ARCHAEOLOGICAL INVESTIGATIONS AT LA 15260; THE COORS ROAD SITE, BERNALILLO COUNTY, NEW MEXICO

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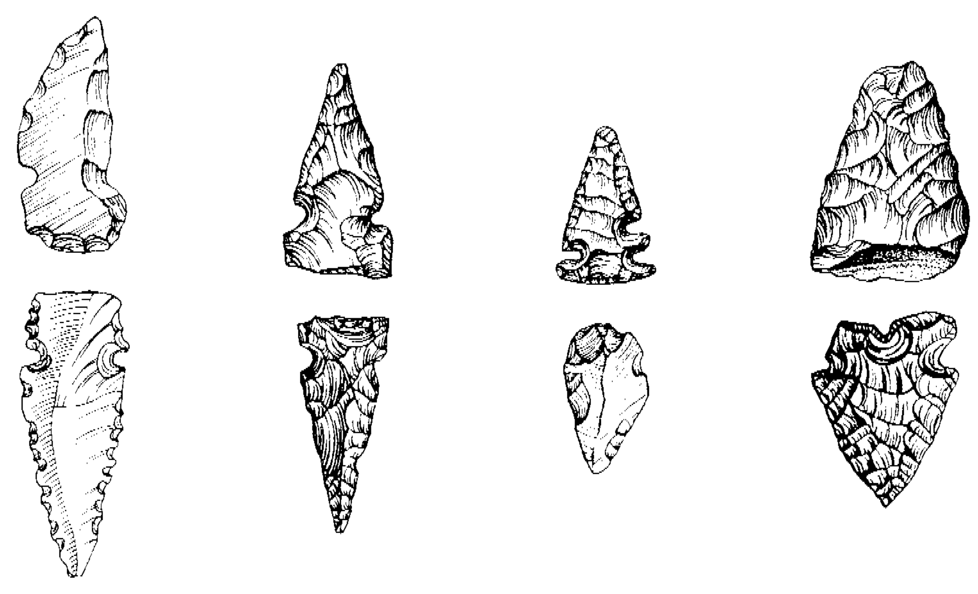

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ARCHAEOLOGICAL EXCAVATIONS AT LA 15260: THE COORS ROAD SITE, BERNALILLO COUNTY, NEW MEXICO

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ARCHAEOLOGY NOTES 147

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the New Mexico State Highway and Transportation Department,
whose support we wish to acknowledge.

ADMINISTRATIVE SUMMARY

Between December 30, 1985, and March 13, 1986, the Office of Archaeological Studies (formerly the Research Section) of the Museum of New Mexico conducted excavations at LA 15260 before the proposed construction of the North-South Interconnection Project. Testing (Vierra 1985) determined that the site was eligible for inclusion on the *National Register of Historic Places* and data recovery was required.

The excavations uncovered two pit structures, the ventilator shaft of a third pit structure, a trash midden, and a number of exterior features dating between A.D. 1125 and 1250. Contrary to research design expectations, the site does not appear to be a seasonally occupied farming settlement. The presence of pit structures, ramadas, storage features, and a considerable amount of trash suggest a more substantial, even if intermittent, use of the site area. The earliest deposits indicate that utility wares were produced in the Socorro area. By the last use of the site, utility ware sources were local.

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Richard B. Sullivan authored the most of the introductory portion and the lithic debitage analysis portions of this report before he left the section. Nancy J. Akins completed the lithic analysis section; wrote the research design and conclusion sections; analyzed the fauna, ground stone, and ornaments and wrote those sections; and edited, revised, and supplemented the existing parts. Signa Larralde analyzed the projectile points and formal tools, wrote those sections of the report, and provided useful comments on the debitage analysis. Robin Gould edited the final volume, Ann Noble prepared the figures, Rob Turner illustrated the projectile points, and Nancy Warren printed the photographs for publication.

INTRODUCTION

This report presents the results of excavations performed by the Office of Archaeological Studies (formerly the Research Section), Museum of New Mexico, at LA 15260, the Coors Road site. The excavations were carried out at the request of the New Mexico State Highway and Transportation Department (NMSHTD) to recover information from the archaeological remains discovered during previous testing of the site (Vierra 1985) before the construction of the North-South Coors Interconnection Project.

The Coors Road site is located within the Western Heights Mobile Home Village in southwestern Albuquerque, Bernalillo County, New Mexico (T 10N, R 2E, unsectioned; elevation 1,524 m; Fig. 1, Fig. 2). The property is owned by Midwest Property Inc., Hassan Khimji, President.

The excavations initially reopened two testing phase backhoe trenches that had intersected two pit features (Vierra 1985). The features turned out to be pit structures and these, plus the surrounding areas, were excavated to define exterior activity areas and features. Half of the thick midden deposit was excavated in search of stratified deposits. A number of backhoe trenches and test pits were placed within the right-of-way to insure that it was free of structures.

Figure 1. Overview of LA 15260, looking west.

ENVIRONMENT

Site Setting

The Coors Road site, LA 15260, is situated on the east edge of West Mesa on the first terrace overlooking the Rio Grande floodplain. The present river channel is 4.4 km to the east and the floodplain on the west side of the river ranges from 2.0 to 3.6 km wide in the vicinity of the site.

Local Geology

The surface geology in the site area consists of a thin layer of sand overlying the Santa Fe Group Formation. Directly east of the site, along the terrace edge, is a Pleistocene gravel deposit (Hunt 1978) containing cobbles more than 15 cm in diameter. This deposit is the most likely source of the stone used to make the tools at the site.

Soils and Associated Vegetation

The soils found on and near the site are members of the Light Colored Soils of the Warm Desertic Region group. Two major subgroups are found within a few kilometers of the site. The Torrifluvents-Calciorthids-Torriorthant soils occur in the floodplain and on gently sloping to moderately steep terraces adjacent to the Rio Grande Valley. Haplargids-Calciorthids-Torripsamment soils typically occur on the plains, depressions, drainages, and side slopes of the Rio Grande Basin (Maker et al. 1974).

These subgroups are further divided into 14 soil subseries. Eleven occur on the floodplain and are considered fair to good soils for the cultivation of legumes, grain, and seed crops. The remaining three soil series, all occurring on the terrace, are very poorly suited for the cultivation of crops (Table 1).

At present, soils of the Torrifluvents-Calciorthids-Torriorthents association are used for irrigated cropland, irrigated pasture, unimproved pasture, and for the preservation of open space. Alfalfa and small grains are the predominant cultigens. Undeveloped floodplain soils support a variety of plant species, including cottonwood *(Populus fremonti)*, Russian olive *(Elaeagnus angustifolia)*, tamarisk *(Tamirix pentandra)*, saltgrass (*Sportina* sp.), alkali sacaton *(Sporobolus airoides)*, broom snakeweed *(Gutierrezia sorothnae)*, mesa dropseed *(Sporobolus flexuosus)*, black grama *(Bouteloua eripoda)*, fluffgrass *(Tridens pulchellus)*, other annuals, and various species of cacti (Maker et al. 1974).

Table 1. Potential Vegetation for Local Soil Series

Soil Series	Potential Habitat						Location
	1	2	3	4	5	6	
Agua loam	G	G	G	G	G	F	floodplain
Agua silty-clay-loam	G	G	G	G	G	F	floodplain
Anapara silt-loam	G	G	F	F	VP	VP	floodplain
Anapara silty-clay-loam	G	G	F	F	G	F	floodplain
Blue Point loamy-sand	VP	VP	P	F	VP	VP	terrace
Blue Point-Kokan hilly	VP	VP	P	F	VP	VP	terrace
Brazito fine-sandy-loam	F	G	P	F	G	G	floodplain
Gila loam	G	G	P	P	G	G	floodplain
Glendale loam	G	G	P	P	G	G	floodplain
Glendale clay-loam	G	G	P	P	G	G	floodplain
Madurez-Wink silty-loam	VP	VP	P	P	P	VP	on site
Vinton loamy-sand	F	F	P	P	P	G	floodplain
Vinton sandy-loam	F	F	P	P	P	G	floodplain
Vinton clay-loam	G	G	P	P	P	G	floodplain

Potential habitats
1 = grain and seed crops
2 = domestic grasses and legumes
3 = wild herbaceous plants
4 = shrubs
5 = wet land plants
6 = shallow water areas

G = good
F = fair
P = poor
VP = very poor

(source: Hacker 1977)

Haplargids-Calciorthids-Torripsamment soil associations are presently used for livestock grazing and wildlife preservation. The Coors Road site was under alfalfa cultivation, with well irrigation, up until ten years ago. Plants currently present on this soil association include sand dropseed *(Sporobous cryptandrus)*, Indian ricegrass *(Oryzopsis hymenoides)*, galleta grass *(Hilaria jamesii)*, blue grama *(Bouteloua gracilis)*, black grama *(Bouteloua eripoda)*, narrow leaf yucca (*Yucca* sp.), Mormon tea (*Ephedra* sp.), smokebush *(Cotinus americanus)*, sand sagebrush *(Artemesia filifolia)*, fourwing saltbush *(Atriplex canescens)*, wolfberry (*Lycium* sp.), bush muhly *(Muhlenbergia porteri)*, cholla (*Opuntia* sp.), and prickly pear (*Opuntia* sp.) (Maker et al. 1974).

Climate

The climate of the Middle Rio Grande Valley is "arid continental" (U.S. Dept. of Commerce 1965). For 89 years of records, the mean annual precipitation is 218 mm, 128 mm of which falls between May and September, usually in the form of short-lived intense thundershowers. Temperatures fluctuate greatly on a daily basis. The mean daily temperature is 3.4° C for the winter months (November to February) and is 23.3° C for the summer months (May to September). Mean annual potential evapotranspiration is 1,208 mm in the site area, resulting in a yearly moisture deficit of 994 mm (Gabin and Lesperance 1977).

The local climate is characterized by the large number of clear days. Clouds are absent more than three-quarters of the hours between sunrise and sunset. Local agriculturalists expect a frost-free season of around 195 days. The shortest frost-free season of record was 173 days and the longest was 232 days (Tuan et al. 1973).

The present New Mexico climatic patterns have most likely persisted for thousands of years, although important variations have occurred (Anschutz 1987:152-157). Dendrochronological reconstructions (Dean et al. 1985; Euler et al. 1979; Jorde 1977; Rose et al. 1981) argue that precipitation patterns between A.D. 750 and 1049 (early Pueblo I to early Pueblo II) were characterized by high frequency (short term) cycles of periodicity, each spanning an average of about two years. Dean et al. (1985) further argue that this period was also characterized by low effective moisture and low regional (spatial) variability in climate. Between A.D. 1050 and 1100 (late Pueblo II) precipitation patterns across much of the Southwest underwent a significant shift (Dean et al. 1985; Euler et al. 1979; Jorde 1977). Periodicity cycles lengthened into a pattern of low frequency (long term) oscillations accompanied by a decrease in the yearly rainfall variance. Lengthening the periodicity cycle increased the probability that two or more consecutive dry years would occur. A decrease in the rainfall variance may have had a positive affect on the adoption of a subsistence economy more heavily dependent on agriculture since precipitation would be more predictable in the short term.

An early Pueblo II pattern of floodplain aggradation and rising water tables continued through Pueblo III, except for a prolonged drought and subsequent floodplain downcutting during the mid-A.D. 1100s (early Pueblo III). High spatial variability in climatic conditions characterized the time span between A.D 1150 and 1300 (early to late Pueblo III) (Dean et al. 1985).

Fauna

As a riparian habitat, the Rio Grande Valley contains a wide assortment of mammalian, avian, and aquatic species that could have been exploited by the prehistoric inhabitants of the site. Some of the more common species found in prehistoric sites are woodrats (*Neotoma* sp.), jack rabbits *(Lepus californicus)*, cottontail rabbits *(Sylvilagus auduboni)*, ground squirrels *(Spermophilus variegatus)*, Botta's pocket gophers *(Thomomys bottae)*, mice (*Peromyscus* and *Perognathus* sp.), kangaroo rats (*Dipodomys* sp.), coyotes *(Canis latrans)*, mule deer *(Odocoileus hemionus)*, pronghorns *(Antilocapra americana)*, Canada geese *(Branta canadensis)*, ducks (*Anas* sp.), turkeys *(Meleagris gallopavo)*, and quail (*Callipepla* and *Lophortyx* sp.) (Oakes 1979; Young 1980).

PREHISTORIC BACKGROUND: LATE DEVELOPMENTAL AND COALITION PERIODS

To better evaluate the cultural material recovered from the Coors Road site, the results of previous archaeological research in the Albuquerque area are reviewed along with an overview of the late Developmental and Coalition periods in the Middle Rio Grande Valley. The following is primarily derived from Anschuetz and Vierra (1985:25-38).

Late Developmental Period (A.D. 900 to 1200)

The late Developmental period in the Middle Rio Grande, which corresponds to the Pueblo II period of the Pecos Classification, is characterized by the appearance of Red Mesa Black-on-white ceramics throughout the region. San Marcial Black-on-white is frequently found in association with Red Mesa Black-on-white in the Albuquerque area (Cordell 1979:43).

Regionally, the number of sites in the southern Santa Fe and Albuquerque districts increased during the late Developmental period (Wetherington 1968). Accompanying the increase in site density was an increase in the range of environmental zones exploited (generally higher elevations). This has been demonstrated by Stuart and Gauthier (1981) for the Cochiti Reservoir area; Blevins and Joiner (1977), Cordell (1979), and Anschuetz (1984, 1987) for the Albuquerque district; and Dickson (1975, 1979) for the Santa Fe district. Dickson suggests that the spread of habitation sites into the piedmont zone overlooking the Santa Fe and Rio Grande floodplains was caused by increased population densities in the Santa Fe district. Concurrent expansion in the Albuquerque and Pajarito districts suggests that the population upswing was a regional pattern.

A major characteristic of the late Developmental period was the transition from pit structures to above-ground habitations (Wendorf and Reed 1955). Accompanying this shift was an increase in site size with pueblos averaging 10 to 12 rooms in the Santa Fe area (Wendorf and Reed 1955). In the Albuquerque district pit structures continued to be occupied through the late Developmental into the following Coalition period. Excavated sites with late Developmental pit structure components include Pithouses 4, 7, 8, and 10 at the Sedillo site (Skinner 1965, 1968), 3.1 km northeast of LA 15260; Pithouses 1 and 2 at the Denison site (Vivian and Clendenon 1965), 12 km south southwest of LA 15260; the second pit structure near Zia Pueblo (Vytlacil and Brody 1958); and Frisbie's (1967) Pithouse 1 at the Artificial Leg site III, north of Corrales.

Developmental period pit structures are usually circular, floors are typically hard-packed or plastered, walls are either plastered or unplastered. Both interior and exterior storage cists may be present. Pit structures of this period seem to share more standardized floor features than those of past periods (Cordell 1979:44). Floor features include ventilators oriented to the east, sipapus, ash pits, ladder holes, collared and uncollared hearths, and roof supports (usually four).

Toward the end of the late Developmental period in the Albuquerque district, surface structures were constructed of jacal, puddled adobe masonry, or adobe masonry with slab footings (Wetherington 1968). Some stone masonry structures may have been built in this time period (Fenenga 1956). Sites with surface structures are the Senteny site, a six to eight-room adobe pueblo near Belen (Switzer 1968); and LA 2567 and LA 2569 located along the Rio Puerco Arroyo west of Los Lunas (Fenenga 1956; Fenenga and Cummings 1956).

Surface habitation structures may or may not have prepared floors (Fenenga and Cummings 1956). Floor features include central and offset hearths, mealing bins, roof supports, and subfloor bins. Exterior feature descriptions are lacking, although Switzer (1968) refers to the presence of a probable ramada at the Senteny site.

Artifact assemblages from the aforementioned sites show considerable continuity with the early Developmental period. The Socorro and Mogollon areas to the south were the primary sources of nonlocal ceramic wares (Cordell 1979).

Coalition Period (A.D. 1200 to 1325)

The Rio Grande Coalition period coincides with the Pueblo III period of the Pecos Classification (Cordell 1979:44). A hallmark of the early Coalition period is the shift from mineral to carbon-based paint on black-on-white decorated wares (Wendorf 1954; Wendorf and Reed 1955). Many of the Pueblo III ceramics in the Northern Rio Grande area (i.e., Santa Fe Black-on-white) resemble wares manufactured in northwestern New Mexico (Lang 1982b:176; Warren 1980:156). Archaeologists have interpreted the appearance of the carbon-painted wares, along with the abrupt increases in the size and number of year-round habitation sites, as evidence for immigration of populations from the San Juan Basin and Mesa Verde areas (Bice and Sundt 1972; Eggan 1950; Hewett 1953; Mera 1935, 1940; Reed 1949; Stubbs and Stallings 1953; Wendorf 1954; Wendorf and Reed 1955). No one ware is predominant; rather, the trend is toward increasing heterogeneity in ceramics and in architectural form and construction (Wendorf and Reed 1955).

The Coalition period is characterized by two major trends in population and settlement. Substantial population growth is shown by the increase in the size and number of habitation sites, and by year-round settlement in areas such as Chama, the Galisteo Basin, Gallina, the Pajarito Plateau, and Taos, which were lightly populated before A.D. 1100 to 1200 (Cordell 1979). Accompanying the population increase is evidence for intensified agricultural practices, including the use of rock-bordered grid gardens, terraced gardens, reservoirs, and dams (Cordell 1979; Moore 1981).

Pit structures continued to be an important architectural component. Rectangular kivas, incorporated into room blocks, coexist with subterranean circular structures (Cordell 1979:44). In the vicinity of Corrales, Frisbie (1967) notes a shift from the less optimal upland site locals to the more arable land adjacent to major drainages. Similarly, the 36 sites in Tijeras Canyon that date to the late Developmental/Coalition periods include: 4 with "pure" Coalition components, 1 village with at least 20 rooms, 16 small pueblos, 8 isolated rooms, and 10 nonstructural artifact scatters (Anschuetz 1984; Oakes 1979; Wiseman 1980). Most of these sites are found at lower elevations adjacent to runoff-watered alluvial soils.

Two sites from this period have been excavated in Tijeras Canyon, the Dinosaur Rock site (Oakes 1979) and Coconito Pueblo (Wiseman 1980). The Dinosaur Rock site consists of five adjoining rectangular adobe masonry surface rooms with a sixth room set at a right angle to the others, and three jacal surface structures. Floors in the adobe rooms are two courses of cobbles covered by a 3-cm veneer of adobe plaster, probably to provide insulation and protection from burrowing rodents. Interior features are lacking and the rooms contained few artifacts, suggesting a storage function. In contrast, the jacal structures have deep, well used hearths accompanied by quantities of trash, suggesting a habitation function. Cultural material around the structures indicates exterior activity areas (Oakes 1979).

Coconito Pueblo, located 1.6 km east of the Dinosaur Rock site and along Tijeras Creek, was inhabited near the end of the Coalition period. The site consists of 19 surface rooms constructed predominantly of adobe masonry, a kiva, and 8 pit structures. The site underwent several periods of building and remodeling, producing a complicated occupation sequence. Pit structures appear to have been present during both the earliest and latest of the site occupations (Wiseman 1980). The kiva is associated with the early site occupation suggesting that the site was initially for permanent habitation. Pit structures superimposed over the kiva indicate that the kiva was used for only a short period of time. Wiseman (1980) interprets this architectural data as indicating a permanent occupation followed by seasonal use, perhaps as a farming satellite for the nearby Tijeras or San Antonio pueblos during the late Coalition period.

Anschuetz (1987) has presented a cultural ecological model that "attempts to explain the emergence of local clusters of stylistic attributes in material culture" (Anschuetz 1987) in the Anasazi region. He assumes that stylistic districts represent points of intensive local interaction, breaks in stylistic attributes represent territorial boundaries, and that populations within these boundaries would attempt to maintain control of internal critical resources such as arable land, permanent water courses, game animals, and wild plants.

Anschuetz (1987) interprets ceramic data from the Albuquerque area as indicating that this locale formed the northern periphery of the Socorro district until the late A.D. 1200s. By Pueblo III, territoriality, which may have been a viable short-term adaptive strategy, was no longer an effective approach. Demographic pressures and a worsening of climatic conditions required access to a wider range of environmental zones with varied resources to form a crucial buffer against local crop failures. Social bonds expanded and Anasazi groups in the Albuquerque area began to interact more closely with populations to the north, while maintaining their affiliations with the Socorro area. Subsequently, the Albuquerque area became more than the northern periphery of the Socorro district and by the A.D. 1300s had become a major Anasazi center because of its central location along north-south and east-west transportation corridors.

Research Design

Anschuetz and Vierra (1985:31-33) offer an interpretive model of the role of the Coors Road site in the overall Anasazi settlement system. They suggest the site was a seasonally occupied farming settlement inhabited by groups from the northern Socorro district during periodic drought cycles. Six major test implications designed to evaluate the validity of the model are presented (Anschuetz and Vierra 1985:34).

1. Tree-ring samples should provide tighter chronological control and place the occupants at the site during cycles of prolonged drought.

2. Floral and faunal assemblages should establish that the sites were seasonally occupied.

3. Architectural features should provide an independent test of seasonality. Year-round habitation would be reflected in a wide range of substantial habitation, storage, and food-processing features similar to those at other Developmental/Coalition sites in the Middle Rio Grande. If the site was seasonally occupied, features would be limited to those functionally related to summer and early fall activities such as roasting pits and jacal structures lacking interior hearths.

4. Petrographic analysis should confirm that much of the Socorro brown ware ceramics were obtained from the northern Socorro district. Identifying the range of variability in temper types is necessary to define broad patterns of trade contact.

5. A systematic study of motifs of Socorro Black-on-white pottery should show that motifs from the Coors Road site resemble those from the northern Socorro district rather than wares manufactured locally.

6. Occupation by groups from the lower Rio Salado and Ladro Mountain areas should be reflected in the lithic materials found at the Coors Road site. A portion of the lithic assemblage, especially formal tools, should be made from materials collected in that area.

SITE DESCRIPTION

General Excavation Procedures

The original datum used in the testing phase could not be located. Referring to the testing map, the datum was placed within 1 m of its original position and assigned an arbitrary elevation of 10 m and coordinates 100N/100E. Vertical subdatums were set with a transit and stadia rod and a grid system was laid out with the transit and a 30-m tape. Stakes were placed at 5-m intervals to indicate the intersection of grid lines. Excavated units were given the numerical and character designation of the stake in the northeast corner of the square.

Test unit size varied with the area excavated. In the area around the pit structures, 1-by-1-m grids were excavated; 1-by-2-m grids were standard in the midden; independent test pits were 1-by-1, 1-by-2, or 2-by-2 meters. All fill, except that from the backhoe trenches, was screened through ¼-inch mesh.

Pit structure excavation began by reopening the testing phase backhoe trenches (Fig. 3). After exposing the pit structure profiles, a small area within each trench was excavated to the floor in order to confirm that the features were pit structures rather than large roasting pits. A 50-cm-wide test trench, perpendicular to the existing backhoe trench, was excavated by strata, stopping 5 cm above the floor and at the opposite wall. A profile of the fill was drawn and photographs were taken. The remaining fill was removed in halves by strata, stopping 5 cm above the floor. A center point was located and the floor divided into quadrants, with the center line oriented toward where the ventilator was thought to be. The remaining fill was removed, piece-plotting any artifacts found on the floor. Pollen and flotation samples were taken from the floor next to features, under artifacts (for example, large ceramics and ground stone), and in possible pollen traps (corners, niches, and entrances). Probable features were numbered, photographed, and then excavated. Features were typically bisected along the long axis and half of the fill was removed as a unit. The remaining half was profiled, photographed, and removed by stratum, if present. Botanical samples were taken from each stratum, and from the base of the feature. Each excavated feature was photographed as was the overall structure.

After the pit structure excavations were completed, the surrounding area was surface stripped. Stratum 1, containing a mixed assemblage of prehistoric artifacts and modern trash, was removed. Stratum 2 was excavated to a level where features began to appear in plan (at the contact between Stratum 2 and Stratum 3). Exterior features were excavated using the same methods used for features within the pit structures.

A thick deposit of Stratum 2 in the midden was excavated in levels separated by discontinuous lenses of Strata 3-6, which may represent remodeling or construction episodes. Approximately half of the midden was excavated. Features were excavated in the described fashion.

Extramural test pits were placed in areas of vegetation or topographic anomalies. These tests varied in size and were excavated by strata to sterile soil.

Finally, a series of eight backhoe trenches were placed across the site (Fig. 3). Cultural features were detected in Trenches 1, 2, 3, and 4. Because of time constraints, these features were not excavated. In profile, the features were full of a sandy eolian deposit, similar to that seen in the Pit Structure 3 ventilator shaft. The shallow nature of these features as well as their aerial extent suggests they are borrow pits associated with the construction of Pit Structure 3.

Site Strata

Stratum 1 consisted of unconsolidated sandy clay loam, 10YR 5/4 on the Munsell color scale. It contained both historic trash and prehistoric artifacts, mixed by modern agriculture, livestock grazing, and leveling for the trailer court. Due to the extent of disturbance, most material from this stratum was not analyzed.

Stratum 2 was a compacted sandy clay loam, Munsell 7.5YR 5/4, containing small pieces of charcoal, ceramics, lithics, bone, and both aquatic and avian shell. In the area around the pit structures, features appeared at the contact between this stratum and Stratum 3. Within several excavation units, plough furrows were evident at the contact zone, indicating some disturbance. In the midden (Fig. 4), Stratum 2 contained discontinuous lenses of Strata 3-6, which were used to separate levels within Stratum 2. In Pit Structures 1 and 2, Stratum 2 occurred as a post-abandonment deposit in the upper fill (Figs. 5 and 6).

Strata 3 through 5 were sandy clayey loam, gravel, and pockets of caliche. Except in the pit structures, areas with rodent burrows, and where they came in contact with Stratum 2, these strata were sterile. In Pit Structure 1, these strata were mixed and appeared to represent the construction of Pit Structure 2 as they fill a shallow depression within abandoned Pit Structure 1. In Pit Structure 2, Strata 3 through 5 may represent the remnants of the surface structures northwest of the pit structure. In the midden, Strata 3 through 5 occurred in discontinuous lenses and may represent feature or pit structure construction episodes. They also occurred as undisturbed deposits underlying the cultural features.

Stratum 6 consisted of sterile, highly calcareous, sandy clayey loam grading to caliche. The midden features and pit structures were excavated into this stratum, which underlies undisturbed Stratum 3, 4, and 5 deposits.

Stratum 7 was sandy, clayey loam, Munsell 7YR 6/4, containing chunks of caliche, lithics, ceramics, bone, shell, and charcoal. This stratum occurred only in Pit Structures 1 and 2.

Stratum 8 was a fine gray ash lens with melted adobe, wall or roof casts, lithics, ceramics, bone, and charcoal. It directly overlay the floors of Pit Structures 1 and 2.

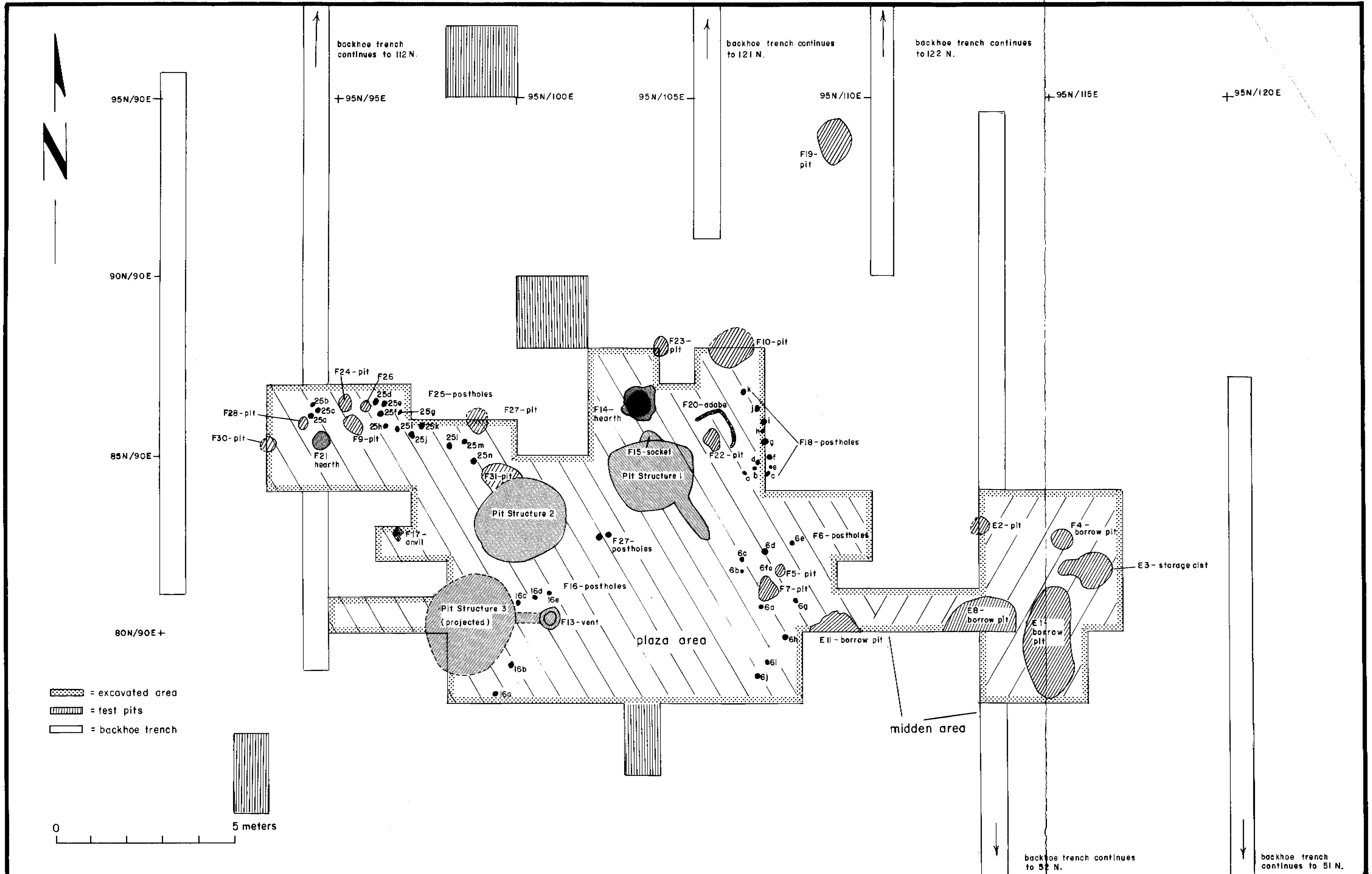

Figure 3. LA 15260, the Coors Road site.

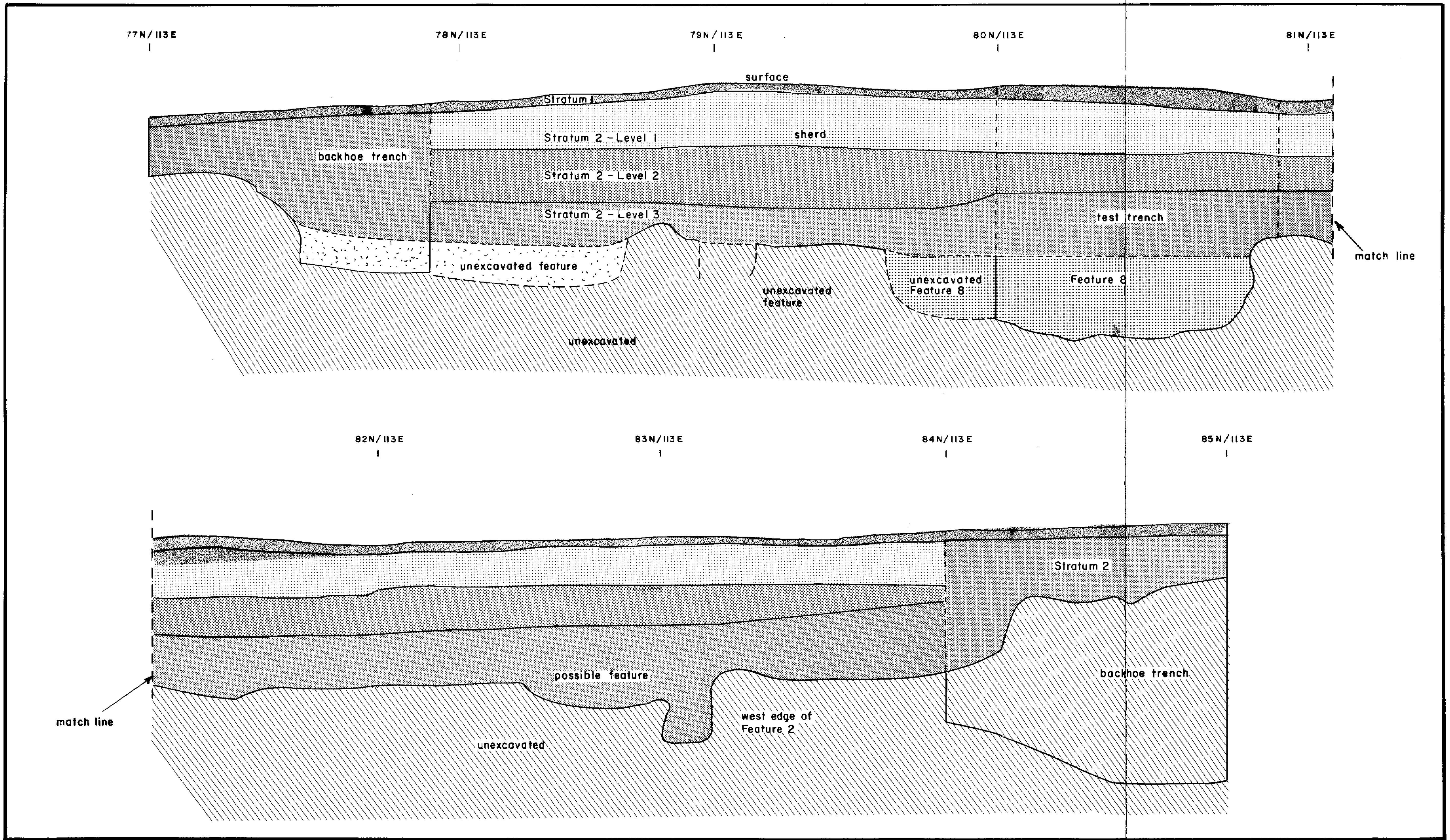

Figure 4. North to south stratigraphic profile of the midden.

