ESTIMATED FEATURE DATE AND BASIS OF ESTIMATE

ARCHEOLOGIST & ADDRESS

COMMENTS

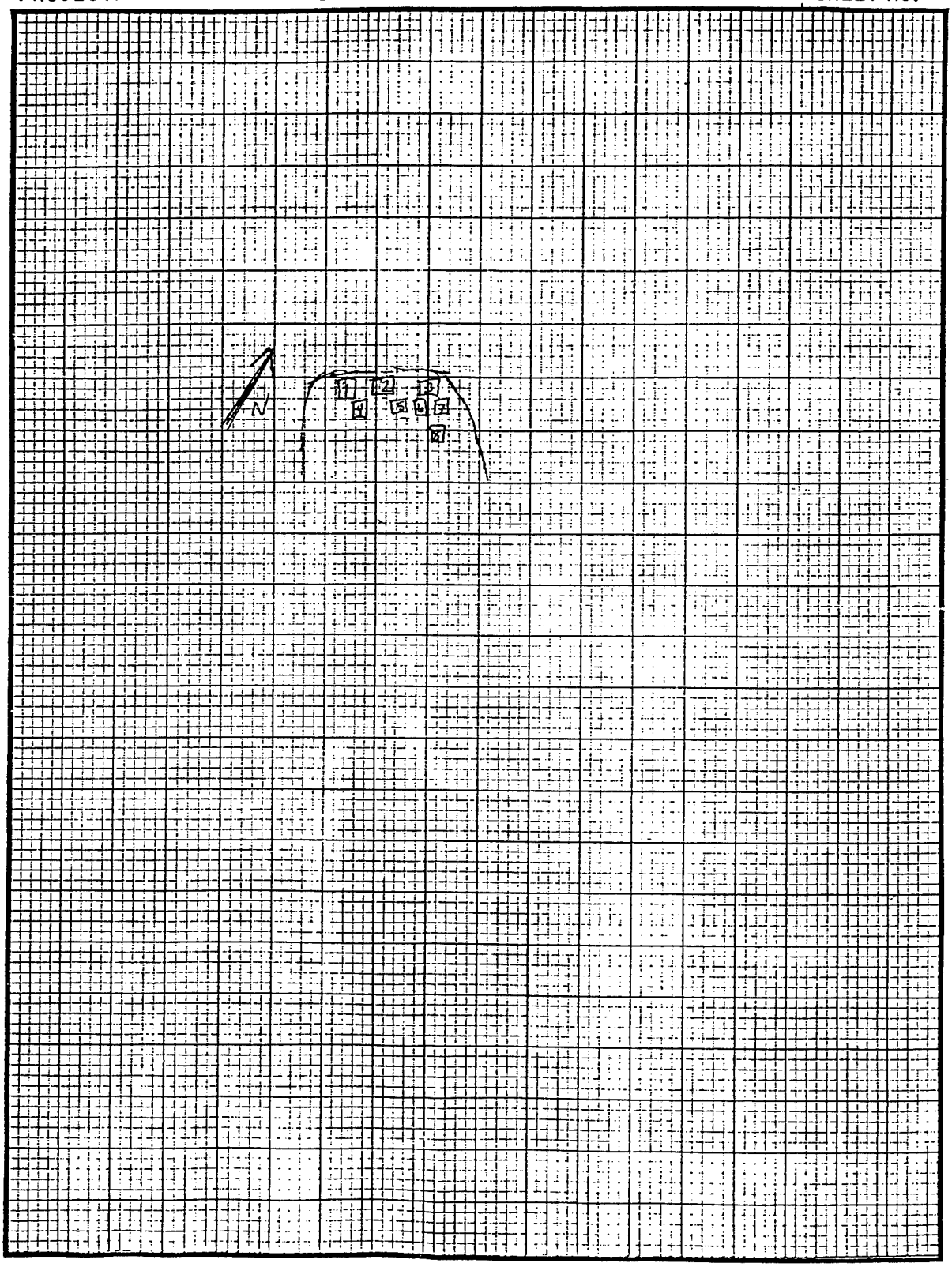
Azimuth	Comments	Azimuth	Comments
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2. 169	SHAKEY	8. 266.5	
3. 163.5		9.	
4. 171.5	SHAKEY	10.	
5. 174.5		11.	
6. 169		12.	

Use reverse side for scale drawing of baked feature with specimen locations and sketch map of baked feature location in the site, house, room, or in relation to other major feature(s).

MUSEUM OF NEW MEXICO

CONTINUATION SHEET

PROJECT: SITE: FEATURE: SHEET NO:



5 Squares to the Centimeter

ARCHEOMAGNETIC SAMPLE FIELD DATA FORM

Daniel Wolfman
Office of Archaeological Studies
Museum of New Mexico
P. O. Box 2087
Santa Fe, NM 87504

Tel. No. (505) 827-6343

DATE COLLECTED: 1/25/94 SAMPLE DESIGNATION: FB13921

SITE NAME: SITE NO.

SITE LOCATION: TEXAS EL PASO COUNTY FORT BLISS

SITE LAT. & LONG. N.3539480 UTM E 385500 COLLECTOR JC

FEATURE DESIGNATION (&/or NO.) HEARTH FEATURE #1 TEST UNIT #1

CULTURAL AFFILIATION (Period, Phase, associated material culture diagnostics, etc.)

EL PASO POLYCHROME

ESTIMATED FEATURE DATE AND BASIS OF ESTIMATE 1200-1400

ARCHEOLOGIST & ADDRESS

COMMENTS ASSOCIATED C-14, (THERMOLUMINESCENCE POSSIBLY)

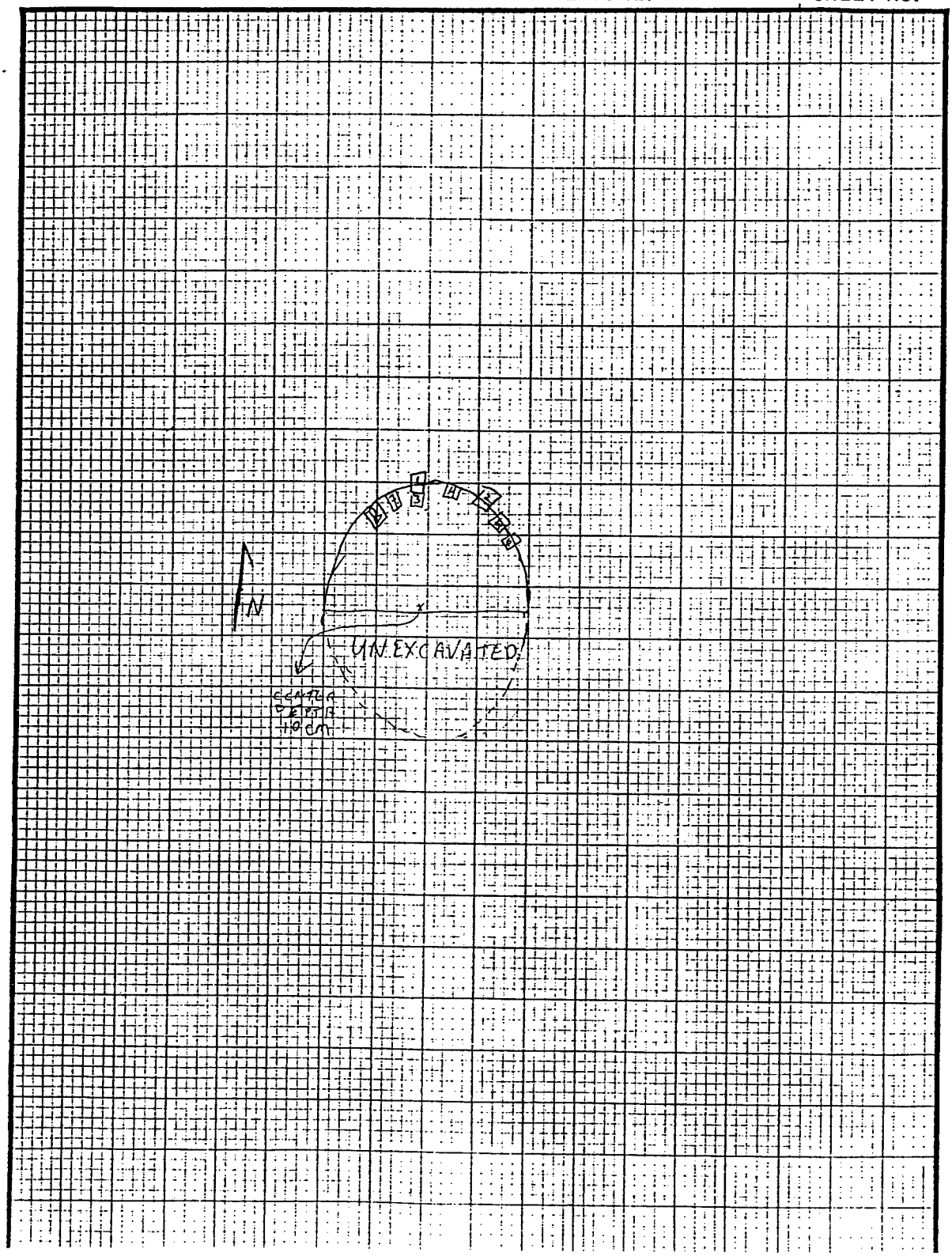
	Azimuth	Comments		Azimuth	Comments
1.	96.5		7.	67.0	
2.	119.5		8.	51.5	
3.	102.0		9.		
4.	110.5		10.		
5.	130.5	SHAKEY	11.		
6.	128.0		12.		

Use reverse side for scale drawing of baked feature with specimen locations and sketch map of baked feature location in the site, house, room, or in relation to other major feature(s).

MUSEUM OF NEW MEXICO

CONTINUATION SHEET

PROJECT: SITE: FEATURE: SHEET NO:



APPENDIX H

EOLIAN LANDSCAPE EVOLUTION IN THE CENTRAL BASIN OF FORT BLISS

by
H. Curtis Monger and Brenda J. Buck
Pedology Lab, New Mexico State University, Las Cruces

The many backhoe trenches placed across Fort Bliss combined with those of the GBFEL-TIE project have revealed a soil stratigraphic record composed of four dominant units—Historic blowsand (Q4), Organ (Q3), Isaacks' Ranch or older Pleistocene paleosols (Q2), and La Mesa (Q1) (Figure H-1). For a detailed discussion of the identification and nature of these units, see Mbutu (this volume), Buck (in press), Monger (1993), and Blair et al. (1990). Figure H-2 illustrates the correlation of stratigraphic terms used by Fort Bliss archeologists, Monger (1993), and Blair et al. (1990).

HISTORIC BLOWSAND (Q4)

The Historic blowsand, which commonly contains military and ranching artifacts, is the youngest and most mobile unit. This unit occurs as coppice dunes, interdune sheet deposits, extensive sheet deposits associated with grasslands, and as large dunes on the eastward side of the Hueco Bolson and Tularosa Basin. The well-rounded sand mineralogy is mostly quartz, feldspars, magnetite, and caliche fragments. The sands are coated with clay and iron oxide which give them a reddish-orange color. This composition places the deposits into sandy loam or loamy sand textural classes. The sand source appears to be locally derived from older basin floor soils that were destroyed by several episodes of wind erosion throughout the Quaternary Period.

Preserved beneath many of the Historic blowsand deposits is the late-1800s land surface (see Figure H-1). Evidence for this surface is the presence of a faint A horizon containing Historic artifacts. In most cases, this buried land surface is relatively horizonal, unlike the hummocky terrain of today. Today's hummocky terrain appears to be unique to the stratigraphic record, presumably because of the great abundance of mesquite spread by cattle during this century's desertification event, unlike earlier desertification events.

ORGAN (Q3)

The Organ eolian unit is significant because it contains most of the archeological material. In the neighboring Desert Project (Gile et al. 1981), Organ-aged alluvium was subdivided into three units: Organ I (~7 to 2.5 ka), Organ II (~2 to 1 ka), and Organ III (~1 to 0.1 ka). Although the eolian Organ unit is readily identifiable by its stratigraphic position and its stage I filaments, subdividing it with confidence into three subunits has been difficult. Fort Bliss archeologists and Monger (1993) observed features that seemed to be diagnostic of Organ I, II, and III in some, but not all, cases (see Figure H-2). Also, see Buck (in press) for a discussion of the Organ units. In the Tobin Well vicinity in the southwestern part of Fort Bliss, pottery occurs on the Organ II surface, both in profile and where Organ II emerges at the land surface (Figure H-3).

The initiation of the Organ unit appears to be the result of the Altithermal desertification event around 7-8 ka (Blair et al. 1990; Gile 1975; Monger 1993). In many areas of the central basin on Fort Bliss, the Organ unit unconformably overlies truncated Pleistocene soils characterized by lag layers of carbonate nodules and pebbles. This lag layer is similar to present-day lag layers in deflated areas on Fort Bliss. Therefore, this layer is interpreted to be a paleodeflational surface. Based on a combination of carbonate and charcoal dates, the lag layer appears to have formed around the beginning of the middle Holocene. Carbonate-dated lag nodules indicate the deflational event occurred after about 10 ka, when the nodules were forming in soils of Isaacks' Ranch age and older. After deflation, the nodules would have collapsed vertically as smaller particles were carried away by the wind (Figure H-4). Radiocarbon dates of carbonate and charcoal in the Organ unit indicate that the event occurred before about 4 ka, and probably prior to 7 ka, based on the dates of incipient nodules (see Figure H-4).