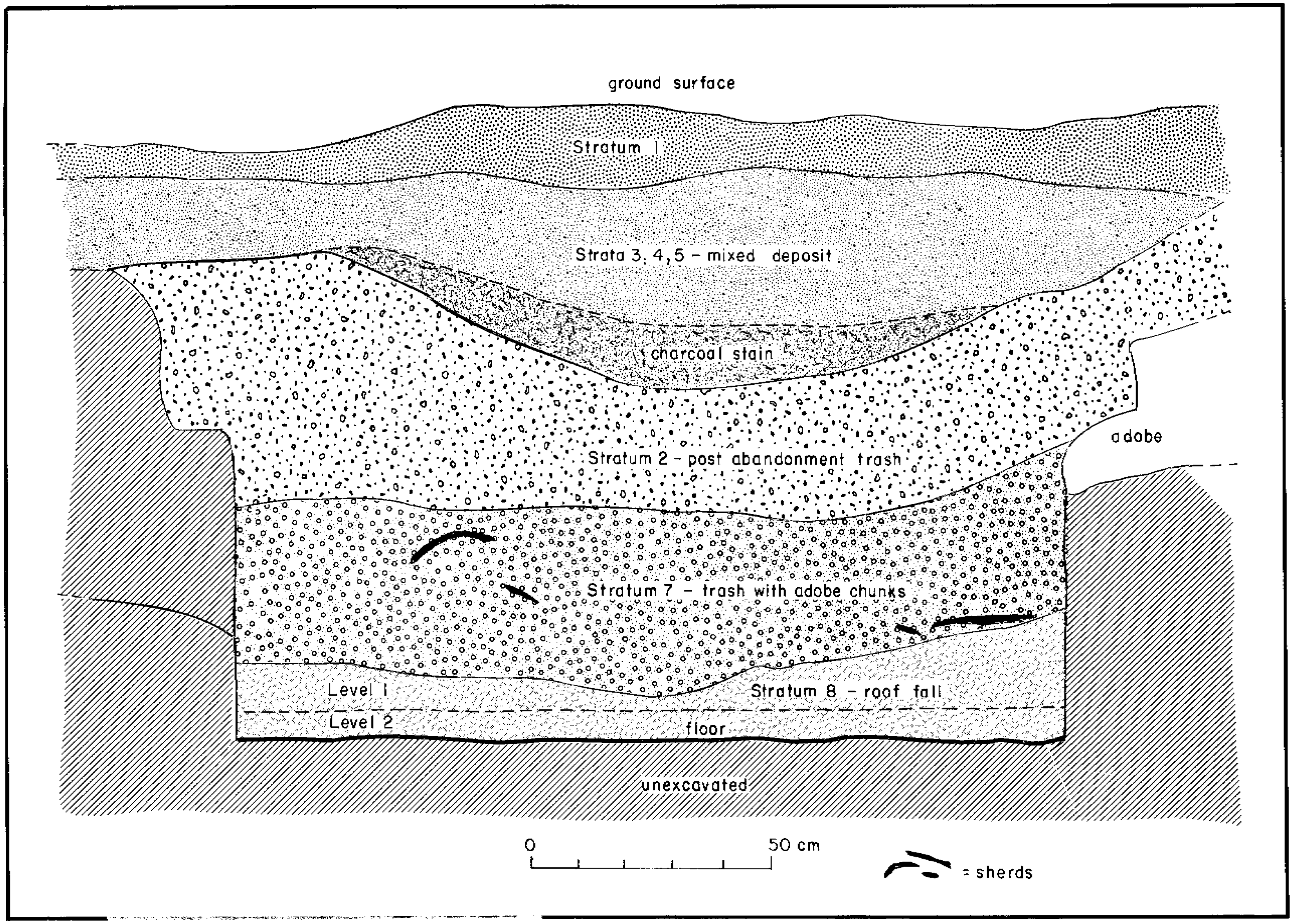

Figure 5. Stratigraphic profile of Pit Structure 1, backhoe trench, east face.

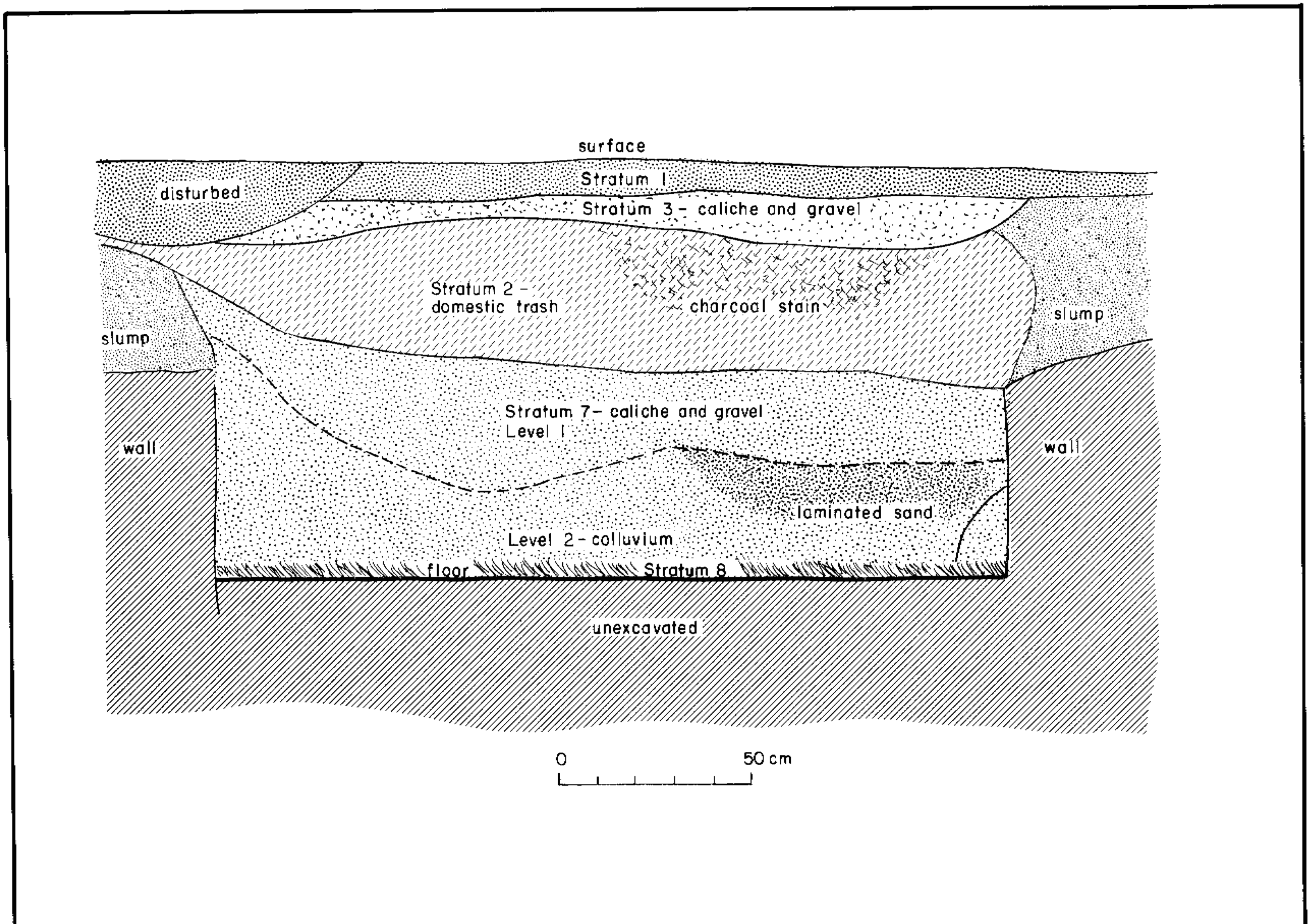

Figure 6. Stratigraphic profile of Pit Structure 2, north face.

Pit Structures

Pit Structure 1

General Description. Pit Structure 1 was roughly rectangular with rounded corners (Fig. 7). It measured 2.10 m north to south and 2.40 m east to west. Depth averaged 1.26 m below the present ground surface. Pit structure walls averaged 70 cm high. There was no evidence suggesting that the original height was much greater. The tops of the walls were roughly level with the Stratum 2/Stratum 3 interface, about 50 cm below modern ground surface. The builders appear to have removed the eolian deposits above Stratum 3, then excavated into the increasingly carbonate-rich Stratum 3, 4, 5, and 6.

Wall, Roof, and Floor Construction. The subsurface walls consisted of smoothed highly calcareous native subsoil grading into caliche. On the surface, a small section of adobe wall foundation (4 cm thick, Feature 20), paralleled the northeast wall of the pit structure, forming a surface alcove to the east (Fig. 7). This upper structure may have consisted of free-standing adobe walls. No evidence of varillas was found, so the presence of a jacal upper wall cannot be inferred. It is possible that any evidence was removed by modern agriculture, recent grading, or subsequent prehistoric site occupations.

Other than six post holes within the pit structure and the burned and melted adobe overlying the floor, there was little evidence from which to infer the roof configuration. Post holes C and H were slanted toward the center of the structure and may indicate that the roof was gabled. The roof fall provided no clue as to the roof form.

The structure's floor was prepared by excavating into the caliche subsoil, leveling the excavation, smoothing, and in some areas by plastering with a thin layer of adobe. The floor was essentially flat. In several areas, rodent burrows filled with clean sand were plastered over with at least a centimeter of adobe suggesting at least one short-term abandonment, later reoccupation, and structure repair.

Fill. Pit structure fill consisted of four distinct strata (Fig. 5). Excluding Stratum 1, the disturbed surface stratum, the strata were as follows. Stratum 3, 4, and 5 (for ease in analysis these strata are referred to as Stratum 3), were a mixed deposit ranging from 20 to 31 cm thick. Stratum 2 was post-abandonment trash containing charcoal, numerous artifacts, and cobbles. Thickness ranged from 18 cm near the wall to 54 cm at the center of the structure. Stratum 7 was more compact and had fewer artifacts than Stratum 2, and it contained pieces of adobe. The division between Stratum 2 and 7 was determined by differences in compaction. Stratum 7 ranged from 32 cm thick near the walls to 24 cm thick near the center of the pit structure. Stratum 8 was roof fall, large chunks of both burned and melted adobe, and interspaced pockets of fine ash and charcoal. The absence of roof supports within this stratum may indicate salvage of the beams for reuse or complete combustion; although the latter is not supported by the degree of burning on the structure floor or walls. This stratum ranged from 32 cm thick near the walls to 16 cm thick at the center. Stratum 8 was excavated in two levels. Upper fill was excavated to 5 cm above the floor, lower fill consisted of the remaining 5 cm.

Floor Features. The Pit Structure 1 floor features consisted of six post holes, a hearth, an ash pit, and a storage pit (Figs. 7 and 8). The six post holes were recessed into the north and south

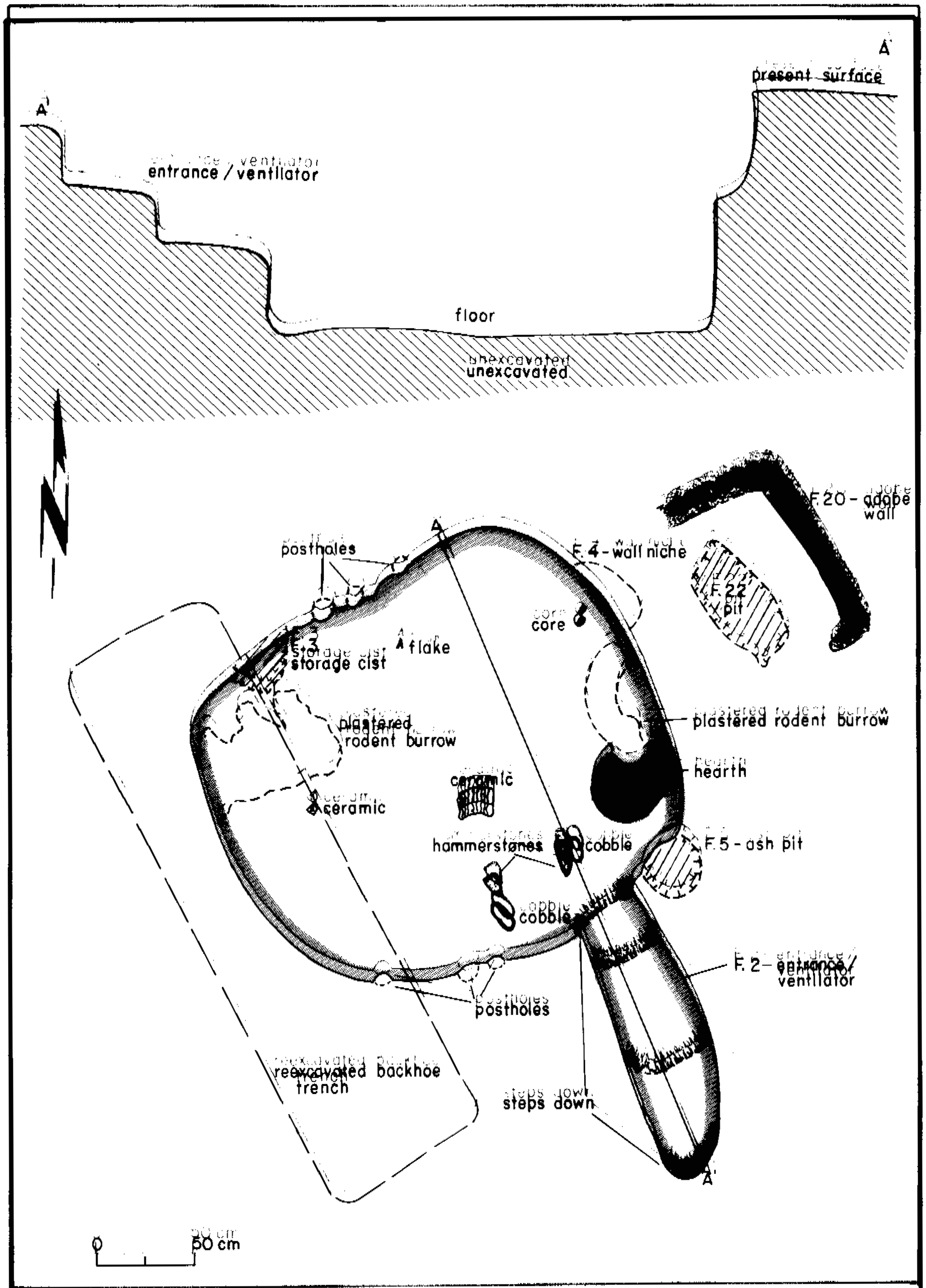

Figure 7. Pit Structure 1 plan and profile.

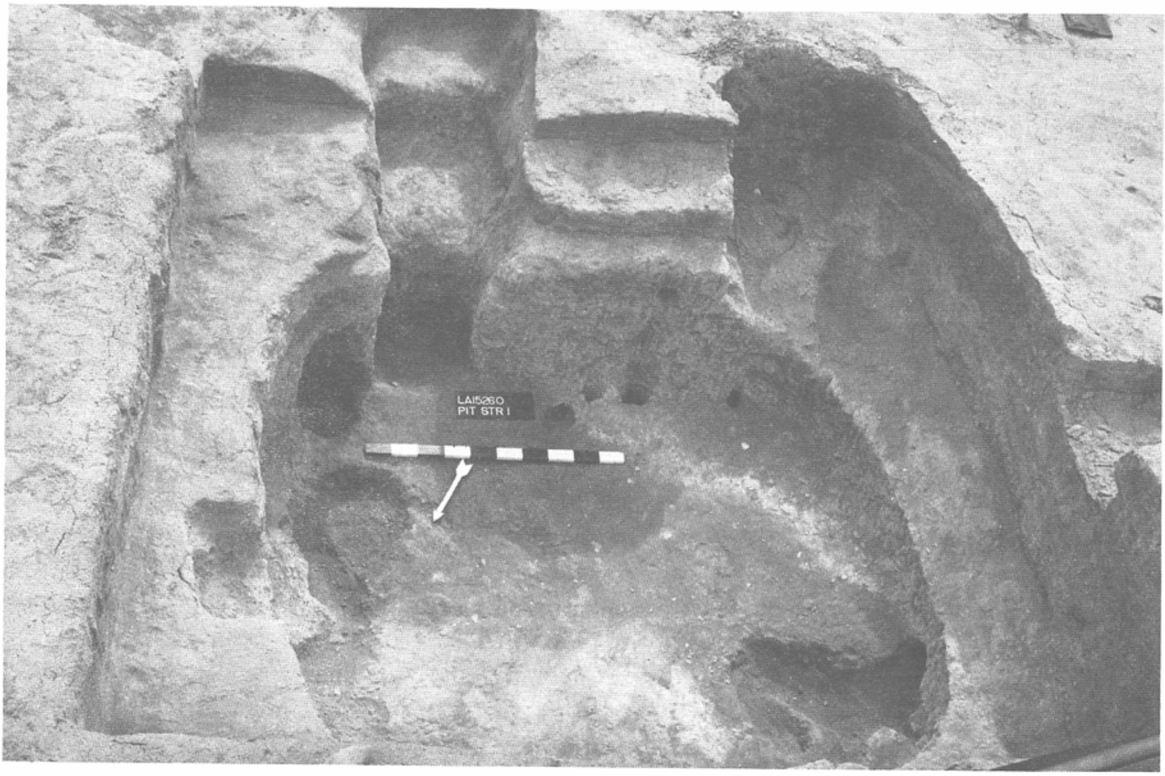

Figure 8. Pit Structure 1 after excavation.

walls of the structure. Post hole fill was fine loamy sand, suggesting that the posts were removed prior to the collapse of the roof. The holes ranged in depth from 10 cm (post G), to 28 cm (post B) with a mean of 15.3 cm and a standard deviation of 6.4 cm. Diameters ranged from 7.5 to 14 cm (mean 10.6 cm, standard deviation 2.1 cm). The walls next to post holes B, F, and G were indented. Post holes C and H were at acute angles roughly oriented toward the center of the room.

The ash pit, Feature 5, was 20 cm south of the hearth. Fill consisted of a level of roof fall overlying very ashy soil containing scant charcoal. This basin-shaped feature measured 30-by-30 cm and was excavated 24 cm below the structure floor. It was recessed 20 cm into the east wall of the structure. The hearth (Feature 6) was roughly circular measuring 42-by-38 cm in plan. A portion of the north edge had been removed by a rodent burrow. It was 10 cm deep at its maximum and roughly rectangular in profile. Fill consisted of a layer of ashy soil containing very little charcoal. Near the base was a layer of very compact ash with moderate amounts of charcoal. The caliche matrix forming the rim was blackened along the eastern edge and the interior of the feature was oxidized.

Entryway. Feature 2 was a stepped entrance oriented south-southeast. It was a maximum of 95 cm deep, 65 cm wide, and 1.40 m long. Excluding the ground surface, the feature had two steps and a slight depression, 9 cm lower than the pit structure floor, at the base of the steps. The fill in this feature matched the pit structure fill (Stratum 2, 7, and 8).

Wall Features. Feature 3 was a storage pit, excavated into the wall and floor in the northwest area of the structure. It measured 35 cm north to south, 33 cm east to west, and was 30 cm deep.

Fill was compact loamy sand, containing adobe chunks, small pieces of charcoal, and artifacts.

Feature 4, a small shallow niche, was excavated into the east wall 54 cm above the structure floor. It measured 26 cm deep, 41 cm long, and 20 cm wide. Its use is unknown.

Feature 14 was a shallow wall socket 8 cm in diameter, 6 cm deep, and 8 cm above the floor. It was directly above the east edge of the storage pit (Feature 3). Feature 15 was another wall socket, located 25 cm west of the west edge of Feature 3 (65 cm east of Feature 14). Its dimensions were 8 cm in diameter, 5 cm deep, and it was 20 cm above the floor. Their proximity to Feature 3 suggests that Features 14 and 15 may been associated with a feature cover.

Feature 17 consisted of two wall sockets 4 cm apart. One measured 10 by 4 cm and the other 9 by 4 cm. Both were 6 cm deep, 30 cm above the floor, and east of post hole 1H. Their function is unknown.

Floor Associated Materials. Floor fill, floor contact, and the floor feature fill produced a number of artifacts. On the floor were sherds, at least three hammerstones, a flake, and an expended core. Floor fill contained two vesicular basalt metate fragments, an abrader, a quartzite polishing stone, an igneous cobble with one ground edge, a shell pendant, a schist pendant, a bone awl, a white powdery material labeled diatomite, and a number of cores, hammerstones, and choppers. Black-on-white sherds included Socorro (n = 10), Chupadero (n = 3), and Kwahee (n = 4). Utility ware types recovered are Gray Indented Corrugated, Plain Gray, Pitoche Rubbed-Ribbed, Plain Brown, Plain Brown Smudged, and Los Lunas Smudged.

Floor and feature pollen samples suggest utilization, preparation, and/or storage of cholla cactus and corn in this structure. Flotation and macrobotanical samples produced hedgehog cactus, pigweed, corn, Cheno-ams, goosefoot, and ricegrass remains. Few bones were found (n = 15). These were from cottontail rabbits, jack rabbits, and an unidentified large mammal or artiodactyl.

Pit Structure 2

General Description. Pit Structure 2 (Fig. 9) was nearly circular, measuring 2.63 m north to south and 2.20 m east to west. The floor was 1.10 m below the present ground surface, the extant walls ranged from 56 cm to 68 cm high. There was no evidence suggesting that the subsurface walls were much greater in height during the occupation of the structure. As with Pit Structure 1, the walls of this structure were roughly level with the top of Stratum 3. The structure was constructed by excavating a pit through Stratum 3 and terminating within Stratum 6.

Wall and Floor Construction. The walls of Pit Structure 2 were unplastered caliche. No wall treatment other than smoothing was evident. The floor was prepared by leveling and smoothing. It was blackened by the ash lying directly over it (Stratum 8) and was not plastered.

Fill. The fill of Pit Structure 2 (excluding the disturbed Stratum 1) consisted of the following Strata (Fig. 6). Stratum 3 ranged from 4 to 15 cm thick. The caliche and gravel in this stratum may represent remnants of the surface structures located northwest of the pit structure (Fig. 3). Stratum 2 was a 14 to 39-cm-thick deposit of artifacts, charcoal, and ash, probably domestic trash associated with the occupation of Pit Structure 3. It was near the base of this stratum that the walls of Pit Structure 2 became well defined.

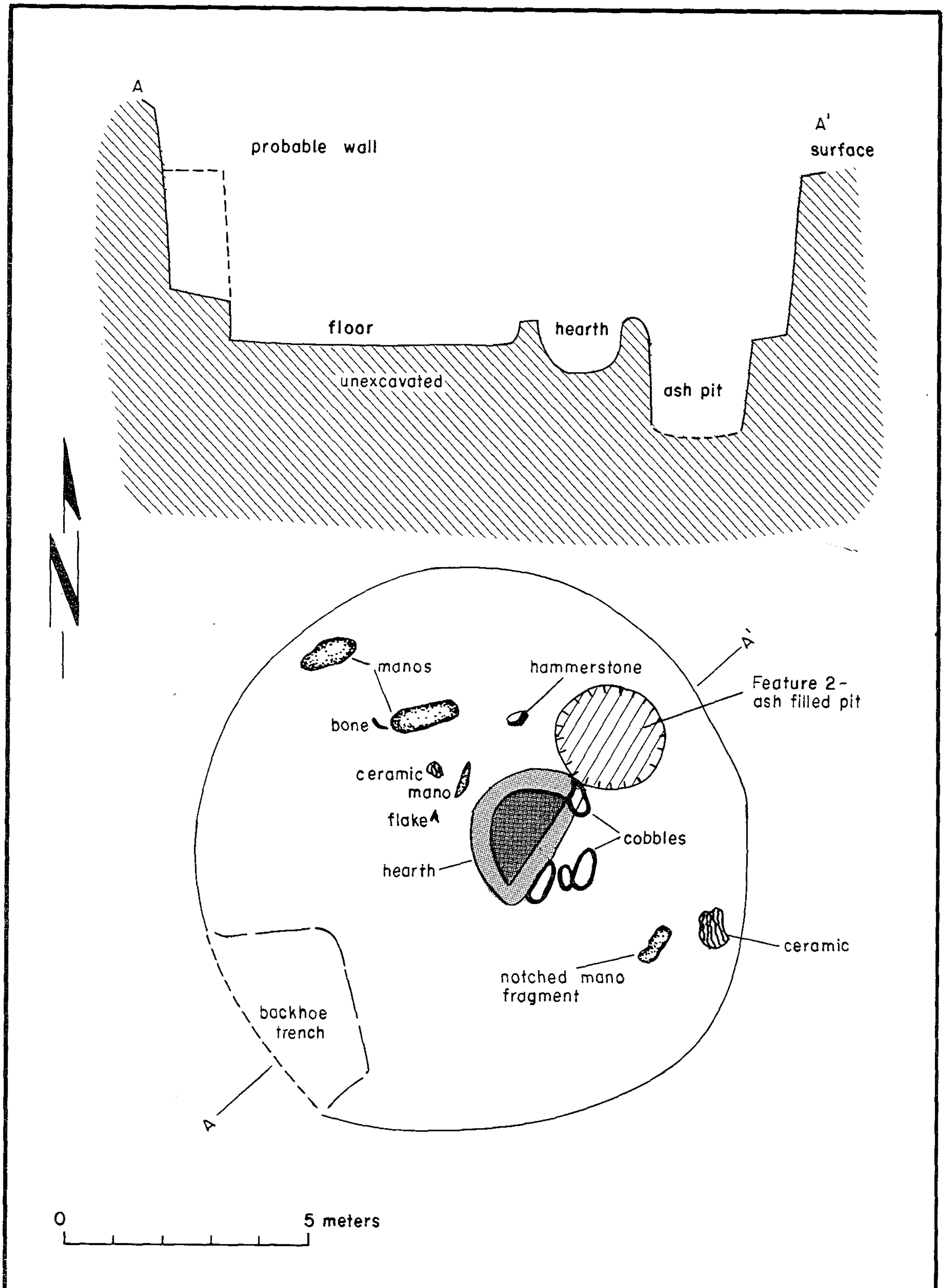

Figure 9. Pit Structure 2 plan and profile.

Figure 10. Pit Structure 2 after excavation.

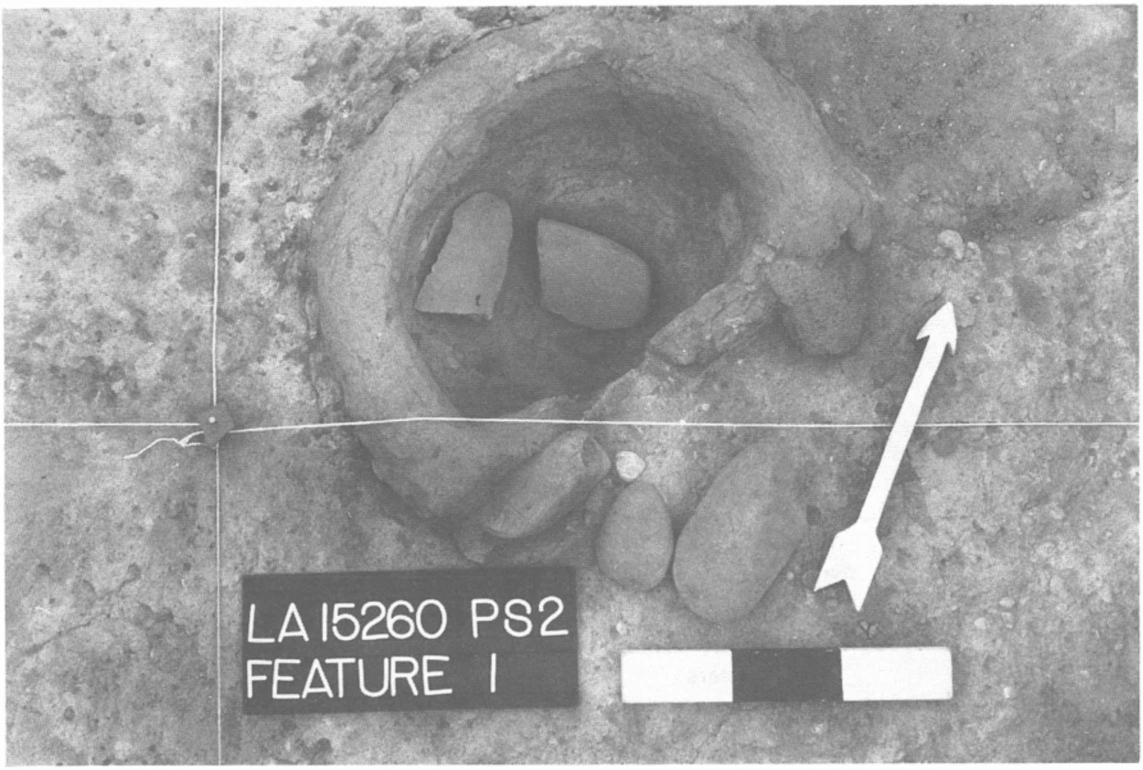

Figure 11. Detail of Pit Structure 2 hearth.

Figure 12. Adobe mass resting on floor of Pit Structure 2.

The next unit, Stratum 7, was removed in two levels. Level 1 contained pockets of caliche and gravel (Stratum 3), some charcoal, and little in the way of artifacts. It ranged from 10 cm at the walls to 34 cm thick at the center. The pockets of caliche and gravel may represent the construction of Pit Structure 3. Level 2 of Stratum 7 had no gravel or caliche. It consisted of laminated lenses of colluvium with pieces of roof fall projecting into it from Stratum 8 below. Stratum 7 ranged from 60-cm thick at the structure walls to 19-cm thick at the center.

Stratum 8 consisted of roof fall, ash, and artifacts. It was 5 cm thick except where portions of roof fall extended into Stratum 7. The roof fall was melted and structural supports were absent, perhaps indicating either recovery of the beams for later use or complete combustion, which is unlikely given that the roof fall was not burned.

Floor Features. Two floor features were found within Pit Structure 2 (Fig. 10), a hearth and an ash-filled pit that may have served as a storage pit. Feature 1, the hearth, measured 53 by 57 cm and was 17 cm deep. It was surrounded by a D-shaped adobe collar that extended 10 to 14 cm above the floor (Fig. 11). The sides and the base were also adobe-lined. Several large cobbles were found on the floor east of the feature, two were partially incorporated into the collar. The cobbles may have functioned as vessel supports or to retain heat within the feature. Feature fill consisted of 5 cm of roof fall, overlying 14 cm of loose coarse sand with several small pieces of adobe at the base. No charcoal was found. Artifacts in the fill included a reconstructible mano and a lithic.

Feature 2, 2 cm north-northeast of the hearth, was a cylindrical pit measuring 46-by-40 cm and 40-cm deep. Two distinct levels of fill included 5 cm of sterile roof fall overlying 35 cm of loose sand and ash containing two trough metate fragments and a mano. The base of the feature was compacted caliche and gravel.

No other floor or wall features were recognized. The absence of post holes within or surrounding the structure implies that the upper walls were free standing, perhaps constructed of jacal, which can be difficult to detect archaeologically. Evidence of wall or roof supports may have been removed during later site occupations or by modern agriculture.

Roof Feature. Within the roof fall was a crescentic mass of partially melted adobe lying immediately southeast of the hearth (Fig. 12). Upon excavation the mass was found to be resting above the floor within the roof fall and is interpreted as either a roof entrance or a smoke hole, most likely a smoke hole due to its location. A 40-cm diameter is inferred from the surviving section.

Floor Associated Materials. Complete manos dominate the floor, floor fill, and floor feature assemblage from Pit Structure 2. The four complete manos located for analysis include two of sandstone and two of vesicular basalt. Two additional manos are listed on the field specimen sheets but could not be found. Other materials include two vesicular basalt metate fragments, a lithic, a core, and a hammerstone. Sherds were sparse and the wares found are identical to those from Pit Structure 1 except that Kwahee Black-on-white is absent.

Pollen, including Cheno-ams, corn, cholla, prickly pear, squash, and globemallow, was identified in samples from this structure. Macrobotanical and flotation analyses identified goosefoot, pigweed, ricegrass, and corn. Few bones were found and these nearly duplicate the species assemblage from Pit Structure 1: cottontail rabbit, jack rabbit, and small mammal.

Pit Structure 3

Only the ventilator shaft of Pit Structure 3 was excavated (Feature 13). It was located 92 cm south of Pit Structure 2 and contained three levels of fill. Six centimeters of melted adobe sealed the feature at the Stratum 2 and 3 interface. Whether the feature was intentionally sealed or this resulted from structural adobe melt could not be determined. Beneath the adobe was 74 cm of sand with occasional small pieces of charcoal, then 60 cm of sand mixed with large pieces of unburned roof or wall fall. The dimensions of this feature were 64 cm east to west, 66 cm north to south, and 1.40 m deep. The vent sides were lined with 8 to 14 cm of adobe.

Unlike Pit Structures 1 and 2, Pit Structure 3 had associated exterior post holes (Feature 16, Fig. 3). Immediately north and to the west of the vent were three post holes (14-by-14-by-8 cm, 18-by-20-by-20 cm, and 22-by-23-by-22 cm) radiating from the edge of the pit structure toward the vent. Two other post holes (18-by-19-by-13 cm and 19-by-25-by-42 cm) were near the southwest edge of the structure.

As mentioned in the Pit Structure 2 strata descriptions, the native soil, caliche, and gravel in Stratum 3 may represent the excavation of Pit Structure 3. If true, the Stratum 2 trash deposit in Pit Structure 2, which overlies Stratum 3, was associated with the occupation of Pit Structure 3.

Surface Structures and Exterior Features

Due to recent agricultural disturbance, evidenced by plow marks at the base of Stratum 2, and the relative scarcity of diagnostic ceramics, the surface structures and features surrounding the structures could not be assigned to a specific site occupation. Features 15 and 31 were superimposed over Pit Structures 1 and 2. If these pits are associated with surface structures, this would suggest that the surface structures date to the last or an otherwise unrecognized occupation of the site.

Surface Structure 1 (Feature 6)

Surface Structure 1 was located south of Pit Structure 1 (Figs. 13 and 14). It consisted of ten post holes (post holes A to J), in a roughly rectangular configuration that measured 2.70 m north to south and 1.90 m east to west (maximum interior dimensions). The southwest corner of this structure was removed by a testing phase backhoe trench. The post holes ranged from 14 to 35 cm in depth (mean 22.4, standard deviation 7.4 cm) and from 13 cm (post holes B and I) to 22 cm (post hole D) in diameter (mean 17.1, standard deviation 3.3 cm). Within the structure were two pits. Feature 5, a small unburned pit along the east edge of the structure, measured 34-by-28 cm and was 13 cm deep. It was roughly oval in plan and basin shaped in profile. Fill was Stratum 2 deposits. Feature 7, another unburned pit, measured 73 cm north to south, 62 cm east to west, and was 20 cm deep. It was oval in plan, irregular in profile, and heavily disturbed by rodent burrowing. Just northeast of Feature 6 was a very shallow pit, Feature 12, which was possibly a borrow pit. It measured 50-by-42 cm in diameter, was irregular in plan and basin shaped in profile. Fill was darkly stained soil, probably Stratum 2 material.

No indication of adobe, jacal, or of a prehistoric use surface was found in association with the structure. Such evidence may have been destroyed by later site occupation or by recent plowing or grading.

Post Hole Alignment (Feature 18)

Approximately 2 m east of Pit Structure 1 was a semicircle of eleven post holes that partially enclosed an area 1.98 m north to south and 58 cm east to west (Feature 18, posts A to K; Fig. 15). The post holes ranged from 15 to 6 cm in diameter, and from 23 to 30 cm in depth. As with Surface Structure 1, there was no apparent prehistoric use surface associated with this edifice. It may have functioned as a ramada, wind break, sun shade, a drying rack, or it may have been an architectural element of Pit Structure 1, although the distance separating the two seems to preclude the latter.

A number of pits were found in the vicinity of the Feature 18 post holes and north or northeast of Pit Structure 1. These pits and Feature 18 are all within 4 cm of the same vertical level and may have been used contemporaneously.

Feature 10, a large unburned pit, was only half excavated. It measured 1.2 m east to west and was approximately 53 cm deep. Upper fill was loose eolian sand with no charcoal and few artifacts. Lower fill contained much caliche and some charcoal.

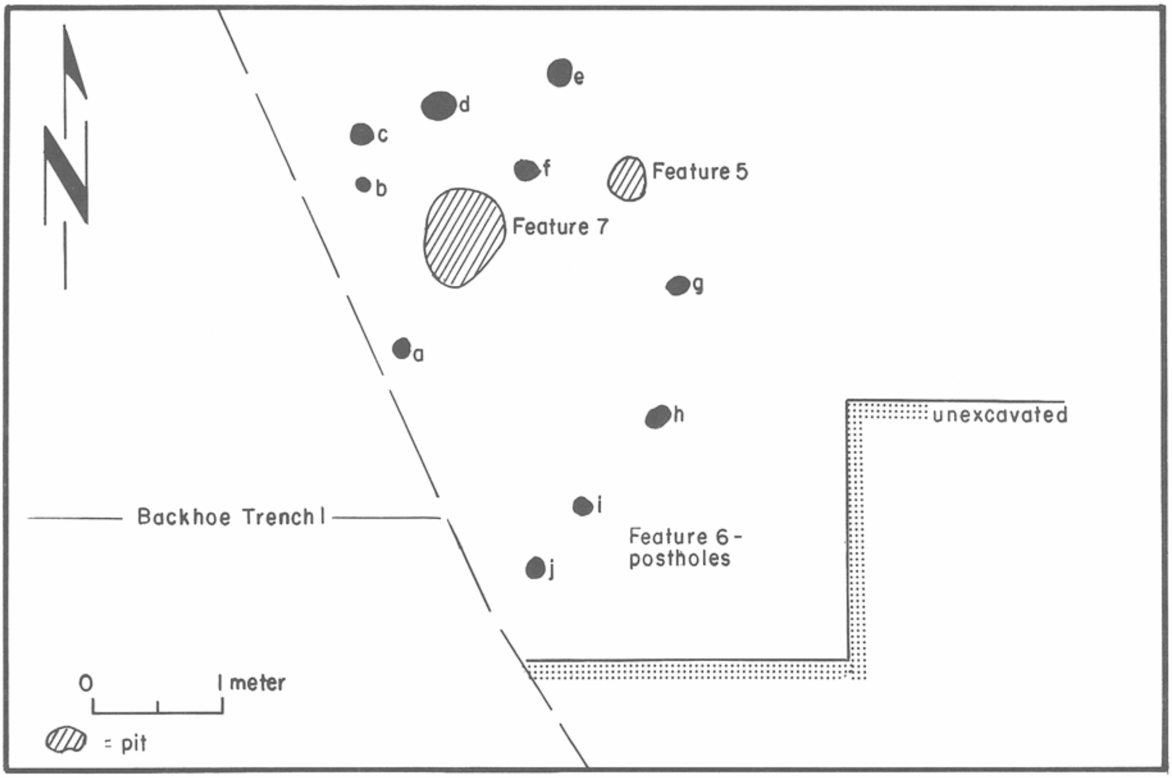

Figure 13. Surface Structure 1 (Feature 6).

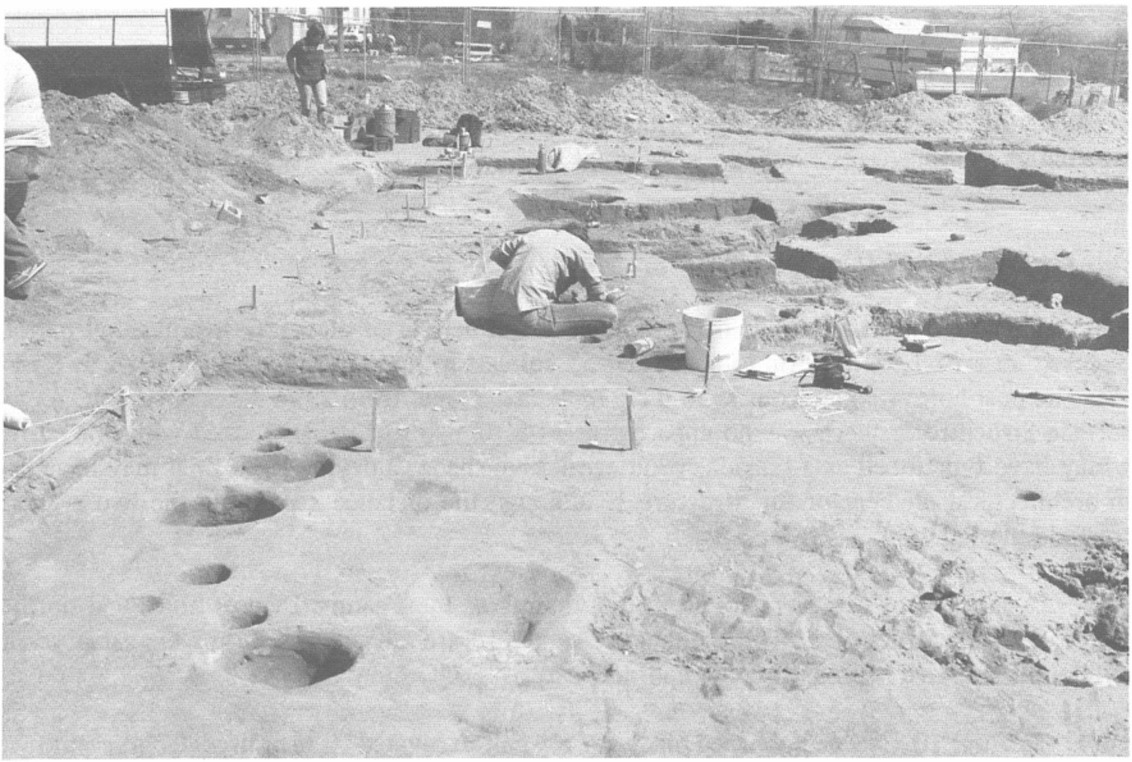

Figure 14. Surface Structure 1 after excavation.

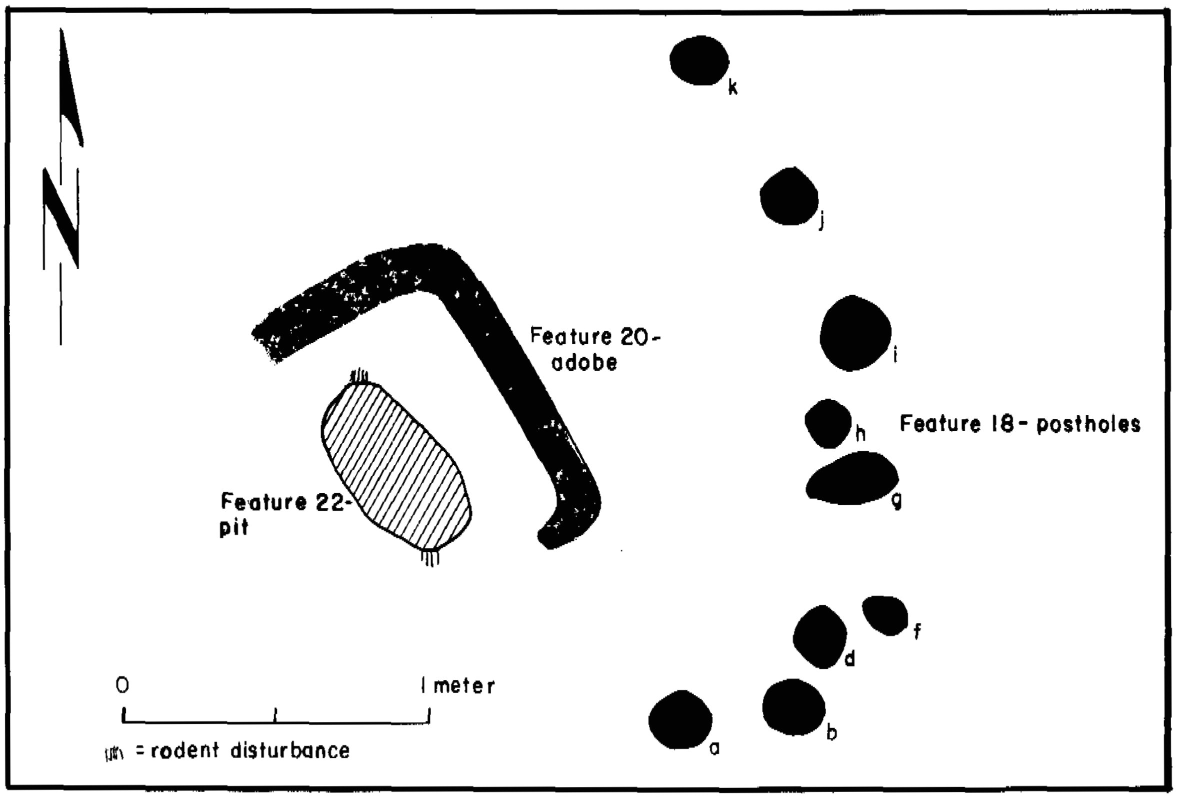

Figure 15. Post alignment, Feature 18.

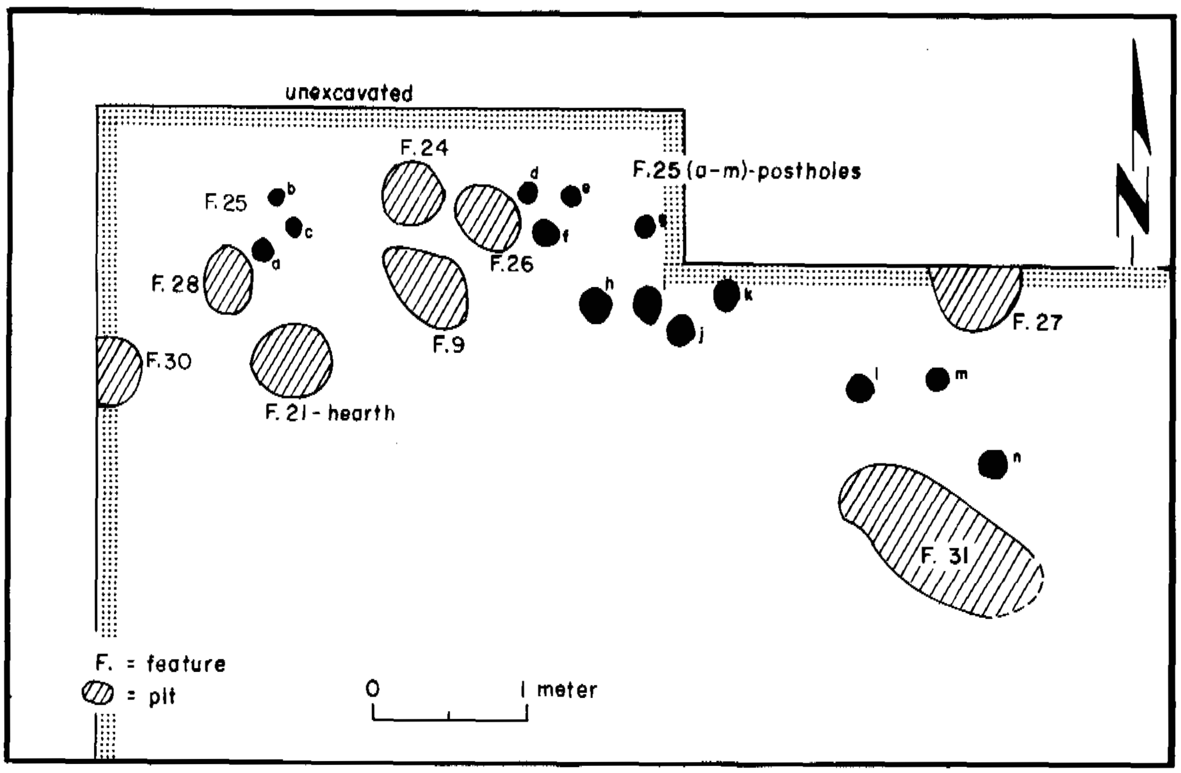

Figure 16. Feature 25 and nearby features.

Just north of Pit Structure 1 was Feature 14, a heavily burned clay-lined hearth. It was oval in plan, basin shaped in profile and measured 74 cm north to south, 58 cm east to west, and was a maximum of 7 cm deep. Fill was fine ash with virtually no charcoal. Near the hearth was Feature 23, an oval-shaped cobble-filled pit. Fill was darkly stained loose sand with some charcoal, the burned cobbles, and burned sherds. It measured 53 by 50 cm and was a maximum of 12 cm deep.

Feature 15 partially overlaps Pit Structure 1 and was removed with the pit structure fill. The portion remaining outside the structure indicates an oval pit 46 cm in diameter with a flat bottom at 23 cm deep. Fill was unconsolidated sand with a few sherds, lithics, and a metate fragment.

Feature 22 was located within Feature 20, the adobe alcove adjacent to Pit Structure 1, but apparently was not associated with the alcove. It was oval shaped and measured 62 by 34 cm and up to 22 cm deep. Fill was a few centimeters of dark stained ashy soil that gradually became more clayey with less charcoal. Unburned deteriorated adobe was observed near the sides and bottom of the pit.

Post Hole Alignment (Feature 25)

Feature 25 was a series of 14 post holes northwest of Pit Structure 2 (Fig. 16). Post holes A through C, and D through F formed a configuration that may represent the southwest and southeast corners of a surface structure, with the northernmost corners in an unexcavated area. These six post holes varied from 13 to 19 cm in diameter (mean 15.3 cm, standard deviation 2.1 cm), and from 5 to 30 cm in depth (mean 18.3 cm, standard deviation 9.2 cm). Assuming these post holes do represent a structure, they would enclose an area 1.30 m east to west with an unknown dimension north to south. Post holes G through N ranged from 16 to 21 cm in diameter (mean 17.7 cm, standard deviation 2.5 cm), and from 14 to 35 cm in depth (mean 21.6 cm, standard deviation 9.9 cm, n = 5). Post holes H, I, and J form a small arc opening to the south-southwest and enclosing an area approximately 80 cm wide. Post holes G, K, L, and N form a straight line 2.9 m in length and oriented west northwest. Except for post hole series A through F, the remainder can be interpreted as the remains of surface structures, although the particular type of structure (ramada, storage structure, or wind break) cannot be inferred.

In the vicinity of Feature 25 were Features 9, 21, 24, 26, 28, 29, 30, and 31 (Fig. 16). Except for Feature 21, a hearth, and Feature 24, a storage pit, no functions could be assigned. All are within 6 cm of the same vertical level suggesting they could have been used contemporaneously and in association with Feature 25.

Feature 9, a shallow unburned pit, was oval in plan, measuring 54 cm northwest to southeast and 50 cm northeast to southwest. Fill consisted of a 2 to 4-cm-thick lens of melted adobe containing no artifacts overlying a 6-cm-thick lens of what appeared to be Stratum 2 deposits.

Feature 21, a hearth, measured 46 cm north to south and approximately 44 cm east to west. Rodent burrowing destroyed portions of the feature's edge. Fill was an ash lens varying from 2 to 4 cm thick over a mixture of ash, burned soil, and sand 2 to 8 cm thick.

A storage pit, Feature 24, was circular in plan measuring 40 cm in diameter, cylindrical in profile, and consisted of three layers of fill totaling 31 cm in depth. Upper fill was sand with ash varying in thickness from 7 to 18 cm. Middle fill was darker sand with ash and charcoal. The lower fill was 4 to 14 cm of sandy clayey fill.

An unburned pit, Feature 26, was roughly oval in plan and basin shaped in profile. It measured 45 cm north to south, 44 cm east to west, and was 19 cm deep. The fill was sand with small pieces of burned adobe and few artifacts. Its function is unknown.

Another unburned pit, Feature 28, was oval in plan and basin shaped in profile. It measured 42 cm north to south, 32 cm east to west, and was 21 cm deep. Fill was an upper layer, ranging in depth from 7 to 21 cm thick, similar to Stratum 2 but with the addition of small pieces of melted and burned adobe. Lower fill was 2 to 14 cm of fill also similar to Stratum 2, but containing more sand than a typical deposit of this stratum. The prehistoric use of this feature is unknown.

Excavation of roughly half of unburned Feature 29 exposed an oval pit with an irregular profile. It measured approximately 80 cm north to south, 58 cm east to west, and was 22 cm deep. Fill consisted of two levels. Up to 16 cm of fill, similar to Stratum 2 in Pit Structure 2, was at the center of the feature, possibly domestic trash associated with the occupation of Pit Structure 3. The remainder of the fill contained less charcoal and more clay than the preceding level.

Roughly one half of unburned Feature 30 was excavated, exposing a nearly circular plan and a slightly belled profile. It measured 42 cm north to south, approximately 45 cm east to west, and was 22 cm deep. The feature fill consisted of an upper level of Stratum 2 material overlying ashy sand.

Feature 31, an unburned pit, partially intruding into Pit Structure 2, was partially removed with the pit structure fill. It measured 72 cm northeast to southwest, approximately 1.4 m northwest to southeast, and was 34 cm deep. Fill was loosely consolidated loamy sand containing few artifacts. If the feature had been part of Pit Structure 2, the fill should have resembled that found within the pit structure. Since this was not the case, Feature 31 was probably associated with the occupation of Pit Structure 3.

Other Features

Features 19 and 27, as well as the unexcavated features exposed in the backhoe trenches, could not be associated with a specific occupation or other features at the site. Feature 19, approximately 10 m northeast of Pit Structure 1 (Fig. 3), was located by a backhoe trench. It was an unburned circular pit measuring 1.2 m in diameter and 24 cm deep. Fill was sand with small pieces of charcoal.

Feature 27 consisted of two post holes located between Pit Structures 1 and 2 and adjacent to a 1984 backhoe trench. These measured 17 cm in diameter and were 16 and 29 cm deep. Fill was compact pebbly soil that became looser and sandier.

Midden Features

Although it was not given a feature number, the midden area was a large borrow pit (Figs. 3 and 4). The midden depression measured approximately 8 m north to south, at least 7 m east to west and had a maximum depth 40 cm. This borrow pit, which formed the base of the midden, and the other midden features, is grouped with the occupation of Pit Structure 1 for analytical purposes.

Feature 1, a borrow pit, measured 3.14 m north to south, 1.36 m east to west, and was 30 cm deep at its maximum. It was subrectangular in plan and irregular in profile. Fill consisted of the lowest level of Stratum 2, indicating that it was most likely utilized during the construction or the occupation of Pit Structure 1.

A shallow unburned pit, Feature 2, measured 27 cm north to south, approximately 25 cm east to west, and was 23 cm deep. It was oval in plan and basin shaped in profile, with slight belling at the base. Fill consisted of 6 cm of material identical to Level 3 in Stratum 2 and suggesting that it, too, was associated with the occupation of Pit Structure 1. Lower fill was sandy with several burned cobbles, sherds, and lithics. This feature may have been a small storage pit or a large post hole.

Feature 3 was a large roofed storage pit (Fig. 17) that measured 1.05 m north to south, 1.68 m east to west, and 75 cm deep. It was keyhole shaped in plan and bell shaped in profile. Interior wall sockets and an adobe layer resting on the feature floor indicate that it was roofed. Fill consisted of three strata. The upper fill (A) was 34 cm of charcoal-laden loamy sand containing artifacts, burned adobe clumps, and burned corn remains. Middle fill (B), 28 cm thick, contained less charcoal, fewer artifacts, and several cobbles. Lower fill (C), 22 cm thick, consisted of very compact clayey sand, melted and burned adobe (roof fall), pockets of loose sand, and artifacts. Some of the artifacts in this level, specifically the metate fragments and cobbles, may have been resting upon or incorporated into the feature's roof. Adjacent to Feature 3 was a basin-shaped depression 22 cm deep that may have served as an access into the main storage pit.

Sherds of Socorro Black-on-white (n=7), Kwahee Black-on-white (n=1), Gray Indented Corrugated (n=4), Plain Gray (n=4), Pilares Banded (n=1), Pitoche Rubbed-Ribbed (n=2), Plain Brown (n=9), and Plain Brown Smudged (n=2) were found in Feature 3. Two metate fragments, an unknown ground stone fragment, a chopper, and at least one hammerstone were also recovered. Pollen from cholla and corn was present as were burned corn and pigweed.

Another borrow pit, Feature 4, was a shallow, basin-shaped depression, 64 cm north to south, 63 cm east to west, and averaging 6 cm deep. Owing to rodent disturbance and the shallow nature of this feature, the artifacts recovered from the fill were considered to be grid fill. This borrow pit appears to have been in use during the occupation of Pit Structure 1.

Also a borrow pit, Feature 8 was irregular in shape measuring 1.6 m north to south, 1.9 m east to west, and ranged from 20 to 40 cm deep. Due to time and budget constraints, only the north half of this feature was excavated. As with several of the preceding features, the upper fill was identical to that found in Level 3 of Stratum 2 in the midden, that is, 15 cm of dark charcoal-stained soil containing numerous artifacts and small pieces of burned adobe. The lower fill was a more compact sand with less charcoal staining, fewer artifacts, and gravel.

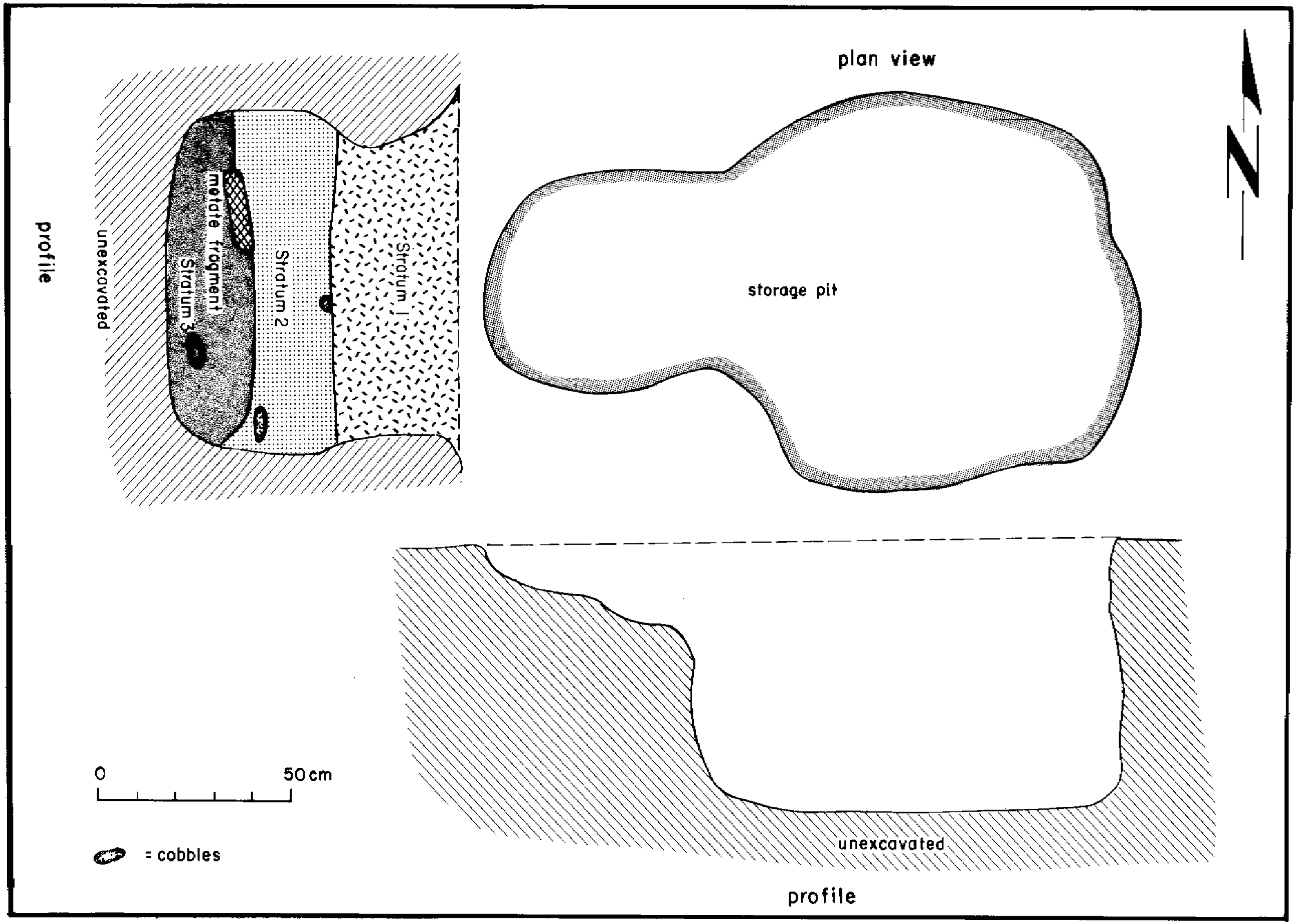

Figure 17. Midden Feature 3 plan and profile.

Only the northern half of Feature 11, another borrow pit, was excavated. It measured approximately 1.20 m north to south, 83 cm east to west, and averaged 15 cm deep. It was irregular in plan and slightly basin shaped in profile. Fill consisted of the lowest level of Stratum 2 and it was most likely associated with the occupation of Pit Structure 1.

Occupational Sequence

At least three distinct occupational episodes are recognized for LA 15260. The post testing research design relied heavily on the recovery of dendrochronological samples to place the site in a tight time reference. Unfortunately, no dendrochronological specimens were recovered, forcing reliance on stratigraphy and radiocarbon dates for chronological placement.

Occupation 1

The cultural material associated with the first occupation consists of remains recovered from Pit Structure 1, Strata 2, 7, 8, the floor, and the fill of the features; midden Stratum 2, Level 3; and the fill of the midden features.

In Pit Structure 1 (Fig. 5) all strata below Stratum 3 (Strata 2, 7, and 8), which appear to be in-situ cultural fill of native soil, caliche, gravel, and artifacts, are believed to have been deposited during the excavation and construction of Pit Structure 2. These deposits are associated with the first site occupation, either as primary in situ fill (the fill of the floor features and point plots) or as a secondary post-abandonment deposit consisting of artifacts redeposited in the abandoned Pit Structure 1 depression by natural agents.

Level 3 in the midden (Fig. 4) and the midden features are assigned to Occupation 1 because the midden itself is a large borrow pit. The fill removed from this pit is thought to have been used in the construction of the superstructure of Pit Structure 1. If true, the basal midden features and the lowest discernible level in the midden contain cultural materials associated with Occupation 1.

A radiocarbon sample (Beta 16462), consisting of dispersed charcoal recovered from the floor of Pit Structure 1, yielded a date of A.D. 710 $\pm$ 90. This date seems quite early considering the ceramic evidence. Stuiver and Becker (1986) have calibrated radiocarbon dates in regard to the recognized fluctuations in radiocarbon content in atmospheric CO^2. When calibrated, this sample would date between A.D. 668 and A.D 890, with a midpoint of A.D. 774 and a 95 percent confidence level for measurement uncertainties of the Libby half-life of 5568 years. Charcoal recovered from the fill of Feature 3, a once roofed storage pit found at the base of the Midden, was radiocarbon dated A.D. 560 $\pm$ 110 (Beta 16464). When calibrated according to Stuiver and Becker (1986) it has a date range of A.D. 560 to 764 with a midpoint of A.D. 664 at a 95 percent confidence level. The Feature 3 date range overlaps with the date from the pit structure floor, although when compared with the accepted production dates for the ceramic wares associated with this occupation, it is somewhat early.

Occupation 2

The cultural material associated with the second site occupation comes from Pit Structure 1, Stratum 3, 4, and 5; Pit Structure 2, Stratum 7 and 8, the floor material, and feature fill; and midden fill, Stratum 2, Level 2. As with the fill of Pit Structure 1, Pit Structure 2 had a deposit of Stratum 3 in the upper fill (Fig. 6). Stratum 3 in Pit Structure 2 is thought to be remnants of the surface structures immediately northwest of the pit structure. Below Stratum 3 is Stratum 2, a domestic trash deposit associated with Occupation 3 and below Stratum 2 lies Stratum 7, a sandy matrix with gravel and caliche. Whereas Stratum 3 in Pit Structure 1 is thought to represent the construction of Pit Structure 2, Stratum 7 in Pit Structure 2 is thought to represent the construction of Pit Structure 3, with the excavated native soil, caliche, gravel, and artifacts filling the still extant depression of the pit structure. This isolated Stratum 8 represents deposits most closely associated with the occupation of this pit structure.

As discussed in the strata section, the midden contained discontinuous lenses of Stratum 3 consisting of native soil, caliche, gravel, and artifacts, and which were used to separate the midden Stratum 2 into three levels, each level representing a particular site occupation (Fig. 4). The discontinuous nature of the Stratum 3 lenses suggests some mixing of the materials from the discrete occupations has occurred.

Combined charcoal samples (Beta 16461) from the floor of Pit Structure 2 produced a radiocarbon date of A.D. 1060 $\pm$ 70. When adjusted according to Stuiver and Becker (1986) a date range of A.D. 1027 to 1221 is indicated with a midpoint date of A.D. 1158 at a 95 percent confidence level.

Occupation 3

The third occupation of the site is represented by the cultural material recovered from Pit Structure 2, Stratum 2 and 3, and midden Stratum 2, Level 1 (Figs. 4 and 6). Feature 13, the ventilator shaft for unexcavated Pit Structure 3, is also lumped with this occupation, even though the fill of this feature contained too few artifacts from which to base any conclusions.

A radiocarbon sample (Beta 16465) recovered from the dispersed charcoal occurring in Feature 13 indicates a date of A.D. 930 $\pm$ 80. When calibrated to Stuiver and Becker (1986) a range from A.D. 904 to 1149 is suggested with a midpoint of A.D. 999 at a 95 percent confidence level. This date is approximately 160 years earlier than the date from Pit Structure 2, which is believed to have predated this pit structure.

Potential Sources of LA 15260 Radiocarbon Date Errors

The previous paragraphs indicate problems with the resultant radiocarbon dates. Occupa tions assigned on the basis of stratigraphic association appear to result in congruous lithic and ceramic assemblages. Yet, the radiocarbon dates, with the exception of the combined samples from the floor of Pit Structure 2, are too early.

Smiley (1985:38-45) has identified several sources of potential error in radiocarbon dating:

1. Field sampling error involves the misidentification of provenience information or the sampling of mixed strata or disturbed contexts.

2. Built-in age bias occurs when the prehistoric occupants of a site scavenged dead surface wood.

3. Cross-section effect is where the sample may be from an inner ring of the organism, therefore providing a date for that specific ring or rings rather than for the death of that organism.

4. Libby half-life error underestimates the age of a sample when the Libby half-life of 5568 is not adjusted to the more accurate half-life of 5,730 years.

5. Contamination, often by rootlets, results in an underestimation of the sample age.

6. Calibration error is caused by fluctuations in the heliomagnetic modulation of the galactic cosmic radiation and, recently, by the burning of fossil fuels and the explosion of nuclear devices in the atmosphere. These calibrations assume that the material dated was short lived (i.e., living less than ten years, such as leaves, small branches, food remains, etc.), otherwise the old wood problem would resurface.

7. The probability of counting error increases as the size of the sample decreases.

8. Klein et al. (1982) have shown that the analyses of the same sample by different laboratories can produce dissimilar results (lab bias).

9. Isotopic fractionation refers to the differing metabolic absorption rates of C-12, C-13, and C-14 isotopes by disparate plant species. Without fractionation correction, the radiocarbon age may be underestimated.

Considering the possible errors in reaching a viable radiocarbon date, two are potential sources for the earlier than expected dates associated with Occupations 1 and 3 at LA 15260. These are built-in age and the cross-section effect. Both would result in an overestimation of the radiocarbon age.

Smiley's (1985) ethnoarchaeological and computer simulation studies of Black Mesa Navajo sites utilizing samples that had been dendrochronologically dated indicate that the built-in age effect from old juniper and pinyon generates an overestimated age of around 100 years. This implies that surface wood was available for the 100 years following the death of the parent organism. In the extreme, one recent Navajo site contained a wood sample dating to A.D. 1156. Smiley also found that old wood was differentially selected. More old wood was used at shorter term seasonal sites, temporary structures, and as a fuel than at long-term or permanent structures. Built-in age bias is not limited to scavenging dead surface wood for use as structural components or as a fuel. Incorporation of structural members from old dwellings into new ones has been a problem in Southwest archaeology since scientific dating procedures were initiated (see McKenna 1984; Morris 1986; Richert 1964; Vivian and Mathews 1964). In a more recent context, the Pueblo of Acoma is currently rebuilding portions of the old pueblo using beams dendrochronologically dated as having been first used in the seventeenth century along with recently cut members (Stephen C. Lent, pers. comm.). Reuse of structural elements may be a primary factor in the earlier than expected date for Pit Structure 3 (Occupation 3).

Regarding the cross-section effect, Smiley (1985) determined that the average cross-section value for juniper and pinyon was 50 years. Taken together, the built-in age effect and the cross-section effect could account for an overestimation of age in the 200 to 300 year range.

MATERIAL CULTURE

Sampling Strategy

The large quantity of artifacts recovered necessitated sampling ceramics and lithics. Most of the artifacts eliminated from the analysis were from Stratum 1 because this stratum was considered disturbed and contaminated by historic materials. Table 2 gives the approximate number of bags not analyzed by strata and the total number of bags analyzed for comparative purposes.

Table 2. Number of Unanalyzed Bags

Material	None	Stratum			Unanalyzed Total	Bags Analyzed
		1	2	3, 4		
Ceramics	2	5	2		9	22
Ceramics and Lithics	2	95	11	1	109	222
Lithics		2	3		5	39
Hammerstones		3	2		5	18
Cores		1			1	14
Totals	4	106	18	1	129	315

In addition to sampling, a number of artifacts could not be located for analysis to provide additional information on the original analyses. These include the shell pendants, eight projectile points and at least nine pieces of ground stone. Neither the analysis forms nor data on the hammerstones, cores, and other analyzed tools could be found.

Ceramics

by Stephen S. Post

This is a study of 4,365 sherds collected from a late Developmental-early to middle Coalition phase pit structure site. Preliminary occupation dates of A.D. 1150-1250 were assigned based on ceramic wares recovered during the testing phase (Vierra 1985).

Research Objectives

The testing phase sherd analysis generated a number of interesting questions concerning the movement of people or goods into and within the Albuquerque district during the late

Developmental and early to middle Coalition periods. These questions are addressed through the study of white ware design elements and their co-occurrence with spatially distinctive temper types. The following outlines the research objectives and relevant data for the Albuquerque and Socorro districts.

1. The first objective was to perform a systematic study of design elements on Socorro Black-on-white ceramics. The goal was to isolate specific elements that may be associated with production in the northern Socorro district and to determine how this differs from the Socorro Black-on-white manufactured in the Albuquerque district. This goal implies the ability to identify locally produced Socorro Black-on-white and that such an "animal" exists. If local and nonlocal Socorro Black-on-white design elements can be identified, intrasite distributions may provide support for the hypothesized movement of populations into the Middle Rio Grande in the late Developmental and early Coalition periods.

2. Another objective was to combine and compare design element and temper data in order to determine whether specific design elements are associated with vessels tempered with volcanic materials found in the Rio Salado-Alamocita Creek areas within the Socorro district or with those tempered with the locally available metamorphic materials found in Tijeras Canyon ceramics. There are no design studies of Socorro Black-on-white in the literature. Surveys and excavations that recovered significant numbers of Socorro Black-on-white report only the most basic of descriptions or refer to earlier descriptions as being typical. It is beyond the limits of this study to do an exhaustive reanalysis of the Socorro Black-on-white recovered from work within the northern bounds of the Socorro district and to compare those results with the supposed locally manufactured Socorro Black-on-white from Albuquerque.

Similarly, the temper data for Socorro Black-on-white from the Socorro district is vague. Warren (1982a:156) identified hornblende latite in Socorro Black-on-white sherds collected from along the lower Rio Puerco near the confluence of the Rio Salado. Limited collection of rock materials from the Ortiz gravels indicate that this tempering material was local (Warren 1982a:141). Further inspection of the geological references for the area revealed the presence of rhyolite tuffs and hornblende latite in the Datil Volcanic Group volcanics between La Joyita Hills and Datil (Warren 1982b). These two temper types were also identified in the testing phase ceramics from the Coors Road site and may indicate common areas of production. This correspondence formed the basis for suggesting that people from the lower Rio Puerco-Rio Salado area moved to the Albuquerque district between A.D. 1150 and 1250 (Anschuetz and Vierra 1985:31-33). Warren (1982a:148) dates the production of Socorro Black-on-white along the lower Rio Puerco between A.D. 1050 and 1275. Unfortunately no archeometric dates were obtained for ceramics from the lower Rio Puerco.