Based on the premise that increased aridity causes increased eolian activity, the Organ unit potentially contains important climatic information on the middle and late Holocene in the Fort Bliss region. Especially pertinent is paleoenvironmental information about the beginning and ending of the Formative period. However, because deposition and deflation are mobile and complex, every backhoe trench does not contain

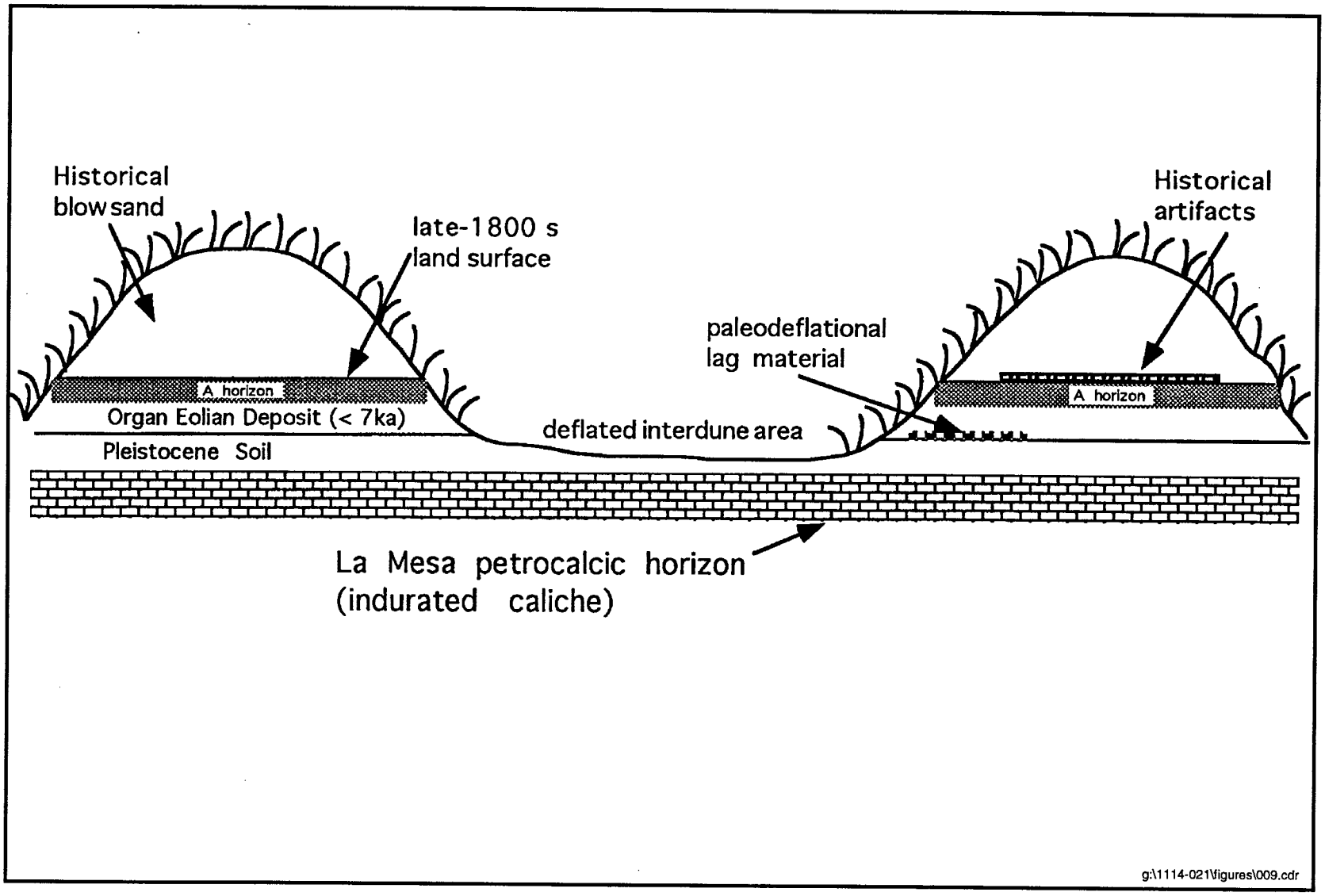


Figure H-1. Illustration of the general stratigraphic units in the central basin of Fort Bliss.

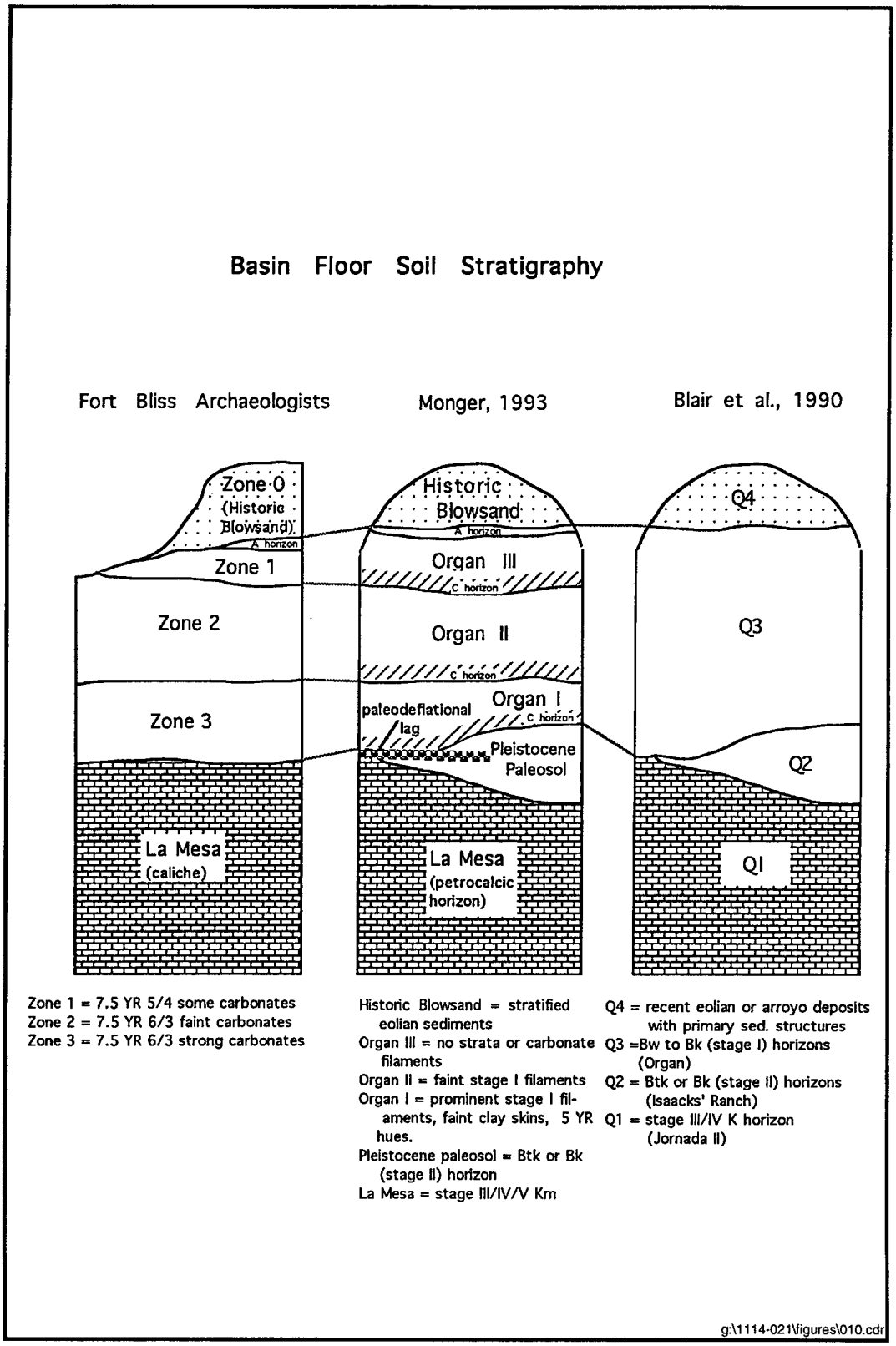


Figure H-2. Correlation of stratigraphic terms and their descriptions as used by Fort Bliss archeologists, Monger (1993), and Blair et al. (1990).

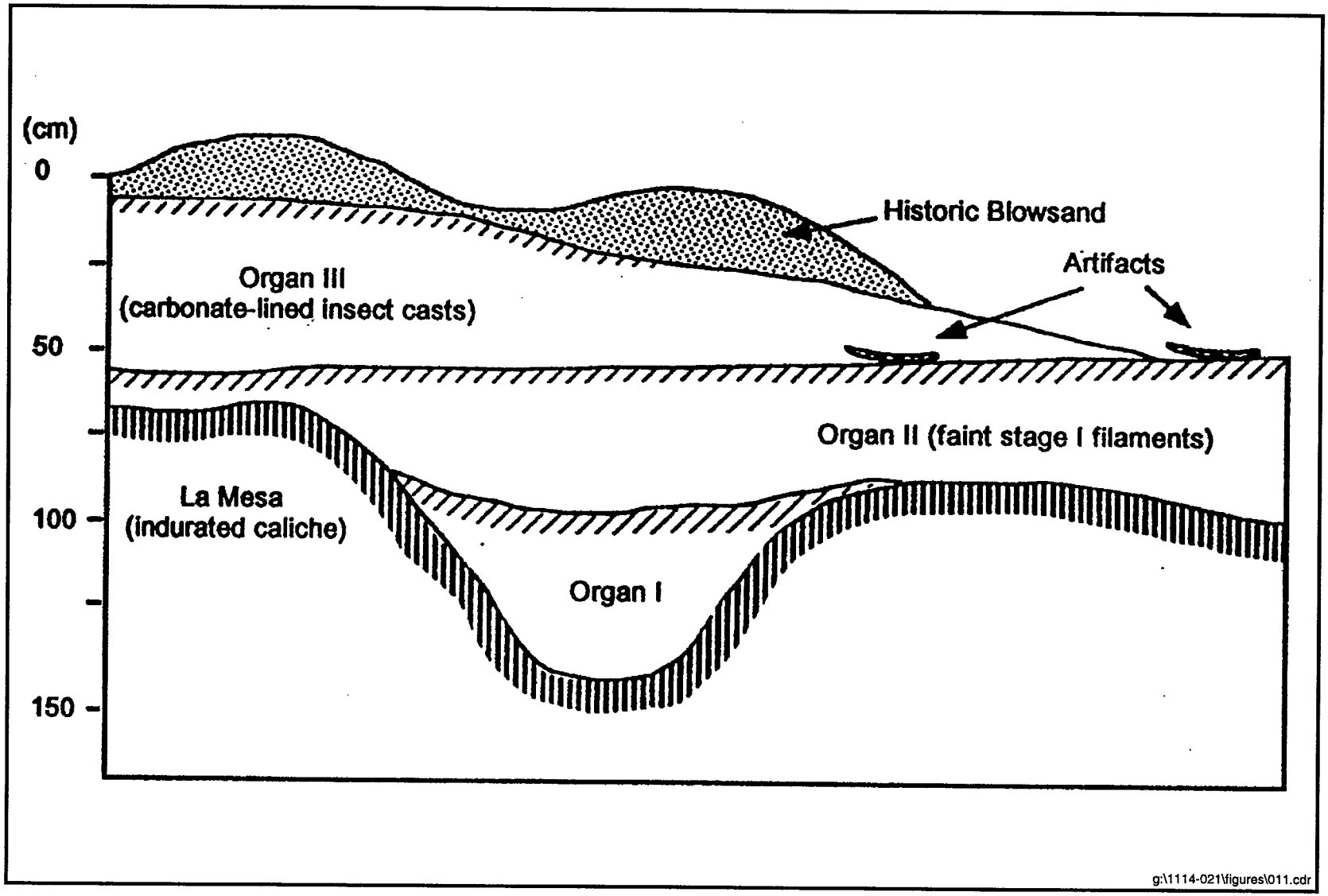


Figure H-3. Soil stratigraphy in the Tobin Well Area. Note the occurrence of pottery on the Organ II surface, both in profile and where Organ II occurs at the land surface.

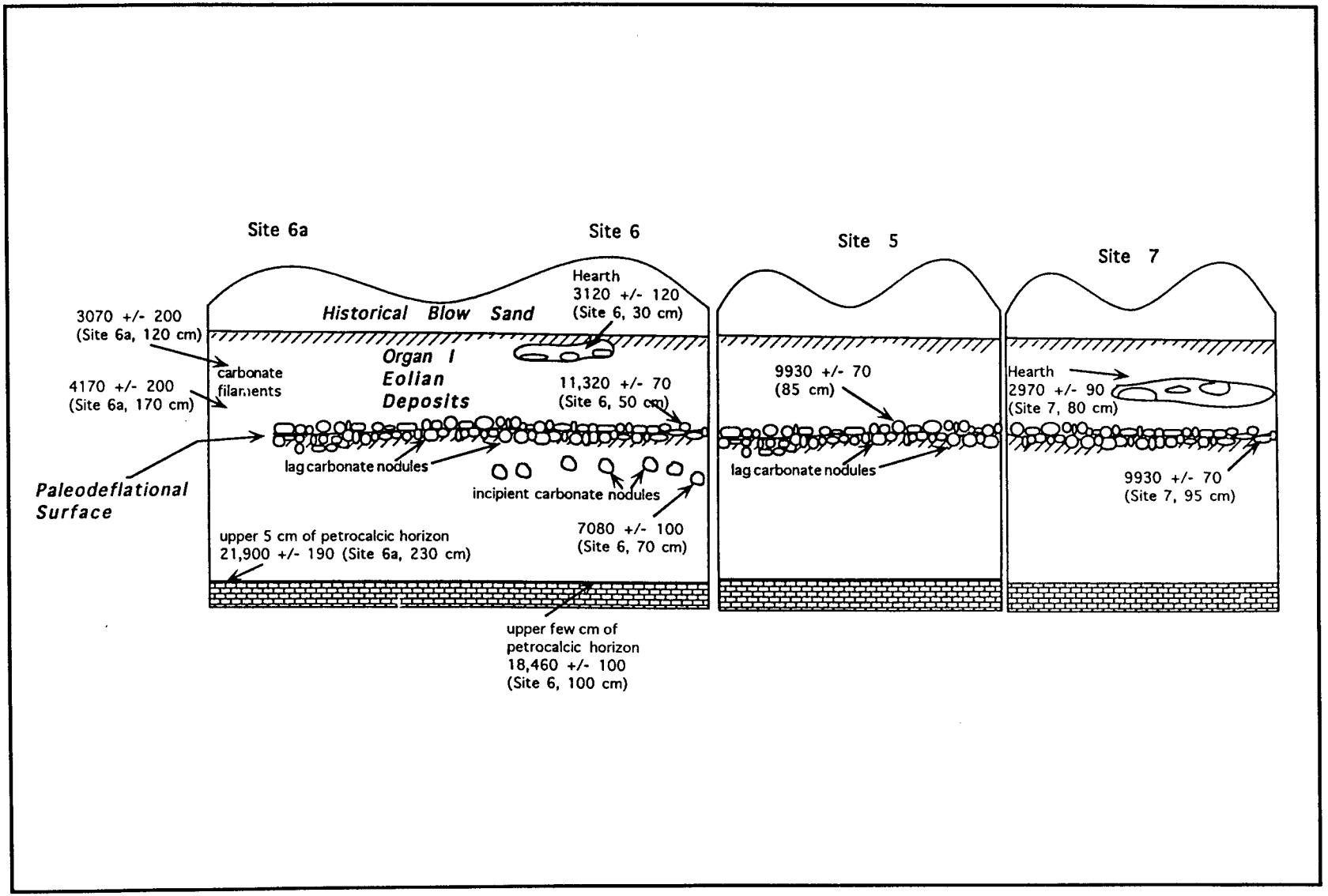


Figure H-4. Composite diagram of radiocarbon dates to determine the age of the paleodeflational surface. Not listed in the above diagram is a date of 9910±70 B.P. for lag nodules from Backhoe Trench 2 (FB 7312). The locations of the above study sites are as follows: Site 6a=UTM 855295; Site 6=UTM 855295; Site 5=UTM 767299; Site 7=UTM 863284.

a complete record. One unique environment being investigated by Brenda Buck is the fault trough environment. This environment occurs as linear north-south oriented depressions resulting from down-dropped blocks associated with normal faults (Seager et al. 1987). These depressions provide traps in which eolian sediment accumulates, resulting in a more complete eolian record. Figure H-5 illustrates the isotopic signatures of the eolian sediments from approximately 50 to 300 cm (Figure H-6). The carbon isotopes show a decrease in C4 grass abundance around the beginning of the middle Holocene (6680 ^{14}C years, see Figure H-5). This finding supports the Altithermal desertification interpretation. The carbon isotopes also indicate a gradual recovery of the C4 grasses throughout the Archaic until 2120 ^{14}C years B.P., when another desertification event occurred that might relate to the beginning of the Mesilla phase (see Figure H-5). The oxygen isotopes indicate a warming trend throughout the Archaic sometime after 6680 ^{14}C years (see Figure H-5).