Lang (1982b:174) asserts that Socorro Black-on-white was produced in the Albuquerque district and throughout the lower Rio Puerco-Rio Salado by the late 1100s. Relying on neck banding and smudging on brown wares and Mimbres style attributes found on Socorro Black-on-white in the Socorro district, Lang believes there was a strong Mogollon influence in the production of Socorro Black-on-white and locally produced utility wares (Lang 1982b). Lang also points out that the Mogollon influence in the Albuquerque District can be traced to as early as A.D. 700 with the presence of local copies of San Francisco Red and Alma Plain and Neckbanded (Lang 1982b:163). Thus, Mogollon traditions were part of the Rio Grande ceramic complex by the early Developmental period.

The literature contains some references to the local manufacture of Socorro Black-on-white in the Albuquerque district. Unfortunately, these studies do not identify local clay or temper sources and do not provide descriptions of the attributes that set the local apart from nonlocal products.

A ceramic study from the Tunnard site (Hammack 1966), an early Classic phase site north of Albuquerque, describes aspects of locally manufactured ceramics dating between A.D. 1325 and 1350. The Classic period date is based on the presence of western polychromes and a few Rio Grande Glaze A sherds. The majority of the assemblage looks earlier. High frequencies of Santa Fe and Socorro Black-on-white and Pitoche Rubbed-Ribbed and Pilares Banded (probably Pilares Fine Banded), which generally date before A.D. 1300, suggest that the occupation primarily occurred between A.D. 1250 and 1300. Although the developments described for the Tunnard assemblage might postdate the occupation of the Coors Road site, Hammack's study recognized a co-mingling of design elements and pigment resulting in the production of pottery with Socorro design styles rendered in carbon pigment and Santa Fe design styles rendered in mineral pigment. Hammack (1966:11) proposed that these ceramics resulted from the local populations copying designs from Socorro district populations who moved into the Albuquerque district during the late 1000s and 1200s. Evidence of semilocal ceramic manufacture is hinted at in the descriptions of the utility wares with friable, highly micaceous paste, dark gray to dark brown in color. This sounds similar to the utility wares described for late Coalition-Classic period sites in Tijeras Canyon (Oakes 1979; Warren 1980).

There are no references to local ceramic manufacture in the Albuquerque district during the late Developmental and early Coalition periods. The Sedillo site (Skinner 1965), a late Developmental period site, has high frequencies of Red Mesa and Kwahee Black-on-white with lesser amounts of Gallup Black-on-white. Kwahee Black-on-white is described as manufactured in the Northern Rio Grande provinces and not satisfactorily described in outside districts. Cibola White Wares are assumed to be traded into the Albuquerque district from western districts. There are no studies that determine whether or not Cibola White Wares were produced along the Rio Grande during the Developmental period. Cibola White Wares are generally considered to represent either interaction with or occupation of the middle Rio Grande by small populations of Western Anasazi.

Warren (1980:155) discusses trade of Socorro Black-on-white, Los Lunas Smudged bowls, and neckbanded utility wares into the Tijeras Canyon area by the early 1100s. Unfortunately there is no data from late Developmental period residential sites to demonstrate a local industry prior to A.D. 1200. By A.D. 1200, Precambrian mica-schist tempered vessels were produced. Production of mica-schist tempered utility vessels continues after A.D. 1200, but the production of Socorro Black-on-white is replaced by the production of Santa Fe and Wiyo Black-on-white.

To summarize, the literature suggests that ceramics were produced in the Albuquerque district during the 1100s and that an influx of Socorro Black-on-white into the Tijeras Canyon area replaced Kwahee and western Cibola White Wares in predominance. Detailed descriptions of design styles or elements and temper materials that make up these local copies or varieties of Socorro Black-on-white and its attendant utility wares are lacking. Precambrian mica-schist temper appears to represent local production of utility wares in Tijeras Canyon and along the Rio Grande north of Albuquerque, primarily during the late Coalition and Classic periods. The production of local utility wares before this time is hinted at without giving specific examples.

The preliminary data indicate that LA 15260 dates ceramically between A.D. 1150 and 1200. If true, this represents the first detailed analysis of an assemblage from that time period in the Albuquerque district and will serve as a seminal study of local ceramic manufacture during the latter portion of the late Developmental-early Coalition periods.

3. At the intrasite level, the sherds were to be identified according to established typologies and recorded by provenience. Descriptions are detailed and important because they are lacking late Developmental-early Coalition period ceramics in the Albuquerque district. Types are described in terms of surface treatment, pigment, design elements, and temper. Temper is not considered diagnostic of one type or another. Decorative and technological attributes do not always statistically co-vary and cannot be confidently used to determine and define a type (Hantman et al. 1984:18). Instead, temper identification is important as an indicator of the locus of production and may provide information on the movement of populations as well as social interaction.

4. Another objective was to develop a site chronology based on established type frequencies and their spatial distribution. Stratigraphic evidence indicates multiple occupations, and ceramic data may be the only means of verifying the occupational sequences. The testing phase analysis (Vierra 1985:15) suggests that the ceramic assemblage is homogeneous, consisting mainly of Socorro Black-on-white and its associated utility wares. If true for the excavation phase assemblage, then it is unlikely that the individual occupational sequences can be identified through the ceramics. The spatial distribution of less common but more temporally sensitive types may be more informative than relative percentages of Socorro Black-on-white.

5. Sherds were identified according to vessel form and portion. Vessel form identification allows for inferences on site function and the spatial distribution of activities within the site. Vessel portion provides information on the condition of the midden deposits, whether or not vessels were discarded in partial form with some portions secondarily deposited after use as a tool, and whether trash deposits remained intact during and after the occupations. Estimates of vessel orifice diameters may allow for inferences of changes in vessel sizes through time and whether or not changes in morphology correspond with changes in site activities.

Analytical Procedures

Four ware categories were identified: white, gray, brown, and red. These categories were sorted into types based on surface treatment, paste characteristics, and design elements.

The white and red wares were sorted into types according to surface finish, paste color, pigment type, and design elements. In addition, sooting, vessel form, and vessel portion, plus orifice diameter for rim sherds were recorded. Characteristics of the sherds such as worked edges, intentional interior sooting, drill holes, and other sherd oddities were noted.

The gray and brown wares were sorted into types according to temper, paste color, surface finish, coil type, and coil width. In those cases where the interior paste was brown and the exterior was gray or vice-versa, the exterior surface color determined placement into the brown or gray ware category. This aspect of the utility wares has interesting implications for determining Anasazi or Mogollon technological traditions. It is possible that qualities of the clays and the manufacture techniques superseded tradition, and color may be less culturally controlled and more technologically and geologically vagrant. Sooting was recorded but is viewed skeptically because blackening can occur from firing as well as cooking.

As can be expected with almost any prehistoric assemblage, there were sherds that did not exhibit enough of a diagnostic attribute or combination of attributes to be assigned a type name. These were placed in indeterminate categories.

If a white ware sherd exhibited only a small nondiagnostic portion of a design element, but the pigment could be determined, it was placed in the undetermined mineral or carbon paint category. If the sherd lacked any paint but appeared to be slipped or polished it was placed in the undetermined white ware category.

Gray ware placement often depended on the coil type or interior and exterior surface treatment. The names used in these categories are self-explanatory: gray indented corrugated, gray incised, plain gray, plain gray smudged, and undetermined banded/corrugated. The last category was made up of primarily rim fillets from brown and gray wares.

The brown wares were similarly divided into a number of categories including brown incised, brown tooled, plain brown, plain brown smudged, brown indented corrugated, and brown indented smudged. The plain brown and plain brown smudged are mostly lower body sherds from bowls and jars with neck decoration. Lower body sherds of the different types cannot be differentiated in a consistent manner.

Vessel portion was recorded as rim, neck, body, shoulder, base, handle, and undetermined. The identification of the portions assists in determining minimum vessel counts and provides information on the condition and nature of the deposits with regard to site activities.

Type Descriptions

The following type descriptions are derived from examining the LA 15260 sherds and references for established type descriptions and the manufacture dates. Attributes are summarized for the whole assemblage. If the site type descriptions do not always conform exactly to the established descriptions, it can be attributed to the prehistoric potters and the vagaries of open-air firing, and the materials that were available in different manufacturing locations. Precise duplication of particular styles and strict adherence to manufacturing traditions should not be expected.

Mineral Painted White Wares.

Kiatuthlanna Black-on-white (n = 1):

Paste Color: Light gray.

Temper: Crushed sherd with sandstone.

Carbon Streak: Absent.

Surface Finish: Slipped/polished interior, smoothed exterior.

Pigment Color: Black.

Design Elements: Multiple parallel rick-rack lines.

Reference: Gladwin 1945:22-23.

Manufacture Dates: A.D. 850-910(?), Breternitz 1966:80 (not well dated).

Red Mesa Black-on-white (n = 9):

Paste Color: Light gray (13%), gray (62%), white (25%).

Temper: Crushed sherd (25%), crushed sherd with sandstone (38%), crushed sherd with clay pellets (25%), crushed sherd with hematite (12%).

Carbon Streak: Absent.

Surface Finish: Slipped and polished interior and exterior (25%), floated and polished interior and/or exterior (12%), slipped and polished interior, smoothed exterior (25%), eroded (35%).

Pigment Color: Black (36%), dark brown (25%), brown (13%), reddish brown (13%), ghost (13%).

Design Elements: Pendant dots on thin lines (37%), broad lines (25%), checkerboard (25%), indeterminate (12%).

Reference: Gladwin 1945:56-57.

Manufacture Dates: A.D. 850-1125, Breternitz 1966:90.

Gallup Black-on-white (n = 12):

Paste Color: Light gray (17%), gray (75%), dark gray (8%).

Temper: Crushed sherd (17%), crushed sherd with sandstone (75%),
crushed sherd and sandstone with hornblende (8%).

Carbon Streak: Absent.

Surface Finish: Polished exterior (8%), slipped interior, smoothed exterior, no polish (8%), slipped and polished (25%), floated and polished interior and/or exterior (17%), slipped and polished interior, smoothed exterior (42%).

Pigment Color: Black (42%), dark brown (42%), brown (16%)

Design Elements: Dogoszhi style hachure (58%), hachure wider than space between with or without broad lines (42%).

Reference: Windes 1981:40-47.

Manufacture Dates: A.D. 1030-1200, Windes 1981:40-42.

Reserve Black-on-white (n = 3):

Paste Color: Light gray (33%), gray (33%), white (33%).

Temper: Crushed sherd (33%), crushed sherd with sandstone (33%), crushed sherd with clay pellets (33%).

Carbon Streak: Absent.

Surface Finish: Slipped and polished (67%), eroded (33%).

Pigment Color: Black (67%), brown (33%).

Design Elements: Hachure narrower than space between with broad lines.

Reference: Cibola White Ware Conference 1958:8; Fowler 1985:110-113.

Manufacture Dates: A.D. 940-1125, Breternitz 1966:90.

Cebolleta Black-on-white (n = 18):

Paste Color: Light gray (78%), gray (16%), gray (6%).

Temper: Crushed sherd (6%), crushed sherd and sandstone (33%), crushed sherd with hornblende (28%), crushed sherd and clay pellets (33%).

Carbon Streak: Present (17%).

Surface Finish: Polished (39%), slipped and polished (11%), floated and polished (17%), polished interior, smoothed exterior (17%), slipped and polished interior, smoothed exterior (16%).

Pigment Color: Black (28%), dark brown (44%), red brown (6%), brown (17%), ghost (6%).

Design Elements: Opposed solid and hachured triangles with broad line (6%), Dogoszhi style hachure (6%), opposed solid chevrons (6%), concentric thin lined squares (6%), contiguous solid triangles (6%), square checkerboard (6%), combinations of parallel broad and thin lines (44%), pendant dots (11%), indeterminate (9%).

Reference: Dittert 1959:400.

Manufacture Dates: A.D. 950-1150, Dittert 1959:400.

Kwahee Black-on-white (n = 28):

Paste Color: Light gray (4%), gray (82%), gray (14%).

Temper: Crushed sherd (7%), crushed sherd with sandstone (64%), crushed sherd with hornblende (7%), crushed sherd with clay pellets (4%), crushed sherd with mica (11%), crushed sherd with caliche (4%), crushed sherd with igneous (4%).

Carbon Streak: Present (11%).

Surface Finish: Smoothed (21%), polished (11%), slipped and polished (7%), floated and polished (3%), polished interior, smoothed exterior (11%), slipped and polished interior and smoothed exterior (29%), eroded (18%).

Design Elements: Dogoszhi style hachure (18%), parallel thin and broad lines in combination or alone (21%), contiguous triangles (21%), checkerboard (11%), indeterminate (29%).

Reference: Mera 1935:5.

Manufacture Dates: A.D. 1050-1175 (peak), Sundt 1987:129.

Socorro Black-on-white (n = 451):

Paste Color: Light gray (44%), gray (53%), dark gray (2%), light brown and orange red (<1%).

Temper: Crushed sherd (7%), crushed sherd with sandstone (47%), crushed sherd with hornblende (28%), crushed sherd with clay pellets (10%), crushed sherd with mica (1%), crushed sherd and caliche (5%), crushed sherd with friable rock (<1%).

Carbon Streak: Present (40%).

Surface Finish: Smoothed (11%), polished (34%), slipped and polished (4%), floated and polished (12%), polished interior, not exterior (29%), floated and polished interior, exterior smoothed (7%), eroded (3%).

Pigment Color: Black (53%), dark brown (26%), brown (7%), reddish brown (5%), subglaze (2%), ghost (7%).

Design Elements: Hachured chevrons or triangles opposed by same, unopposed, or framed by solid lines (24%), opposed or unopposed solid or open triangles (17%), Dogoszhi style with or without broad framing lines (3%), ticked lines with triangles, broad or thin lines, or checkerboards (9%), concentric thin lined squares or circles (3%), parallel thin or broad lines, single or multiple, in combination or alone (31%), checkerboard, square, triangular, or diamond (8%), indeterminate (5%).

References: Mera 1935:27-28; Sundt 1979:5-6.

Manufacture Dates: A.D. 1050-1300, Breternitz 1966:96; Sundt 1987:126.

Chupadero Black-on-white (n = 88):

Paste Color: Light gray (23%), gray (73%), dark gray (2%), white (1%), light brown (1%).

Temper: Crushed sherd (15%), crushed sherd and sandstone (57%), crushed sherd with hornblende (15%), crushed sherd with mica (4%), crushed sherd with clay pellets (2%), crushed sherd and caliche (6%), crushed sherd with feldspars (1%).

Carbon Streak: Present (11%).

Surface Finish: Smoothed (13%), polished (16%), slipped and polished (2%), slipped interior, smoothed exterior (13%), floated and polished (9%), polished interior, smoothed exterior (26%), slipped and polished interior, smoothed exterior (12%), eroded (9%).

Pigment Color: Black (36%), dark brown (42%), red brown (14%), brown (1%), ghost (3%), indeterminate (3%).

Design Elements: Hachure triangles or chevrons opposed or unopposed by the same or framed by broad lines (24%), opposed or unopposed solid triangles (7%), Dogoszhi style hachure with or without broad lines (3%), concentric thin lines (1%), thin or broad lines, single or multiple, in combination or alone (29%), checkerboard, square, triangular, or diamond (21%), opposed hachure and solid triangles with the tips touching (3%), triangles formed by contiguous squares with centered dots (1%).

Reference: Warren 1981:67-73.

Manufacture: A.D. 1175-1500, Warren 1981:72.

Tularosa Black-on-white (n = 5):

Paste Color: Light gray.

Temper: Crushed sherd with sandstone (40%), crushed sherd with clay pellets (60%).

Carbon Streak: Present (60%).

Surface Finish: Slipped and polished.

Pigment Color: Black (60%), dark brown (40%).

Design Elements: Opposed solid and hachured triangles with broad lines (80%), concentric rectangles (20%).

Reference: Fowler 1985:113.

Manufacture Dates: A.D. 940-1125, Breternitz 1966:90.

Carbon Painted White Wares.

McElmo Black-on-white (n = 3):

Paste Color: Gray.

Temper: Crushed sherd (33%), crushed sherd with igneous (67%).

Carbon Streak: Absent.

Surface Finish: Slipped and polished interior, smoothed exterior.

Pigment Color: Black.

Design Elements: Vertical thin parallel lines pendant from the rim

Reference: Breternitz et al. 1974:41-44.

Manufacture Dates: A.D. 1090-1270, Breternitz 1966:84.

Santa Fe Black-on-white (n = 17):

Paste Color: Gray (88%), dark gray (12%).

Temper: Crushed sherd (6%), crushed sherd with sandstone (88%), crushed sherd with mica (6%).

Carbon Streak: Present (24%).

Surface Finish: Smoothed (5%), polished (5%), slipped and polished (5%), polished interior, smoothed exterior (52%), slipped and polished interior, smoothed exterior (29%), eroded (18%).

Design Elements: Dogoszhi style hachure (17%), parallel thin lines (33%), checkerboard, square, and diamond (17%), contiguous triangles (11%), indeterminate (22%).

Reference: Mera 1935:11-14.

Dates: A.D. 1200-1350, Breternitz 1966:95.

Gray and Brown Wares.

Kana'a Gray/Tohatchi Banded (n = 50):

Paste Color: Gray (74%), dark gray (14%), dark brown (12%).

Temper: Crushed sandstone/sand (70%), crushed clay pellets (2%), crushed muscovite schist (12%), crushed biotite schist (14%), crushed sherd (2%).

Carbon Streak: Present (4%).

Coil Type: Smoothed (42%), clapboard (44%), flattened/smeared (6%), indeterminate (8%).

Coil Width: Range 4-15 mm.

References: Hargrave 1932:11; Olson and Wasley 1956:371.

Manufacture Dates: A.D. 760-1150, Breternitz 1966:78.

Gray Indented Corrugated (n = 343):

Paste Color: Light gray (4%), gray (32%), dark gray (53%), light brown (2%), brown (3%), dark brown (5%); reddish brown (<1%).

Temper: Crushed sandstone/sand (74%), crushed rhyolite (<1%), crushed hornblende latite (2%), crushed clay pellets (3%), crushed muscovite schist (3%), crushed biotite schist (13%), crushed mixed schist (<1%), crushed sherd and sandstone (4%).

Carbon Streak: Present (17%).

Coil Type: Smeared (24%), oblique (42%), blind (10%), smoothed (1%), banded, unsmoothed (10%), punctate (<1%), banded, smoothed (<1%), not applicable (10%).

Coil Width: Range 2-15 mm.

References: Warren 1982a:150.

Manufacture Dates: A.D. 950-1300, Warren 1982a:150.

Gray Incised (n = 11):

Paste Color: Gray.

Temper: Crushed sandstone/sand (9%), crushed biotite schist (91%).

Carbon Streak: Present.

Coil Type: None.

Coil Width: None.

References: None.

Manufacture Dates: None.

Gray Indented Smudged (n = 1):

Paste Color: Gray.

Temper: Crushed sandstone.

Carbon Streak: Absent.

Coil Type: Oblique.

Coil Width: 5 mm.

References: None.

Manufacture Dates: None.

Plain Gray Smudged (n=45):

Paste Color: Light gray (2%), gray (47%), dark gray (44%), brown (4%), dark brown (2%).

Temper: Crushed sandstone/sand (24%), crushed rhyolite (7%), crushed hornblende latite (44%), crushed clay pellets (11%), crushed muscovite schist (2%), crushed biotite schist (4%), mixed schist (2%), crushed sherd and sandstone (4%).

Carbon Streak: Present (6%).

References: None.

Manufacture Dates: None.

Pilares Banded (n = 46):

Paste Color: Light gray (4%), gray (27%), dark gray (30%), light brown (2%), brown (2%), dark brown (13%), red brown (22%), indeterminate (4%).

Temper: Crushed sandstone/sand (28%), crushed rhyolite (9%), crushed hornblende latite (20%), crushed clay pellets (7%), crushed muscovite schist (11%), crushed biotite schist (22%), mixed schist (2%), crushed sherd and sandstone (2%).

Carbon Streak: Present (39%).

Coil Type: Smoothed (65%), clapboard (6%), textured (6%), flattened (10%), indeterminate (13%).

Coil Width: Range 4-8 mm.

References: Dittert 1959:413-415.

Manufacture Dates: A.D. 950-1100, Dittert 1959:413-415.

Pitoche Rubbed-Ribbed (n = 478):

Paste Color: Gray (5%), dark gray (13%), light brown (5%), brown (22%), dark brown (39%), red brown (16%), indeterminate (5%).

Temper: Crushed sandstone/sand (9%), crushed igneous (1%), crushed rhyolite (40%), crushed hornblende latite (35%), crushed aplite granite (4%), crushed clay pellets (1%), crushed muscovite schist (4%), crushed biotite schist (5%), crushed sherd and sandstone (1%).

Carbon Streak: Present (13%).

Coil Type: Clapboard (50%), flattened (28%), textured (9%), smoothed (10%), miscellaneous (3%).

Coil Width: 1-4 mm.

References: Marshall and Walt 1984:77-78; Mera 1935:28.

Manufacture Dates: A.D. 1150-1300; based on association with Socorro Black-on-white.

Los Lunas Smudged (n = 164):

Paste Color: Gray (6%), dark gray (30%), light brown (8%), brown (17%), dark brown (32%), red brown (6%).

Temper: Crushed sandstone/sand (27%), crushed rhyolite (27%), crushed hornblende latite (58%), crushed aplite granite (1%), crushed sherd and sandstone (2%).

Carbon Streak: Present (11%).

Coil Type: Clapboard (18%), flattened (24%), textured (10%), punctate (20%), miscellaneous (20%), indeterminate (8%).

Coil Width: Range 1-4 mm.

References: Mera 1935:28-29.

Manufacture Dates: A.D. 1150-1300; based on association with Socorro Black-on-white.

Brown Indented Corrugated (n = 69):

Paste Color: Dark gray (7%), brown (7%), brown (85%).

Temper: Crushed sandstone (58%), crushed hornblende latite (5%), crushed muscovite schist (17%), crushed biotite schist (14%), crushed sherd (5%).

Carbon Streak: Absent.

Coil Type: Smeared (20%), oblique (55%), punctate (3%), exuberant (5%), indeterminate (17%).

Coil Width: Range 2-13 mm.

References: None.

Manufacture Dates: None.

Red Wares.

Puerco Black-on-red (n = 8):

Paste Color: Orange-red.

Temper: Crushed sherd and sandstone.

Carbon Streak: Present.

Surface Finish: Slipped and polished.

Pigment Color: Black.

Design Elements: Broad lines (62%), checkerboard (37%).

Reference: Carlson 1970:7-11.

Manufacture Dates: A.D. 1030-1125, Breternitz 1966:89.

Wingate Black-on-red (n = 15):

Paste Color: Orange-red.

Temper: Crushed sherd and sandstone.

Carbon Streak: Present.

Surface Finish: Slipped and polished.

Pigment Color: Black.

Design Elements: Opposed hachured and solid elements.

Reference: Carlson 1970:12-17.

Manufacture Dates: A.D. 1050-1200, Breternitz 1966:102.

St. Johns Black-on-red (n = 1):

Paste Color: Orange-red.

Temper: Crushed sherd and sandstone.

Carbon Streak: Present.

Surface Finish: Slipped and polished.

Pigment Color: Dark brown.

Design Elements: Opposed solid and hachure, solid more dominant.

Reference: Carlson 1970:31.

Manufacture Dates: A.D. 1175-1300, Carlson 1970:31.

Agua Fria Glaze-on-red (n = 1):

Paste Color: Gray.

Temper: Crushed sherd and sandstone.

Carbon Streak: Absent.

Surface Finish: Slipped and polished.

Pigment Color: Black.

Design Elements: Single broad line.

Reference: Warren 1982a:149.

Manufacture Dates: A.D. 1315-1425, Warren 1982a:149.

Data Summary

A total of 4,365 sherds from four ware groups were included in the site sample. Of the 37 types identified, 20 had been described in the literature; 17 types were used for sorting and description. Formal type and sorting category frequencies by temper type and by vessel form and portion are contained in Tables 3 through 10.

White Wares. The most common white ware is Socorro Black-on-white. The remaining white wares include the Cibola White Wares, Chaco Series (Kiatuthlanna, Red Mesa, and Gallup Black-on-whites), Northern Rio Grande mineral paint tradition (Kwahee Black-on-white), Middle and Northern Rio Grande carbon paint tradition (Santa Fe Black-on-white), San Juan carbon paint tradition (McElmo Black-on-white), the Acoma province Cebolleta Black-on-white, Southern Cibola White Wares (Reserve and Tularosa Black-on-white), and Chupadero Black-on-white (Tables 3-6). Bowls are the most common vessel form. Ladle, olla, pitcher, canteen, and pipe sherds occurred in low numbers (Tables 7-10). White ware tempering materials are diverse and

Temper Codes

Painted Wares: 1 = crushed sherd; 2 = crushed sherd and quartz; 3 = sherd and hornblende; 4 = crushed sherd and caliche; 7 = crushed sherd and igneous; 8 = crushed sherd and friable rock; 9 = crushed sherd and hematite; 10 = crushed sherd and feldspars; 11 = crushed mica schist; 12 = crushed sandstone.

Utility Wares: 1 = crushed sandstone or sand; 2 = crushed metamorphic rock; 3 = crushed rhyolite; 4 = crushed hornblende latite; 5 = crushed aplite granite; 6 = crushed clay pellets; 7 = crushed mica schist, muscovite; 8 = crushed mica schist, biotite, and silver; 9 = crushed mica schist, mixed; 10 = crushed sherd only; 11 = crushed sherd and sandstone.

Table 3. Occupation 1, Ceramic Wares by Temper

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
Black-on-white														
Socorro	16	55	39	5		2		1				1	120	11.7
Chupadero	2	11	3		1	2							19	1.8
Ceboletta		1	1										2	.2
Kwahee	2	11	1										14	1.4
Santa Fe		3											5	.5
Red Mesa		2							1				3	.3
Gallup	1	2											3	.3
Reserve		1											1	.1
Chupadero w.w.		2	1										3	.3
Undeter. mineral	3	17	15	3									38	3.7
Undeter. w.w.	17	65	22	4	2	2					1	13	126	12.3
Total White Ware	41	170	82	12	5	6		1	1		1	15	334	32.5
Red Wares														
Puerco Black/red		2											2	.2
Wingate Black/red		4											4	.4
Total Red Ware		6											6	.6
Gray Wares														
Kana'a Gray	6												6	.6
Tohatchi Banded	7												7	.7
Gray Indent. Corr.	51					2	2	10			3		68	6.6
Gray Incised								1					1	.1
Gray Indent. Smud.	1												1	.1
Plain Gray	47			8	1		8	17		2	4		87	8.5
Plain Gray Smud.	1		1	6									8	.8
Undeter. band/corr.	7		4	4			4	1			1		21	2.0
Total Gray Ware	120		5	18	1	2	14	29		2	8		199	19.4
Brown Wares														
Pilares Banded	2		2	6			1	1					12	1.2
Pitoche Rubbed-rib	8		96	42	4		4	1			1		156	15.2

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
Los Lunas Smudged	2		16	19	1						1		39	3.8
Brown Incised							1	7					8	.8
Brown Tooled								1					1	.1
Plain Brown	8		72	91	11		13	15		3	1		214	20.9
Plain Brown Smud.	3		12	24									39	3.8
Brown Indent. Corr.	10			1			2	5					18	1.7
Total Brown	33		198	183	16		21	30		3	3		487	47.5
Total Sherds														
Painted Wares	41	176	82	12	5	6		1	1		1	15	340	
Utility Wares	153		203	201	17	2	35	59		5	11		686	
% of Wares														
White Wares	12.3	50.9	24.5	3.6	1.5	1.8		.3	.3		.3	4.5		100.
Red Wares		100.0												100.
Gray Wares	60.3		2.5	9.0	.5	1.0	7.0	14.6		1.0	4.0			99.
Brown Wares	6.8		40.7	37.6	3.3		4.3	6.2		.6	.6			100.

Table 4. Occupation 2, Ceramic Wares by Temper

Temper type	1	2	3	4	5	6	7	8	9	10	11	n=	%
Black-on-white													
Socorro	6	52	35	24	1	20						138	12.4
Chupadero	5	12	4		1					1		23	2.1
Ceboletta		1	1									2	.2
Kwahee		1			1	1	1					4	.4
Santa Fe		4										4	.4
Mc Elmo							2					2	.2
Kiatuthlana		1										1	.1
Red Mesa	1											1	.1
Gallup		1										1	.1
Tularosa				2								2	.2
Undeter. mineral	13	38	6	8								65	5.9
Undeter. w.w.	10	59	13	7	1	1	1				1	93	8.4
Total White Ware	35	169	59	41	4	22	4			1	1	336	30.3
Red Wares													
Puerco Black/red		1										1	.1
Wingate Black/red	3	4										7	.6

Temper type	1	2	3	4	5	6	7	8	9	10	11	n=	%
Undeter. red		2										2	.2
Total Red Ware	3	7										10	.9
Gray Wares													
Kana's Gray	7						1					8	.7
Tohatchi Banded	5					1	2	2				10	.9
Gray Indent. Corr.	64					4	3	4		5	2	82	7.4
Gray Incised								6				6	.5
Gray Indent. Smud.						1						1	.1
Plain Gray	40	1	5	1		5	5	22	2	7	4	92	8.3
Plain Gray Smud.	2			6				1	1	1	3	14	1.3
Undeter. band/corr.	7			8	2		3	5				25	2.2
Total Gray Ware	125	1	5	15	2	11	14	40	3	13	9	238	21.4
Brown Wares													
Pilares Banded	1		2	1			2				1	7	.6
Pitoche Rubbed-rib	7	1	37	53			4	3				105	9.5
Los Lunas Smudged			17	38						2	7	64	5.8
Brown Incised							1	1				2	.2
Plain Brown	23		49	104	19		37	19	1	2	3	257	23.1
Plain Brown Smud.	3		20	47			2	2		2	2	78	7.0
Brown Indent. Corr.	7			2			1	1			2	13	1.2
Total Brown	41	1	125	245	19		47	26	1	6	15	526	47.4
Total Sherds													
Painted Wares	38	176	59	41	4	22	4			1	1	346	
Utility Wares	166	2	130	260	21	11	61	66	4	19	24	764	
% of Wares													
White Wares	10.4	50.3	17.6	12.2	1.2	6.5	1.2			.3	.3		100
Red Wares	30.0	70.0											100
Gray Wares	52.5	.4	2.1	6.3	.8	4.6	5.9	16.8	1.3	5.5	3.8		100
Brown Wares	7.8	.2	23.8	46.6	3.6		8.9	4.9	.2	1.1	2.8		99.9

Table 5. Occupation 3, Ceramic Wares by Temper

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
Black-on-white														
Socorro	9	58	28	15	4								114	9.4
Chupadero	5	17	3	1	2	2							30	2.5
Ceboletta		2	1	6									9	.7
Kwahee		4	1	1	2								8	.7
Santa Fe		6											6	.5

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
McElmo	1												1	.1
Red Mesa	1	2		2									5	.4
Gallup		3		1									4	.3
Reserve		1		1									2	.2
Tularosa		3											3	.2
Chupadero w.w.						3						1	4	.3
Undeter. mineral	11	27	8	8	2								56	4.6
Undeter. w.w.	17	84	52	18	11	2			1			1	186	15.3
Total White Ware	44	207	93	53	21	7			1			2	428	35.3
Red Wares														
Puerco Black/red		2											2	.2
Wingate Black/red		1											1	.1
red-on-tan		1											1	.1
Undeter. red		2											2	.2
Total Red Ware		6											6	.5
Gray Wares														
Kana'a Gray	1							4					5	.4
Tohatchi Banded	4						3	1					8	.7
Gray Indent. Corr.	61			1		3	1	12			6		84	6.9
Gray Incised										1			1	.1
Plain Gray	78	1	4	2		2	8	46		4	4		149	12.3
Plain Gray Smud.	1		2	7		4					2		16	1.3
Undeter. band/corr.	5		5	3	1		1				1		16	1.3
Total Gray Ware	150	1	11	13	1	9	13	63		5	13		279	23.0
Brown Wares														
Pilares Banded	9			2			2	8					21	1.7
Pitoche Rubbed-rib	14	1	14	41	6	1	5	8			3		93	7.7
Los Lunas Smudged	4		9	23	1								37	3.0
Brown Incised	2						1						3	.2
Brown Tooled					1								1	.1
Plain Brown	17		50	79	8	1	45	63		2	2		267	22.0
Plain Brown Smud.	6		18	29	2						1		56	4.6

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
Brown Indent. Corr.	12			2			5	3					22	1.8
Total Brown	64	1	91	176	18	2	58	82		2	6		500	41.2
Total Sherds														
Painted Wares	44	213	93	53	21	7			1			2	434	
Utility Wares	214	2	102	189	19	11	71	145		7	19		779	
% of Wares														
White Wares	10.3	48.4	21.7	12.4	4.9	1.6			.2			.5		100
Red Wares		100												100
Gray Wares	53.8	.3	3.9	4.7	.3	3.2	4.7	22.6		1.8	4.7			100
Brown Wares	12.8	.2	18.2	35.2	3.6	.4	11.1	16.4		.4	1.2			

Table 6. Site Ceramic Wares by Temper

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
Black-on-white														
Socorro	33	214	128	46	5	24		1					451	10.3
Chupadero	13	50	13	2	4	5				1			88	2.0
Ceboletta	1	6	5	6									18	.4
Kwahee	2	18	2	1	3	1	1						28	.6
Santa Fe	1	15			1								17	.4
McElmo	1						2						3	.1
Kiatuthlanna		1											1	
Red Mesa	2	4		2				1					9	.2
Gallup	2	9	1										12	.3
Reserve	1	1		1									3	.1
Tularosa		2		3									5	.1
Chupadero w.w.	1	4	1			3			1				10	.2
Undeter. mineral	33	111	32	24	2								202	4.6
Undeter. carbon		3											3	.1
Undeter. w.w.	66	288	106	38	19	5	1		1		5	14	543	12.4
Total White Ware	156	726	288	123	34	38	4	2	2	1	5	14	1393	31.9
Red Wares														
Puerco Black/red		8?											8	.2
Wingate Black/red	4	11											15	.3
St. Johns Poly	1												1	
Agua Fria G/red	1												1	

Temper type	1	2	3	4	5	6	7	8	9	10	11	12	n=	%
Undeter. red		10?											10	.2
Total Red Ware	6	29?											35	.8
Gray Wares														
Kana'a Gray	14						1	4		1			20	.5
Tohatchi Banded	21					1	5	3					30	.7
Gray Indent. Corr.	253		2	8		10	10	46	1		13		343	7.9
Gray Incised	1							10					11	.2
Gray Indent. Smud.						1							1	
Plain Gray	234	2	7	15	1	11	33	130	5	4	7		449	10.3
Plain Gray Smud.	11		3	20		5	1	2	1		2		45	1.0
Undeter. band/corr.	26		14	22	3	1	18	7			1		92	2.1
Total Gray Ware	560	2	26	65	4	29	68	202	7	5	23		991	22.7
Brown Wares														
Pilares Banded	13		4	9		3	5	10	1	1			46	1.0
Pitoche Rubbed-rib	41	5	192	169	19	3	18	25		6			478	10.9
Los Lunas Smudged	17	1	45	95	2					4			164	3.8
Brown Incised	1							4	8				13	.3
Brown Tooled						1	1	1					3	.1
Plain Brown	72		218	362	35	1	134	121	2	1			946	21.7
Plain Brown Smud.	17		81	121	2		2	2		2			227	5.2
Brown Indent. Corr.	40			5			12	10		2			69	1.6
Total Brown	201	6	540	761	58	8	172	173	11	16			1946	44.6
Total Sherds														
Painted Wares	162	755	288	123	34	38	4	2	2	1	5	14	1428	
Utility Wares	761	8	566	826	62	37	240	375	18	21	23		2937	
% of Wares														
White Wares	11.2	52.1	20.7	8.8	2.4	2.7	.3	.1	.1	.1	.4	1.0		99.0
Red Wares	17.1	82.9												100
Gray Wares	56.5		.2	2.6	6.6	.4	2.9	6.9	20.4	.7	.5	2.3		100
Brown Wares	10.3	.3	27.7	39.1	3.0	.4	8.8	8.9	.6	.8				99.9

Table 7. Occupation 1, Ceramic Wares by Vessel Form and Portion

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	P	p	U	
Black-on-white															
Socorro	27	54	1		1		30			4		1		2	120
Chupadero	8	5					3			1	2				19
Cebolleta	1	1													2
Kwahee	5	6					2					1			14
Santa Fe	1	3					1								5
Red Mesa		2					1								3
Gallup							3								3
Reserve							1								1
Chupadero w.w.		1					2								3
Undeter. mineral	5	16	1				15			1					38
Undeter. w.w.	7	67	5		1		35	4	1			2	2	2	126
Total White Ware	54	155	7		2		93	4	1	6	2	4	2	4	334
White Ware %	16.2	46.4	2.1		.6		27.8	1.2	.3	1.8	.6	1.2	.6	1.2	100
Red Wares															
Puerco Black/red		1			1										2
Wingate Black/red		4													4
Total Red Ware		5			1										6
Red Ware %		83.3			16.7										
Gray Wares															
Kana'a Gray					6										6
Tohatchi Banded					7										7
Gray Indent. Corr.				4	9		55								68
Gray Incised							1								1
Gray Indent. Smud.		1													1
Plain Gray				2			84	1							87
Plain Gray Smud.		8													8
Undeter. band/corr.				20	1										21

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	P	p	U	
Total Gray Ware		9		26	23		140	1							199
Gray Ware %		4.5		13.1	11.6		70.3	.5							100
Brown Wares															
Pilares Banded					12										12
Pitoche Rubbed-rib		1		7	116	5	27								156
Los Lunas Smudged	4	32			3										39
Brown Incised				1	5		2								8
Brown Tooled					1										1
Plain Brown		11		1	1		200	1							214
Plain Brown Smud.	1	32					6								39
Brown Indent. Corr.							18								18
Total Brown	5	76		9	138	5	253	1							487
Total Brown %	1.0	15.6		1.8	28.3	1	51.9	.2							99.8

R = rim; B = body; Ba = base; N = neck, Sh = shoulder; P = pitcher; p = pipe; U = unknown

Table 8. Occupation 2, Ceramic Wares by Vessel Form and Portion

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	C	L	U	
Black-on-white															
Socorro	16	66		1	1		44		1	2	1	1	2	3	138
Chupadero	9	8					6								23
Cebolletta	2														2
Kwahee	2	2													4
Santa Fe	2	2													4
McElmo	2														2
Kiatuthlana	1														1
Red Mesa							1								1
Gallup							1								1
Tularosa	1						1								2

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	C	L	U	
Undeter. mineral	7	36	1	1	1		12			2		1	3	1	65
Undeter. w.w.	2	52			1		33	3	1					1	93
Total White Ware	44	166	1	2	3		98	3	2	4	1	2	5	5	336
White Ware %	13.1	49.4	.3	.6	.9		29.2	.9	.6	1.2	.3	.6	1.5	1.5	100.1
Red Wares															
Puerco Black/red		1													1
Wingate Black/red		7													7
Undeter. red		1					1								2
Total Red Ware		9					1								10
Red Ware %		90.0					10.0								100.0
Gray Wares															
Kana'a Gray					7		1								8
Tohatchi Banded					10										10
Gray Indent. Corr.				5	2		74	1							82
Gray Incised				2	3		1								6
Gray Indent. Smud.						1									1
Plain Gray		2					90								92
Plain Gray Smud.	1	9					4								14
Undeter. band/corr.				21	3		1								25
Total Gray Ware	1	11		28	25	1	171	1							238
Gray Ware %	.4	4.6		11.8	10.5	.4	71.8	.4							99.9
Brown Wares															
Pilares Banded					6	1									7
Pitoche Rubbed-rib				6	87	5	7								105
Los Lunas Smudged	19	43			1	1									64

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	C	L	U	
Brown Incised							2								2
Plain Brown	1	15		4	5		231	1							257
Plain Brown Smd.	1	75					2								78
Brown Ind. Corr.				2	2		9								13
Total Brown	21	133		12	101	7	251	1							526
Brown Ware %	4.0	25.3		2.3	19.2	1.3	47.7	.2							100

R = rim; B = body; Ba = base; N = neck, Sh = shoulder; P = pitcher; p = pipe; U = unknown

Table 9. Occupation 3, Ceramic Wares by Vessel Form and Portion

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	C	L	U	
Black-on-white															
Socorro	24	54	1		3		30		1	1					114
Chupadero	4	16					8	1			1				30
Ceboletta	1	7					1								9
Kwahee	5	2					1								8
Santa Fe	3	3													6
McElmo		1													1
Red Mesa	1	4													5
Gallup		4													4
Reserve	1	1													2
Tularosa	1	1					1								3
Chupadero w.w.		2					1			1					4
Undeter. mineral	9	25	1		3		14			2				2	56
Undeter. w.w.	16	66	2	7	1		76	6	1	5		1	4	1	186
Total White Ware	65	186	4	7	7		132	7	2	9	1	1	4	3	428
White Ware %	15.2	43.5	.9	1.6	1.6		30.8	1.6	.5	2.1	.2	.2	.9	.7	99.8
Red Wares															
Puerco Black/red	1	1													2
Wingate Black/red		1													1
red-on-tan	1														1

	Bowl			Jar					Olla			Other			n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	C	L	U	
Undeter. red		2													2
Total Red Ware	2	4													6
Red Ware %	33.3	66.7													100
Gray Wares															
Kana'a Gray				1	2		2								5
Tohatchi Banded				1	7										8
Gray Indent. Corr.					1		82	1							84
Gray Incised						1									1
Plain Gray	1	6		1	1		137	3							149
Plain Gray Smud.		16													16
Undeter. band/corr.				11	3		2								16
Total Gray Ware	1	22		14	14	1	223	4							279
Gray Ware %	.4	7.9		5.0	5.0	.4	79.9	1.4							100
Brown Wares															
Pilares Banded				3	14		4								21
Pitoche Rubbed-rib				1	81	3	8								93
Los Lunas Smudged	5	30		1		1									37
Brown Incised					3										3
Brown Tooled							1								1
Plain Brown		20		4	7	2	234								267
Plain Brown Smd.		51					5								56
Brown Ind. Corr.				3	1		18								22
Total Brown	5	101		12	106	6	270								500
Brown Ware %	1.0	20.2		2.4	21.2	1.2	54								100

R = rim; B = body; Ba = base; N = neck, Sh = shoulder; P = pitcher; p = pipe; U = unknown

Table 10. Site Ceramic Wares by Vessel Form and Portion

	Bowl			Jar					Olla			Other		n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	R	B	
Black-on-white														
Socorro	76	219	2	1	5		124		2	7	3	7	5	451
Chupadero	23	35		1	1		25		1	1	1			88
Ceboletta	5	12					1							18
Kwahee	14	10	1				2					1		28
Santa Fe	6	10					1							17
McElmo	2	1												3
Kiatuthlana	1													1
Red Mesa	1	5					3							9
Gallup	1	6					5							12
Reserve	1	1					1							3
Tularosa	2	1					2							5
Chupadero w.w.	1	4					4			1				10
Undeter. mineral	31	98	3	2	3		51	1		6		1	6	202
Undeter. carbon		3												3
Undeter. w.w.	40	242	7	7	6		197	18	4	6		6	10	543
Total White Ware	204	647	13	11	15		416	19	7	21	4	15	21	1393
White Ware %	14.6	46.4	.9	.8	1.1		29.9	1.4	.5	1.5	.3	1.1	1.5	100
Red Wares														
Puerco Black/red	3	4			1									8
Wingate Black/red	1	14												15
St. Johns Poly.	1													1
Agua Fria G/r	1													1
Undeter. red		7			3									10
Total Red Ware	6	25			4									35
Red Ware %	17.1	71.5			11.4									100
Gray Wares														
Kana'a Gray				1	16		3							20
Tohatchi Banded				1	27		2							30
Gray Indent. Corr.				12	18	1	308	4						343
Gray Incised				2	5		4							11
Gray Indent. Smud.						1								1
Plain Gray	1	12		4	1	4	426	1						449
Plain Gray Smud.	1	38					6							45

	Bowl			Jar					Olla			Other		n=
	R	B	Ba	R	N	Sh	B	Ba	R	N	B	R	B	
Undeter. band/corr.				75	11	1	5							92
Total Gray Ware	2	50		95	78	7	754	5						991
Gray Ware %	.2	5.0		9.6	7.9	.7	76.1	.5						100
Brown Wares														
Pilares Banded				4	37	1	4							46
Pitoche Rubbed-rib		1		18	395?	14	50?							478
Los Lunas Smudged	34	117		1	8	2	2							164
Brown Incised				1	8		4							13
Brown Tooled					1		2							3
Plain Brown	1	47		10	16	2	862	8						946
Plain Brown Smud.	3	210					12	2						227
Brown Indent. Corr.				5	3	1	60							69
Total Brown	38	375		39	468	20	996	10						1946
Brown %	1.9	19.3		2.0	24.0	1.0	51.2	.5						99.9

R = rim; B = body; Ba = base; N = neck; Sh = shoulder

include crushed sherd, crushed sherd combined with sandstone, hornblende, mica, clay pellets, igneous (probably andesite), or feldspars. Tempers without crushed sherd included mica schist and sandstone. Crushed sherd with sandstone or hornblende are the most common (Tables 3-6).

Gray Wares. The gray wares comprise the third most common group of wares. Plain gray and gray indented corrugated are the most common types accompanied by substantially lower numbers of Kana'a/Tohatchi Banded. Both bowl and jar forms are present (Tables 3-6). Bowl forms occur as plain gray and plain gray smudged (Tables 7-10). The main tempering materials are crushed sand/sandstone, Precambrian mica schist, hornblende latite, and rhyolite. Lesser amounts of crushed clay pellets, crushed sherd, and crushed sherd with sandstone and aplite granite are present (Tables 3-6). Of interest are numerous examples of sherds with gray surfaces and brown cores. Two paste colors on a single sherd suggests that the so-called Mogollon Brown Ware and Anasazi Gray Ware traditions are not clear-cut in this assemblage or in other assemblages from the Albuquerque district (Oakes 1979).

Brown Wares. The brown wares are the most numerous ware identified. They are ubiquitous in the major features and strata. Plain Brown is the most common type, followed by Pitoche Rubbed-Ribbed. Plain Brown sherds occur in large numbers because lower body sherds from Pitoche Rubbed-Ribbed jars are plain (Tables 3-6). Only 10 jar rims and 58 bowl sherds represent Plain Brown vessels. Also present in fairly large numbers are Los Lunas Smudged and Plain Brown Smudged bowls. Only three Plain Brown Smudged bowl rims were recorded (Tables 7-10).

Mera's (1935:28-29) description of Los Lunas Smudged includes only bowls. This assemblages demonstrates that both jar and bowl forms were produced in Los Lunas Smudged, although bowls are more common. As in the gray wares, small numbers of incised or tooled surface vessels were recorded. These do not occur in significant numbers and half of the incised brown count can be attributed to a single vessel fragment in Pit Structure 1, Stratum 7. Brown Indented Corrugated is present in small numbers throughout the deposits.

The primary temper materials for the brown wares are crushed hornblende latite, rhyolite, crushed sand/sandstone, and Precambrian mica schist (Tables 3-6). As was observed for the gray wares, there are sherds with brown surfaces and gray to dark gray cores. This seems to indicate that local clays contain the minerals necessary to produce gray or brown wares and that the final surface color may have more to do with the vagaries and inconsistencies inherent in prehistoric firing methods than with a strict adherence to culturally determined traditions.

Red Wares. The red wares are the smallest group. Three White Mountain Redware types (Puerco, Wingate, and St. Johns Black-on-red) and one Rio Grande Glaze Ware (Agua Fria Glaze-on-red) were identified (Tables 3-7). As with the white wares, bowl sherds are the most numerous (Tables 7-10). The White Mountain Redwares are easily identified and common intrusives as well as one of the better temporal indicators. One odd Puerco Black-on-red vessel fragment from Pit Structure 1, Stratum 3, 4, and 5 has an exterior covered with a basket impression. The single Agua Fria Glaze-on-red bowl sherd was recovered from the plaza. No other post-A.D. 1325 wares are represented in the sample. Its presence in combination with early Cibola White Wares suggests a mixing of deposits in the plaza. The plaza materials are not assigned to a specific occupation.

Research Objective Results

The first two research objectives focus on changes in local population or changes in the cultural affiliations of local populations of the Albuquerque district. The hypothesized changes are addressed through design elements on Socorro Black-on-white and the distribution of local and nonlocal temper types at LA 15260 for white, gray, and brown wares. The remaining three research objectives deal with intrasite problems including typology, chronology, and site function. The typological objective has already been discussed in the type descriptions.

Design Style and Temper. Previous ceramic analyses have yielded tabulations, vague descriptions (with the exception of Sundt 1979), and a few photographed examples of Socorro Black-on-white vessels or sherds. This is unfortunate because Socorro Black-on-white is the most common white ware produced. It was traded over a very broad area including the Socorro district (as defined by Mera 1935), the Acoma province (Dittert 1959), the Albuquerque district (Lang 1982b), and north to Mesa Prieta along the Rio Puerco of the East. Quantities of Socorro Black-on-white have been identified in assemblages as far north as Gallo Wash near Chaco Canyon (Franklin 1982). Socorro Black-on-white is considered so distinctive that investigators have not provided detailed descriptions from its main production areas. Because of this oversight, the existing data are inadequate for a regional study of the Socorro Black-on-white. Therefore, the focus of this design study is to begin building a data base by describing the stylistic data for this assemblage.

The testing phase results indicate that a large number of the white and brown wares were probably manufactured near the Rio Salado-Alamocita Creek area in the Socorro district and that these intrusive ceramics provide evidence of social and economic ties between populations within the Albuquerque and Socorro districts (Anschuetz and Vierra 1985). Maintaining these ties may have allowed for the seasonal movement of horticulturalists into the less intensively farmed areas along the middle Rio Grande during periods of environmental or demographic stress (Anschuetz and Vierra 1985:33). Without design style information from these areas, the hypothesis of population movement and close social ties between populations must be based mostly on the frequency and distribution of distinctive local temper types from the Albuquerque and Socorro districts. Identification of specific design styles that may be attributable to the Albuquerque or Socorro districts must be based on the coocurrence of the design styles with the spatially distinct temper materials.

Lang (1982b) suggests that the Socorro and Albuquerque districts are stylistically, and therefore, culturally distinct from the carbon-paint producing populations of the northern Rio Grande districts. He bases this on the lack, except for small numbers recorded along the lower Rio Puerco (Warren 1982a:156), of Santa Fe Black-on-white in assemblages within the Socorro district. If the Socorro and Albuquerque populations were culturally allied so that the white ware design styles from the two areas could be said to represent a "style zone" (Plog 1980) then design style homogeneity should be great. Design style homogeneity may result from the exchange of ceramic vessels and design style information over broad areas (Plog 1980:137). Design heterogeneity may occur when populations are segmented into distinct socio-economic areas. The spatial distribution of a group's ceramics may reflect their success in creating and maintaining long-range ties for the purpose of buffering against periods of environmental stress. The wide distribution of Socorro Black-on-white suggests that Socorro district populations were very successful at developing and maintaining ties.

Socorro Black-on-white design elements fall into 11 classes. A few observations and cautions about the possible origins of the elements can be made. The most common elements were multiple parallel thin and/or broad lines. Multiple parallel thin lines are not considered diagnostic of any particular style, although multiple parallel lines that divide and encircle design fields are found on Red Mesa Black-on-white and Puerco Black-on-white (Doyel 1980). Extensive use of parallel line dividers may result in the high counts in this assemblage. Parallel dividers are probably not diagnostic of a particular area of production. Broad bands, sometimes in concentric or scrolled arrangement, are indicative of Puerco Black-on-white, and Dittert (1959) thought these represented the origin of the Socorro Black-on-white in the Acoma province. This design element is present throughout the Coors Road site strata indicating that it was popular into the early A.D. 1200s. Combinations of thin and broad lines, common in Chupadero Black-on-white, may have a similar origin. Similarities in Chupadero and Socorro Black-on-white may, in part, be attributed to interaction with Mimbres populations or to sharing of information gathered by Socorro district populations from western groups with Chupadero-style producing peoples east of the middle and lower Rio Grande (Lang 1982b).

The second most common design element is opposed solid and hachured contiguous triangles, chevrons, or feather motifs. The hachure is diagonal and the width of the hachure is rarely greater than the framing lines. The space between the hachure is narrower than the hachure line width. The solid elements are more often equal to or smaller than the opposing hachure elements. This trait is common for Reserve Black-on-white (Doyel 1980). Dittert (1959) has observed parallel designs in Socorro, Reserve, and Puerco Black-on-white at sites in the Acoma province occupied during the early A.D. 1000s. In the Acoma province, the southern borders of which are part of the Socorro district, Reserve/Puerco designs on Socorro Black-on-white are associated with the increased frequencies of brown wares and of Pilares Banded. Dittert attributes this to increased Mogollon influence. Allied populations either residing in or trading with the Acoma province are evidenced by high frequencies of Socorro Black-on-white throughout the 250 years of Acoma province cultural development.

The space between the hachured lines is not considered an important attribute of Reserve Black-on-white (Doyel 1980). Socorro-style hachure, where width of the hachure lines is broader than the space between hachures, is a distinctive attribute of this assemblage and is ubiquitous throughout the three occupational episodes. This design element is commonly found on the Socorro Black-on-white from sites along the middle Rio San Jose (Hannaford in prep.) and near Los Lunas, New Mexico (Fenenga and Cummings 1956).

The third most common design motif is the combination of diagonally hachured triangles and feather elements with a single solid broad line (4-8 mm) outlining the straight portion of the hachure element. This combination can be considered a hybridization of Gallup and Puerco Black-on-white. Lang (1982a, 1983) has recorded similar design combinations in the Prewitt district and from sites along the North Fork of the Rio Puerco of the West. The main difference between this and the western style is that the hachure is wider than the space between it. Again, this trait is considered diagnostic of Socorro Black-on-white.

The fourth most common element is ticked or dotted lines. This element is found on both broad (4-8 mm) and thin (1-2 mm) lines. The most common application is on thin parallel lines with the dots pendant from the lines opposing one another in alternating order. On broad lines, the ticks are most often on both sides of the line. The use of ticked lines reflect the early development of Socorro Black-on-white out of Red Mesa Black-on-white (Lang 1982b:167). Ticked lines are found in combination with checkerboard, opposed solid and open triangles, and contiguous triangles. Sherds, presumably from the Socorro district, shown in Mera's ceramic study (1935, pl. 15) have ticked lines. Examples of Socorro Black-on-white from the Tunnard site in north Albuquerque do not have ticked lines, although only four examples are shown (Hammack 1966:13). The photographed examples are of broad lines and diagonally hachured triangles.

The fifth most common element is checkerboard produced by using triangles, diamonds, and squares. This is commonly considered a western Anasazi design element associated with Escavada, Puerco, and late Red Mesa Black-on-white. Checkerboards are rarely the total design on a vessel and are often associated with ticked or plain thin lines. The temporal span of checkerboard elements is unknown. It is a common element in Santa Fe Black-on-white, which succeeds Socorro Black-on-white as the most common type in middle to late Coalition and early Classic phase sites within the Albuquerque district.

The sixth most common element is the contiguous, solid triangles, often pendant from the rim. Contiguous, solid triangles are common in Puerco and Escavada Black-on-white. It is common in the assemblage from the Cerros Mojinos site (LA 2569) and LA 2567, which are located along the lower Rio Puerco near Los Lunas (Fenenga and Cummings 1956) and was identified in Socorro-dominated assemblages located along the north edge of the Rio San Jose floodplain (Hannaford, in prep.) located at the northern boundary of Mera's (1935) Socorro district.

Other design elements present in quantities of 5 percent or less of the Socorro Black-on-white total include square, rectangular, or circular concentric lines, opposed or interlocking solids, Sosi or Gallup-style hachure, and opposed alternating, contiguous solid or open triangles.

To determine whether specific design elements occur more frequently on vessels produced in the Rio Salado-Alamocita Creek area, Socorro Black-on-white design elements were tabulated according to temper type (Table 11). Crushed sherd with hornblende temper is considered indicative of production from the Rio Salado-Alamocita Creek area. The other main Socorro Black-on-white tempers, crushed sherd and crushed sherd with sandstone, were combined for this aspect of the study. Neither is attributable to a particular production area.

Overall, there is more sherd and sand or sandstone tempered Socorro Black-on-white. The ratio of sherd and sand or sandstone to sherd and hornblende latite is 1.76:1. By way of comparison, if all the broad and narrow line design classes are combined, the ratio is 1.71:1 in favor of sherd and sand or sandstone temper. The classes that include Socorro style hachure have a ration of 2:1 in favor of sherd and sand or sandstone temper. Broad and narrow lines and designs that include Socorro-style hachure are found on 157 (52.8 percent) of the Socorro Black-on-white sherds.

Looking at Socorro-style hachure designs by occupation, sherd and sand or sandstone temper are more common. The ratio for Occupation 1 is 1.4:1; for Occupation 2 is 1.5:1; and Occupation 3 is 3.8:1. A chi-square test of significance using the three occupations and the Socorro-style hachure yields a value of 3.25 with 2 degrees of freedom, which is not significant at the .01 level (critical value 13.816). The data indicate an increase in non-Rio Salado-Alamocita Creek tempers, but this increase is not statistically significant. The data also indicate that there is no preference for Socorro-style hachure by temper. The remaining design data by temper seems to reflect this more specific pattern. Some minor differences exist but they cannot be interpreted as regionally distinct preferences for design elements.

Although conclusive evidence of a design-specific product from the Rio Salado-Alamocita Creek area is not present in the assemblage, some interesting observations concerning the stylistic variability within Socorro Black-on-white during the late Developmental-early Coalition period can be made. Design variability is great within Socorro Black-on-white while contemporaneous types such as Reserve Black, Puerco, and Gallup Black-on-white exhibit fairly restricted element variability. Reserve, Puerco, and Gallup Black-on-white, dominant in assemblages dating between A.D. 1050 and 1200, are found over vast areas of the Southwest. Homogeneity results from the exchange of vessels and design information between culturally related groups in close proximity and may result in a clinal distribution of design information (Wobst 1977). At the heartland of these "style zones" (Plog 1980:134), design elements are fairly homogeneous. Variability is greatest on the fringes of design style zones. Evidence of this increased variability or style hybridization is seen in assemblages from the North Fork of the Rio Puerco of the West where the Gallup and Puerco designs have combined. This hybridization appears to result from the exchange of information between individual potters living in close proximity on the fringes of their respective style zones or social boundaries. The exchange of vessels with culturally distinct designs results in the eventual use of these designs and variability in assemblages.

The great variability within the Socorro Black-on-white pottery suggests that the Socorro Black-on-white-producing populations maintained social ties with groups over a broad geographical area. Similarities in style to Gallup, Reserve, Puerco, and Chupadero Black-on-white may, in part, be attributed to the fact that Socorro district and Acoma province border areas were where these wares were produced. Contact between potters on the fringes of these five areas may have resulted in the exchange of design style information. Incorporation of these design styles by potters of the Socorro district and Acoma province may have resulted in the modification and combination of these styles into what is now called Socorro Black-on-white. The broad distribution of Socorro Black-on-white vessels may represent the means by which Socorro people interacted with populations in adjoining areas rather than the hybridized Socorro Black-on-white style being incorporated into design styles or pottery from the surrounding areas.

Changes in Socorro Black-on-white cannot be adequately addressed until firmer dating of the inception and termination of this ware is ascertained. Because Socorro Black-on-white conservatively spans a 250-year period there was undoubtedly an ebb and flow in the use of design elements that may reflect changes in social interaction. The identification of temporally sensitive stylistic variability would allow us to refine dates for previously excavated sites, to better understand settlement patterns of Socorro Black-on-white producing populations in the northern periphery of the Socorro district and the Albuquerque district, and to better address the dynamics of the social interaction between the groups in the two areas. Until we know whether the populations were contemporaneous, we can not confidently discuss or interpret the relationships between them.

The Temper Study

The temper identification and analysis follows Warren's study of the testing phase ceramics, which is based on her lithic codes (Museum of New Mexico n.d.). To duplicate her temper identifications, the divisions were followed as closely as possible. Temper determinations were made using up to 40X on a binocular microscope.

Temper descriptions. Crushed sherd and sandstone temper is typified by light gray to black angular fragments of crushed potsherds. Crushed sherds comprise at least 50 percent of the temper material, and at the most extreme, 100 percent of the temper is crushed sherd with no other identifiable materials. Sandstone in tandem with sherd temper is most often angular, clear, and finely crushed. Crushing is indicated by the angularity of the particles.

Crushed sherd and hornblende temper is a combination of finely crushed hornblende latite and sherds. Hornblende is described later in this section. The diagnostic characteristic of this temper is sparse to abundant hornblende. Hornblende-latite may come from the Rio Salado-Alamocita Creek area within the Socorro district.

Clay pellets were identified in tandem with the sherd temper. These inclusions vary in shape from round to sub-rounded to lenticular. The exterior of the clay pellet is usually the same color as the paste, but the interior is usually a darker shade of gray or black. Clay pellets may result from incomplete grinding of the raw material. Clay pellets or inclusions have been reported in ceramics dating from A.D. 500 to 1300 (Dittert 1959; Hannaford, in prep.; Warren 1982a).

Mica schist usually occurs as finely crushed microcrystalline crenulated grains of biotite or muscovite mica and quartz. The crystalline structure is clear to brown to black in color. Possible sources of this material are Tijeras Canyon and in the Ortiz gravels near the Ladron Mountains and along the Rio Grande south of Albuquerque.

Table 11. Socorro Black-on-white Design Elements by Temper and Occupation

Provenience by temper	Occupation 1		Occupation 2		Occupation 3		Total	
Design element	Sherd/ sandstone	Sherd/ hornblende	Sherd/ sandstone	Sherd/ hornblende	Sherd/ sandstone	Sherd/ hornblende	Sherd/ sandstone	Sherd/ hornblende
1. Socorro-style hachure, chevrons		2		1	1	1	1	4
2. Opposed alternating, solid triangles, framed by single thin lines	1	2		1	5	1	6	4
3. Opposed alternating, large triangles, formed by broad lines		4						4
4. Socorro-style hachure	7	6	6	3	14	4	27	13
5. Alternating, opposed pendant dots on thin lines	5	2	2	4	1	4	8	10
6. Vertical solid bands, framed by thin parallel lines	1	3	3		1		5	3
7. Broad, solid line	5		7	3	5	3	17	6
8. Parallel lines, 4-8 mm wide	3	2	7	7	11	10	21	19
9. Gallup-style hachure, with dots and broad line framers	6						6	
10. Large hachure triangles opposed by broad line triangles	1	1					1	1
11. Contiguous solid diamonds						1		1
12. Checkerboard	1	2	4	4	5	2	10	8
13. Contiguous triangles	1	1	9	2	3	3	13	6
14. Broad line, ticked on both edges	2						2	
15. Concentric thin lined squares	3						3	
16. Socorro-style hachure and broad lines	6	2	5	3	5	1	16	6

Provenience by temper	Occupation 1		Occupation 2		Occupation 3		Total	
Design element	Sherd/ sandstone	Sherd/ hornblende	Sherd/ sandstone	Sherd/ hornblende	Sherd/ sandstone	Sherd/ hornblende	Sherd/ sandstone	Sherd/ hornblende
17. Opposed solid and Socorro-style hachure trianges	1		1	1	3		5	1
19. Gallup-style hachure					1	1	1	1
20. Gallup-style hachure and broad lines			4		1		5	
22. Opposed solid chevrons			1				1	
23. Opposed pendant dots on lines and checkerboard	1						1	
26. Concentric lines	2	3	3		2	1	7	4
27. Broad lines and dots					4		4	
28. Opposed pendant dots on thin lines and broad lines		1	2		1		3	1
29. Interlocking solid elements	1	3	2				3	3
30. Checkerboard and broad lines		1						1
31. Rick-rack		1						1
32. Thin and broad lines	2		3	2	5	1	10	3
33. Opposed alternating large triangles formed with broad lines, parallel lines 4-8 mm wide, and opposed pendant dots on thin lines			1				1	
36. Variation on opposed alternating triangles			1				1	
38. Cross hachure framed with solid lines				1			1	
Totals	49	36	61	32	68	33	178	101

Caliche particles, which appear as soft off-white to yellowish particles, are sub-rounded and are easily scratched by a hard, sharp probe. It is not known if the caliche is an intentional additive or naturally occurring in the raw clay.

Glassy igneous inclusions are tentatively identified as andesite. The material is finely crushed, rendering precise identification or description difficult. Andesitic tempers are found in the pottery from the La Plata/San Juan area (Shepard 1939) and are common in the white wares from the northern Rio Grande (Warren 1979).

Three other materials are present in very small quantities and are useful for demonstrating the variability in tempers. Undetermined friable rock was found in very small quantities. Soft, easily obliterated particles of red hematite are also present. Hematitic sandstone is found in outcrops bordering the Rio San Jose, west of Albuquerque. Crushed potassium feldspars are also present in small quantities and may be finely crushed inclusions of aplite granite. Aplite granite is a common temper in the brown wares and is described later.

The following crushed rock materials are found in specimens that do not also have crushed sherd temper. These tempers are found primarily in the brown and gray wares.

Hornblende latite is an intermediate microporphyritic volcanic rock composed of abundant plagioclase feldspars and hornblende phenocrysts. The phenocrysts are embayed by a microgranular ground mass consisting of sanidine, quartz, and plagioclase. Crushed hornblende latite has a sugary texture that is distinctive when viewed under the binocular microscope.

The rhyolite tuff is composed primarily of microcrystalline potassium feldspar and lesser amounts of quartz, plagioclase, amphibole, and biotite. Feldspar and quartz phenocrysts are present and are often embayed in the soft white microcrystalline ground mass.

A third igneous temper was identified by Warren (Vierra 1985) as aplite granite. The source of this particular material is unknown although it may be the Datil Volcanics. The rock is primarily quartz and potassium feldspar with lesser amounts of biotite and amphibole. It does not exhibit the microcrystalline ground mass that is apparent in the other two materials. The general appearance under the microscope is coarse.

The metamorphic Precambrian mica schist found in utility wares from the Tijeras Canyon area is well described in Oakes as "silvery, gray, crenulated fragments, 1 to 3 mm, with bands of fine granular quartz, occasional coarse angular grains of smoky to mildly white quartz, and hematitic stains and inclusions" (Oakes 1979:98). Temper is abundant and coarse, causing the clay body to be weak and very friable. Warren (1980:156) describes the primary temper in the Tijeras Pueblo utility wares as silvery colored muscovite schist or crushed sandstone. Descriptions from the two references agree with the temper observed in the LA 15260 utility wares except that some light brown colored mica mixed with the silvery mica is present. This particular mica may not be directly sourced to the Tijeras Canyon and may, in fact, come from a source to the south in the Ladron Mountain area and along the east banks of the Rio Grande. Nevertheless, this mica schist temper is found in the Tijeras Canyon sites and the Tunnard site and may represent evidence of local manufacture.

Crushed sandstone/sand is also a common temper in assemblages from the Tijeras Canyon area and along the Middle Rio Grande. Sandstone temper is commonly found in combination with blocky coarse pastes. The sandstone/sand ranges from fine to coarsely grained with angular, sub-angular, sub-rounded, and rounded shapes. It is most commonly light gray to clear in color and is usually abundant. Sandstone is ubiquitous over a broad geographic area and is generally not diagnostic of a particular area, at least when viewed through a binocular microscope. Crushed clay pellets are present in a small number of the utility wares where it appears that the unground clay was a temper additive since it is the only visible inclusion in the paste. Clay pellets are common additives in the ceramics from the Acoma province (Dittert 1959). Because the presence of clay pellets is not diagnostic, ceramics with clay pellets are not assigned to a specific area of production.

White ware temper. White ware temper data by occupation are summarized in Tables 3-6. The most common temper in the white ware assemblage is crushed sherd and sandstone, which outnumbers the sherd with hornblende by almost two to one and the rest of the materials from between four and six to one. Sherd and hornblende temper may be indicative of manufacture within the Socorro district while sherd and sandstone temper is not indicative of a particular production source but may suggest local production. The presence of the sherd and hornblende tempered white wares suggests either ceramic exchange between populations in the Socorro and Albuquerque districts or, possibly, the seasonal movement of populations based in the Socorro district into the Albuquerque district.

Changes in temper distribution by occupation could point to changes in site occupants' social and economic contacts. A chi-square test of independence on Socorro Black-on-white (because it is the most common white ware type and represents the largest sample) frequencies for these two major temper groups by the three occupations (combining sherd and sandstone and sherd only) resulted in a value of 1.53 (d.f. = 3; significance level = .01). The chi-square value indicates that the variables of temper and occupation are independent and that there is no significance difference in the temper distributions. White ware temper does not provide the information necessary to determine whether there were changes in social and economic ties for the site residents.

Gray and brown ware temper. While white ware tempers do not show the variability necessary to determine whether there were changes in the cultural identity or affiliation of the site residents, it is informative to use chi-square tests of independence for brown and gray temper proportions of the three occupations. For the purposes of this analysis three main temper groups were recognized: Precambrian mica schist (temper types 7, 8, and 9), hornblende latite/rhyolite/aplite granite (temper types 3, 4, and 5), and sandstone/sand (temper type 1). The Precambrian mica schist includes the silver and brown mica; the hornblende latite/rhyolite also includes aplite granite; sand/sandstone is self-explanatory. These three groups were chosen because they represent the largest samples available for statistical manipulation. The hornblende latite/rhyolite group provides evidence for ceramic manufacture in the Socorro district, Precambrian mica schist represents local manufacture, possibly within the Tijeras Canyon area or certainly within the Albuquerque district. The sandstone temper is somewhat of a control since it cannot be attributed to any specific area of manufacture. Not included are temper types that are present in low numbers and are not temporally or regionally diagnostic.

Table 12 contains the summary data used to formulate the chi-square tests. The gray and brown ware separation minimally indicates that the wares represent different loci of manufacture.

Table 12. Sherd Counts for Three Occupations by Ware and Temper

	Gray Ware		Brown Ware		Totals	
	n =	%	n =	%	n =	%
Occupation 1						
Sandstone/sand	120	64.2	33	6.9	153	22.9
Hornblende latite/rhyolite/aplite granite	24	12.8	397	82.5	421	66.0
Mica schist	43	23.0	51	10.6	94	14.1
Occupation 2						
Sandstone/sand	125	61.3	41	8.1	166	23.4
Hornblende latite/rhyolite/aplite granite	22	10.8	389	77.2	411	58.0
Mica schist	57	27.9	74	14.7	131	18.5
Occupation 3						
Sandstone/sand	150	59.8	64	13.1	214	28.9
Hornblende latite/rhyolite/aplite granite	25	10.0	285	58.3	310	41.9
Mica schist	76	30.3	140	28.6	216	29.2

Table 13. Chi-Square Results by Occupation

Occupations Compared	x^2	Critical Value	Degrees of Freedom	Result
Brown Wares				
1, 2, 3	81.52	13.28	4	not accepted
1 and 2	4.58	9.21	2	not rejected
1 and 3	69.71	9.21	2	not accepted
2 and 3	41.22	9.21	2	not accepted
Gray Wares				
1, 2, 3	3.50	13.28	4	not rejected
1 and 2	1.26	9.21	2	not rejected
1 and 3	3.47	9.21	2	not rejected
2 and 3	.56	9.21	2	not rejected

Eight chi-square tests were run to determine if differences in temper frequencies for the three occupation units were independent. The results of these test are summarized in Table 13.