ISAACKS' RANCH AND OTHER PLEISTOCENE PALEOSOLS (Q2) AND LA MESA (Q1)

Non-gravelly sediments of Isaacks' Ranch age are characterized by stage II nodules (Gile et al. 1981). Isaacks' Ranch deposits are approximately 15 to 8 ka. These deposits are laterally discontinuous; they are laid as both alluvial fan and eolian deposits. In many areas, either Isaacks' Ranch sediments were not deposited or they have eroded away. In some areas of the central basin, paleosols older than Isaacks' Ranch, such as Jornada II or I, occupy the stratigraphic position between Organ and La Mesa. These older paleosols may preserve information on earlier interglacial periods in the Quaternary.

The La Mesa unit is characterized by a stage IV morphology (i.e., indurated laminar calcrete) that forms as the result of soil formation subsequent to the middle Pleistocene. Although in most places the La Mesa unit exhibits stage IV morphology, the Highway 375 pipeline across Fort Bliss revealed that, if deeply buried, La Mesa has stage III morphology. This is probably because younger sediments intercept carbonate that normally would accumulate atop the petrocalcic horizon to form carbonate laminae. In other parts of the central basin, however, such as the vicinity near McGregor Base Camp, La Mesa has stage V morphology. Blair et al. (1990) correlated their Q1 unit to Jornada II. However, because Jornada II in non-gravelly sediments does not contain stage IV carbonate morphology (Gile et al. 1981), their non-gravelly Q1 unit should probably correlate to La Mesa.

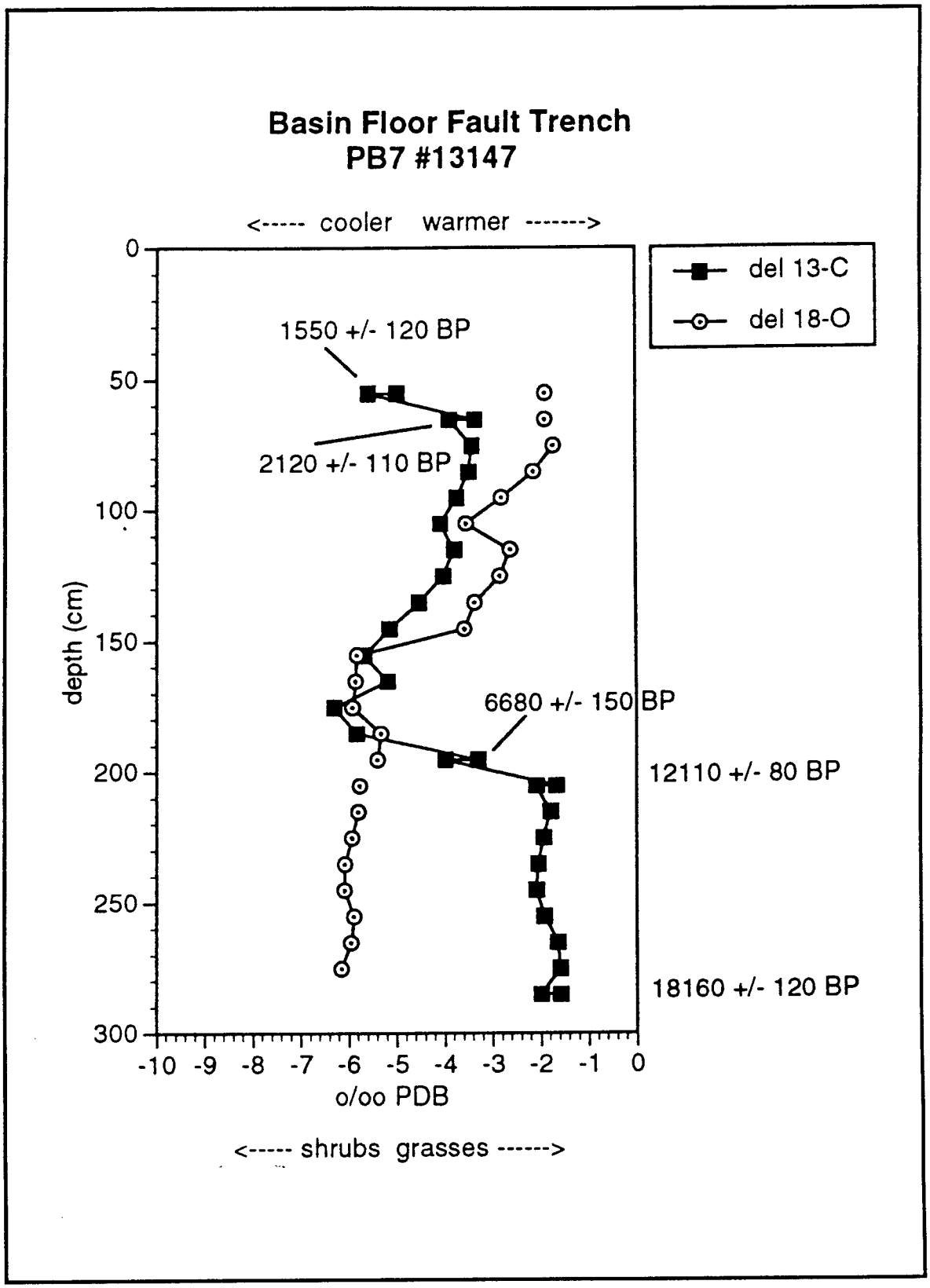


Figure H-5. Carbon and oxygen isotopic values for a deep trench in a faulted depression (PB 7 FB 13147).



Figure H-6. Backhoe Trench 8, site FB 13147.

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APPENDIX I

FAUNAL REMAINS

by
Thomas C. O'Laughlin
Jornada Anthropological Research Association

Prehistoric and historic sites from which faunal remains were recovered during the current project are situated in the low desert environment of the Hueco Bolson of southern Otero County, New Mexico, and northern El Paso County, Texas. The prehistoric sites appear to represent ephemeral and seasonal occupations during the Archaic and Formative periods, and animal bone from these sites was recovered from suspected structures and thermal features which often had burned caliche or fire-cracked rock. The historic sites evidence stains and trash areas, have material remains which date to the early twentieth century, and are most probably associated with cattle ranching in the area. Resource utilization, feature function, and intensity and duration of occupation are the principal topics addressed by the analysis of the faunal remains from this project.

Beginning in the 1970s, the analysis and reporting of faunal assemblages has become an integral part of the study of prehistoric sites in the Hueco Bolson (Whalen 1994). As a result, a substantial amount of information on faunal remains has accumulated from the subsurface investigation of caves and open sites in the area (Bayham and Broughton 1991; O'Laughlin 1977, 1979, 1988, 1994; O'Laughlin and Martin 1989; Russel n.d.; Stratton 1994; Whalen 1994). The majority of sites are camps with generally few artifacts and features. However, sites with small huts or pithouses and more substantial pueblos are also represented. Animal bones are often not found at camps or occur in small numbers. They are more common at sites with huts or pithouses, and pueblo sites and sites with multiple pithouses may have abundant faunal material. The duration and intensity of occupation, as well as concomitant differences in discard behavior, are factors contributing to the introduction, preservation, and quantity of faunal material at these sites.

Animal bone occurs infrequently on camp sites and is found more consistently and in greater numbers on longer-occupied sites with structures. Cottontail and jackrabbit are often the only animals represented in small assemblages, and they dominate large assemblages. Species diversity increases with assemblage size, and large assemblages show the occasional taking of rodents, birds, other small game, deer, and pronghorn. However, cottontail and jackrabbit appear to be the targeted animals and are most numerous on the basin floor between late spring and early winter.

Few artifacts and features characterize the tested prehistoric sites; and these sites appear to reflect ephemeral and low-intensity use of the area. Possible remains of huts or pithouses have been noted on a small number of the sites and may indicate longer occupation of those locations. Given the results of previous analyses of faunal remains from the Hueco Bolson and the nature of the sites investigated during the current project, a number of findings could be anticipated for the study of faunal remains from this project. First, faunal remains would not be found at most sites, and many of the sites with faunal remains would have few bones. Second, sites with structures should have greater quantities of bone and, perhaps, a larger diversity of species than sites without structures. Third, animal remains should primarily reflect the taking of cottontail and jackrabbit in small numbers. Finally, data on season of occupation would be lacking or questionable for many, if not all, site assemblages.

Historic sites within the project area are located either near the former Newman ranch or what is known as McLeary's cow camp and may be limited activity sites and trash areas associated with cattle ranching earlier in this century. It is not certain if structures are present on any of these sites and whether scattered trash is the result of onsite activities or disposal from some other location. It is also not certain as to whether these historic remains represent limited activities associated with a cow camp or a larger ranch with more varied activities. Thus, it is difficult to develop expectations for the faunal remains from these sites, and the analysis of the bones from these sites is largely intended to provide base-line information on one class of historic sites. Even so, the presumed association of these sites with cattle ranching allows for some expectations. It can, for example, be anticipated that faunal assemblages could include the bones of cattle, either as a result of subsistence activities, the natural death of some cows, or perhaps the occasional preparation of beef for local markets. If the raising of cattle was principally for distant markets, it could alternatively be expected that few cattle would be butchered for onsite consumption or that prepared cuts

could have been introduced from local markets. Additionally, the bones of chicken, turkey, and pig would not be unexpected for these sites, nor would the bones of local game.

It is hard to anticipate the nature of historic faunal and floral assemblages with the limited information presently available for these sites. These factors alone would change expectations with respect to biological materials. The analysis of floral and faunal remains from historic sites is, therefore, oriented toward providing descriptive and base-line data.

METHODS

Faunal materials from the tested sites were acquired through surface collection, hand screening of soils in the field, and screening of soil flotation samples. No attempt was made to distinguish modern from prehistoric bone in the field, and all bone was submitted for analysis. The bone was generally very fragmented and small, and bones with fresh breaks were refitted prior to identification. Old breaks were not rejoined, so that information on processing would be retained.

The identification of bone was done to the lowest possible taxonomic level and through comparison with modern material. When an identification was not definite but reasonable on morphological grounds, the suggested taxon was preceded with a "cf." for "closely follows." Lagomorphs (rabbits and hares) made up the bulk of the identifiable material and were identified through reference to the writer's personal collection. Birds, rodents, and mammals larger than a jackrabbit were identified by comparison with synoptic collections of the Biology Department of The University of Texas at El Paso.

Identification of some of the faunal material was restricted to class or order, and many of the bones could only be classified as mammal. Mammal bones were further recorded as of small, medium, or large body size. Mammal bones the size of a cottontail or smaller mammal were defined as small mammal. Those bones of jackrabbit to coyote size were called medium mammal, and larger bones were classified as large mammal.

Attributes recorded for the faunal material included anatomical part, portion, side, and size (longest dimension). The identification of body parts was assisted by reference collections and recording was consistent with general anatomical usage. Exceptions were in the treatment of unidentifiable mammal remains when the particular anatomical part could not be ascertained. Fragments of long bone diaphyses were simply classed as long bone splinters, and flat bone fragments distinguished bone plaques which may have come from such elements as the cranium, innominate, or scapula.

The fusion of long bone epiphyses of jackrabbit and cottontail was monitored for information possibly pertinent to an understanding of season of site occupation. Ratios of juveniles to adults for modern populations have been recorded to vary with season, and the frequency of juveniles in prehistoric faunal assemblages of the Jornada region have shown some promise for defining the season of site occupation (O'Laughlin 1994; Russell n.d.; Whalen 1994). In general, adults can make up 85 percent to 100 percent of a population in the early spring and as little as 15 percent to 25 percent by late summer to late fall when the percentage begins to climb to the spring high. Juvenile lagomorphs were noted among the faunal remains as having unfused or partially fused epiphyses of long bones, while adult lagomorphs were viewed as having fused epiphyses.

Observations on the modification of bone were also made. Bone was described as burned if any portion of the bone was burned. Similarly, bone was noted as calcined if any portion of the bone showed white or blue-gray color. Rodent gnawed bone was recorded, and butchering marks and sawing were observed on some bone from historic sites.

Quantification of the faunal remains involves the use of two measures. The first measure is the most straightforward. It is simply the total number of bones for each recognized taxon. Given small sample sizes for most sites and features, bone totals furnish an adequate means of comparing most assemblages. The second is the minimum number of individuals, or MNI. MNI is calculated by nonfeature and feature contexts within a site and references the most common element or portion of an element. Objections have been raised to the use of MNI because of problems inherent in different methods of calculating MNI (see Grayson 1984). MNI is primarily used as a heuristic tool in this report and is applied principally to lagomorph remains which comprise the bulk of identifiable material.

RESULTS

There are 489 bones from this project. Faunal remains were not recovered from many sites, and of 11 sites with bone, only five have more than 15 bones. Fifteen taxa are recognized for these remains, 12 of which are mutually exclusive categories.

Jackrabbit remains outnumber those of cottontail more than two to one, and they respectively comprise 8.4 percent (n=41) and 3.1 percent (n=15) of the total number of bones. The remains of jackrabbit are probably those of *Lepus californicus*, black-tailed jackrabbit. This is the only species of jackrabbit in the region. Cottontail bones can only be identified as a species of *Sylvilagus*. Desert cottontail, *S. auduboni*, is found in the area today, and similar-sized species occur at higher altitudes and latitudes. It is presumed that the cottontail bones from this project are from desert cottontail. Lagomorph bones that could not be identified specifically as jackrabbit or cottontail make up another 7.0 percent (n=34) of the total number of bones.