The chi-square tests reveal statistically significant differences in the temper frequencies for brown wares from the three occupations. The gray ware temper results indicate that little change occurred in tempering materials through time.

The brown wares show significant differences between the three occupations. Tempering material for Occupations 1 and 2 show an independence between occupation and temper material indicating that the use of pottery from different sources were similar through time. The major differences are between Occupations 1 and 2 and Occupation 3. When Table 13 is consulted, it is immediately apparent that the percentage of mica schist tempered pottery dramatically increases while hornblende latite/rhyolite/aplite granite tempered pottery decreases. Hornblende latite/rhyolite/aplite granite brown utility pottery decreases from 82.5 to 58.3 percent. At the same time mica schist increases from 10.6 to 28.6 percent. Gray wares also show an increase in the percentage of mica schist tempered pottery from 23.0 to 30.3 percent, but it is not statistically significant. This implies that the sources of utility pottery changed through time.

Summary and Interpretation. The temper comparisons for decorated and utility wares provide results that are different from those expected at the outset of the analysis. Socorro Black-on-white temper material did not change significantly during the site occupation. The proportion of crushed sherd and sandstone to crushed sherd and hornblende temper remained fairly constant ranging between 29 and 37 percent. This suggests that the white ware procurement mechanisms remained the same throughout the site occupation and that a large percentage of the white wares came from the Socorro district. If the site was only seasonally occupied, this would mean that the white wares were brought to the site from the primary residences and the local exchange networks were not tapped for locally produced white wares.

The gray wares show a similar consistency in percentages through time, ranging from 60 to 64 percent sandstone/sand tempered for all three occupations. Gray wares were obtained from at least three main sources and the contacts between the site residents and areas of manufacture appear to have remained relatively unchanged through time.

The brown wares show the most change in sources. Sandstone/sand tempered brown wares remain fairly constant with a slight increase from 7 to 13 percent through time. The hornblende latite/rhyolite/aplite granite tempered pottery decreases from 82 to 58 percent while the local mica schist increases from 11 to 29 percent. This is a significant change in proportion of both hornblende latite/rhyolite/aplite granite and mica schist. It implies that the site residents depended on Socorro area sources for the majority of brown utility wares during the early occupations, possibly because reliable sources in the Albuquerque area had not yet been established. By the third occupation, local sources are more accessible and reliable. This also may indicate a shift away from dependence on Socorro sources for goods.

Wendorf and Reed (1955) and Lang (1982b) believe that there was a major influx of population from the south into the Albuquerque district between A.D. 1100 and 1200. The results of this temper study suggest that this is true. Decreasing frequencies of Socorro district pottery may indicate that the migrating populations gradually developed social and economic contacts that allowed them some autonomy. Continued ties with the Socorro district populations is indicated by the presence of Socorro Black-on-white and the relatively high percentages of hornblende latite/rhyolite brown wares.

The constant use of sandstone/sand tempered gray utility wares indicates that the residents maintained contacts with other pottery producing groups that had been established prior to the initial occupation of the site. Short-range contacts may have been maintained through the exchange of utility wares and limited numbers of white wares like Kwahee, Santa Fe, and Cebolleta Black-on-whites.

Site Chronology

The testing phase ceramic analysis characterized the assemblage as homogeneous, dominated by Socorro Black-on-white and brown wares. Because of this homogeneity the research design emphasized collecting datable materials, either radiocarbon or dendrochronological samples. No dendrochronological samples were collected and the radiocarbon samples were primarily scatter samples from post-occupational strata. Thus, occupation dates must be estimated from the ceramic data.

The problems of using ceramics to date site occupational sequences are many, but the practice continues. The primary problem here is the absence of absolute dates for assemblages from late Developmental-early Coalition sites in the Albuquerque district and from this site. No comparative temporal framework exists to develop and interpret a ceramic seriation profile.

A second problem is that Socorro Black-on-white is the most common white ware type throughout all occupations and strata. No type with an earlier or later manufacturing date replaces Socorro Black-on-white or even significantly increases in frequency to aid in formulating beginning and end dates for the site occupation. This would not be a problem if the stylistic development of Socorro Black-on-white had been analyzed with regard to its changes through time. As it is, there are no documented changes in Socorro Black-on-white even though it was produced over a 200 to 350-year span (Dittert 1959:542). If early and late Socorro Black-on-white design styles had been identified in previous studies, a relative framework would exist for dating the occupations.

These two problems deter fine-grained ceramic dating of the Coors Road site occupation and dating must be limited to fairly broad spans of time. The dates are partially based on the small body of knowledge concerning ceramic developments and population movement for the Albuquerque district. Occupation dates also incorporate temporal sequence studies performed on ceramic assemblages from areas adjacent to the Albuquerque district, such as the lower Rio Puerco and the Middle Rio San Jose. These studies do not offer absolute dates for trends in ceramic development, but do offer a comparative framework. Presence or absence of certain well dated temporally sensitive types add to the chronological framework. Finally, ceramic manufacture dates outlined by Breternitz (1966) are used.

The broadest temporal span is determined by the manufacture dates of the earliest and latest types. The earliest types are Kiatuthlanna and Red Mesa Black-on-white with A.D. 850 as the earliest date of manufacture (Breternitz 1966:80,90). The latest dates, A.D. 1315-1425, are from Agua Fria Glaze-on-red (Warren 1977a:99). These types represent a potential occupation span of 565 years. Although it is possible that unexcavated portions of the site better reflect this temporal range, the bulk of the ceramic data suggests a more restricted temporal span.

Late Red Mesa Black-on-white dates to A.D. 1125 (Breternitz 1966:90) and Kiatuthlanna Black-on-white is considered to occur into the late 1000s or early 1100s along the lower Rio Puerco of the East (Warren 1982a:147). These could also represent curated or recycled items, heirlooms, or evidence of mixed deposition. Red Mesa Black-on-white is part of the late Developmental ceramic complex identified for the Albuquerque district (Skinner 1965). The majority of the Red Mesa Black-on-white from LA 15260 is from Levels 1 and 2 of the midden, levels that could have some post-depositional mixing.

An initial occupation date of around A.D. 1125 to 1150 based on the presence of Red Mesa, Reserve, Gallup, Kwahee, and Cebolleta Black-on-white as well as the two major types, Socorro and Chupadero Black-on-white, all of which date to this time period, is possible. Two developments may shed light on the early end of the site history. First, the decline of the Chacoan interaction sphere has been interpreted as corresponding to the decrease and eventual absence of mineral painted Cibola White Wares along the Middle Rio Puerco of the East by A.D. 1150 (Burns and Klager 1979). Following the decline of the Cibola White Wares, by A.D. 1200 there was an increase in Socorro and Santa Fe Black-on-white. Similar developments are documented along the Middle Rio San Jose, where the Cibola White Wares were replaced by a dramatic increase in Socorro Black-on-white (Post n.d.). The limited data from late Developmental period sites indicate that Cibola White Wares, including Gallup and Red Mesa Black-on-white, are common in Albuquerque district assemblages. Cibola White Ware frequencies decline during the early 1100s, apparently coinciding with the decline of the Chaco system. Here, too, evidence points to Cibola White Wares being replaced by Socorro Black-on-white in the Albuquerque district. Kwahee Black-on-white is common in Albuquerque district and middle Rio Puerco of the East assemblages between A.D. 1100 and 1200. This seems to signify definite changes in the cultural affiliation from the Chaco and Western Cibola to the Socorro district and the Northern Rio Grande districts and possibly movement into the Albuquerque district from the north and southwest.

The second development during the early 1100s is the increase in Socorro Black-on-white, possibly reflecting population movement from the Socorro district into the Albuquerque district (Hammack 1966:12; Lang 1982b:177). The small presence of western Cibola White Wares in the Coors Road assemblage reflects declining affiliations with the western populations. This, combined with high frequencies of Socorro Black-on-white, suggests that the first intensive occupation of the site occurs between A.D. 1125 and 1150.

The late span of dates from A.D. 1325 to 1415 evidenced by the single Agua Fria Glaze-on-red sherd is not appropriate for the excavated portion of the site. There are no other ceramics that might be considered contemporaneous, such as Galisteo Black-on-white. A more appropriate end date for the site is between A.D. 1200 and 1250, based on the limited presence of Santa Fe Black-on-white. Late Coalition or Classic period assemblages are generally dominated by Santa Fe and Wiyo Black-on-white with lesser amounts of Socorro and Chupadero Black-on-white. Greater numbers of Santa Fe or Wiyo Black-on-white should have occurred if the Coors Road site late deposits date to the late 1200s.

The Tunnard site (on the north edge of Albuquerque) assemblage is composed primarily of Santa Fe Black-on-white and Smeared Gray Indented Corrugated with lesser amounts of Socorro Black-on-white, Pitoche Rubbed-Ribbed, and Los Lunas Smudged. Largely based on the intrusive ceramics, the site is dated to the late 1200s or early 1300s. In contrast, the Coors Road assemblage has a preponderance of Socorro Black-on-white, less Santa Fe Black-on-white, and equal amounts of Pitoche Rubbed-Ribbed and Gray Indented Corrugated. The presence of Wingate and Puerco Black-on-red to the near exclusion of St. Johns Black-on-red also indicate a major occupation between A.D. 1050-1200. St. Johns Black-on-red or Polychrome should be found at sites occupied after A.D. 1150 and common on those dating after A.D. 1200. Thus, the late occupation of the Coors Road site probably occurred during the early 1200s.

The assemblage from the first occupational episode (as defined earlier in this volume) is primarily composed of Socorro Black-on-white and Pitoche Rubbed-Ribbed. The primary temper agents are from the crushed sherd and hornblende latite/rhyolite groups. Lesser amounts of Chupadero, Kwahee, and Santa Fe Black-on-white and Gray Indented Corrugated are present. Stratum 7, trash from the occupation of Pit Structure 1, had numerous sherds from the same vessels indicating the stratum at one time represented a cohesive deposit. The presence of Santa Fe Black-on-white might indicate a later occupation because of its post-A.D. 1200 manufacture date. However, the sherds are from a deposit that is a mixture of Stratum 2 and 7. Some mixture of the upper levels of Stratum 7 is indicated and may explain the presence of the later ceramics. The greatest frequency of Kwahee Black-on-white and the lowest frequency of Chupadero Black-on-white are as expected if this is the earliest occupation. As discussed previously, the initial occupation may coincide with the hypothesized movement of population into the Albuquerque district after A.D. 1150 and the collapse of the Chacoan system. An A.D. 1125 to 1150 date is tentatively assigned.

The second occupation ceramic assemblage contains virtually all of the types identified in the analysis. Socorro and Chupadero Black-on-white, Pitoche Rubbed-Ribbed, and Gray Indented Corrugated are the most common types. This occupation may have been the longest, evidence by the large amount of trash it includes. It is also the most ambiguous. Ceramics from a wide geographical area are represented, including White Mountain Redwares, northern Mogollon White Wares, Western Cibola White Wares, Acoma province White Wares, and Northern Rio Grande White Wares. The ceramic configuration suggests that the site residents maintained a number of long-range ties. This variety of ceramics could result from the social and economic ties kept by a family maintaining two seasonal residences. The presence of Red Mesa Black-on-white and the similarity between the ceramic configurations of the first and second episodes could signify that the second occupation succeeded the first by a short period of time.

The brown and gray wares have temper frequencies similar to Occupation 1. Warren (1980) suggests that the pottery industries of Tijeras Canyon were well established by A.D. 1200 so that Santa Fe and Socorro Black-on-white with mica schist temper would have been available. If the second occupation dated after A.D. 1200, there should be greater numbers of locally produced mica schist tempered ceramics. The lack of mica schist tempered Santa Fe and Socorro Black-on-white with no increase in mica schist tempered utility wares suggests an occupation date between A.D. 1150 and 1200.

Evidence for a third occupation episode is based on stratigraphic observations and a change in the frequencies of temper types in utility wares. A dramatic increase in the Precambrian mica schist, the major temper for the utility wares, is accompanied by a decrease in the occurrence of hornblende latite/rhyolite temper. This change in the utility wares indicates a shift away from a major dependence on the original Socorro manufacture centers to procurement and interaction on a more local level.

Whether or not interaction was with Tijeras Canyon populations cannot be determined. While year-round residential occupation of the Tijeras Canyon area probably took place in the late 1200s, exchange between seasonal populations may have occurred earlier. Many of the ceramics used at the Coors Road site were probably obtained locally. This occupation episode is tentatively assigned an A.D. 1200 to 1250 date. If the occupation occurred much after A.D. 1250, there would be more Santa Fe Black-on-white and St. Johns Polychrome.

Vessel Forms

Bowls. Bowls comprise 1,360 sherds or 31.1 percent of the assemblage. Frequencies and percentages for ware groups by occupation are presented in Table 14.

White wares comprise 63.5 percent of the bowl sherds and 19.8 percent of the site assemblage. Bowl sherds for each occupation and the site range from 30.3 to 34.8 percent. Gray ware bowls, which are usually smudged on the interiors, were never very numerous. Brown ware bowl percentages range from 7.2 to 13.9 percent. The increase from Occupation 1 to Occupation 2 can be attributed to larger numbers of Los Lunas Smudged rim and Plain Brown Smudged body sherds. Red ware bowl percentages remain fairly constant throughout the three occupations, possibly suggesting the length of occupation and the group size were similar through time. If functional requirements and supply demands for bowls had changed dramatically through time, there should be differences in vessel form percentages.

Jars. Jars total 2,918 sherds and comprise 66.8 percent of the site assemblage (Table 14). Red ware jars are negligible. The jar percentages are fairly consistent for the three occupations. A decrease in brown wares from Occupation 1 to Occupation 3 could reflect the changes in temper frequencies noted earlier, except that mica schist was used in both brown and gray ware utility jars. The decrease in brown ware jars does not indicate changes in activities performed at the site since brown and gray utility ware jars served similar functions (Doyel 1980). More utility jar sherds than bowl sherds suggest a focus on domestic activities including cooking and storage. Limited transportation and storage of water is indicated by the small frequencies of white ware ollas.

Other Vessel Forms. Vessel forms other than jars, bowls, and ollas are present in very small numbers. These include ladles, canteens, pipes, a miniature jar fragment, and sherds from vessels that could not be functionally identified. Ladles are identified by distinctive handles and bodies. They are utilitarian and probably were used in many ways. Canteens have very narrow rim diameters so water can be stored during transport with minimum spillage and easy corking. Canteens are common, but never numerous on Anasazi or Mogollon sites.

Pipes are represented by tubular stem fragments. They do not exhibit burning but may have been used as ceremonial smoke blowers. The pipes are only present in Occupation 1 and in the plaza deposits. The fragment from the plaza is a polished gray ware and has an estimated diameter of 2.0 cm. It is sherd tempered and was probably brought to the site. One fragment from the midden, Stratum 2, Level 1 (associated with Occupation 3), is unpolished white ware with sherd temper. It has an estimated diameter of 2.3 cm. A second fragment from the midden (also associated with Occupation 3) is a highly polished white ware with sherd temper. It is part of a lip and no estimate of the diameter could be made.

Table 14. Bowl and Jar Frequencies and Percentages by Ware and Occupation

	Occupation 1		Occupation 2		Occupation 3		Site	
	n =	%	n =	%	n =	%	n =	%
Bowls								
White	216	20.0	211	19.0	255	21.0	864	19.8
Gray	9	.9	12	1.1	23	1.9	52	1.2
Brown	81	7.9	154	13.9	106	8.7	413	9.5
Red	5	.5	9	.8	6	.5	31	.7
Jars								
White	99	9.6	106	9.5	153	12.6	448	10.3
Gray	190	18.5	226	20.4	256	21.1	934	21.4
Brown	406	39.6	372	33.5	394	32.5	1533	35.1
Red	1	.1	1	.1			3	.1

One Socorro Black-on-white miniature jar fragment was recovered from the midden, Stratum 2, Level 2 (associated with Occupation 2). The height of the jar is estimated at 3.5 cm. The presence of miniatures on sites is not well understood. In the markets of Mexico today miniatures are sold as children's toys. Possibly the residential group included children.

Orifice Diameters

Vessel orifice diameters and how they change over time and in response to social and economic factors have been the object of a number of studies (see Doyel 1980; McKenna 1984). These studies deal with residential sites and seasonally occupied fieldhouses and had temporal ranges greater than represented by this site. Nevertheless, it was decided that the evidence for multiple occupations might afford the opportunity to compare orifice diameters to see if they evidenced changes in group size, composition, or site activities. Unfortunately this lofty expectation did not meet with great success. The number of measurable jar and bowl rims is small and does not allow for extensive analysis. The data are presented in the hope that it can be utilized in future studies.

Bowls. Bowl rim diameters (n = 38) are primarily from Socorro Black-on-white and Kwahee Black-on-white vessels. There were two measurable rims of Los Lunas Smudged. White ware bowl rim diameters range from 16 to 30 cm and average 20 cm. Ten were in the small range between 10 and 16 cm in diameter and are cup to small soup bowl size. Twenty-six bowls ranged between 18 and 26 cm in diameter with peaks at 20 and 22 cm. These mid-ranged vessels were probably used for the greatest variety of household activities including short-term storage, eating, and serving. Only two were greater than 26 cm in diameter and were probably used for serving dishes.

The two Los Lunas Smudged bowls are 26 cm in diameter and represent the upper end of the mid-sized vessels. They may have been used for serving as they tend to be larger than the white ware bowls. The heavy smudging and highly polished interiors may have rendered these vessels more useful as serving dishes since the well finished interior would be less likely to scrape away or spall off into the food.

Jars. Only five jar rims could be measured, one brown incised and four Pitoche Rubbed-Ribbed. The diameters range from 14 to 20 cm, similar to the small bowl diameters. Semi-restricted orifice openings may facilitate covering the jar for cooking and storage. The diameter, however, does not restrict access to the contents. These semi-restricted opening jars were probably designed to allow easy access on a regular basis. Although they may have been used for long-term storage, their greatest utility was for everyday activities. It is not surprising that they are the most numerous vessels on the site because of their frequent use and probably their frequent breakage. Replacement might have been frequent so the source would have to be near.

Worked Sherds

Fourteen sherds were worked. Four basic categories were recognized: tool, modified vessel, disc, and ornament, defined by edge morphology and wear patterns. All of the worked sherds were from white ware vessel fragments.

Seven were tools with rounded or single beveled edges. Edge striations were both perpendicular and parallel to the edge. These striations and the edge shape indicate three basic types of motion. Parallel striations on a slightly rounded or flat edge indicate that the sherd was used in a uni- or bidirectional motion parallel to the edge of the sherd. This could result from activities such as notching wood or grinding pigment. Sherds with single beveled or rounded edges and perpendicular striations were used in a unidirectional manner, scraping or smoothing across the sherd edge. This motion is commonly assigned a function of pottery making or smoothing of other objects with curved sides. These types of tools are present in deposits from all occupations.

One example of a modified vessel is present. It has an acutely double beveled edge that appears to be deliberately shaped rather than shaped incidental to use. Its thin, double-beveled edge would have been ideal for scooping and is considered to have been modified into another vessel form.

Two disc fragments were identified. They are characterized by a round plan view and flat edges. A projection of the edge would be circular. Discs could be used as jewelry, weaving implements, or gaming pieces. Functions of discs are not well understood.

A single pendant or ceramic button fragment was identified from the midden (associated with Occupation 3). It is small and shaped like the end of a finger. The edges are single beveled for thinness with the tip of the bevel flattened. The size of the fragment suggests that the drill hole was to allow hanging or attachment rather than repair.

The worked sherds suggest that other activities occurred at the site. Jewelry and pottery manufacture, and possibly weaving are suggested. Worked sherds alone may be insufficient to positively identify these domestic or leisure activities, but the speculation can be made.

Evidence for Pottery Manufacture

Limited evidence suggests pottery was manufactured at the site. As previously discussed, worked sherd edges are often considered evidence of pottery manufacture. McKenna (1984:203) outlined a pottery manufacture tool kit that could be useful in identifying the activity in the absence of raw materials and kilns. Items include mortars and pestles, kneading slabs, base molds, scrapers, smoothers, polishers, pigments, and grinders. As McKenna (1984:204) points out, many elements of the tool kit are multipurpose and do not necessarily mean on-site pottery production.

Ground stone and pottery smoothers or scrapers are part of the Coors Road assemblage as are two partially fired or sun dried vessel fragments associated with Occupation 3. One of the fragments consists of 15 sherds from one jar, including a rim sherd. It has coil construction and has been smoothed on the interior and exterior. The exterior is reddish brown and the interior is gray carbon streaked. The reddish brown interior and the gray exterior are indicative of the problems inherent in attempting to define Mogollon and Anasazi utility ware manufacture traditions. The two clay colors indicate a clay that is relatively high in iron content that has been fired for a short time in an oxidizing atmosphere. The carbon has not been completely burned off. It appears that a brown ware was intended as the finished product. It is also apparent that the potter could have made a gray ware with the same clay. This same paste and firing phenomenon were observed for the mica schist tempered utility wares in this assemblage and in assemblages in Tijeras Canyon (Oakes 1979). The fragment has sand temper. The grains are fine-rounded, frosted eolian particles that look as though they could be natural in the clay or even collected from a fine-grained sand dune. This vessel indicates that the pottery produced on site was made with expediently available tempering materials. Mica, which is available in the gravels around the site, was not selected, nor was tempering material transported onto the site from the Socorro district.

The second unfired vessel fragment consists of three sherds. The sherds are crumbly, appear to be coil construction, and have a rough smoothed exterior and a smoothed and polished interior. The paste color is dark gray brown and it is tempered with eolian sand grains like the other specimen. The potter could have been attempting to produce either a gray or brown smudged bowl. Small numbers of Plain Gray Smudged, sandstone/sand tempered vessels were identified for Occupation 3. It is possible that they were produced on site. However, there is enough sandstone/sand tempered pottery to suggest it could come from off site sources as well.

Three unfired clay lumps were recovered from plaza and Occupation 3 deposits. The lumps are small, dark brown, and sand tempered. Two of the lumps have fingernail incisions. These further illustrate the probability of on-site pottery manufacture.

Evidence of pottery manufacture is often found on seasonal sites and may be a slow-time activity (Hannaford 1990). The limited evidence at the Coors Road site suggests that pottery making was not a primary activity and that the majority of the pottery was brought to the site from the Socorro area or procured through trade. Where the manufacture occurred is not known. No kilns were found and the clay is from secondary deposits and not from formal activity areas or pithouse floors.

Conclusions

The Coors Road assemblage agrees with the postulated developments and temporal sequences defined for the late Developmental and early Coalition periods. The initial occupation, with its predominance of Socorro district tempered pottery, may represent seasonal or intermittent use of the Rio Grande for farming by populations from the south at around A.D. 1125 to 1150. Regional interaction is evidenced by the presence of White Mountain Redwares, Cibola White Wares, and Kwahee Black-on-white. During the second occupation, the majority of the white wares and utility wares again come from the Socorro district. The final occupation evidences a marked increase in use of locally produced utility wares, although white wares largely come from the Socorro district. The small numbers of Santa Fe Black-on-white and the absence of locally produced white wares indicate a final occupation date sometime between A.D. 1200 and 1250.

There are no positively identified local white wares and the Santa Fe Black-on-white is minimal. The design style analysis did not reveal significant differences between the occupation episodes and the temper data indicate no clear difference between crushed sherd and hornblende and crushed sherd with sand/sandstone Socorro Black-on-white design styles. Therefore, we were unable to determine if there is a shift to the use of locally produced Socorro Black-on-white during the late occupation of the site, nor could we identify locally produced Socorro Black-on-white. Previous data compilations suggest that locally produced copies of Socorro Black-on-white and exchange of ceramics increased throughout the late 1100s and 1200s. The data from this site neither support nor refute this hypothesis and it is evident that more detailed study is required.

The Coors Road ceramic assemblage agrees with the hypothesized population movement into the Albuquerque district from the Socorro district during the late Developmental and early Coalition periods. As Anschuetz (1987) suggests, the Albuquerque District represented a frontier between two distinct cultural areas, the Socorro district and the Santa Fe district. This use as a frontier may have resulted in the absence of permanent residential sites prior to the transition between the Coalition and Classic periods. The evidence from this assemblage suggests that the earliest site residents relied heavily on supply of utility and painted wares from the Socorro district. In response to the influx of Socorro Black-on-white and associated utility wares, Tijeras Canyon residents began to produce Socorro Black-on-white using local materials. References to movement of people into the Albuquerque district (Hammack 1966; Lang 1982b; Warren 1980) suggest that this transpired in the 1100s and provide a date for local production of Socorro Black-on-white pottery and the associated utility wares. The continued trajectory for ceramic development in Albuquerque is best represented by the transitional Coalition-Classic period sites in Tijeras Canyon. In those assemblages, carbon painted wares of the Northern Rio Grande traditions predominate. White Mountain Redwares are still present indicating continued social interaction with western populations. Utility wares change from a primarily banded or neck indented southern influenced style to smeared indented corrugated. The influence of the Socorro Black-on-white tradition is almost gone and this ware is present in minor amounts. The once numerous hornblende latite/rhyolite tempered utility wares are also very limited. Social interaction within the Albuquerque district appears solidified by the Classic period and the predominance of southern influence ended.

Chipped Stone

The lithic artifact analysis divides the assemblage into groups representing the three occupations. A total of 2,360 pieces of unutilized debitage comprised of flakes and small angular debris, 271 pieces of utilized or retouched debitage, 62 cores, 45 hammerstones, 4 choppers, 27 projectile points or bifaces, and 22 formal tools are reported here. The formal tools were set aside in the original analysis and are analyzed as a unit even though some could have been included in other categories. Debitage from the plaza was analyzed but is not reported because it could not be assigned to an occupation.

Debitage analysis techniques follow Vierra (1985). Data was computer coded and statistical comparisons were performed utilizing SPSS/PC+. A significance level of .001 was used and analytical categories containing cells with less than five objects were eliminated from the comparisons.

Material Selection

Most, if not all, of the raw material selected for the production of tools is available in the axial river gravels of the ancestral Rio Grande. Warren (1979) counted cobbles in the ancestral Rio Grande gravels at 31 locations around Cochiti Reservoir, approximately 80 km north of the Coors Road site. Presumably, materials in the Rio Grande gravels are similar in both locales. Materials observed at Cochiti include chalcedony, chert, obsidian, quartzite, basalt, and igneous rocks. Vesicular basalt and Pedernal-like chert/chalcedony are also available to the west of the project area on the Ceja Mesa. No apparent exotic lithic materials were identified in the assemblage.

Table 15 gives the number and percentages of the analyzed lithic artifacts recovered from LA 15260. Pedernal-like chert/chalcedony accounts for more than half the assemblage in each occupation for both the unutilized and utilized debitage.

Warren's counts indicate that Pedernal-like chert/chalcedony make up 3.3 percent of the cobbles in the Cochiti locales, and probably comprise even less farther south at LA 15260. The local availability of this material appears to be much lower than its proportion in the site assemblage suggests. Warren's most abundant material type is quartzite, comprising 38.5 percent of the cobbles. At LA 15260 quartzite comprises 4.9 percent of the unutilized debitage assemblage and 1.1 percent of the utilized debitage assemblage. Basalts, another possible indicator of the differences in material availability in the local environment, comprised a mean of 16.4 percent for Warren's 31 examined units. The overall percentage of basalt from LA 15260 is only 5.9 percent of the unutilized debitage and 4.1 percent of the utilized debitage. The data indicate that the residents of the Coors Road site selected cryptocrystalline lithic materials that, while rare, were locally available.

Raw material selection shows little change over time. A simultaneous (Occupation 1 versus Occupation 2 versus Occupation 3) chi-square test comparing counts for unutilized debitage of selected material types (undifferentiated chert, Pedernal-like chert, silicified wood, chalcedony, Pedernal-like chalcedony, quartzite, igneous, limestone, and basalt) results in a chi-square value of 30.74478 (d.f.=16, p=.0145) indicating that there is no statistically significant difference in the material selection for the three occupations (p=.001 level).

Table 15. Lithic Raw Materials

Material	Occupation 1		Occupation 2		Occupation 3	
	n =	%	n =	%	n =	%
Unutilized Debitage						
Undiff. chert	110	15.5	131	16.9	139	15.8
Pedernal-like chert	68	9.6	73	9.4	84	9.6
Silicified wood	29	4.1	36	4.7	28	3.2
Undiff. chalcedony	31	4.4	35	4.5	48	5.5
Pedernal-like chalcedony	302	42.6	384	49.7	398	45.3
Quartzite	44	6.2	29	3.7	42	4.8
Quartz	13	1.8	1	.1	4	.5
Basalt	42	5.9	33	4.2	68	7.7
Igneous	59	8.3	37	4.8	53	6.0
Limestone	7	1.0	12	1.5	12	1.4
Obsidian	2	.3	1	.1		
Sandstone					1	.1
Schist	2	.3			1	.1
Metamorphic			1	.1		
TOTAL	709	100.0	773	99.7	878	100.0
Utilized Debitage						
Undiff. chert	16	17.6	16	20.2	22	21.8
Pedernal-like chert	3	3.3	12	15.2	4	4.0
Silicified wood	9	9.9	5	6.4	2	2.0
Undiff. chalcedony	4	4.4	2	2.5	2	2.0
Pedernal-like chalcendony	50	54.9	34	43.0	64	63.3
Quartzite	1	1.1	1	1.3	1	1.0
Basalt	3	3.3	6	7.6	2	2.0
Igneous	4	4.4			1	1.0
Limestone	1	1.1			2	2.0
Obsidian					1	1.0
Not recorded			3	3.8		
TOTAL	91	100.0	79	100.0	101	100.2

A simultaneous chi-square test combining the three occupations, comparing raw material choice for utilized and unutilized debitage resulted in a chi-square value of 6.00 (d.f.= 2; p=.0495). This test indicates that there was no significant difference in material selection between the utilized and unutilized debitage when the three occupations are combined.

Lithic Reduction

Table 16 summarizes the stages of lithic reduction occurring in both the unutilized and utilized debitage assemblage. The primary stage of core reduction (defined as flakes with cortical platforms and 100 percent dorsal cortex, Vierra 1985:57) is represented by less than 2 percent of the unutilized debitage and slightly more of the utilized debitage when the three occupations are combined. Secondary core reduction (defined as flakes with cortex on the platform only, dorsal only, or platform/partial dorsal, Vierra 1985:58) comprise the majority of the debitage for the three occupations and both the unutilized (81.9 percent) and utilized (80.4 percent) debitage. Tertiary (flakes exhibiting no cortex, Vierra 1985:58) reduction is represented by less than 1 percent of unutilized and utilized debitage classifications except for the Occupation 3 utilized debitage where it comprised 4.9 percent of the assemblage.

Table 16. Debitage Attributes

	Unutilized Debitage						Utilized Debitage					
	Occ. 1		Occ. 2		Occ. 3		Occ. 1		Occ. 2		Occ. 3	
Whole Flakes												
mean length (cm)	2.1		2.0		2.1		2.9		3.1		2.8	
Mean width (cm)	1.9		1.9		1.9		2.7		3.0		2.9	
Mean thickness (cm)	.7		.6		.6		.9		1.0		.8	
Mean weight (g)	4.5		3.5		3.6		10.0		13.0		8.0	
Debitage Type	n =	%	n =	%	n =	%	n =	%	n =	%	n =	%
Angular debris	127	17.9	109	14.1	175	19.9	13	14.3	9	11.4	13	12.9
Core	575	81.1	660	85.4	696	79.3	78	85.7	69	87.3	83	82.1
Biface	3	.4	0		3	.3	0		0		3	2.9
Uniface	4	.6	3	.4	4	.5	0		1	1.3	2	1.9
Indeter.	0		1	.1	0		0		0		0	
Totals	709	100.0	773	100.0	878	100.0	91	100.0	79	100.0	101	99.8
Ratio flake: angular	4.6		6.1		4.0		6.0		7.7		6.8	

Flake Condition												
Whole	355	6.0	410	61.7	434	61.7	49	62.8	52	74.3	65	73.9
Proximal	58	10.0	54	8.1	74	10.5	13	16.7	7	10.0	13	14.8
Midsection	16	2.7	24	3.6	20	2.8	5	6.4	2	2.9	0	
Distal	91	15.6	116	17.5	99	14.1	8	10.3	6	8.6	6	6.8
Lateral	40	6.9	34	5.1	51	7.2	3	3.8	3	4.3	3	3.4
Indeter.	22	3.8	26	3.9	25	3.6	0		0		1	1.1
Totals	582	100.0	664	99.9	703	99.9	78	100.0	70	100.1	88	100.0
Cortex: Flakes												
Absent	304	42.9	378	48.9	402	45.8	38	41.8	38	48.1	44	43.6
Platform only	74	10.4	82	10.6	84	9.6	6	6.6	5	6.3	15	14.8
Dorsal only	151	21.3	161	20.8	167	19.0	25	27.5	19	24.0	18	17.8
Plat/part dorsal	42	5.9	28	3.6	41	4.7	8	8.8	7	8.9	8	7.9
Plat/all dorsal	11	1.5	15	1.9	9	1.0	1	1.1	1	1.3	3	3.0
Cortex: Angular												
Present	73	10.3	64	8.3	46	5.2	6	6.6	6	7.6	5	4.9
Absent	54	7.6	45	5.8	129	14.7	7	7.7	3	3.8	8	7.9
Totals	709	99.9	773	99.9	878	100.0	91	100.1	79	100.0	101	99.9
Ratio cortical: noncortical	.98		.83		.65		1.02		.93		.94	
Platform												
Absent	130	22.3	178	26.8	144	20.5	15	19.2	9	12.9	9	10.2
Cortical	122	21.0	116	17.5	130	18.5	15	19.2	13	18.6	24	27.3
Faceted	296	50.9	321	48.3	389	55.3	42	53.8	44	62.9	47	53.4
Unidir. retouch	2	.3	2	.3	3	.4	0		1	1.4	1	1.1
Bidir. retouch	1	.2	0		2	.3	0		0		2	2.3
Collapsed	29	5.0	46	6.9	34	4.8	5	6.4	3	4.3	4	4.5
Battered	2	.3	1	.1	1	.1	1	1.3	0		1	1.1
Totals	582	100.0	664	99.9	703	99.9	78	99.9	70	100.1	88	99.9

The mean cortical (any cortex) to noncortical (no cortex) ratio for the three occupations (flakes and angular debris) combined is .80 for unutilized debitage and .96 for utilized debitage. While not all lithic analysts agree that cortex is always a measure of formal tool production (Elyea and Eschman 1985:247), others (Vierra 1985:17) suggest that a high ratio reflects an emphasis on the early stages of lithic reduction while a low ratio indicates an emphasis on the later stages of tool production and/or maintenance. Unfortunately, there is no "bright line" value that separates the role of cortex in the Archaic core reduction trajectory (core → blank → facial retouch → utilization) from its role in the supposed "expedient" trajectory (core → flake → utilization) characteristic of many Anasazi assemblages. At the Coors Road site, 97.5 percent of the unutilized flakes are core reduction flakes and more than 60 percent of those from each occupation lack cortex. At this site, the lack of cortex does not appear to measure formal tool manufacture or maintenance.