Together, the taxa of jackrabbit, cottontail, and lagomorph (n=90) make up 18.4 percent of the total number of bones and 78.9 percent of remains identified to a more specific level than mammal or bird (aves). Jackrabbit and cottontail bones occur on sites with prehistoric and historic components, are the principal animals represented in prehistoric assemblages, and are an important part of the historic assemblage at one site.

Unidentifiable mammal remains constitute 75.5 percent (n=369) of the total number of bones. Of these, 93.5 percent (n=345) are from small to medium-sized mammals that most probably are cottontail or jackrabbit. This high percentage of small to medium-sized mammals compares well with the high percentage of lagomorph bones among the identifiable remains. Medium/large and large mammal remains were only found on one historic site and are likely fragments of cattle bone.

Nine elements of cattle (*Bos taurus*) were recovered from two sites. Although few in number, cattle bones are second in number to those of lagomorphs and 7.9 percent of the identifiable bone. Few other identifiable mammal bones were found, and these include four elements of coyote (*Canis latrans*), one of desert pocket gopher (*Geomys arenarius*), and one of a small rodent (rodentia).

With the exception of a single bone that was identified as either bird or mammal, all remains of birds were recovered from one historic site. These include five specimens identifiable only as bird and one or two elements of a teal-sized duck (*Anas* sp.), domestic chicken (*Gallus gallus*), a large perching bird (passeriformes), and mourning dove (*Zenaida macroura*). Together, bird remains constitute 2.4 percent (n=12) of the total number of bones.

The remaining identifiable bones include an element of a lizard (lacertilia) and another of a western box turtle (*Terrapene ornata*). These two elements contribute only 0.4 percent to the total number of bones, and both appear to be modern site intrusions.

Data on the faunal remains from the current project are provided in Table I-1 where provenience, taxonomic level of identification, element, portion, and side are given for the bones. Information on fused or unfused bones, burned or calcined bones, and bone size is also furnished. Faunal assemblages are briefly described below at the site and feature level. Detail is provided on species composition, condition of the bone, and evidence of processing and season of occupation. This is then followed by a discussion of the faunal assemblages.

FBH 70

This site is noted principally by a surface scatter of historic artifacts. However, the southern portion of the site also has a scatter of prehistoric artifacts that includes brownware sherds. Within this latter area, 57 fragments of bone were recovered. A small stain that may represent a hearth was also found in the area of the bone.

The faunal assemblage includes 10 elements of jackrabbit, three elements of cottontail, six elements of lagomorphs, and 38 bones of small to medium-sized mammals that are probably from jackrabbit and cottontail. For the assemblage, the minimum number of individuals includes one jackrabbit and one cottontail. Butchering marks were not observed on any of the bone. Seventy-five percent (n=43) of the bone is burned or calcined, and the average size of the bone is 11.3 mm. The percentage of burned or calcined bone and the average size of the bone are comparable to those recorded for similar kinds of prehistoric sites in the region (O'Laughlin 1994), and this supports the interpretation that the bone from FBH 70 is from a prehistoric occupation.

The exposed edges and inner and outer surfaces of bone showed burning and calcining which would indicate that the bone was burned after having been fragmented. In terms of body parts for all lagomorphs, 45 percent (n=5) of foot elements and 87 percent (n=7) of all other elements are burned or calcined. These percentages are the reverse of what might be expected if whole animals were roasted over coals (see O'Laughlin 1994; Whalen 1994). However, the sample size is small (n=19), and evidence of the roasting of whole animals may be masked by burning of the bone after meal preparation and consumption. While the fusion of epiphyses was noted for metapodials and phalanges of cottontail and jackrabbit, no portions of long bones were recovered that showed fused or unfused epiphyses. Thus, it was not possible to age the remains and infer season of occupation.

FBH 98

A single element was recovered from FBH 98. This is a portion of the skull of a desert pocket gopher which exhibits no evidence of cultural modification. Pocket gophers are common burrowing animals in the area, and this element is considered to be a modern site intrusion.

FB 3929

A total of 83 bones was found associated with Feature 1 at FB 3929. This feature appears to be the remains of a brush shelter that burned following occupation. Radiocarbon dates indicate occupation during the Mesilla phase.

The faunal remains include 18 elements of jackrabbit, two elements of lagomorphs, and 63 bones of small to medium-sized mammals. A minimum of one jackrabbit is represented by the identifiable elements, and the unidentifiable mammal bone is probably from this animal. No butchering marks were observed. The bone is highly fragmented and was burned after fragmentation. Average bone size is 9.7 mm, and 80 percent (n=66) of the bone fragments are burned or calcined.

Table I-1
Provenience and Attributes of Faunal Remains from Tested Sites

Site (FB)	Coll. No.*	Test Unit	Provenience	Species	Element**	Number*** T	B	C	Mean Size (mm)
H70	3	2	nonfeature	*Sylvilagus* sp.	femur, midshaft	1		1	17.0
H70	3	2	nonfeature	*Sylvilagus* sp.	metatarsal, prox., L, F	1	1		7.0
H70	3	2	nonfeature	*Lepus californicus*	radius, midshaft	1		1	7.0
H70	3	2	nonfeature	*Lepus californicus*	metatarsal, dist., F	1	1		11.0
H70	3	2	nonfeature	Lagomorpha	premolar/molar fragment	2		2	6.0
H70	3	2	nonfeature	small mammal	long bone splinter	4	2	1	12.0
H70	3	2	nonfeature	small/medium mammal	metapodial, midshaft	1	1		5.0
H70	3	2	nonfeature	small/medium mammal	long bone splinter	22	16	3	9.0
H70	7	2	nonfeature	small/medium mammal	long bone splinter	1		1	13.0
H70	11	2	nonfeature	*Lepus californicus*	ulna, midshaft, L	1	1		18.0
H70	11	2	nonfeature	*Lepus californicus*	calcaneum, prox., R	1			19.0
H70	11	2	nonfeature	*Lepus californicus*	metapodial, dist.	1			9.0
H70	11	2	nonfeature	*Lepus californicus*	metacarpal, R, F	1			14.0
H70	11	2	nonfeature	*Lepus californicus*	metacarpal, prox., R, F	2			18.0
H70	11	2	nonfeature	*Lepus californicus*	phalange, 1st, forelimb, F	1			9.0
H70	11	2	nonfeature	*Lepus californicus*	phalange, 2nd, hindlimb, F	1	1		8.0
H70	11	2	nonfeature	*Sylvilagus* sp.	innominate, ilium, L	1			16.0
H70	11	2	nonfeature	Lagomorpha	dentary, horiz. ramus	1		1	7.0
H70	11	2	nonfeature	Lagomorpha	premolar/molar fragment	1		1	8.0
H70	11	2	nonfeature	Lagomorpha	metapodial, dist., F	1		1	3.0
H70	11	2	nonfeature	Lagomorpha	phalange, dist., F	1	1		8.0
H70	11	2	nonfeature	small/medium mammal	metapodial, midshaft	2		2	7.0
H70	11	2	nonfeature	small/medium mammal	long bone splinter	6	1	2	12.8
H70	11	2	nonfeature	small/medium mammal	flat bone fragment	1		1	12.0
H70	17	2	nonfeature	small/medium mammal	long bone splinter	1	1		13.0
H98	13	1	nonfeature	*Geomys arenarius*	skull, premax./maxilla, R&L	1			24.0
3929	8	1	Feature 1	*Lepus californicus*	radius, prox., L, F	1	1		9.0
3929	8	1	Feature 1	*Lepus californicus*	metatarsal, prox., R, F	1		1	36.0
3929	8	1	Feature 1	small/medium mammal	long bone splinter	2	1	1	6.0
3929	12	1	Feature 1	*Lepus californicus*	upper molar fragment, L	1			11.0
3929	12	1	Feature 1	*Lepus californicus*	dentary, I-P3, L	1	1		17.0
3929	12	1	Feature 1	*Lepus californicus*	incisor fragment	2	1	1	8.0
3929	12	1	Feature 1	*Lepus californicus*	innominate, acetabulum, L, F	1	1		20.0
3929	12	1	Feature 1	*Lepus californicus*	humerus, prox. midshaft, L	1	1		28.0
3929	12	1	Feature 1	*Lepus californicus*	radius, midshaft	2	2		18.0
3929	12	1	Feature 1	*Lepus californicus*	calcaneum, L	1	1		27.0
3929	12	1	Feature 1	*Lepus californicus*	astragalus, L	1		1	14.0
3929	12	1	Feature 1	*Lepus californicus*	tarsal, L	2		2	11.5
3929	12	1	Feature 1	*Lepus californicus*	phalange, 2nd, hindlimb, F	1		1	9.0
3929	12	1	Feature 1	small/medium mammal	rib, midshaft	1		1	9.0
3929	12	1	Feature 1	small/medium mammal	scapula, blade fragment	1		1	10.0
3929	12	1	Feature 1	small/medium mammal	long bone splinter	24	8	16	10.5
3929	12	1	Feature 1	small/medium mammal	flat bone fragment	2	2		7.5
3929	14*	1	Feature 1	Lagomorpha	dentary, horiz. ramus	1		1	8.0
3929	14*	1	Feature 1	small/medium mammal	long bone splinter	5	3		6.8
3929	18	1	Feature 1	*Lepus californicus*	humerus, dist., L, F	1	1		11.0
3929	19*	1	Feature 1	*Lepus californicus*	incisor fragment	1			8.0
3929	19*	1	Feature 1	*Lepus californicus*	dentary, ascend. ramus, R	1			6.0
3929	19*	1	Feature 1	small/medium mammal	metapodial, midshaft	1			6.0
3929	19*	1	Feature 1	small/medium mammal	long bone splinter	14		3	5.1
3929	21	1	Feature 1	Lagomorpha	metapodial, dist., F	1		1	25.0
3929	21	1	Feature 1	small/medium mammal	long bone splinter	12	4	8	6.5

Table I-1 (cont'd)

Site (FB)	Coll. No.*	Test Unit	Provenience	Species	Element**	Number*** T	B	C	Mean Size (mm)
3929	21	1	Feature 1	small/medium mammal	flat bone fragment	1		1	10.0
6085	10	1	Feature 1	small/medium mammal	long bone splinter	1		1	6.0
6085	14	1	Feature 1	small/medium mammal	long bone splinter	3		2	7.0
6085	14	1	Feature 1	small/medium mammal	flat bone fragment	2	1		6.0
6085	18	1	Feature 1	*Sylvilagus* sp.	radius, midshaft	1	1		10.0
6085	22	1	Feature 1	Lagomorpha	premolar/molar fragment	2			8.0
6085	22	1	Feature 1	small/medium mammal	long bone splinter	6		4	5.5
6085	30*	1	Feature 1	*Lepus californicus*	innominate, ischium, R	1		1	12.0
6085	30*	1	Feature 1	Lagomorpha	incisor fragment	1			3.0
6085	30*	1	Feature 1	Lagomorpha	premolar/molar fragment	6	2	2	3.5
6085	30*	1	Feature 1	Lagomorpha	dentary, horiz. ramus	1	1		7.0
6085	30*	1	Feature 1	small/medium mammal	metapodial, midshaft	2		2	7.5
6085	30*	1	Feature 1	small/medium mammal	long bone splinter	130	37	54	4.1
6085	30*	1	Feature 1	small/medium mammal	flat bone fragment	2	2		3.5
6085	32*	1	Feature 1	mammal	tooth fragment	1			3.0
6085	32*	1	Feature 1	small/medium mammal	long bone splinter	10	6	4	2.9
6085	36	1	Feature 1	Lagomorpha	premolar/molar fragment	2	1	1	7.5
6085	36	1	Feature 1	Lagomorpha	metapodial, dist., F	1	1		7.0
6085	36	1	Feature 1	small/medium mammal	long bone splinter	19	2	13	6.0
6085	38	1	Feature 2	*Lepus californicus*	tibia, midshaft, R	1		1	31.0
6085	38	1	Feature 2	small/medium mammal	long bone splinter	6	1	3	14.7
6085	42*	1	Feature 3	Lagomorpha	premolar/molar fragment	8			3.5
6085	42*	1	Feature 3	small/medium mammal	metapodial, midshaft	2		1	7.5
6085	42*	1	Feature 3	small/medium mammal	long bone splinter	12	2	6	3.9
6086	16	1	nonfeature	*Bos taurus*	lower premolar 4, L, decid.	1			30.0
6086	16	1	nonfeature	*Bos taurus*	lower molar 1, L, unerupted	1			25.0
6086	18	-	Trench 1	*Bos taurus*	scapula, prox. head/neck,L,U	1			78.0
6086	18	-	Trench 1	*Bos taurus*	humerus, prox. epiphysis,R,U	1			105.0
6086	18	-	Trench 1	*Bos taurus*	femur, prox. diaphysis, R, U	1			112.0
6086	18	-	Trench 1	*Bos taurus*	phalange, 1st, F	1			61.0
6086	18	-	Trench 1	cf. *Bos taurus*	phalange, 2nd, U	1			23.0
7312	2	1	Feature 1	small/medium mammal	long bone splinter	3	1		10.0
7312	17*	5	Feature 5	*Sylvilagus* sp.	metacarpal, L, F	1			16.0
7312	17*	5	Feature 5	small/medium mammal	scapula, head, L?, F	1			6.0
7312	17*	5	Feature 5	small/medium mammal	long bone splinter	1	1		7.0
7312	58	13	nonfeature	Lacertilia	dentary, L	1			9.0
7312	58	13	nonfeature	Aves/mammal	long bone splinter	1			18.0
7312	58	13	nonfeature	small/medium mammal	long bone splinter	2			13.0
7312	58	13	nonfeature	medium mammal	long bone splinter	3			21.3
7312	59	13	Feature 12	*Sylvilagus* sp.	humerus, dist., L, F	1			8.0
7312	59	13	Feature 12	*Sylvilagus* sp.	tibia, prx., R, U	1			12.0
7312	59	13	Feature 12	Lagomorpha	dentary, ascend. ramus	1			19.0
7312	59	13	Feature 12	Rodentia	skull, zygomatic, R?	1			9.0
7312	59	13	Feature 12	small/medium mammal	vertebra, neural arch	1			6.0
7312	59	13	Feature 12	small/medium mammal	long bone splinter	1			12.0
7312	60	13	Feature 12	*Lepus californicus*	vertebra, caudal	1			9.0
7312	60	13	Feature 12	*Lepus californicus*	radius, midshaft	1			21.0
7312	60	13	Feature 12	medium mammal	vertebra, centrum	1			12.0
7312	60	13	Feature 12	medium mammal	vertebra, articular process	4			7.7
7312	60	13	Feature 12	medium mammal	rib, neck/prox. shaft	4			11.2
7312	60	13	Feature 12	medium mammal	long bone splinter	3			8.7
7312	61	13	Feature 12	*Lepus californicus*	metacarpal, prox., L, F	1			27.0
7312	61	13	Feature 12	small/medium mammal	long bone splinter	1			9.0
7312	62	13	Feature 12	*Lepus californicus*	radius, midshaft, L	1			28.0
10694	5*	1	Feature 1	small/medium mammal	long bone splinter	2		2	2.5
10916	25*	3	Feature 3	small/medium mammal	long bone splinter	1		1	9.0

Table I-1 (cont'd)

Site (FB)	Coll. No.*	Test Unit	Provenience	Species	Element**	Number*** T	B	C	Mean Size (mm)
13140	15	1	nonfeature	Aves	eggshell fragment	2			5.5
13140	15	1	nonfeature	Passeriformes	tibiotarsus, dist., L	1			27.0
13140	15	1	nonfeature	medium/large mammal	long bone splinter	1			13.0
13140	15	1	nonfeature	medium/large mammal	flat bone fragment	1			17.0
13140	15	1	nonfeature	medium/large mammal	cancellous bone	1			8.0
13140	19	1	nonfeature	Aves	eggshell fragment	1			8.0
13140	19	1	nonfeature	*Sylvilagus* sp.	innominate, acetabulum, L, F	1			40.0
13140	19	1	nonfeature	*Lepus californicus*	femur, dist., R, F	1			41.0
13140	19	1	nonfeature	small/medium mammal	metapodial, prox., F	1			11.0
13140	19	1	nonfeature	medium mammal	long bone splinter	2			31.0
13140	4	2	nonfeature	Aves	long bone, dist.	1			17.0
13140	4	2	nonfeature	*Zenaida macroura*	coracoid, prox., R	1			15.0
13140	4	2	nonfeature	*Zenaida macroura*	radius, dist., L	1			17.0
13140	4	2	nonfeature	*Anas* sp.	ulna, prox., L	1			19.0
13140	4	2	nonfeature	*Sylvilagus* sp.	skull, squamosal, R	1			10.0
13140	4	2	nonfeature	*Sylvilagus* sp.	vertebra, lumbar	2			14.0
13140	4	2	nonfeature	*Sylvilagus* sp.	sacrum	1			27.0
13140	4	2	nonfeature	*Lepus californicus*	dentary, I-P4, R	1			25.0
13140	4	2	nonfeature	*Lepus californicus*	humerus, dist., R, F	1			32.0
13140	4	2	nonfeature	Lagomorpha	premolar/molar fragment	1			11.0
13140	4	2	nonfeature	Lagomorpha	phalange, 1st, F	1			12.0
13140	4	2	nonfeature	Lagomorpha	phalange, 2nd, F	1			7.0
13140	4	2	nonfeature	cf. *Bos taurus*	humerus?, midshaft, L?	1			62.0
13140	4	2	nonfeature	cf. *Bos taurus*	thoracic vert., trans. proc.	1			51.0
13140	4	2	nonfeature	small/medium mammal	thoracic vert., neural arch	1			10.0
13140	4	2	nonfeature	small/medium mammal	vertebra, transverse proc.	2			10.5
13140	4	2	nonfeature	small/medium mammal	long bone splinter	1			14.0
13140	4	2	nonfeature	large mammal	long bone splinter	5			46.6
13140	4	2	nonfeature	large mammal	flat bone splinter	3			16.0
13140	10	2	nonfeature	*Sylvilagus* sp.	innominate, acetabulum, L, F	1			39.0
13140	10	2	nonfeature	*Sylvilagus* sp.	ulna, midshaft, R	1			15.0
13140	10	2	nonfeature	*Sylvilagus* sp.	tibia, midshaft, R	1			38.0
13140	10	2	nonfeature	*Lepus californicus*	radius, dist., L, F	1			34.0
13140	10	2	nonfeature	*Lepus californicus*	metatarsal, dist., F	1			12.0
13140	10	2	nonfeature	medium mammal	long bone splinter	1			9.0
13140	10	2	nonfeature	medium/large mammal	long bone splinter	1			20.0
13140	10	2	nonfeature	large mammal	long bone splinter	1			17.0
13140	33	4	Feature 2	large mammal	long bone splinter	1			47.0
13140	33	4	Feature 2	large mammal	flat bone fragment	2			28.0
13140	37	4	Feature 2	medium/large mammal	long bone splinter	1		1	17.0
13140	37	4	Feature 2	large mammal	femur?, prox. epiphysis, U	1			38.0
13140	37	4	Feature 2	large mammal	long bone splinter	2			21.0
13140	39	4	Feature 2	large mammal	flat bone fragment	1	1		15.0
13140	41	4	Feature 2	*Anas* sp.	tibiotarsus, dist., R	1			11.0
13140	43	4	Feature 2	large mammal	flat bone fragment	1			21.0
13140	47	4	Feature 2	*Gallus gallus*	fused lower thoracic vert.	1			50.0
13140	47	4	Feature 2	*Gallus gallus*	fibula, R	1			66.0
13140	47	4	Feature 2	Aves	tibiotarsus, prox., L	1			27.0
13140	47	4	Feature 2	medium/large mammal	flat bone fragment	1		1	16.0
13140	47	4	Feature 2	large mammal	long bone splinter	1			31.0
13140	62	-	Trench 1	*Canis* cf. *latrans*	skull, occipital/L squamosal	1			81.0
13140	62	-	Trench 1	*Canis* cf. *latrans*	skull, R squamosal, periotic	1			50.0
13140	62	-	Trench 1	*Canis* cf. *latrans*	skull, maxilla/palatine, R&L	1			106.0
13140	62	-	Trench 1	*Canis* cf. *latrans*	mandible, L	1			120.0

Table I-1 (cont'd)

Site (FB)	Coll. No.*	Test Unit	Provenience	Species	Element**	Number*** T	B	C	Mean Size (mm)
13147	10	4	Feature 4	medium mammal	rib, prox. head/neck, L	1		1	7.0
13147	19	3	Feature 5	small/medium mammal	long bone splinter	1	1		8.0
13147	27	3	Feature 5	*Lepus californicus*	radius, midshaft	1	1		15.0
13147	27	3	Feature 5	Lagomorpha	metapodial, dist., F	1	1		9.0
13147	27	3	Feature 5	small/medium mammal	long bone splinter	3	1	2	13.7
13147	39	3	Feature 5	*Lepus californicus*	radius, prox., L, F	1		1	14.0
13147	41*	3	Feature 5	small/medium mammal	long bone splinter	5	2		9.4
13147	48*	9	Feature 6	small/medium mammal	long bone splinter	1		1	9.0
13147	77	-	Trench 6	*Terrapene ornata*	costal, inferior margin	1			65.0
13206	5	1	Feature 1	small/medium mammal	long bone splinter	1		1	5.0

T = total
* bone from flotation sample
** F = fused epiphysis or bone; U = unfused epiphysis or bone; L = left; R = right
*** B = burned; C = calcined

Differential burning of body parts is not strongly suggested by the small number of lagomorph remains (n=20). All of the foot bones (n=7) are burned (or calcined), and 69 percent (n=9) of other body parts are burned. This could be taken as evidence for the roasting of a whole animal (O'Laughlin 1994; Whalen 1994). However, the high overall percentage of burned bone would suggest indiscriminate burning of bone. This could have occurred when the possible structure burned.

There are five elements of jackrabbit with fused epiphyses, two of which are long bones. This would indicate the taking of an adult animal. Adult lagomorphs provide no information on season of occupation because adult animals can be found throughout the year.

FB 6085

Faunal remains at FB 6085 were found within Feature 1, a probable brush shelter, and Features 2 and 3 that are a hearth and pit in the floor of Feature 1. These features are radiocarbon dated to the transition between the Archaic period and the Mesilla phase.

A total of 220 bones was recovered from the structure. Many of these bones are quite small and were found in the processed flotation samples. The average size of the bone is 5.0 mm, and 69 percent (n=152) of the bone is burned or calcined. The small size of the bone could reflect considerable processing of the bone or trampling of bone left in the structure. In any case, the bone appears to have been burned after fragmentation and possibly with the burning of the structure.

Identifiable remains include one cottontail bone, two jackrabbit bones, and 21 elements of lagomorphs. There are 195 bones of small to medium-sized mammals and one piece of mammalian tooth enamel. The lagomorph bones represent a minimum of one cottontail and one jackrabbit, and the unidentifiable mammal bones are most probably from these animals. No intact ends of diaphyses or epiphyses were found, and it is not possible to age these animals and infer season of occupation.

Nineteen of the 21 lagomorph bones are fragments of teeth. Fragments of teeth can often be identified while identification of small fragments of other elements is more difficult. Given the biased nature of the identifiable lagomorph remains, a consideration of possible differential burning of body parts is not warranted. Aside from broken, burned, and calcined bone, no other modification of the bone was noted.

FB 6086

Features and artifacts indicate a prehistoric occupation at FB 6086. However, faunal remains found at this site are only of cow and represent modern site intrusions. Seven elements were recovered, and six of these appear to be from a calf of less than six months in age. These include a deciduous fourth premolar, an unerupted first molar, and four other elements with unfused epiphyses. The seventh bone is a first phalange with fused epiphyses indicating an individual of one and a half years in age or older. No butchering marks or carnivore marks were noted, and none of the bone is burned. If only the remains of the calf had been found, it could be suggested that the bones represent a calf that died of natural causes while on the open range. However, the finding of elements of two individuals may suggest some ranching activity in the immediate vicinity.

FB 7312

FB 7312 is a multicomponent site with occupation during the Archaic and Formative periods. Faunal remains were associated with three probable thermal features. Feature 1 is a fire-cracked rock feature, and Features 5 and 12 are small stains.

Faunal remains from this site total 36 and include three bones of cottontail, four bones of jackrabbit, one bone of a lagomorph, one bone of a small rodent, a mandible of a lizard, one bone fragment of a small bird or mammal (probably a mammal), and 25 bones from cottontail to jackrabbit-sized mammals. The lizard mandible and three mammal long bone splinters from the surface sands of a nonfeature area of TU #13 are bleached white and are believed to be modern site intrusions. Three other bones from this same area may also be of recent origin, although they are yellow in color and appear old. The rodent element comes from Feature 12 and is the only example of a nonlagomorph in a good archeological context. Although unburned, this rodent element may represent the use of small mammals for food. The occasional taking of small game that included rodents and birds has previously been recorded for the Hueco Bolson (O'Laughlin 1994; Whalen 1994). At the feature level, the minimum number of individuals would be one cottontail and one jackrabbit for Feature 12, one cottontail for Feature 5, and possibly one rabbit or hare for Feature 1. This latter feature only contained three unidentifiable mammal bones.

An unfused proximal tibia of a cottontail from Feature 12 indicates that this animal is a juvenile. The jackrabbit from Feature 12 and the cottontail from Feature 5 could not be aged because of the absence of the ends of long bones and epiphyses. In that juveniles can make up a substantial portion of a cottontail or jackrabbit population between late spring and early winter, it could be argued that Feature 12 was in use during these seasons. However, arguments of season of occupation based upon the remains of a single animal are tenuous.

The faunal remains from FB 7312 are very fragmented and have an average size of 12.5 mm. No butchering marks were observed, and one piece of jackrabbit radius from Feature 12 was rodent gnawed. One bone in Feature 1 and another in Feature 5 were burned, but the bulk (94 percent) (n=34) of the assemblage is unburned. While the breakage and size of the bones compares well with other prehistoric assemblages from this project, the small number of burned bones is atypical of assemblages of this project or others in the Hueco Bolson (O'Laughlin 1994). Most of the bone is yellowed with age and shows root etching, and aside from a few sun-bleached bones, there is nothing to suggest that the remains are not associated with the prehistoric occupations of this site. Although most of the bone is directly associated with presumed thermal features, the predominance of unburned bones would suggest that animals may not have been roasted whole at this site and that meal refuse was not discarded in active hearths.

FB 10694 and FB 10916

Feature 1 at FB 10694 is a small stain with associated Formative period ceramics. FB 10916 is a multicomponent prehistoric site with numerous features. Feature 3 at FB 10916 is a stain with burned caliche. Two calcined bones were found in the feature at FB 10694, and one calcined bone was recovered from the Feature 3 at FB 10916. All of these bones were retrieved from flotation samples and are long bone splinters from small to medium-sized mammals. No butchering marks or other modifications were noted. The bones from FB 10694 average 2.5 mm in size, and the one from Feature 3 at FB 10916 is 9.0 mm long. These remains show little more than the occasional taking of an animal, probably cottontail or jackrabbit, and the disposal of some bone in a hearth.

FB 13140

Located near the intersection of several roads, the area of FB 13140 was apparently used for dumping trash as early as the 1920s. In the southern portion of the site, TU #1 and TU #2 were placed within a scatter of historic artifacts and produced a total of 47 bones. Four additional elements were recovered from a backhoe trench between TU #1 and TU #2. Feature 2, a trash dump in the north-central part of the site, was investigated with TU #4 and yielded 15 pieces of bone.

The faunal remains from FB 13140 differ from those from prehistoric sites in a number of ways. This historic assemblage includes domestic animals and has a variety of species that would not be expected for prehistoric assemblages of similar size. This latter observation possibly reflects the use of more effective hunting weapons. The historic bone is also larger and exhibits less burning than prehistoric bone. This corresponds to the introduction of larger animals, less processing of the bone, and the intentional disposal of bone in trash areas. Finally, butchering marks were noted on a number of large mammal bones and show the need to dismember and butcher large animals into more manageable packages. Butchering marks were not seen on bones of lagomorphs which dominate prehistoric assemblages.

The composition of the faunal assemblages from TU #1 and TU #2 is similar and suggests that materials from these two areas may be related. Recovered items include three bird eggshell fragments the size of chicken, one unidentifiable bird bone, one element of a large perching bird, one element of a teal-sized duck, two bones of mourning dove, eight bones of cottontail, five bones of jackrabbit, three bones of lagomorphs, two elements of cow, eight bones of small to medium-sized mammals, four medium/large mammal bones, and nine large mammal bones. The presence of game birds and lagomorphs in the faunal material would indicate some local hunting to supplement the diet. Also, the occurrence of dove and duck in this material would suggest hunting at water tanks, cattle tanks, or playas holding water. Fall, or perhaps spring, hunting would be indicated by the duck remains. Teals, mallards, and other ducks are not resident year-round and migrate through the area in the spring and again in the fall. All lagomorph elements with ends of diaphyses have fused epiphyses that show the taking of adult animals and that do not assist interpretation of season of deposition of the faunal remains. Counts for the minimum number of individuals of animals smaller than a cow include one unknown perching bird, one duck, one dove, two cottontail, and one jackrabbit.