The flake to angular debris ratio has also been considered indicative of the stages of lithic reduction (Vierra 1985). A low ratio is thought to reflect an emphasis on the initial reduction stages since more angular debris is produced during core reduction. A high ratio reflects the presence of more tertiary flakes presumably from tool production and/or maintenance (Vierra 1985). The mean unutilized debitage flake to angular debris ratios (Table 16) range from a low of 4.0 (Occupation 3) to a high of 6.1 (Occupation 2). The ratio for the three combined occupations is 4.7 for the unutilized debitage, and 6.8 for the utilized debitage.

A simultaneous chi-square test (Table 17) comparing the number of unutilized flakes to angular debris between the three occupations resulted in a chi-square value of 9.82 (d.f. = 2, p = .0074), demonstrating that there is no significant difference in debitage types between the occupations.

Table 17. Chi-Square Matrix: Unutilized Debitage Type by Occupation

Debitage type	Occupation 1	Occupation 2	Occupation 3	Total
Angular debris	127	109	175	411
Flake	582	*663	703	1948
Total	709	772	878	2359

* One bipolar flake not included.

Both the amount of cortex and the proportion of angular debris can reflect aspects of the raw material such as material size, shape, and hardness, rather than the reduction stage. Without studies of the local raw materials or comparative assemblages from Archaic populations who drew from the same material source, the amount of variability attributable to the reduction strategy cannot be distinguished from that due to material characteristics (for example, Elyea and Eschman 1985:247; Signa Larralde, pers. comm., October 1990).

Table 18 breaks down the material by the debitage type. It shows that chert and chalcedony constitute much of the assemblage, especially tertiary flakes. The relatively high proportion of noncortical debitage (tertiary flakes and angular debris with no cortex) may be a function of raw material size or how far the parent core was reduced. The number of debitage pieces per core ranges from a low of 13 for quartzite to 93 for silicified wood (chert = 47, Pedernal-like chert = 25, Pedernal-like chalcedony = 45, basalt = 24, igneous = 30). Considered together, the abundance of tertiary flakes and high numbers of debitage pieces per core indicate that the chert and chalcedony cores were reduced further. This may or may not have anything to do with overall reduction strategy.

Table 18. Material by Debitage Type for the Three Occupations Combined

Material Type	FLAKES						ANGULAR DEBRIS				TOTAL	
	Primary		Secondary		Tertiary		Cortex		No Cortex			
	n=	%	n=	%	n=	%	n=	%	n=	%	n=	%
Undiff. chert	7	1.8	112	29.6	184	48.7	23	6.1	52	13.6	378	16.0
Pedernal-like chert			81	29.2	115	41.5	8	2.9	23	8.3	227	9.6
Silicified wood			38	40.9	30	32.2	18	19.3	7	7.5	93	3.9
Chalcedony	1	.9	23	20.1	63	55.3	11	9.6	16	14.0	114	4.8
Pedernal-like chalcedony	10	.9	322	29.7	577	53.2	78	7.2	97	8.9	1084	45.9
Quartzite	5	4.3	56	48.7	31	27.0	16	13.9	7	6.1	115	4.9
Quartz			8	44.4	5	27.8	4	22.2	1	5.5	18	.8
Basalt	2	1.4	84	58.7	36	25.2	15	10.5	6	4.2	143	6.1
Igneous	10	6.7	84	56.4	32	21.5	12	8.0	11	7.4	149	6.3
Limestone			19	61.3	8	25.8			4	12.9	31	1.3
Obsidian			1	33.3	1	33.3			1	33.3	3	.1
Sandstone					1	100.0					1	t
Schist					1	33.3	1	33.3	1	33.3	3	.1
Metamorphic	1	100.0									1	t
Total	35		829		1084		186		226		2360	
% Debitage		1.5		35.1		45.9		7.9		9.6		

Overall, whole flakes account for 50.8 percent of the unutilized flakes and 61.2 percent of the utilized flakes. Mean whole flake sizes are presented in Table 16. As can be seen in all size categories, over all the occupations, it was the larger flakes that were utilized.

The treatment of platforms (Chapman 1977) provides another method for determining the stages of tool production that occurred on the site. Table 16 shows that few flakes with extant platforms exhibit platform retouch, a platform preparation technique used for the additional control necessary in facially retouched tool manufacture. A large number of unmodified platforms (cortical and faceted) is found among all material classes over the three occupations. The remaining platforms are collapsed or battered. Flakes with battered platforms were probably produced as a result of the impact of a hammerstone upon the core, with a flake spalling from the hammerstone.

A simultaneous chi-square test (Table 19) comparing platform attributes among the three occupations for unutilized debitage resulted in a chi-square value of 14.76925 (d.f. = 6; p=.0221), indicating that there is no significant difference in platform types among the three occupations.

Table 19. Chi-Square Matrix: Platform Type by Occupation, Unutilized Debitage

Platform type	Occupation 1	Occupation 2	Occupation 3	Totals
Absent	130	178	144	462
Cortical	122	116	130	368
Faceted	296	321	389	1006
Collapsed	29	46	34	109
Totals	577	661	697	1935

Utilized Flake Attributes

Utilized debitage attributes are summarized in Tables 15 and 16. Overall, there is little difference in the materials utilized when compared to the unutilized debitage (Table 15). Pedernal-like chert and chalcedony are again in the majority representing 61.6 percent of the utilized assemblage followed by undifferentiated chert 19.9 percent, and lesser amounts of silicified wood (5.9 percent), basalt (4.1 percent), undifferentiated chalcedony (2.9 percent), undifferentiated igneous (1.8 percent), quartzite (1.1 percent), limestone (1.1 percent), and obsidian (.4 percent).

Utilized debitage, debitage that exhibits marginal edge retouch or damage, is classed as informal tools. Edge modification occurs on 271 pieces of debitage (11.5 percent of the total occupational assemblage), either as marginal retouch or as damaged edges. Of the 271 pieces of utilized debitage, 38 (14 percent) exhibit use-wear or marginal retouch on more than one edge, 15 (5.5 percent) on more than two edges, and 5 (1.8 percent) on more than three edges, resulting in a total of 341 (less 13 projections) modified edges over the three occupations. Table 20 gives the attributes for these edges.

Marginal retouch occurs on 597 edges, representing 16.7 percent of the utilized edges and 2.2 percent of the total debitage. It is assumed that the damaged/retouched edges represent modification from or for use. Appendix 1 gives the type of retouch, damage, and the average edge angle per occupation.

Tool types recovered from a site are generally considered a reflection of specific activities performed on that site. Previous investigators have found it useful to divide informal tools into functional categories determined by characteristics such as edge angle, edge outline, type of edge damage, and edge retouch. Ethnographic data suggest certain edge angles may be selected for task-specific applications (Gould et al. 1971; Hayden 1979; Schutt 1980).

Table 20. Attributes of Utilized Edges

	Occupation 1		Occupation 2		Occupation 3	
	n=	%	n=	%	n=	%
No. of Utilized Edges						
One	68	74.7	64	81.0	81	80.2
Two	15	16.5	11	13.9	12	11.9
Three	6	6.6	3	3.8	6	5.9
Four	2	2.2	1	1.1	2	2.0
Total items	91	100.0	79	100.0	101	100.0
Total edges	124		99		131	
Retouch						
Absent	102	82.2	86	86.8	107	81.7
Unidirect. dorsal	9	7.2	7	7.1	10	7.6
Unidirect. ventral	4	3.2	4	4.0	9	6.9
bidirect.	2	1.6	0		4	3.1
unidirect broken edge	1	.8	0		0	
unidirect. angular debris	5	4.0	1	1.0	1	.8
unidirect. platform	1	.8	1	1.0	0	
Total retouch	22	17.7	13	13.1	24	18.3
Edge Outline						
Straight	57	46.0	53	53.5	73	55.7
Concave	44	35.5	20	20.2	31	23.7
Convex	16	12.9	18	18.2	19	14.5
Concave/convex	5	4.0	3	3.0	2	1.5
Projection	2	1.6	5	5.0	6	4.6
Serration						
Present	2	1.6	1	1.0	0	
Absent	122	98.4	98	99.0	131	100.0
Projections						
Drill	1	1.1	2	2.5	1	1.0
Graver	1	1.1	3	3.8	5	4.9
Absent	89	97.8	74	93.7	95	94.1

	Occupation 1		Occupation 2		Occupation 3	
	n=	%	n=	%	n=	%
Total	91	100.0	79	100.0	101	100.0
Damage Type						
Absent	3	2.4	2	2.0	9	6.9
Unidirect. scarring	87	70.2	83	83.8	89	67.9
Bidirect. scarring	23	18.5	10	10.1	15	11.4
Unidirect. rounding	2	1.6	0		4	3.0
Unidirect. scar. & rounding	8	6.4	3	3.0	11	8.4
Bidirect. scar. & rounding	1	.8	1	1.0	3	2.3
Total	124	99.9	99	99.9	131	99.9
Edge Angle*						
5 & 10	1	.8	0		1	.8
15 & 20	1	.8	5	5.3	1	.8
25 & 30	5	4.1	9	9.6	22	17.6
35 & 40	29	23.7	20	21.3	21	16.8
45 & 50	26	21.3	16	17.0	27	21.6
55 & 60	17	13.9	19	20.2	19	15.2
65 & 70	18	19.1	13	13.8	22	17.6
75 & 80	16	13.1	10	10.6	6	4.8
85 & 90	8	8.5	2	2.1	6	4.8
> 90	1	.8	0		0	

* mean angle if variable, otherwise majority angle; recorded to the nearest 5° increment

A graph (Fig. 18) of edge angle values found over the three occupations displays a bimodal distribution with peaks in the 35 and 40, and the 65 and 70 degree ranges for Occupation 1. Occupation 2 has a bimodal distribution with peaks in the 35 and 40, and at the 55 and 60 degree ranges. Occupation 3 has a trimodal distribution with peaks in the 25 and 30, the 45 and 50, and the 65 and 70 degree ranges.

It is reasonable to assume that different functional uses are reflected in these distributions. However, it would be an oversimplification to assume that each peak correlates to a specific functional use. Researchers have proposed technological functions for restricted edge angle categories (Hayden 1979; Ranere 1975; Semenov 1964; Wilmsen 1968). Acute angles of 25 to

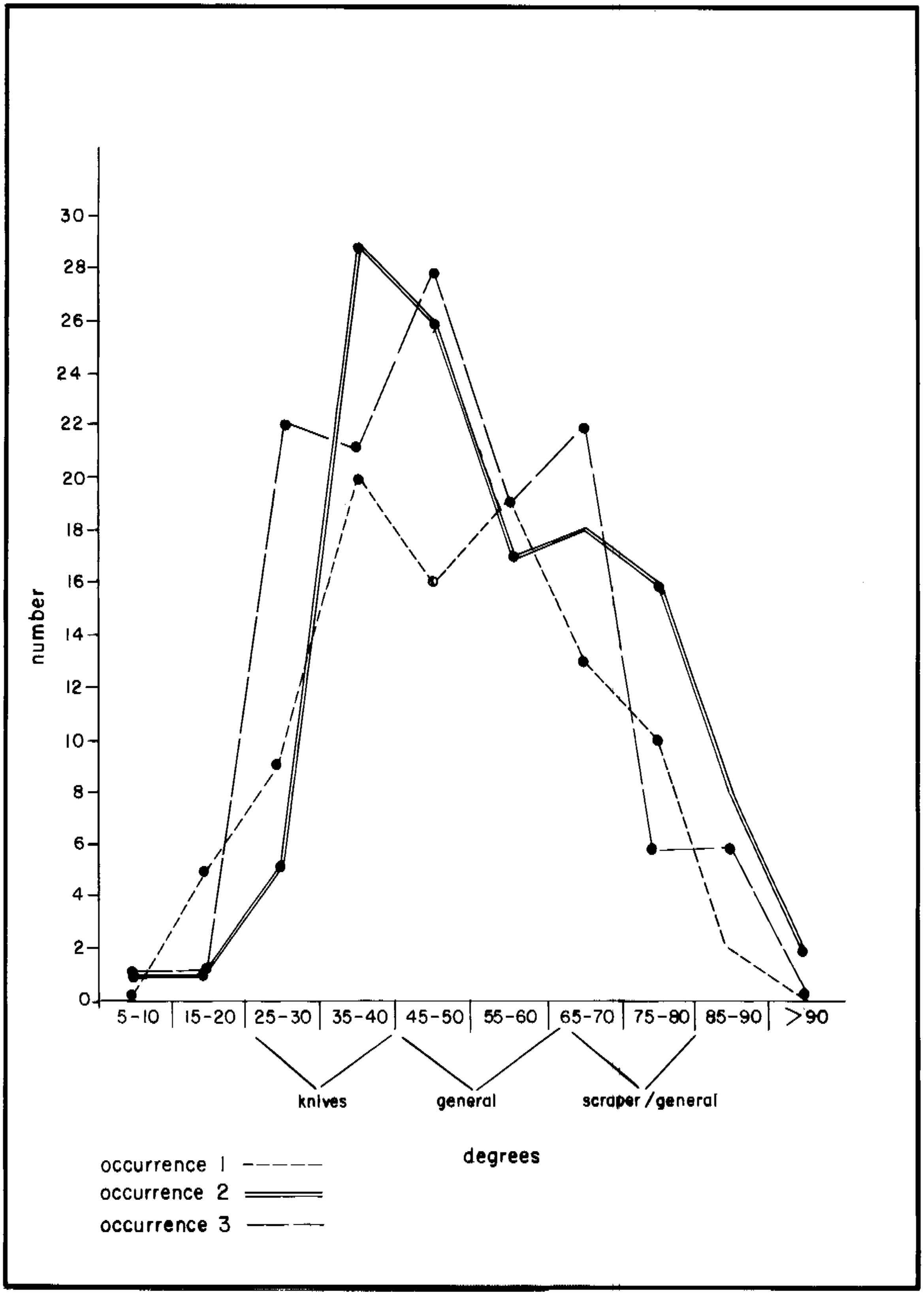

Figure 18. Utilized flake edge distribution by occupation.

40 degrees occur on 29.9 percent of the total utilized edges (27.4 percent of Occupation 1, 29.3 percent of Occupation 2, and 32.8 percent of Occupation 3). These tools appear to have been used for cutting and are for convenience called knives to distinguish them from the steeply angled usually unifacially damaged/retouched debitage classified as scrapers. The shape and size of these tools vary, although the utilized edge is usually straight (50 percent of tools in this angle range for Occupation 1, 65.1 percent for Occupation 2, and 62.5 percent for Occupation 3). The presence of a suitable cutting edge appears to be the primary consideration for selecting a particular flake as a cutting tool. A second consideration may have been whether the flake could be comfortably used in the hand or could be hafted for use. None of the debitage appears to have been intentionally modified for hafting (such as backed or blunted edges opposite the use edge). If indeed these tools were hafted, the desired characteristics were included in the original selection of the flake (for example, intrinsic backing by platform remnants or cortex), such as in the selection of larger flakes for utilization and of Pedernal chert/chalcedony as the preferred lithic material. Ranere (1975), who has used a number of both hafted and unhafted flakes as knives, found that wear patterns similar to archaeological specimens were more closely replicated when hafted flakes were used on wood. Without hafting, not enough physical force could be applied to remove use flakes similar to those found on archaeological specimens. When using a hard lithic material, such as andesite and to a lesser degree chalcedony, Ranere found he could use a flake for an indefinite period of time on soft objects such as plant or animal matter without removing use flakes. The cutting edge and the surfaces of the flake do become polished.

In the Coors Road assemblage, very few flakes (two from Occupation 1 and four from Occupation 3) exhibit polish alone, although this attribute has a low visibility unless each flake is examined microscopically. Presumably, based on the presence of edge damage, the majority of the recognized tools in this range of edge angles was used to work material such as wood, bone, or antler. Absent polish, pre- or post-depositional edge damage are viable alternatives.

All three occupations have numerous tools with edge angles falling in the 45 to 60 degree range (Fig. 18, Table 20). Wilmsen (1972) suggests that edge angles within this range are general tools appropriate for a number of functions such as skinning and hide scraping, and heavy cutting of wood, bone, or antler. Edge angles in the 65 to 80 degree range are found on 24 percent of the total utilized edges. Utilized debitage with edges in this steep range have variable edge outlines but are generally straight (49.4 percent of the total assemblage) or concave (36.5 percent of the total site assemblage). Both Hayden (1979) and Wilmsen (1968, 1972) have suggested that these tools were used as wood working implements, perhaps as scraper-planes or spoke shaves, and for working bone. To summarize, utilized edges from the occupations are similar in distribution. When viewed as the percent of edges (Table 21), general purpose tools comprise a consistent proportion of the assemblage. Knife-like edges increase slightly at the expense of scraping tools, but not enough to suggest significant changes in the activities carried out during the three occupations.

Table 21. Percent of Edges by Functional Type and Occupation

Angle Range	Occupation 1	Occupation 2	Occupation 3
25-40	27.9	30.9	34.2
45-60	35.2	37.2	36.8
65-80	27.8	24.4	22.4

Cores

A total of 62 cores were collected from proveniences associated with the identified site occupations (Table 22). It is interesting to note that the number of cores decreases as the occupation progresses. One possible explanation is that the site occupants utilized debitage from the previous occupations making core procurement/reduction less necessary through time. Combining the three occupations, there is an average of 42.4 pieces of debitage (both nonutilized and utilized) per core. Taken together with the fact that there are 40 primary flakes for each of the 62 cores indicates that most, if not all, lithic reduction took place on-site.

Table 22. Core Attributes by Occupation

	Occupation 1		Occupation 2		Occupation 3		Total	
	n=	%	n=	%	n=	%	n=	%
Material								
Undiff. chert	5	16.1	3	18.7			8	12.9
Pedernal-like chert	3	9.7	4	25.0	2	13.3	9	14.5
Pedernal-like chalcedony	9	29.0	5	31.2	10	66.7	24	38.7
Silicified wood					1	6.7	1	1.6
Quartzite	6	19.3	2	12.5	1	6.7	9	14.5
Basalt	3	9.7	2	12.5	1	6.7	6	9.7
Igneous	5	16.1					5	8.1
Total	31	99.9	16	99.9	15	100.1	62	100.0
Core Type								
Unidirectional	2	6.4					2	3.2
Bidirectional	1	3.2	1	6.2	1	6.7	3	4.8
Multifaceted	24	77.4	13	81.2	13	86.7	50	80.6
Bifacial	4	12.9	2	12.5	1	6.7	7	11.3
Total	31	99.9	16	99.9	15	100.1	62	99.9
Exhausted	8	35.8	9	56.2	7	46.7	24	38.7

Hammerstones

Forty-five hammerstones were recovered from proveniences associated with one of the three identified occupations (Table 23). Quartzite is by far the preferred material. Just as the number of cores associated with the three occupations decreases through time so do the hammerstones.

Table 23. Hammerstones by Material and Occupation

Material Type	Occupation 1		Occupation 2		Occupation 3		Total	
	n=	%	n=	%	n=	%	n=	%
Pedernal-like chert	1	2.6					1	2.2
Undiffer. chert	1	2.6	1	14.3			2	4.4
Pedernal-like chalcedony			1	14.3			1	2.2
Quartzite	33	86.8	3	42.9			36	80.0
Igneous	3	7.9	1	14.3			4	8.9
Basalt			1	14.3			1	2.2
Total	38	99.9	7	100.1	0		45	99.9

Choppers

Four choppers were located for analysis. A number of others (at least seven: five from Pit Structure 1, mostly floor contact and two from the midden) are indicated in the field specimen sheets. These may have been analyzed in the first round of analysis but neither the artifacts nor the analysis forms could be located to determine if they are choppers.

The four choppers that were located were from the plaza (n = 2), midden Stratum 2, and midden Feature 3. Two were quartzite cobbles, one an igneous cobble, and the last a basalt cobble. Three had single chopper edges that were bifacially flaked. The fourth had two utilized edges, one bifacially flaked and the other unifacially flaked. All were complete. These ranged from 7.6 to 11.6 cm in length, 6.1 to 9.2 cm in width, and 2.4 to 3.8 cm in thickness.

One of the quartzite cobbles also exhibits slight grinding and anvil wear on one face. The basalt chopper has hammerstone wear.

Projectile Points by Signa Larralde

Twenty-seven projectile points (Fig. 19) were recovered during the excavation of LA 15260. Fifteen are small enough to be considered Puebloan points, conventionally considered to have been used as arrow points. Of the Puebloan points, eleven are side-notched and four are unnotched. No corner-notched points were recovered. Five of the projectile points are possible knives, dart points, or Archaic points.

All the points are of cryptocrystalline cherts or chalcedonies. Fifteen of the twenty projectile points are whole or nearly whole, two are bases, one a tip, and two midsections. Nine were made on flakes that retain large areas of their original, unmodified surfaces. Many of these exhibit only slight marginal retouch to form them into points. The remaining eleven may have also been made on flakes but have been completely flaked leaving none of the original surface. Seventeen can be assigned to a specific site occupation on the basis of stratigraphy. The remainder are from problematic proveniences. Table 24 gives the provenience, material type, and attributes for the assemblage. Seven of the points could not be located for reanalysis.

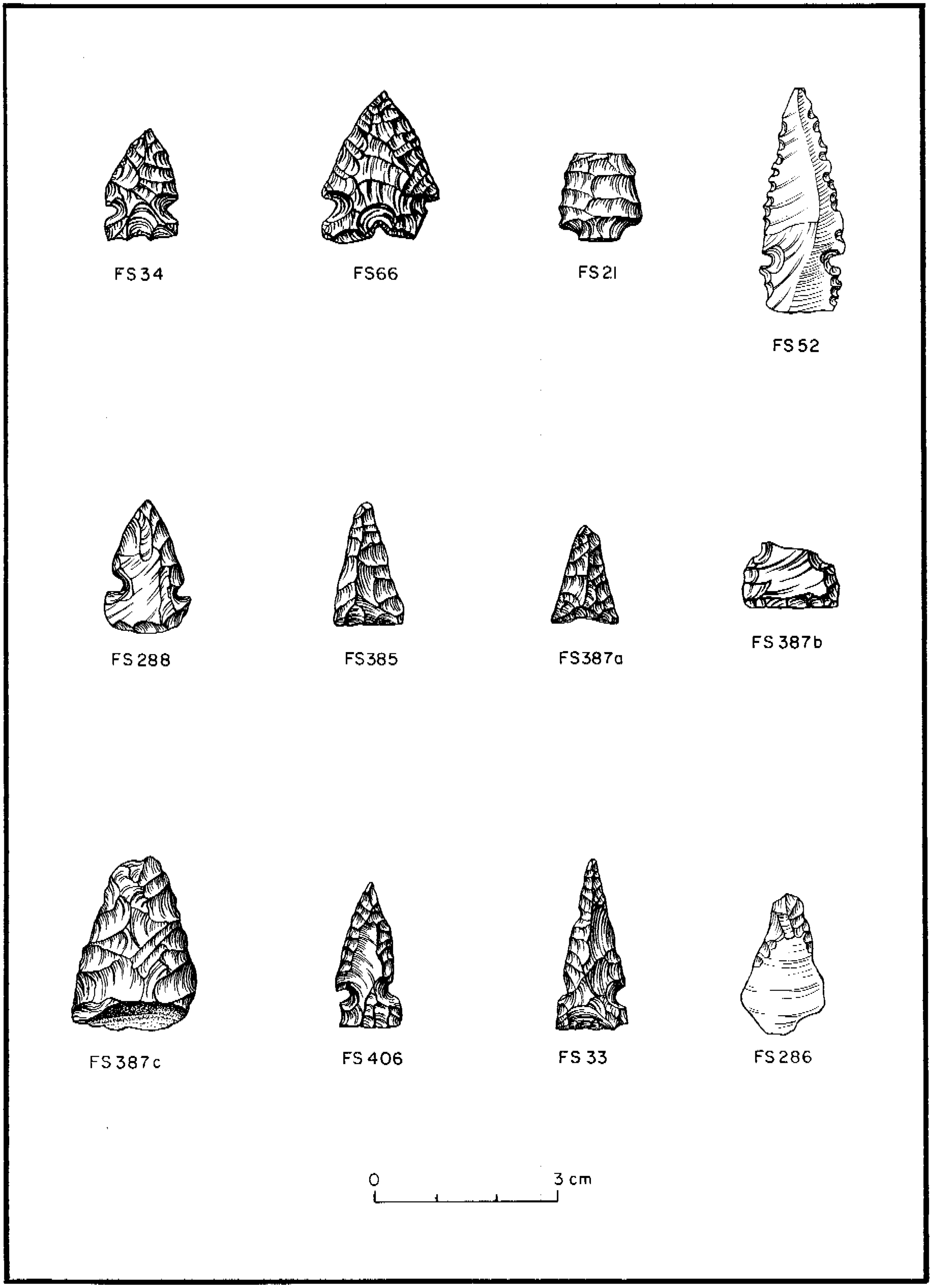

Figure 19. LA 15260 projectile points.

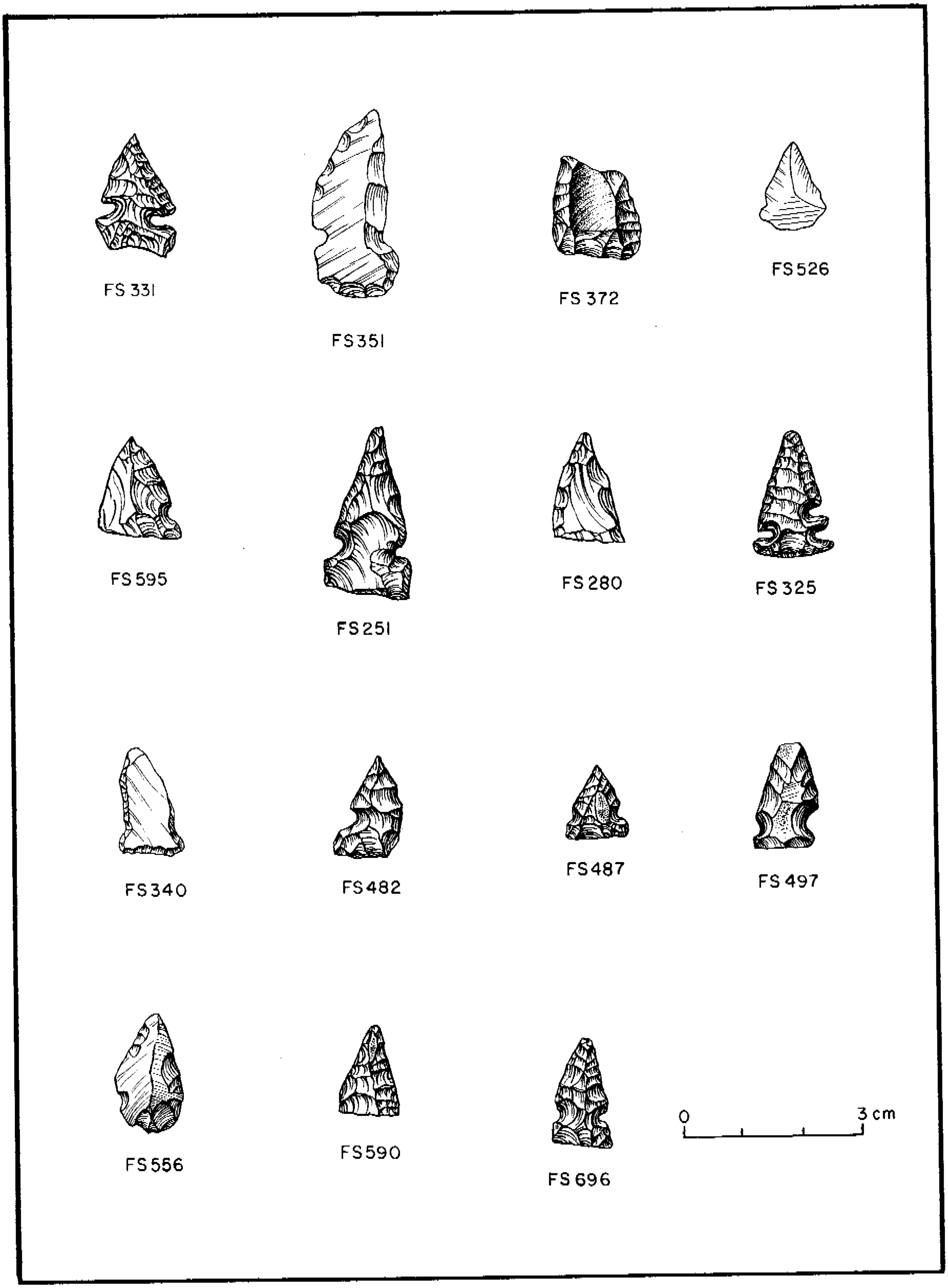

Figure 19. Continued.

Table 24. Projectile Point Attributes

F.S.	Provenience	Material	Portion	L (mm)	W (mm)	T (mm)	Neck width	Weight (g)	Morph ology
Occupation 1									
34*	PS 1, St. 7	**chalcedony	whole	19	12	2			
66	PS 1, St. 2	chalcedony	whole, part of base missing	25	20	3	14	1.9	biface
Occupation 2									
21	PS 1, St. 3-5	obsidian	midsection	14	13	2	7	.7	biface
52*	PS 1, St. 3-5		whole	37	14	3	11		flake
288	Midden St.2, L.2	chert	whole	22	15	2	9	.7	flake
385	Midden St.2, L.2	Pedernal chalc.	whole	21	12	3	0	1.1	biface
387a	Midden St.2, L.2	chert	whole	18	12	2	0	.5	biface
387b	Midden St.2, L.2	chert	base	10	16	2	9	.6	biface
387c	Midden St.2, L.2	chert	midsection	29	21	3		2.8	flake
406	Midden St.2, L.2	chert	whole, part of base missing	24	11	2	7	.6	flake
Occupation 3									
33*	PS 2 St. 2	sil. wood**	whole	29	11	4			flake?
286	Midden St.2, L.1	chert	whole	25	14	4	7	1.2	flake
331	Midden St.2, L.1	Pedernal chalc.	whole	20	13	2	6	.6	biface
351	Midden St.2, L.1-2	chert	whole	31	14	4	9	1.6	flake
372	Midden St.2, L.1	Pedernal ch/chalc.	base	16	15	2	0	1.0	flake
526	Midden St.2, L.1	Pedernal chert	whole, part of base missing	15	10	2	8	.3	flake
595	Midden St.2, L.1	Pedernal chert	whole, tang missing	19	15	3		.6	biface
Unassigned									
251*	Plaza St. 1		whole	28	16	4			biface?
280	Midden St. 1	chert	tip, midsection, tang	17	12	3		.6	biface
325*	Plaza St. 1		whole	21	13	3			biface?
340	Midden St.1	jasper	whole	20	10	2	8	.7	flake
482	Midden St. 1	chert	whole, tang missing	17	11	2		.3	biface

487*	Plaza St.2	**obsidian	whole	14	10	3			biface?
497	Plaza St.1	Pedernal chert	whole, tip missing	18	10	3	7	.7	biface
556	Midden St.2	chert	whole	20	12	3	9	.7	biface
590	Plaza St.2	chert	tip	15	10	3		.4	biface
696*	Plaza St.1		whole	18	11	3			biface?

Field Specimen	Notching	Possible Time Period	Comments
Occupation 1			
34*	side-notched	Puebloan	
66	tri-notched "eared"	Archaic?	possibly Washington Pass chert
Occupation 2			
21		Puebloan	
52*	side-notched		possible knife or dart point
288	side-notched	Puebloan	
385	unnotched	Puebloan	
387a	unnotched	Puebloan	
387b	side-notched	Archaic?	Base of a dart point or knife
387c		Archaic?	May be a dart point; impact fracture at tip
406	side-notched	Puebloan	possible drill
Occupation 3			
33*	side-notched	Puebloan	
286	unnotched	Puebloan	expanding base, burned
331	side-notched	Puebloan	concave base
351	side-notched	?	possible knife; backed; very asymmetrical
372	unnotched	Puebloan	
526	side-notched	Puebloan	
595	side-notched	Puebloan	
Unassigned			
251*	side-notched	Puebloan	
280		Puebloan	
325*	side-notched	Puebloan	two notches on one side
340	side-notched	Puebloan	

Field Specimen	Notching	Possible Time Period	Comments
482	side-notched	Puebloan	not finished; manufacturing error
487*	side-notched	Puebloan	
497	side-notched	Puebloan	
556	side-notched	Puebloan	very thick base
590			
696*	side-notched	Puebloan	

* = could not be located for reanalysis; measurements from first analysis; ** = material from field specimen sheets

Proveniences for the projectile points and point fragments are given in Table 24. The majority are from the upper levels of the midden. None were in what could be considered a primary context.

Formal Tools by Signa Larralde

The term "formal tools" should be used loosely in regard to the tool assemblage from the Coors Road site. The assemblage consists of twelve early stage unifaces and bifaces, a retouched multidirectional core, a retouched bipolar core, two retouched chunks, four retouched or utilized pieces of debitage, and a middle stage biface (Table 25).

Table 25. Formal Tool Attributes

F.S.	Provenience	Material	Morphology	Cortex %	L (mm)	W (mm)	T (mm)	Weight (g)	Part
Occupation 1									
13	PS 1 St.2	obsidian	stage 1 uniface	40	26	23	6	4	whole
25	PS 1 St.7	Pedernal chert	stage 1 uniface	30	38	23	15	14	whole
71a	PS 1 St. 7	Pedernal chalc.	stage 1 uniface	0	33	27	13	6	whole
71b	PS 1 St. 7	Pedernal chalc.	stage 1 uniface	0	29	24	14	10	whole
81	PS 1 St.8	Pedernal chert	stage 1 uniface	20	53	34	25	36	whole
392	Midden St.2, L.3	Pedernal chert	angular debris	30	25	18	18	7	whole

F.S.	Provenience	Material	Morpho-logy	Cortex %	L (mm)	W (mm)	T (mm)	Weight (g)	Part
Occupation 2									
20	PS 1 St.3-5	obsidian	chunk	50	15	14	10	2	whole
309a	Midden St.2, L.2	Pedernal chalc.	stage 1 biface	10	32	33	6	8	whole
309b	Midden St.2, L.2	chert	flake	0	22	12	2	1	latera l
385	Midden St.2, L.2	Pedernal chalc.	stage 1 biface	40	18	21	7	3	whole
403	Midden St.2, L.2	obsidian	angular debris	50	20	15	9	2	whole
Occupation 3									
54	PS 2 St.3-5	Pedernal chalc.	stage 1 uniface	0	32	17	9	2	whole
298a	Midden St.2, L.1	chert	flake	0	19	13	3	1	prox.
298b	Midden St.2, L.1	chalcedo ny	angular debris	0	18	8	2	1	indet er
298c	Midden St.2, L.1	chert	stage 2 biface	0	16	9	5	1	indet er
372	Midden St.2, L.1	Pedernal chert	stage 1 uniface	20	37	32	13	14	whole
398	Midden St.2, L.1	obsidian	bipolar core	50	17	13	10	3	whole
Unassigned									
329	Plaza St.2	Pedernal chert	multi-direction-al core	10	26	21	16	9	whole
383	Plaza St.2	Pedernal chert	stage 1 biface	10	38	30	22	19	whole
551	Plaza St.2	chert	flake	0	16	10	1	1	distal
675	Plaza St.2	Pedernal chalc.	stage 1 uniface	50	35	33	17	18	whole
690	Plaza St.2	Pedernal chalc.	chunk	70	28	22	18	12	whole

F.S.	Function	Edges n=	Projections n=	Wear	Comments
Occupation 1					
13	side scraper	2	-	bifacial utilization	
25	end scraper	3	2	unifacial retouch	small potlids
71a	end/side scraper	3	3	unifacial retouch	small potlids
71b	Utilized/retouched core	3	2	unifacial retouch	
81	end/side scraper	3	1	unifacial retouch	
392	retouched debitage	1	2	unifacial retouch	
Occupation 2					
20	end scraper	2	1	bifacial utilization	
309a	notch or graver	2	2	bifacial retouch, unifacial retouch	
309b	retouched debitage	1	-	bifacial retouch	
385	side scraper	1	2	unifacial retouch	
403	retouched debitage	1	-	bifacial retourch	very small nodule
Occupation 3					
54	end scraper	1	-	unifacial retouch	large potlid?
298a	projectile point?	2	-	bifacial utilization/ unifacial utilization	made on a flake; unfinished
298b	small biface?	-	-		one side bifacially worked, no edges
298c	biface	1	-	unifacial retouch	very fragmentary
372	end/side scraper	2	4	unifacial retouch	
398	end scraper	1	-	unifacial retouch	very small nodule
Unassigned					
329	side scraper	1	-	unifacial retouch	
383	end/side scraper	2	1	unifacial retouch	
551	utilized debitage	2	-	bifacial utilization	
675	end/side scraper	2	1	unifacial utilization	
690	retouched chunk/end scraper	1	1	unifacial retouch	

The early stage unifaces and bifaces share similar attributes. They are all made of either Pedernal-like chert/chalcedony or obsidian, and they all appear to have been made from small nodules of raw material. Raw material size is evident from the large cortical areas that are often still present on the tools and from the uniform small size of the tools. Although the largest tool weighs 36 g, the remainder weigh between 2 and 19 g. Whether unifaces or bifaces, the tools are manufactured by removing flakes from one or both margins of a pebble-sized chunk of raw material. During this process, one or more projections remain on the margin. Leaving these projections appears to be intentional, since many of them bear evidence of wear and since all the tools conform to a general discoidal shape that retains the projections. The tools consequently may have also served as gravers or notchers as well as scrapers.