The average size of bone from TU #1 and TU #2 is 23.0 mm, about twice the size of bone from prehistoric sites. None of the bone is burned or calcined, and butchering marks were noted only on possible cow bones and large mammal bones the size of cow. Unidentifiable medium/large and large mammal bones are a conspicuous part of the faunal material, and bones of similar size are rare on prehistoric sites. This would suggest that most or all of these bones are probably cow bones. Only two bones could be tentatively identified as cow. One is a sawed cross section of a possible humerus that is 20 mm thick, and the other is a lateral section of a vertebra with a longitudinal saw cut. One large mammal bone fragment has a mark from a cleaver or axe, and a second is a portion of a sawed cross section of long bone that is 3 mm thick.

The few possible cow bones and large mammal bones the size of cow do not appear to represent the butchering of an entire animal, and it may be that prepared cuts were purchased in nearby towns.

Faunal remains from the backhoe trench between TU #1 and TU #2 and near a stain are all from the same animal skull. Following Gilbert (1980:66), measurements of the cranium and attributes of the cranium and left mandible would indicate that the skull is that of a coyote and not a medium-sized dog. The presence of this coyote skull may be indicative of an activity relating to predator control.

Feature 2, a recognizable historic trash dump, produced only 15 bones. This assemblage is similar to that from TU #1 and TU #2, with some of the differences attributable to the smaller assemblage size. Included in this assemblage are one unidentifiable bird bone, one bone of a teal-sized duck, two bones of chicken, two medium/large mammal bones, and nine large mammal bones. Again, the duck bone would indicate some local hunting. The chicken bones could suggest the raising of chickens at a ranch or cow camp where these remains originated. The unidentifiable mammal bones are most probably from cow. Only three of the bones are burned or calcined, and evidence of butchering was noted on one large mammal bone. This consists of a long bone splinter with an oblique saw cut at one end.

FB 13147

Site FB 13147 is a multicomponent site with Archaic and Formative period occupations. Faunal remains were recovered from Features 4 and 5 that have associated Formative period ceramics, Feature 6 that is of unknown age, and the upper sands of TU #9. Feature 4 is a burned caliche feature, Feature 5 is a stain that is suspected to be a structure, and Feature 6 is a small stain.

A portion of the carapace of a western box turtle was recovered from TU #9. This specimen is unburned, and the condition of the bone suggests that it is a recent site intrusion.

Few bones were found in the three features. Feature 5 has two elements of an adult jackrabbit, one lagomorph element, and nine small to medium-sized mammal bones that are the size of cottontail or jackrabbit. Feature 4 has a single bone of a medium-sized mammal, and one bone of a small/medium mammal was recovered from Feature 6. The remains from each of these features indicate nothing more than the taking of a single animal. The bone is highly fragmented and averages 10.7 mm. 73.3 percent (n=11) of the bone was burned or calcined after breakage.

FB 13206

Feature 1 at FB 13206 is a possible brush structure dating to the Mesilla phase. Within this feature, a single long bone splinter of a small to medium-sized mammal was found. This bone is also calcined.

DISCUSSION

Modern site intrusions were noted for three sites and include the remains of a desert pocket gopher at FBH 98, a lizard mandible and three medium long bone splinters at FB 7312, and a portion of a western box turtle carapace at FB 13147. Additionally, the bones of a calf and another cow were recovered from FB 6086, a site otherwise evidencing a prehistoric occupation. These animals may have died from natural causes or may represent historic activity in the general area.

Historic trash deposited on FB 13140 dates as early as the 1920s and includes faunal remains that differ from most prehistoric assemblages in having larger bones, less burned or calcined bone, a greater variety of

species, and remains of domestic animals. Some local hunting of game is indicated by the presence of bones of mourning dove, duck, other unidentifiable birds, cottontail, and jackrabbit. The raising of chickens may be suggested by the occurrence of eggshells and bone in the assemblage. A significant number of large mammal and possible cow bones were recovered, and butchering marks were noted on some of these remains. It has been suggested that the relatively few large mammal and possible cow bones and the sawing of some of this bone could reflect the use of prepared cuts purchased in local markets. Interpretation of the faunal assemblage from this site is hampered by the uncertainty of the number of episodes of dumping and the source of this material. Given the variety of represented species and the presence of chicken remains, it is possible that this material came from a nearby ranch rather than a cow camp.

Most of the bone (84 percent, n=411) from the Fort Bliss project was recovered from prehistoric sites with late Archaic and/or Formative period occupation. Assemblages from these sites may be described as impoverished (O'Laughlin 1994; Whalen 1994). Relatively few bones were retrieved from these sites, assemblages are dominated by remains of lagomorphs, and no more than two cottontail or jackrabbit are represented in any given context. Animals larger than lagomorphs were not identified, and smaller game is represented by a single rodent element. These findings compare well with other assemblages from the Hueco Bolson (O'Laughlin 1994; Whalen 1994). Additionally, faunal remains were not found in most project sites. Taken together, the prehistoric faunal assemblages suggest that hunting may not have been an important activity, that hunting was possibly opportunistic and by individuals, and that game was perhaps scarce and not easily hunted in the low basin environment.

The impoverished nature of the prehistoric assemblages and the taking of few lagomorphs is further illustrated by the modification of bone. Bone sizes average less than 13 mm for these assemblages, and 69 percent or more of the bone is burned or calcined for all but one of these assemblages. These patterns also follow those of other prehistoric assemblages of the region (O'Laughlin 1994) and indicate the processing of animals for maximum utility. Processing of lagomorphs may have included the roasting of whole animals, as has been inferred for some regional assemblages (O'Laughlin 1994; Whalen 1994). Remains from FB 6085 do not indicate support of this inference, those from FB 3929 questionably support the roasting of whole animals, and those from FBH 70 are indiscriminately burned and do not provide evidence either way. Other assemblages are too small for this analysis. Whether lagomorphs were first roasted whole or not, the highly fragmented and small size of bones would appear to reflect the crushing of meat and bone for meat-bone paste or soup (O'Laughlin 1994) and/or the crushing and boiling of bone for fats and oils (Whalen 1994). Either of these processes would extend the nutritional utility of small cottontails or jackrabbits.

Prehistoric faunal remains are principally associated with features. Seventy-six percent (n=312) of the bone comes from possible structures, 10 percent (n=41) from thermal features, and 14 percent (n=58) from unknown or nonfeature contexts. These percentages follow those for similar sites and features in the Hueco Bolson where the amount of bone was found to vary with feature type and presumed duration or intensity of occupation (O'Laughlin 1994). That is, sites with structures are thought to have been occupied longer than those with only thermal features and would be expected to have larger faunal assemblages. Possible structures from this project have an average of 78 bones, while thermal features have an average of 8.2 bones per feature. The higher bone counts for structures are as expected.

The predominance of bone found in structures and thermal features and not in defined trash areas or middens would indicate little concern for trash disposal. This would suggest that the occupations of these sites were of low intensity and short duration. The rather small faunal assemblages would also support this conclusion. Bone residue from meals or the rendering of fats and oils was simply tossed in nearby thermal features or left in the ephemeral structures, most of which may have been burned intentionally with abandonment. With the exception of the assemblage from FB 7312, 69 percent or more of the bone was found to be burned or calcined. Again, these findings are duplicated at similar sites in the Hueco Bolson (O'Laughlin 1994).

Long bones of lagomorphs were monitored for epiphyseal closure that might provide information on season of occupation for prehistoric sites. Unfortunately, the minimum number of individual cottontail and jackrabbit for this project is nine, and only three of these animals could be aged. Two adult jackrabbits and one immature cottontail were noted. This small number of aged lagomorphs does not permit any inference on season of occupation. No other faunal material was recovered that helps address the issue of seasonal exploitation of the low basin environment.

SUMMARY

A total of 489 animal bones was analyzed for this project. The results of this analysis provide many points of comparison with previous studies of faunal remains from the Hueco Bolson.

Faunal assemblages from prehistoric occupations are generally small and reflect ephemeral occupation and possibly opportunistic hunting. Little attention was paid to the disposal of bone, as the majority of bone was apparently tossed into thermal features or left in structures. Most of the bone was recovered from structures, with thermal features having much lower counts of bone. These features reflect areas of meal preparation and consumption, and the higher counts of bone from structures is thought to correspond to their longer occupation as compared to components with only thermal features.

With the exception of a single rodent element, identifiable faunal remains from prehistoric sites include only cottontail and jackrabbit. Small to medium-sized mammal bones make up a substantial portion of the prehistoric assemblages and probably are cottontail and jackrabbit bones. No more than two lagomorphs were recognized for any given context. Bones are highly fragmented and of small size. The intensive processing of lagomorphs appears to have been to extend the nutritional utility of the small number of animals taken and their relatively small size. It has been suggested that much of the bone may have been crushed for the preparation of meat-bone paste or soup or to render fats and oils. Aside from one assemblage, the bone is mostly burned or calcined from having been tossed into thermal features or left in structures that were fired following abandonment.

FB 13140 is a historic site with several loci of trash dating to as early as the 1920s. Faunal remains from this site include mourning dove, duck, cottontail, and jackrabbit which indicate some local hunting of game. Eggshells and chicken bones were recovered and could reflect the raising of chickens. Large mammal and probable cow bones were also found, and a number of them had been sawed or cut. It has been suggested that these large mammal remains may be more indicative of prepared cuts purchased in a local market than they are of the butchering of a range animal. The variety of animals represented in the faunal assemblage from this site additionally suggests that it may have originated at a nearby ranch and not a cow camp.

The only other faunal remains from project sites are a few elements of pocket gopher, lizard, and box turtle that appear to be modern site intrusions and few cow bones at FB 6086. These cow bones may be from a calf and cow that died of natural causes on the range or may be from some historic activity in the general site area.

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APPENDIX J

ANALYSIS OF FLORAL REMAINS

by
Thomas C. O'Laughlin
Jornada Anthropological Research Association

The analyzed floral remains from the test excavations come from prehistoric and historic sites located on the desert floor of the Hueco Bolson in southern Otero County, New Mexico, and northern El Paso County, Texas. The samples were retrieved principally from features that included possible structures, stains, trash areas, and thermal features that frequently contained burned caliche or fire-cracked rock. Historic sites are noted by scattered trash of the early twentieth century, and historic records indicate late nineteenth and twentieth century use of the area for cattle ranching. Prehistoric sites generally have few artifacts and features, suggesting short-lived and seasonal occupations. Radiocarbon dates and diagnostic artifacts suggest that the prehistoric sites were occupied during the Archaic and Formative periods. The analysis of floral remains is primarily intended to provide data on resource utilization. Information from this study should also assist interpretations of feature function and length of occupation.

It is only within the last two decades that floral remains have been studied in detail and consistently reported for prehistoric sites of the Jornada Mogollon region (Whalen 1994). Even so, there is a considerable amount of information available for the Hueco Bolson. Plant remains have been analyzed from a few caves and many open sites in the basin and reported by Dean (1994), Ford (1977), Gasser (1983), Holloway (1994a, 1994b), Minnis and Goldborer (1991), O'Laughlin (1977, 1979, 1985, 1988, 1994a, 1994b), O'Laughlin and Martin (1989), Wetterstrom (1978, 1980), and Whalen (1994). The sites are mostly camps with generally low artifact densities and few features, though sites with small huts or pithouses and more substantial pueblos are also represented. Floral remains are not often found on camp sites. They are somewhat better represented at sites with huts or pithouses, and they, especially cultigens, are most common on pueblo sites. The presence and quantity of floral remains varies with intensity and duration of occupation. Additionally, factors of preservation and trash disposal behavior appear to affect the survival of biological materials.

Recovered native plant remains include the seeds of amaranth, goosefoot, purslane, plain's sunflower and dropseed grass, the pods and seeds of mesquite, and the seeds of the fruits of banana yucca and various cacti. These resources are seasonally available and are generally viewed as referencing the use of a wide range of wild resources and occupation during the warmer and biotically productive portion of the year. Corn, beans, and squash have been found at pueblo period sites with structures. Corn has rarely been noted at camp sites and occurs in small amounts at pithouse period sites with structures. Again, plant remains occur infrequently at camp sites and vary in their representation at sites with structures. Only pueblo period sites with structures and evidence of some duration of occupation are known for having much in the way of plant remains.

Charcoal is variably represented at open sites where features are often exposed and eroded. The poor preservation of charcoal is most apparent at campsites, while sites with structures exhibit better preservation of charcoal that accompanies deeper and more varied features and patterned trash disposal. Mesquite is the most common wood used for fuel and construction of small huts and pithouses. Four-wing saltbush, acacia, and creosotebush were occasionally used for fuel on the basin floor and surrounding alluvial fans, and oak is also noted as a fuel in features on alluvial fans and near its present distribution. Grass has been found as a material used in roofing some structures, and cottonwood, juniper, yucca stalks, and reeds are reported as construction materials for pueblos. Cottonwood, juniper, and reeds are not found in the immediate project area but do occur in nearby mountains or along the Rio Grande.

Prehistoric sites within the project area generally have few artifacts or features and appear to reflect an ephemeral and low-intensity use of the area. A few sites, however, have possible remains of huts or pithouses and may have been loci of somewhat longer occupation. In general, project sites also seem to have been impacted by soil erosion and redeposition. Based upon these site characteristics and previous studies of floral remains, there were a number of expectations for the plant remains data from prehistoric sites of this project. First, most sites would produce no floral remains, and little carbonized plant material would be expected for those sites with plant remains. Second, it would be anticipated that biological materials would generally be greater in number and more varied at sites with structures. Third, few carbonized plant parts of potential subsistence items would be recovered. The interpretation of these remains would also be difficult because of their small number and natural occurrence in soils of the site environments. Fourth,

charcoal would reflect the principal use of mesquite as a fuel and for construction. Finally, it was anticipated that data on season of occupation will be lacking or ambiguous.

Expectations for the plant remains from historic sites are difficult to develop. There have been few archeological studies of historic sites in the region, and these have dealt mostly with settlements and forts along the Rio Grande. Historic sites within the project area appear to be limited activity sites and trash areas associated with cattle ranching. These sites are located either near the former Newman ranch or what is known as McLeary's cow camp.

Cans and bottles are a conspicuous part of the historic assemblages at these sites and evidence the provisioning of sites through a market economy. Typically, canned and bottled foodstuffs include only soft parts that do not preserve well in the archeological record. Unprocessed items such as beans and coffee could be anticipated, especially if trash disposal involved incineration. Peach pits and the seeds of other fruit might also be anticipated. Even so, it was expected that plant materials from these sites would reflect only a small portion of the plant diet.

It is hard to anticipate the nature of historic floral assemblages with the limited information presently available for the historic sites. That is, it is not certain if structures are present on any of these sites and whether the scattered trash is the result of onsite activities or disposal from some other location. It is also not certain as to whether these historic remains represent limited activities associated with a cow camp or a larger ranch with more varied activities. These factors alone would change expectations with respect to biological materials. The analysis of floral remains from historic sites is, therefore, oriented toward providing descriptive and base-line data.

METHODS

A total of 57 flotation samples was analyzed. Processing of the soil from these samples was undertaken by the staff of Geo-Marine, Inc., using a water flotation technique comparable to that described by Smith (1985). The volume of a soil sample was measured, and the soil was placed in a bucket. Water was then added to the soil, and the mixture stirred. The soil and water mixture was poured into a soil flotation machine where fine soil particles settled to the bottom and the heavier fraction was caught in a washtub with window screen. Water entering the bottom of the machine also agitated the soil sample and brought carbonized material and other light weight materials to the surface. Water carried the suspended material through a spout and then into a basket where it was captured with a flotation cloth with a mesh of less than one millimeter in size. This light fraction was dried, labeled, and submitted for analysis. The heavy fraction caught in the window screen of the washtub was also retrieved, dried, labeled, and submitted for analysis. Most samples did not have many large pieces of charcoal, as the larger pieces had been removed for radiocarbon dating. The amount of soil processed for each sample varied between .3 and 11.0 liters, with the majority of samples having 3.0 liters or more of soil.

The flotation samples represented 35 features at 20 sites, and 16 of the features had multiple samples from different proveniences. Charcoal large enough to snap for a fresh transverse section for identification was removed from both the light and heavy fractions and viewed under 10 to 30 power with a binocular microscope. The remaining material was also viewed under a microscope at 10 power. Burned and unburned seeds and plant parts other than unburned roots and charcoal were separated for identification, and notes were taken of contaminants such as roots, rodent droppings, and insect parts. All of the heavy fractions were scanned with the microscope, as were all except three of the fine fraction samples which had large volumes. These three samples were mixed and randomly sampled for viewing. The identification of materials from the scanning of the samples was performed at 10 to 40 power.

In addition to the flotation samples, 11 separate charcoal samples were submitted for analysis. The charcoal in these samples was also snapped to reveal a fresh transverse section for identification at 10 to 30 power.

Charcoal and seeds were identified with reference to collections of the writer and published sources. In cases where identification was uncertain but reasonable on morphological grounds, a "cf." was used to indicate the taxon in question.

RESULTS

Sample numbers, provenience information, soil sample sizes, analyzed portions, contaminants, and relative quantities of charcoal for the flotation samples are listed in Table J-1. All of the 57 samples show contamination with roots, and many of the samples have rodent droppings and insect parts. Moderate to abundant quantities of charcoal are present in only 11 samples (19 percent), and 45 samples (80 percent) have little or very little charcoal. Charcoal is not present in one sample which also contains numerous small twigs and pieces of decomposed wood. The evident bioturbation of soils by plants, rodents, and insects and the general poor preservation of charcoal is an apparent reflection of the occurrence of most features on or near the surface and the processes of soil erosion and redeposition in the project area.

Table J-2 provides counts for identifiable seeds and other plant parts for the 57 flotation samples. There is a total count of 1,642 items (predominantly seeds), and 28 different taxa are recognized. Of these, 24 taxa are represented by 1,541 unburned seeds and other plant parts which were found in all but two of the samples. Uncharred seeds (and other plant parts) are considered modern contaminants. Their occurrence in the soils of archeological features would not be unexpected given the above noted bioturbations and the predominantly exposed or shallowly buried features. These seeds also reflect the modern plant environment of the project area (O'Laughlin and Crawford 1977). Most of the unburned seeds are from herbaceous species that are prolific producers of seeds. These include such plants as amaranth, goosefoot, spurge, and purslane. Perennial shrubs and succulents of the project area produce fewer seeds and are represented by a small number of seeds or none at all. Mesquite, creosotebush, four-wing saltbush, soaptree yucca, banana yucca, and a variety of cacti are among these species. Grasses are variably represented in the project area but are absent or occur with sparse cover in most of the tested sites. Few uncharred grass seeds were identified. The common presence of unburned seeds in archeological features and the occurrence of many of the same species reported here have been noted in the analysis of flotation samples for other projects in the Hueco Bolson (Dean 1994; Holloway 1994a, 1994b; O'Laughlin 1985, 1988, 1994b; Wetterstrom 1978, 1980).

A total of 101 carbonized seeds and corn cob cupules was recovered from the flotation samples. In addition to corn, eight other taxa were recognized. These charred remains were found in 15 samples or 26 percent of the 57 samples. The percentage of samples with burned seeds and corn cobs is relatively high when compared to samples from similar kinds of sites in the Hueco Bolson (Dean 1994; Holloway 1994a, 1994b; O'Laughlin 1988, 1994b; Wetterstrom 1978, 1980). This would appear to be a product of the processing of large volumes of soil and concomitant increased chances of recovering burned seeds. Even so, nine of the samples have only one burned seed.

There are eight unidentifiable fragments of burned seeds, and one unidentifiable seed fragment is all that was found in seven samples (nos. 6, 43, 45, 50, 51, 53, and 57). Although the fragments appear to be from small seeds similar to amaranth or goosefoot, the lack of identification and the finding of so few seeds in some samples does not assist the study of resource utilization. Additionally, there is some question as to how the seeds come to be burned. The seeds may have been burned as a result of food processing or maintenance/discard behavior. The seeds may also have been burned incidentally to any subsistence activity. That is, seeds may have been included with other plant material used for tender for starting fires, may have been incorporated with other material in the construction of a shelter or house that later burned, or may have been present in soil lining a thermal feature or making up part of a structure.

Table J-1
Provenience, Soil Volume, Portion Viewed and Contaminants of Flotation Samples

Sample Number	Site (FB)	Test Unit*	Provenience	Volume (liters)	Percent Viewed	Contaminants** Rt	Rd	In	Ch***
1	H98	2	Feature 2, level 2	1.00	100	A	VF	VF	VL
2	H98	2	Feature 1, level 2	3.50	100	A	F	F	VL
3	H182	2	Feature 2, Quad 3	3.00	100	A	M	VF	VL
4	H182	2	Feature 2, Quad 2	9.00	30	A	A	F	VL
5	3996	BT1	charcoal stain	1.00	100	A	-	-	VL
6	3929	1	Feature 1, level 1	5.00	100	M	F	-	L
7	3929	1	Feature 1, level 3	3.00	100	A	M	M	L
8	3929	1	Feature 1, level 3	10.00	30	A	M	-	L
9	3994	4	Feature 4, level ½	3.50	40	M	M	F	L
10	6085	1	Feature 1	10.00	100	M	F	VF	L
11	6085	1	Feature 1	2.00	100	M	-	VF	VL
12	6085	1	Feature 3, Quad 1	3.50	100	M	VF	-	M
13	6089	2	Feature 2	0.55	100	F	-	-	VL
14	6089	1	Feature 1, level 2	4.50	100	M	F	F	VL
15	6940	2	Feature 3	3.50	100	M	-	-	VL
16	6940	1	Feature 1	2.50	100	M	-	M	VL
17	6940	5	Feature 4	9.00	100	M	-	-	L
18	6940	2	Feature 2, level 3	11.00	100	M	-	-	VL
19	6940	2	Feature 2, level 3	10.00	100	F	-	-	VL
20	6940	1	Feature 1	4.00	100	M	-	-	VL
21	7312	BT2	west wall feature	0.50	100	F	-	VF	VL
22	7312	1	Feature 1	3.00	100	M	M	-	VL
23	7312	5	Feature 5, level ½	6.50	100	F	-	VF	M
24	7312	5	Feature 5, level 2	6.50	100	F	-	-	A
25	7312	12	Feature 11	3.00	100	F	VF	-	VL
26	7312	5	Feature 5, level 3	2.50	100	F	-	-	M
27	7820	1	Feature 1, level 1	1.50	100	F	-	F	VL
28	7820	1	Feature 1	3.50	100	A	-	F	VL
29	10694	1	Feature 1, level 2	2.00	100	F	VF	VF	M
30	10694	1	Feature 1, level 2	6.00	100	M	VF	VF	L
31	10694	1	outside Feature 1	0.55	100	F	VF	-	VL
32	10694	2	Feature 2	0.20	100	VF	VF	-	VL
33	10916	3	Feature 3, level 4	5.00	100	A	M	M	VL
34	10916	3	Feature 3, level 5	7.50	100	A	VF	VF	L
35	11617	1	Feature 1, level 2	3.00	100	M	VF	M	L
36	13139	1	Feature 1	2.00	100	A	F	M	VL
37	13139	1	Feature 1	3.50	100	A	VF	F	VL
38	13139	1	Feature 1	6.50	100	A	F	F	VL
39	13140	BT1	trench floor feature	1.50	100	VF	-	-	A
40	13140	5	Feature 3	4.00	100	-	M	VF	-
41	13140	5	Feature 3	2.00	100	A	-	-	VL
42	13140	3	Feature 1	1.00	100	M	F	-	VL
43	13147	5	Feature 7	9.00	100	A	F	F	VL
44	13147	3	Feature 5	2.00	100	M	F	F	L
45	13147	5	Feature 7, level 2	2.50	100	A	M	VF	L

Table J-1 (cont'd)

Sample Number	Site (FB)	Test Unit*	Provenience	Volume (liters)	Percent Viewed	Contaminants** Rt	Rd	In	Ch***
46	13147	9	Feature 6, stain	10.00	100	A	VF	VF	L
47	13147	9	Feature 6, zone 1	6.00	100	A	VF	-	VL
48	13147	BT6	east wall feature	0.30	100	F	VF	VF	L
49	13206	1	Feature 1, Quad 2	3.00	100	F	-	-	A
50	13206	1	Feature 1, Quad 2	8.00	100	M	VF	F	M
51	13920	1	Feature 1	11.00	100	A	VF	VF	M
52	13920	1	Feature 1	4.00	100	A	F	VF	L
53	13920	1	Feature 1	10.00	100	A	M	F	L
54	13920	1	Feature 1	6.00	100	A	F	M	L
55	13921	1	Feature 1	3.00	100	V	VF	-	A
56	13921	1	Feature 1	2.50	100	F	VF	-	A
57	14502	2	Feature 1, level 3	10.00	100	A	VF	M	VL

* BT = backhoe trench

** Rt = roots; Rd = rodent droppings; In = insect parts; VF = very few; F = few; M = moderate; A = abundant VL = very little; L = little

*** Ch = charcoal

Table J-2
Seeds and Other Plant Parts from Flotation Samples

Taxon	Sample Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Allionia incarnata trailing four o'clock	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Amaranthus sp. amaranthus	-	-	1	2	-	1	-	-	1	-	-	-	-	-
Chenopodium sp. goosefoot	-	2	-	1	-	-	-	-	-	-	-	-	-	-
COMPOSITAE (seed/floret) sunflower family	-	2	1	-	-	-	1	-	9	-	-	1	-	1
cf. *Croton* sp. croton	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CRUCIFERAE mustard family	-	-	-	-	-	-	1	3	-	-	-	-	-	-
Descurainia pinnata tansy mustard	-	-	-	1	-	2	-	1	-	-	-	-	-	-
cf. *Echinocereus* sp. pitaya cactus	-	(2)*	-	-	-	-	-	-	-	-	-	-	-	-
Eragrostis sp. lovegrass	-	(9)	-	-	-	-	-	-	-	-	-	-	-	-
Euphorbia cf. *serpyllifolia* spurge	-	-	43	18	1	-	-	3	1	1	-	-	-	1
GRAMINEAE grass seed/floret	-	(2)	-	-	-	-	-	-	-	-	-	-	-	-

Table J-2 (cont'd)

Taxon	Sample Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Muhlenbergia cf. *porteri* bush muhly grass	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Opuntia sp. cylindro-opuntia type	-	(2)	-	-	-	-	-	-	-	-	-	-	-	-
Phaseolus sp. domesticated bean	-	(12)	-	-	-	-	-	-	-	-	-	-	-	-
Portulaca sp. purslane	1	10	456	126	2	5	3	26	31	96	2	2	2	43
Prosopis glandulosa mesquite seed/leaf	-	-	11	26	-	-	-	-	-	-	-	-	-	-
Sporobolus sp. dropseed grass	-	(2)	1	-	-	-	(21)	(3)	-	(1)	-	-	-	-
Verbesina enceliodes cowpen daisy	-	-	-	-	-	-	-	2	-	-	-	-	-	-
unidentifiable seed frag.	-	2	-	-	1	(1)	(1)	-	-	-	-	-	-	-

Taxon	Sample Number 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Allionia incarnata trailing four o'clock	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
Amaranthus sp. amaranthus	-	1	2	-	-	2	2	3	-	-	1	-	2	1	1
Baileya multiradiata desert marigold	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
COMPOSITAE (seed/floret) sunflower family	-	1	-	-	-	-	-	-	-	-	-	-	12	-	3
Corispermum nitidum shining tickseed	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
cf. *Croton* sp. croton	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
Descurainia pinnata tansy mustard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Euphorbia cf. *serpyllifolia* spurge	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-
Euphorbia cf. *serrula* spurge	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
GRAMINEAE grass seed/floret	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-
MALVACEAE mallow family	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Portulaca sp. purslane	12	11	57	10	6	-	13	47	1	1	5	-	1	-	19
Prosopis glandulosa mesquite seed/leaf	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-
Verbesina enceliodes cowpen daisy	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
unknown seed	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-

Table J-2 (cont'd)

Taxon	Sample Number 30	31	32	33	34	35	36	37	38	39	40	41	42	43
Amaranthus sp. amaranthus	2	-	-	3	-	-	2	-	1	(1)	-	3	-	2
COMPOSITAE (seed/floret) sunflower family	18	1	-	-	-	-	-	-	-	-	22	-	1	-
Corispermum nitidum shining tickseed	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CRUCIFERAE mustard family	-	-	1	3	-	-	-	-	-	-	-	-	-	-
Dimorphocarpa wislizenii spectacle pod	-	-	-	1	-	-	-	1	-	-	-	-	-	-
Echinocereus sp. pitaya cactus	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Euphorbia cf. *serpyllifolia* spurge	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Helianthus petiolaris plains sunflower	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Portulaca sp. purslane	34	9	1	1	-	33	7	4	1	-	24	4	2	5
Prosopis glandulosa mesquite seed/leaf	-	-	-	-	1	-	-	1	-	-	7	-	-	-
Sporobolus sp. dropseed grass	-	-	-	-	-	-	-	(4)	-	-	-	-	-	-
unidentifiable seed frag.	-	-	-	-	-	-	-	-	-	-	-	1	-	(1)

Taxon	Sample Number 44	45	46	47	48	49	50	51	52	53	54	55	56	57
Allionia incarnata trailing four o'clock	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Amaranthus sp. amaranthus	2	-	9	4	5	-	13	3	1	-	1	2	(2)	-
Cheno-Am chenopodium/amaranthus	-	-	-	-	-	-	-	-	12	7	1	-	-	-
COMPOSITAE (seed/floret) sunflower family	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Corispermum nitidum shining tickseed	1	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. CRUCIFERAE mustard family	-	-	-	-	-	-	-	-	-	-	-	-	(3)	-
Descurainia pinnata tansy mustard	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Dimorphocarpa wislizenii spectacle pod	1	-	-	-	-	-	-	-	-	-	-	-	-	-
cf. *Echinocactus* sp. devil's head cactus	-	-	-	-	-	-	-	-	-	-	10	-	-	-
Euphorbia cf. *serpyllifolia* spurge	1	-	-	-	2	-	1	-	-	-	-	-	-	-
Euphorbia cf. *serrula* spurge	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Portulaca sp. purslane	2	-	7	4	1	1	1	11	1	30	13	2	4	8
Prosopis glandulosa mesquite seed/leaf	25	4	-	-	-	-	-	3	-	-	8	-	-	-
Sporobolus sp. dropseed grass	-	-	-	-	-	(2)	-	-	-	-	-	-	-	-
Yucca elata soaptree yucca	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Zea mays corn cupules	-	-	-	-	-	-	-	-	-	-	-	-	(27)	-
unidentifiable seed frag.	-	(1)	-	-	-	-	(1)	(1)	-	(1)	-	-	-	(1)

* burned items shown in parentheses

The seven samples that have a single unidentifiable seed fragment come from prehistoric and mostly Mesilla phase features that include burned caliche/fire-cracked rock features and possible huts or small pithouses. The finding of so few seeds in these particular samples is compatible with the presumed low-intensity of occupation of most of the project sites and the probable low level of input of subsistence items into sites. Again, these seeds may have been part of materials used for tender, fuel, or construction. They may also have been in soils subjected to heat. As previously noted, unburned seeds and other materials are modern contaminants of the samples. Contaminants would also have been present in the soils in the past. In this vein, it is interesting to note that a few burned rodent droppings were encountered in three samples (nos. 29, 35, and 37). These rodent droppings come from thermal features, and their burning would lend credence to the inference that some seed contaminants were also burned.

Five samples (nos. 7, 8, 10, 37, and 49) come from prehistoric features and contain 31 burned seeds of dropseed grass. One sample (no. 7) also has one unidentifiable seed fragment. Four of the samples are from possible structures, and the fifth (no. 37) is from a burned caliche/fire-cracked rock feature. These seeds may have been burned from their inclusion with grass stems used in the construction of walls and roofs of the possible structures or used for tender or fuel in the thermal feature. Burned seeds of dropseed and burned grass stems have been recorded for a number of structures in the region (O'Laughlin 1985, 1986) and have been infrequently noted for thermal features (O'Laughlin 1985). O'Laughlin (1985) describes the common occurrence of dropseed in pits, thermal features, and pithouses at Meyer Pithouse Village in the Hueco Bolson, reviews ethnographic information on the use of dropseed as a food item, and concludes that dropseed was probably a subsistence item as well as a material used for tender, fuel, and construction. He further suggests that the use of dropseed and other grasses as food may have been overlooked by researchers in the region because of the relatively few reports on the analysis of flotation samples and the paucity of burned floral remains in most samples. The presence of charred seeds of dropseed in five of the samples from the current Fort Bliss project adds considerably to the amount of information available on the occurrence of dropseed in archeological features and lends some support to the possible use of dropseed as a food resource. The seeds of this plant develop during the summer but stay on the plant well into the winter. Thus, their occurrence in an archeological feature does not provide specific seasonal information.

In addition to above noted charred seeds, burned seeds were observed in three other samples. One of these (no. 56) is a prehistoric feature, while the other two (nos. 2 and 39) are historic period features. The prehistoric feature is dated to the El Paso phase, is a burned caliche/fire-cracked rock feature, and was found to contain two burned seeds of amaranth, three burned seeds of a mustard, and 27 charred cupules of a corn cob. The seeds and greens of amaranth are edible and there are numerous examples of the use of this plant by Southwestern groups (see Wetterstrom 1986). Mustard seeds of a variety of species are also noted as having been used as food or condiment. However, the finding of a few burned seeds of amaranth or mustard in this feature and their absence in other features does not provide strong support for their use as subsistence items. Again, they may have been burned incidentally to any subsistence activity. The corn cupules from this feature appear to represent a single cob, but their condition does not allow identification of row number or accurate measurement of cob characteristics. Corn remains have commonly been recovered from structural sites of the El Paso phase (Whalen 1994). They have rarely been found in nonstructural sites (Wetterstrom 1980). The presence of corn in this feature may indicate that this site was the locus of activities ancillary to those of a not too distant habitation site. The amaranth and mustard seeds may also suggest occupation between late spring and early fall.

Sample number 39 was retrieved from a historic period stain exposed in a backhoe trench at FB 13140. An apparent coyote skull was associated with this stain, and parts of cans and pieces of iron were noted in the flotation sample. A single charred seed of amaranth was found in the sample. The presence of this single burned seed may reflect a subsistence activity. However, the apparent dumping and burning of historic trash at this site makes it more probable that the seed was burned accidentally or with other materials used as fuel.

The second historic period sample with burned seeds is sample number 2 and comes from a hearth at FBH 98. This sample contains nine burned seeds of lovegrass, two burned seeds of dropseed, and two other burned grass seeds. The variety of grass seeds recovered from this feature would suggest that grass had been used as tender or a fuel. Additional burned seeds include one unidentifiable fragment, two seeds of pitaya cactus, and two seeds of a cylindro-opuntia or cholla cactus. Cactus fruits would not be expected to have been used as fuel and are not common to the site area. The presence of cactus seeds in this hearth would, therefore, suggest the consumption of fresh fruits which are best available during the summer months. Finally, 12 fragments of cotyledons of the common bean or frijole were identified and are obvious food remains. Beans are easily transported, stored, and prepared and could be anticipated at a cow camp or similar site of short occupation.

Charcoal is present in all but one of the flotation samples, but the small size of most pieces permits identifications for only 29 of the 57 samples (Table J-3). Mesquite occurs in 83 percent (n=24) of the 29 samples with identifiable charcoal. Three of these samples (nos. 1, 2, and 39) are from historic contexts, while the other 26 samples come from prehistoric thermal features and possible structures. Mesquite is ubiquitous to the area and has been noted as the predominant fuel for prehistoric features and a common element for the construction of small structures (Ford 1978; Holloway 1994a, 1994b; O'Laughlin 1985, 1988, 1994a, 1994b). Many of these samples also contain specimens noted as ring porous or diffuse porous. These are very small pieces of charcoal and may represent outer rings or the pith of mesquite branches.

The historic samples have two species not observed for the samples from prehistoric features. Sample number 1 has remains of the stalk of soaptree yucca, and sample number 39 contains pine charcoal. Both of these species would appear to have been used for fuel. Pine does not occur in the immediate project area, and the presence of pine charcoal in sample number 39 may indicate the burning of crates, fence posts, or other construction material.

Four-wing saltbush charcoal was found in five prehistoric flotation samples (nos. 23, 24, 47, 49, and 50) that come from a thermal feature and possible structures. Four-wing saltbush occurs in the project area and has been noted as a fuel or construction material of minor importance at other prehistoric sites in the Hueco Bolson (Ford 1978; Holloway 1994a, 1994b; O'Laughlin 1985, 1988, 1994a, 1994b).

Burned grass stems were retrieved from two samples (nos. 38 and 57) from prehistoric thermal features. The feature that sample number 38 came from also produced burned seeds of dropseed grass (sample no. 37). The burned grass stems indicate the use of grass as tender or fuel for these particular features. However, burned grass stems are fragile and do not always survive time or the processing of soil samples. The finding of burned grass seeds in other samples suggests that grass was used as fuel or tender in other thermal features and as construction material in some small structures.

Six flotation samples contain an unidentifiable and carbonized material noted as unknown A in Table J-3. This material was observed in three samples (nos. 23, 24, and 26) from Feature 5 at FB 7312 and in three samples (nos. 51, 53, and 54) from Feature 1 at FB 13920. The pieces have a tuberculate exterior, a smooth interior, and appear to come from a root or possibly a large fruit. This material does not come from a monocotyledon or a cactus and bears no resemblance to any fruits or seeds of the area known by the writer. It has been shown to other researchers, but none have been able to identify it. Unknown A may be the root of a herbaceous dicotyledon. Without identification, it is not possible to comment further on this material.

In addition to the flotation samples, 11 charcoal samples were submitted for identification. One of these is an unburned insect larval case was deleted from the sample. The other 10 samples are reported in Table J-4. Among these is another piece of unknown A from Feature 5 at FB 7312, as well as three pieces of unknown A from a feature exposed in a backhoe trench at FB 7312. Mesquite is the only material identified in the other sample from FB 7312 and in the samples from FB 13206 and FB 13921. These samples are all from prehistoric thermal features or possible structures. Mesquite is also the only identifiable charcoal present

Table J-3
Identifiable Charcoal from Flotation Samples

Sample Number	Mesquite	Four-wing saltbush	Soaptree yucca	Pine	Ring porous	Diffuse porous	Unknown A	Grass stem
1	4	-	3	-	-	1	-	-
2	5	-	-	-	2	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
6	4	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	2	-	-	-	-	1	-	-
9	3	-	-	-	3	-	-	-
10	3	-	-	-	-	1	-	-
11	-	-	-	-	-	-	-	-
12	2	-	-	-	1	-	-	-
13	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
17	2	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	10	3	-	-	2	-	43	-
24	21	1	-	-	-	1	27	-
25	-	-	-	-	-	-	-	-
26	6	-	-	-	-	-	18	-
27	-	-	-	-	-	-	-	-
28	1	-	-	-	-	-	-	-
29	16	-	-	-	1	-	-	-
30	3	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-
33	-	-	-	-	1	-	-	-
34	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	1
39	20	-	-	2	7	17	-	-
40	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-
44	5	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-
47	-	1	-	-	-	3	-	-
48	3	-	-	-	-	-	-	-
49	10	11	-	-	-	3	-	-
50	12	1	-	-	-	1	-	-
51	4	-	-	-	-	-	37	-
52	4	-	-	-	-	-	-	-
53	2	-	-	-	-	1	21	-
54	-	-	-	-	-	-	9	-
55	83	-	-	-	4	-	-	-
56	64	-	-	-	3	-	-	-
57	-	-	-	-	-	-	-	-

Table J-4
Charcoal Samples

Site (FB)	Test Unit	Provenience	Description
7312	5	Feature 5, level 1	1 piece of unknown A
7312	5	Feature 5, level 2	5-6 cm diameter mesquite branch
7312	BT2	west wall feature	3 pieces of unknown A
11617	1	Feature 1, level 2	4 pieces of mesquite; others too small to identify
13140	1	level 4	5 pieces of mesquite
13140	2	level 2	14 pieces of mesquite; 1 piece of four-wing saltbush; 8 pieces of pine; 1 piece of coal
13140	4	level 2	7 pieces of mesquite; 13 pieces of pine
13206	1	Feature 1, level 2	12 pieces of mesquite; others too small to identify
13921	1	Feature 1, surface/level 1	36 pieces of mesquite; others too small to identify
13921	1	Feature 1, level 1	8 pieces of mesquite

in the sample from Feature 1 at FB 11617, a stain of unknown temporal affiliation. The remaining three samples are from historic trash at FB 13140. Mesquite, four-wing saltbush, and pine charcoal are represented in these samples, as is one piece of coal.

SUMMARY

Fifty-seven flotation samples and 10 of the original 11 charcoal samples were analyzed. Results of this analysis provide relatively little information on the use of plants and parallel findings from similar studies of plant remains from the Hueco Bolson.

Flotation samples come from features predominantly located on or near the surface and were found to be contaminated with unburned roots, seeds, and leaves and with rodent droppings and insect parts. Many of the samples have little charcoal, and few burned seeds were recovered. The general paucity of charred plant material in the samples may reflect both the poor preservation of these remains in exposed features and the low intensity of feature use in the project area.

Charred seeds and corn cupules were recognized in 15 or 26 percent of the 57 flotation samples. This is a rather high recovery rate for the region and partially reflects the processing of large volumes of soil. Charred material was recovered from both historic and prehistoric contexts.

Grass seeds, pitaya cactus seeds, cylindro-opuntia or cholla seeds, and fragments of common beans or frijoles were found in one flotation sample from FBH 98, a historic dump dating as early as the 1920s and possibly

associated with a not too distant cow camp. The beans are an obvious food item, and the cactus seeds suggest the use of fresh fruits from the area. The grass seeds most probably represent the use of grass as tender or fuel. A flotation sample from a historic context at FB 13140 has a single burned seed of amaranth which most probably was burned incidentally to any historic activity at the site.

Burned seeds were found in 13 samples from eight features and from eight different prehistoric sites. Eight unidentifiable seed fragments and 31 seeds of dropseed grass are present in samples from both thermal features and small structures. These seeds may represent grass and other materials used in the construction of shelters, for tender or fuel, or for food. Two amaranth and three mustard seeds were also recovered from a Pueblo period hearth on FB 13921 and could indicate their use as food, condiment, tender, or fuel. Some seeds may have been burned accidentally because of their natural occurrence in soils, and the few recovered burned seeds suggest ephemeral occupation and a low level use of wild seed plants, possibly between late spring and fall. Additionally, fragments of a burned corn cob were retrieved from the Pueblo period hearth. Corn is documented as an important subsistence item for the Pueblo period, and its presence in this hearth could suggest that FB 13921 is an ancillary activity area to a nearby habitation site.

Identifiable charcoal was recovered from 51 percent (n=29) of the flotation samples. These flotation samples and the charcoal samples show that mesquite was the dominant wood used for fuel and/or construction of small shelters in prehistoric sites and for fuel for the historic contexts. Four-wing saltbush is of minor importance in samples from prehistoric thermal features and structures, and grass stems were noted for two prehistoric thermal features. Historic sites also have small amounts of four-wing saltbush, soaptree yucca, and pine which were presumably used for fuel. With the exception of pine, all identifiable plants are common to the project area. The pine charcoal at the historic site of FB 13140 is an obvious introduction, as pine does not occur in the immediate area.

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