Three other classes of items, utilized/retouched cores, chunks, and debitage, show even less manufacturing effort and conventionally would be put in the category of informal tools. Eight of these items are marginally modified flakes, angular debris, or chunks of raw material. One, F.S. 298a, is a flake that may have been broken while being marginally shaped into a projectile point. Of two retouched cores in the assemblage, one is a multidimensional core of Pedernal-like chert and one is an obsidian bipolar core. These items suggest that reduction trajectories were dependent on the small size and spherical to blocky shape of the obsidian and Pedernal-like chert.

Only one item appears to have been surficially reduced beyond the initial removal of flakes by percussion. This item, F.S. 298b, is extremely fragmentary, but one side retains flake scars that appear to have resulted from late stage pressure flaking.

In short, although the unifaces and bifaces in this assemblage require a greater degree of reduction than tools consisting of utilized or retouched flakes and chunks, they are still expediently made by knocking off small flakes from small nodules or chunks of raw material. They do not exhibit evidence of further reduction to thin or shape either the surfaces or the edges of the tools. Their uniform small size (possibly a result of raw material size) and the presence of projections on the periphery of most of the unifaces and bifaces are the most notable attributes of the assemblage.

Chipped Stone Discussion

Vierra (1987:28-31) compared the lithic assemblages from six middle Rio Grande sites: Kuaua, LA 288, Nuestra Señora, Pojoaque Pueblo, La Cantera, and Coors Road. Looking at material, aspects of lithic reduction, and tool use, he concludes that secondary noncortical reduction dominates the assemblages of most, including Coors Road testing, and that this assemblage contained amounts of modified edges similar to Nuestra Señora and Pojoaque Pueblo. Both of the latter are multiroom pueblo sites. All six sites have more damaged edges than retouched edges suggesting the flakes were used as expedient tools, as does the selection for large flakes. Evidence of tool production and maintenance is generally lacking at all six sites. In short, these Middle Rio Grande Pueblo period assemblages reflect an expedient technology geared towards production of flakes for use as short-term tools (Vierra 1987).

Ground Stone

Sixty-seven pieces of ground stone were located and analyzed. Another five are indicated on the F.S. sheets but could not be found, some may have been discarded as nontools. Two are from the floors or features within the pit structures, one is from the plaza, Stratum 2, and the remainder are from Features 3 and 17. Table 27 gives the provenience distribution for the analyzed ground stone.

Table 27. LA 15260 Ground Stone by Provenience

Provenience	Mano	Metate	Abrader	Polisher	Polished Pebbles	Shaft Smoother	Anvil	Slab Cover	Unknown	Total
Occupation 1										
Pit Structure 1										
St. 2 & 7	2	1	3				2			8
St. 8 floor		2	1	1						4
Midden										
St.2, L.3	2									2
Features		2								2
Total	4	5	4	1		1	2		1	18
Occupation 2										
Pit Structure 2										
St. 7			2	1						3
St.8 floor, feature	4	3	1	1						9
Midden										
St.2, L.2	1	1	2	1					4	9
Total	5	4	5	3					4	21
Occupation 3										
Pit Structure 2										
St.2-3	1		2	2		1				6
Midden										
St.2, L.1		1		1					9	11
Total	1	1	2	3		1			9	17
Unassigned										
Midden St.1			*1							1
Plaza										
St. 1	1									1
St. 2		1		1	1	1		1	1	6

Features		2							1	3
Total	1	3	1	1	1	1		1	2	11
Grand Total	11	13	11	8	1	3	2	1	16	67

* possible awl sharpener

Ground stone artifacts are most often of sandstone followed by vesicular basalt (Table 27). Others are cobbles of quartzite, igneous rock, and granite. Good quality sandstone was often reutilized. One mano and one abrader are made from metate fragments and two abraders and one anvil are reused mano fragments.

Table 27. Ground Stone by Material

Type	Chert	Quartzite/ Sandstone	Sandstone	Tuff	Igneous	Quartzite	Vesicular Basalt	Granite	Total
Mano		1	5				4	1	11
Metate frag.		2	4				7		13
Abrader			11		1				12
Polisher						8			8
Pebble	1								1
Shaft smoother			1	2					3
Anvil			1			1			2
Slab cover			1						1
Unknown			9		1		6		16
Total	1	3	32	2	2	9	17	1	67

Manos

Three of the manos are indeterminate, one is a one-hand biscuit mano, two are two-hand indeterminate as to metate type, four are two-hand manos used on trough metates, and one is a two-hand mano apparently used on a slab metate. One is definitely bifacial, that used on a slab metate. Two others have triangular cross sections with double grinding surfaces on the same face. At least four of the two-hand manos have thumb notches. One unusual specimen from the floor of Pit Structure 2 is made from a sandstone metate fragment, used as a mano, then notched as if it were to be used as an axe.

Seven manos are definitely shaped usually by pecking or flaking. Two appeared to have been sharpened and only one exhibits striations. The use surfaces are slightly convex for all but one fragment. Most are rectangular in plan view and in cross section. Two are triangular in cross section. The biscuit mano is complete and measures 9.8 by 8.9 by 3.6 cm. Complete dimensions for manos, abraders, and polishers are summarized in Table 28. Six of the manos are complete and all but one came from the floors or features in the pit structures. The biscuit mano is from the plaza, Stratum 1.

Table 28. Complete Dimensions for Manos, Abraders, and Polishing Stones

Artifact/ Dimension	N =	Range		Mean	Standard Deviation
		Minimum	Maximum		
Manos					
Length	5	20.0	26.2	23.0	2.5
Width	8	7.4	13.4	11.1	1.9
Thickness	8	1.8	5.3	3.5	1.1
Abraders*					
Length	7	4.2	11.8	7.8	2.4
Width	8	4.1	7.9	6.4	1.5
Thickness	9	1.6	5.7	2.4	1.3
Polishers					
Length	6	6.4	9.4	8.3	1.1
Width	7	4.8	10.2	7.1	1.8
Thickness	7	1.8	3.4	2.5	.7

* does not include the possible awl sharpener

Metates

Only fragments of metates were found. Four are interior or corner fragments where the metate type cannot be determined. The remainder are from trough metates. More are of vesicular basalt than sandstone. At least four metates are estimated from the varying material types. Two different vesicular basalt metates are indicated by differences in the color and size of vesicles.

While none of the fragments are complete enough to provide dimensions, the trough depth was observed on four (4.3, 6.4, 6.8, and 7.3 cm). Three have been sharpened, two sandstone and one quartzitic sandstone. Little in the way of manufacture can be detected from these fragmentary pieces. Two have some grinding, two are pecked, and one has flaking and pecking. Two have evidence of use as anvils.

Abraders

Abraders are as common as manos at the Coors Road site. These are almost always of sandstone including one hematitic sandstone cobble. Cross sections are flat (n=6), slightly convex (n=4) or irregular with concave areas (n=1). Shapes are indeterminable (n=3), subrectangular (n=1), irregular (n=5), and square (n=1). Some manufacture in the form of grinding (n=4), pecking (n=1) and flaking (n=1) was observed. Three are made from fragments of other ground stone tools. None are extensively modified and all appear to represent expedient tools.

As Table 28 indicates, abraders tend to be smaller than either polishers or manos. The variability in grain size suggests a variety of functions for these tools. Eight are fine-grained sandstone and four are medium-grained. The igneous cobble is flattened with grinding on one edge. Four also have pitting characteristic of anvil use. Another abrader is made from a mano fragment, has anvil wear, and a small portion of one edge was modified and used as a chopper.

Polishers

Nearly all of the polishers are quartzite cobbles. Material may have been a factor in selecting the cobbles or this may reflect the visibility or tendency to wear on the part of quartzite as opposed to igneous or metamorphic cobbles. Use surfaces are flat (n = 1) or convex. Four are bifacial. One has a gray substance adhering to the surface and another has red hematite on one face. Hammerstone wear was observed on the edges of three and anvil pitting on another.

Anvils

Only two tools are primarily anvils. One is a quartzite cobble with the surface ground flat and anvil wear. It measures 12.7 by 7.9 by 5.8 cm. The other is a fragment of a sandstone mano that was used as an anvil.

Shaped Slab

Only one fragment appears to be from a shaped slab. It is ground on the faces with flaking on the edge present. No wear was observed.

Shaft Smoothers

One shaft smoother is a medium-grained whitish sandstone and measures 5.2 by 4.0 by 1.5 cm. It has two grooves 1.0 and 1.3 cm in diameter. One groove is on the face and the larger one on the edge of the piece. The second shaft smoother is completely shaped by grinding and possibly pecking. It is of pinkish tuff and is approximately half complete measuring 3.3 cm wide and 1.8 cm thick. The groove is 6 mm in diameter. The third is also approximately half complete and of pinkish tuff. The use surface is ground flat with a single 6 mm shaft groove. It measures 4.2 m wide and 1.9 mm thick.

Polished Pebble

An unusual red mottled chert pebble from the plaza has three heavily ground facets. These are on an edge with two adjacent facets on a larger surface. Broken in one dimension, the pebble measures 2.1 by 1.2 by 1.1 cm.

Indeterminate Fragments

This category includes pieces too small to determine the function. All are ground and could represent fragments of manos, metates, abraders, polishers, or anvils.

Discussion

The presence of manos and metates indicates that corn was processed at the site. The biscuit mano may indicate seed processing. The polishers are relatively large with grinding on flattened faces and are more typical of those used for smoothing plaster than pottery manufacturing tools. In general, most of the ground stone tools were expediently made and were used for a number of purposes.

Other Artifacts

Ornaments

In addition to the bone bead or tube described in the bone tool section, at least 14 pendants or pendant blanks were recovered. These include three of shell, one of sherd, one "stone," two of pumice, and seven of schist. The "stone" pendant could not be located for analysis. The shell pendants are of fresh water mussel shell. Table 29 gives the basic information for the pendants.

Table 29. LA 15260 Pendants

F.S.	Provenience	Material	Shape	Grinding		Drill Hole		Measurements (mm)		
				Edges	Face	Location	Diameter	Length	Width	Thick.
6	PS 1 St.8	shell	oval?	yes	no	unknown			20.0	1.0
31	PS 2 St.2	pumice	round	yes	yes	offset	1.4	13.5	12.2	1.6
31	PS 2 St.2	pumice	irreg.	slight	yes	offset	2.5	15.7	15.4	1.4
81	PS 1 St.8	schist	rectang.	yes	yes	offset		13.5	+6.4	1.6
106	PS 2 St2	schist	irr/rect.	slight		offset	1.5	33.5	16.2	2.3
352	Midden St.2, L.1-2	schist	round	yes	yes	center	1.2	12.2	11.9	1.2
390	Midden St.2, L.2	schist	round	slight		center	1.5	14.5		2.5
401	Midden St.2, L.1	shell	oval	yes		offset	1.5	27.0	18.0	1.0
519	Midden, St.2, L.1	sherd	dome	beveled				11.0	10.0	3.0
564	Midden, St.2, L.1	stone								
613	Midden, St.2, L.1	schist	round	yes	yes	none		17.3	15.0	1.6
625	Midden, St.2, L.1	schist	irreg.	slight		offset	3.5	28.0	26.9	2.8
694	Plaza St.2	schist	rectang.	slight		none		42.9	+16.1	1.8
791	Plaza F.31	shell	oval	yes		offset		21.0	12.0	1.0

Numerous (between 30 and 50) small pieces of unworked or marginally worked pieces of schist were recovered from throughout the site. These suggest that the pendants were manufactured at the site. Specimen F.S. 81 also suggests on-site manufacture. About half the pendant is present, it is drilled part way through the stone and broken at the drill mark indicating it may have broken during the drilling processes.

Few of the pendants are extensively modified. Edges are most often slightly ground to shape the object, and the faces are rarely ground. Holes in the schist pendants are drilled from both sides and either centered or off-centered. Most drill holes are quite small and round.

Minerals

Few minerals were collected. Those that were include a lump of yellow ocre (F.S. 373, midden Stratum 2, Level 2) with one ground surface and measuring 20.4 by 13.2 by 4.5 mm, and a bag of powdery white material labeled diatomite (F.S. 81, Pit Structure 1, Stratum 8). At least six chunks of the white material were present and measure up to 27 mm in diameter. In addition, the stain on a cobble polisher from Feature 31, which partially overlay Pit Structure 2 (F.S. 790), was identified as hematite by Brian Chacamakos. A small spot of red hematite was also observed on an abrader (F.S. 192) found on the floor of Pit Structure 2.

SUBSISTENCE REMAINS

POLLEN

by Karen H. Clary

Introduction

Nineteen pollen samples were analyzed from a variety of features at the Coors Road site. The goals of the pollen analysis were to define the functions of the features with regard to site use and occupation, to identify subsistence habits based on the kinds of plant foods represented, and to define the plant communities in the vicinity of the site during the occupations of the site. Details of the pollen extraction and analysis methodology are on file at the Archeological Records Management Division in the Laboratory of Anthropology under this site number.

Of the 19 samples analyzed, only two were preserved well enough to obtain a standard count of 200 pollen grains. The rest contain between 1 and 105 pollen grains per slide preparation. Absolute pollen numbers tend to be low, with poorly preserved samples containing between 43 and 3,361 pollen grains per gram of sediment. The better preserved samples contain substantially more, between 6,253 and 8,439 pollen grains per gram of sediment. Although several samples have absolute pollen numbers in the 1,000 grains per gram range, the abundance of microscopic charcoal hindered the concentration of fossil pollen making it difficult to encounter in most of the samples. The taxa present and the frequencies in which they occur appear to be in large part the result of poor preservation, which biases the record in favor of the more ubiquitous and decay-resistant pollen types (pine, Cheno-ams, and the sunflower family). Because of this, the pollen record is a partial one with regard to taxa present during the site occupation.

Vegetative Indicators Reflected in the Pollen Record

The pollen record reflects few of the vegetational components in the general site vicinity, and likely those from some distance. Most of the taxa indicate vegetational disturbance, primarily the Cheno-ams, the sunflower family, and the mallows. These taxa are shrubby and herbaceous weed species that are particularly common in disturbed shrub grasslands below 2,000 m and in agricultural fields. Also present is the pollen of perennial shrubs such as sage, cholla cactus, and prickly pear cactus. Scant pine pollen (both pinyon and ponderosa) most likely reflect trees growing at higher elevations rather than at the site locale. However, scattered pinyons and junipers could have been present a few kilometers to the west.

The pollen record primarily reflects a disturbed shrub grassland similar to the present-day potential natural vegetation. Whether or not the disturbance reflects the site occupation, farming activity, or the importation of ethnobotanically useful weed species to the site is not clear. The presence of maize, coupled with the location of the site in the vicinity of the arable floodplain, implies that the disturbance reflects nearby agricultural activity.

Economic Activity Reflected in the Pollen Record

Even though preservation was poor in the majority of the samples, substantial amounts of both maize and cactus pollen in the larger fraction scan strongly implies a heavy use of both cactus and maize, suggesting that activities performed at this site include processing, storage, or consumption of the fruits and other parts of these plants for food. To a lesser degree, the utilization of Cheno-ams is indicated. Maize pollen was encountered in all of the features sampled, with the heaviest concentrations found in the Pit Structure 2 floor samples. The presence of numerous aggregates of pollen and incompletely developed pollen within anther fragments in some features suggests that maize tassels were utilized, and by inference, maize plants.

Cactus pollen concentrations were similar in samples from both pit structures. The presence of substantial amounts of cactus pollen reflects an emerging pattern of cactus pollen utilization at other Anasazi period sites along the Middle Rio Grande, such as LA 54147 near Rio Rancho and Qualucu Pueblo (LA 757) near Socorro (Clary 1987a, 1987b). The dominant cactus type is cholla rather than prickly pear. This is noteworthy because prickly pear fruit, especially that of *Opuntia phaecantha,* is larger, tastier, and preferable to cholla fruit. The presence of cholla pollen, coupled in some instances with pollen aggregates, implies that cholla flower buds with the young, still fleshy and palatable fruits attached were collected.

Cholla buds are a well-documented food source among historic and prehistoric Indians in the American Southwest (Greenhouse et al. 1981:231). A modern ethnographic study of cholla bud utilization among the Pima revealed that gathering occurs before the buds open in order to maximize the number of buds obtained from each plant and to minimize the area traversed and energy expended. Although the open flowers are edible, their texture is apparently stickier and less desirable than that of the unopened buds (Greenhouse et al. 1981:228). Only the buds are picked and several Pimas disclaimed the use of the stem or fruit as described in the literature. Apparently these later plant parts are utilized in times of greater need (Greenhouse et al. 1981:229). Cholla buds are available in the spring and early summer, providing a nutritious source of food when other plant foods are in short supply. After cooking or roasting, they can be dried and stored for an indefinite period (Greenhouse et al. 1981:232).

The abundance of cholla pollen in the Coors Road site samples indicates that the buds were cooked, processed, and stored in the pit structures, and suggests a spring or early summer occupation. Abundant maize pollen in many of the same features suggests that these features were reused after the maize harvest in the late summer/fall (especially Pit Structure 2 samples 157, 158, 175, and 235 and Pit Structure 1 samples 64, 75, 210, and 215). Scant prickly pear pollen indicates that mature fruits or pads rather than the flower buds were utilized by the site occupants. Pollen-bearing flowers dehisce from the fruit before maturation (Benson 1982:387). Thus, compared to cholla, proportionally less prickly pear pollen is expected to enter the pollen record.

Cholla Morphology

Two kinds of cholla pollen were encountered. The first and more abundant type, *Opuntia imbricata* type 1, compares favorably in size and structure to the modern reference sample (between 60 and 70 microns in diameter). The second type, *Opuntia imbricata* type 2, compares favorably to the modern reference but is considerably larger (about 100 microns in diameter) and has a less pronounced punctibaculate ektextine (Tsukada 1964:70), which makes it appear more worn down and eroded. This anomalous large cholla pollen may represent a cholla type not previously collected for reference. Alternatively, it may be from a polyploid or hybrid since hybrids often have larger pollen, flowers, fruits, leaves, and branches, and may have been favored by gatherers (Dr. W. C. Martin, pers. comm.). The larger size and different morphology could also result from digenetic factors that caused the grains to flatten and expand in size.

A similar pattern of unique and anomalous cholla pollen is reported by Bohrer for Anasazi sites in New Mexico and Arizona (1986:212-213). At Arroyo Hondo, New Mexico, the significant difference between pollen diameters of prehistoric and modern species of cholla indicate that no single modern species is likely to have been the source (Bohrer 1986:213). At Salmon Ruin near Farmington, New Mexico, preliminary pollen investigations found a cholla pollen grain 90 microns in diameter, which exceeds the normal size range of the cholla, *Opuntia whipplei*, growing in the vicinity today (Bohrer 1986). This information, combined with size anomalies from other prehistoric sites in Arizona, suggests that the distribution of cholla species may have been markedly different and more directly the result of human introduction and manipulation in the past than today. As Bohrer notes (1986:214),

> [t]oday, humans seldom serve as direct agents of cactus seed reintroduction into areas where disease or unfavorable climatic conditions have decimated plant populations. Where native ceremonies disappear, the need for maintaining the required plants also wanes. Other factors such as trade or methods of processing may help explain the anomalies in cholla pollen size and distribution in the prehistoric record.

Whatever the case, further study is merited.

Description of Pollen Encountered in the Samples

Pit Structure 1

Eight pollen samples were collected from Pit Structure 1 (Table 30). Sample 64, taken from post-abandonment Stratum 2 fill, contains a substantial amount of cholla pollen as well as scant maize and prickly pear pollen. A wide range of taxa, seemingly from surrounding vegetation, is preserved in this stratum including Cheno-ams, greasewood, grasses, sunflower family, ephedra, and beeweed. The proportionately high amount of cholla pollen suggests that cholla was either growing in close proximity or was processed or utilized near the pit structure. Sample 75, also from the upper fill of the structure, contains a fairly high number of maize pollen grains followed by Cheno-am and cholla pollen.

The remainder of the samples were from the floor (samples 129, 130, and 308) or features associated with the floor. The presence of maize pollen in all of the samples indicates that activities associated with maize utilization took place in Pit Structure 1. Maize pollen is more concentrated in samples 130 (floor), 200 (hearth), 210 (ash pit), and 215 (storage pit). Aggregates and pollen of globemallow, cholla, and maize imply that these taxa were stored in Feature 3. The ash pit and hearth samples both contain notable amounts of maize pollen indicating maize was

Table 30. LA 15260, Pit Structure 1 Pollen

	Fill		Floor			Features		
Sample Number:	64	75	129	130	308	210	200	215
Arboreal Pollen								
Pinus sp. (pine)	(2)R	(20)	(3)C	(1)R	(1)R	(1)C	R	(2)R
Pinus edulis (piñon pine)			(1)					(1)
Pinus ponderosa (ponderosa pine)	(3)		(3)					
Non-Arboreal Pollen								
Cheno-ams (chenopod-amaranth)	(35)	(24)a	(7)Ra	(6)a	(4)	(8)		(7)a
Sarcobatus sp. (greasewood)	(9)							
Poaceae (grasses)	(2)							
H.S. Asteraceae (high spine sunflowers)	(4)	(6)	(8)a	(2)				(5)
L.S. Asteraceae (low spine sunflowers)	(1)	(2)						
Artemesia sp. (sage)		(1)						
Ambrosia sp. (ragweed)		(3)						
Ephedra sp. (Mormon tea)		(4)			(1)			(1)
Ephedra trifurca (Mormon tea)	(1)							
Spaeralcea sp. (globemallow)						R	R	(2)Ca
Opuntia imbricata (cholla type 1)	(12)Ca	(6)C	R	R	(1)R	(2)Ca		(1)C
Opuntia imbricata (cholla type 2)	R					R		R
Opuntia polyacantha (prickly pear)	R	(1)R						R
Cleome sp. (beeweed)	(1)		(1)					
Zea mays L. (maize)	(4)Ra	(3)Ca	(5)Ca	R	R	Ca	(1)Ca	(7)Ca
Unidentified	(2)	(1)			(1)	(2)		(1)
Total Number	77	98	28	9	8	14	1	27
per gram of sediment	1218	1437	544	217	375	459	43	746

Key: R = rare occurrence (1-10 grains); C = common occurrence (11-100 grains); A = abundant (>100 grains); a = aggregates noted; ( ) = real number in samples with < 200 g.

used in the context of these features. The ashpit appears to have been involved in the roasting or cooking of cholla.

Pit Structure 2

The frequencies of taxa within the Pit Structure 2 (Table 31) samples are more distinctive and less homogenized than those from Pit Structure 1. Nine samples were analyzed and, like Pit Structure 1, agricultural dependence is indicated from the pollen results. Most of the samples contain notable amounts of maize and cholla pollen. The larger cholla pollen type is more abundant here than in Pit Structure 1. Sample 108, from upper fill Stratum 2, contains a notable amount of cholla pollen, suggesting that a fair amount of cholla was either growing or processed nearby. The relative abundance of maize pollen indicates that maize was processed or utilized as well.

The remaining samples are from occupational deposits in the pit structure. Sample 140, from the floor near the wall, contained the greatest amount of Cheno-am pollen encountered in the samples. The copious presence of aggregates indicates that Cheno-ams were collected and transported to the pit structure for use as food or fuel. Sample 144, from under a mano on the floor, also contained a fairly high number of Cheno-am pollen with aggregates, as well as a substantial amount of maize pollen indicating that these two taxa were prepared with the mano. Sample 158, from immediately west of the hearth, and sample 157 from immediately north of the hearth, both contained large amounts of maize pollen, including aggregates and anther fragments. These strongly suggest that maize was processed near the hearth. Sample 208 from under a stone resting on the bottom of the hearth, contained the only squash pollen (1 grain). It is difficult to tell if this was domestic or wild squash since it was badly deteriorated and crumpled. This sample also contained scant amounts of globemallow, cholla, prickly pear, and

Table 31. LA 15260, Pit Structure 2 Pollen

Sample number:	Fill			Floor			Features		
	108	140	144	158	157	175	208	230	236
Arboreal Pollen									
Abies sp. (fir)						+			
Picea sp. (spruce)						+			
Pinus sp. (pine)	(1)R	R	(3)C	(1)R	(3)R	9R	R	(8)C	(5)C
Pinus edulis (piñon pine)			(2)		(1)	2		(3)	(3)
Pinus ponderosa (ponderosa pine)			(2)			2		(12)	(7)
Juniperus sp. (juniper)					(2)				
Non-arboreal Pollen									
Cheno-ams (chenopod-amaranth)	(6)	97Ca	(86) Ra	(9)	(22)a	15	(20)a	(20)a	(12)a
Poaceae (grasses)	(1)	+		(1)a		+		(3)Ra	

Sample number:	Fill			Floor			Features		
	108	140	144	158	157	175	208	230	236
H.S. Asteraceae (high spine sunflowers)	(1)	+		(1)	(3)	2	(2)	(1)	
L.S. Asteraceae (low spine sunflowers)	(3)	1	(6)	(2)	(3)	3		(4)	(2)
Ephedra sp. (Mormon tea)			(1)						
Ephedra trifurca (Mormon tea)	(2)	+	R	(1)		2		(4)	(1)
Sphaeralcea sp. (globemallow)	R	R				+	R	R	R
Opuntia imbricata (cholla type 1)	(5)C	+	(2)R a	(5)C a	(2)C	6C a	R	(7)Ca	R
Opuntia imbricata (cholla type 2)	R	R	R		R	R	R	R	R
Opuntia polyacantha (prickly pear)			R			1R	R	R	
Cucurbita sp. (squash)							R		
Zea mays L. (maize)	(7)C a	+Ra	(1)C a	(10) Aa	(24) Aa	56 Aa	(3)C a	(20)A a	(4)Ra
Unidentified	(1)		(2)					(3)	(1)
Total Number	27	200	105	30	60	200	25	85	35
per gram of sediment	335	8439	1583	3361	1271	625 3	731	1800	720

Key: R = rare occurrence (1-10 grains); C = common occurrence (11-100 grains); A = abundant (>100 grains); a = aggregates noted; ( ) = real number in samples with < 200 g.

slightly more maize pollen. Sample 230 from Feature 2 (an ash-filled pit) contains notable amounts of maize and cholla pollen as well as scant amounts of globemallow and prickly pear. The pollen frequencies in sample 236 (also from Feature 2) do not point to storage of any particular taxon. Scant amounts of cholla, prickly pear, maize, and globemallow occur; however, their introduction appears to have been ambient rather than as the result of purposeful storage of plants.

Midden Features

Midden Features 3 and 8 (Table 32) have pollen remains that resemble those from Pit Structure 1. Sample 538 from the storage pit, Feature 3, suggests it was used for storing cholla and possibly maize. Sample 660 from the borrow pit (Feature 8) contains scant cholla and maize pollen, which may have entered the pit as ambient pollen from general site activities. Otherwise the pollen record is not diagnostic of economic activities.

Table 32. LA 15260, Midden Features 3 and 8 Pollen

	Feature 3, #538	Feature 8, #660
Arboreal Pollen		
Pinus sp. (pine)	(2)R	(3)R
Pinus edulis (piñon pine)	(2)	
Non-arboreal Pollen		
Cheno-ams (chenopod-amaranth)	(26)a	(2)
Poaceae (grasses)		(1)
H.S. Asteraceae (high spine sunflowers)	(3)	R
L.S. Asteraceae (low spine sunflowers)	(3)	(1)
Ephedra sp. (Mormon tea)	(2)	
Sphaeralcea sp. (globemallow)	R	R
Opuntia imbricata (cholla type 1)	(5)C	R
Opuntia imbricata (cholla type 2)	R	
Cleome sp. (beeweed)		(1)
Zea mays L. (maize)	(2)Ra	R
Unidentified	(1)	(1)
Total Number	46	9
per gram of sediment	281	386

Key: R = rare occurrence (1-10 grains); C = common occurrence (11-100 grains); A = abundant (>100 grains); a = aggregates noted; ( ) = real number in samples with < 200 g.

Summary and Conclusions

Economic activities reflected in the pollen record demonstrate that processing and utilization of maize and the manipulation of cholla cactus took place. To a lesser degree, Cheno-ams, prickly pear, and possibly globemallow were also utilized. Such activities imply the site was occupied during late spring, early summer, and at harvest time in the late summer/early fall. The identification of two kinds of cholla cactus pollen may indicate the utilization of two kinds of cholla. The larger size of cholla type 2 may result from the purposeful manipulation or artificial selection for larger flower buds or fruits. The pollen size anomalies fit well with the pattern observed by Bohrer (1986:214), suggesting that the distribution of species of cholla was markedly different and more directly the result of human introduction and manipulation in the past than today.

FLOTATION, MACROBOTANICAL REMAINS, AND CHARCOAL

Mollie S. Toll

Introduction

Excavations at the Coors Road site (LA 15260) provide a rare opportunity to investigate attributes of the prehistoric Puebloan occupation within the bounds of present-day Albuquerque. Botanical materials reviewed here include 17 flotation samples (7 from Pit Structure 1, 8 from Pit Structure 2, and 2 from midden features) and 12 macrobotanical samples. In the pit structures, organic material (pockets of darker fill, ash, and charcoal) was concentrated in the upper fill; this zone was examined through two samples from Pit Structure 1 and one from Pit Structure 2. Stratum 8 (cultural fill directly overlying the floor) was sampled in each pit structure. Samples were also taken from fill of hearths, ash pits, and storage pits associated with the floors; care was taken to avoid rodent disturbance. Macrobotanical specimens include all plant remains large enough to be recognized as such during excavation. These were few in number and consist chiefly of carbonized corn cob fragments. Cobs are an exceedingly durable by-product, differentially resistant to both biological deterioration processes and consumption during carbonization; together with charcoal they are by far the most common direct artifacts of agricultural period plant utilization in the Southwest. A single, highly deteriorated cucurbit seed was also present in the macrobotanical assemblage from LA 15260.

Methods

The 17 soil samples collected during excavation were processed at the Laboratory of Anthropology by the simplified "bucket" version of flotation (see Bohrer and Adams 1977). Each sample was first measured as to volume (range 1100-2275 ml), and then immersed in a bucket of water. After a 30-40 second interval for settling out heavy particles, the solution was poured through a fine screen (about 0.35 mm mesh) lined with a square of "chiffon" fabric, catching organic materials floating or in suspension. The fabric was lifted out and laid flat on coarse mesh screen trays, and the recovered material allowed to dry. Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh), and then reviewed under a binocular microscope at 7-45x. All samples were sorted in their entirety.

From the three flotation samples in Pit Structure 2 with sufficient charcoal, a sample of 20 pieces of charcoal was identified (10 from the 4 mm screen, and 10 from the 2 mm screen). Each piece was snapped to expose a fresh transverse section, and identified at 45x. Low-power, incident light identification of wood specimens does not often allow species- or even genus-level precision, but can provide reliable information useful in distinguishing broad patterns of utilization of a major resource class.

Carbonized corn remains were recovered both by flotation and as macroremains. All kernels are fragmentary. For all cob fragments retaining a full circumference, row number was counted, and diameter and cupule width and height were measured with dial calipers according to description by Nickerson (1953).

Results

Pit Structure 1

Two levels of upper fill were sampled. Flotation sample F.S. 65 from Stratum 2, a post-abandonment deposit, contains clearly modern seeds of several taxa with little economic utility (Russian thistle--a species introduced to the Southwest in the nineteenth century, stickweed, and scorpionweed) and modern pigweed bracts (Table 33). Tansy mustard frequently appears as a food species in Puebloan assemblages, but at this site it occurs only as a single unburned seed in this one post-occupational context, in association with several other contaminants. Carbonized economic specimens in Stratum 2 (hedgehog cactus, corn, and a grass) reiterate taxa found in deeper deposits in Pit Structure 1, indicating mixing, probably by rodents. Sample F.S. 76, from a charcoal stain (Stratum 7) about 1 m below ground surface contained carbonized seeds of several potential economic species. Pollen recovered from the upper fill in Pit Structure 1 overlaps only in the case of Cheno-ams, grasses, and corn (Clary, this volume); several taxa occur only as pollen (for example, cholla, prickly pear, ephedra, beeweed) or only as seeds in flotation (for example, hedgehog cactus).

Seeds associated with the pit structure floor were few in number, but include hedgehog cactus and a grass, both carbonized. Feature 2, the stepped entrance, contains no identifiable plant material at all. The principal hearth (Feature 6) was located near the southeast margin of the pit structure. Flotation sample 201, from a small pocket of ash and charcoal in the hearth fill, contains carbonized seeds of each of the annual weed species encountered at the site. Pollen in a nearby ash pit (Feature 5) showed a concentration of cholla (Clary, this volume). Flotation reveals that this feature was not used exclusively for cholla roasting, nor was it simply a discard locus for hearth debris; contents include two carbonized economic taxa not found in the hearth (ricegrass and corn). Macrobotanical charcoal from this ash pit (F.S. 218) consisted chiefly of coniferous wood (5 pieces, 0.1 g). Feature 3, a storage pit excavated into the wall and floor in the northwest section of the pit structure, also contained carbonized ricegrass, corn, and edible annuals; these plant materials are likely indicators of generally trashy fill not related to pit use. Pollen provides more substantive evidence of products likely stored in this feature (Clary, this volume); pollen aggregates of globemallow, cholla, and corn are probable in situ micro-debris, and not the result of ambient, airborne dispersal.

Midden Features

Two features situated in the midden about 10 m east and south of Pit Structure 1 are associated with the Pit Structure 1 occupation. At approximately 1 m below present ground surface, these features were 20 to 30 cm shallower than floors in the pit structures. Feature 3, a substantial storage pit, contained carbonized wild and cultivated plant debris probably relevant to general occupational trash or post-occupational fill rather than pit use. A single winged pigweed seed attested to use of weedy annuals (Table 32), while carbonized corn cob fragments were found in both flotation and macrobotanical remains (F.S. 475). A borrow pit (Feature 8) contained additional charred corn, including a single kernel (F.S. 533). This kernel was not swollen during carbonization, indicating it was probably fully dried or on a cob between other kernels when carbonized. This incomplete kernel measures 6.6 mm in width, and 3.7 mm in thickness. Again, the recovered plant specimens probably relate to general trash rather than borrow pit function.

Table 33. Flotation Results, Pit Structure 1

	St. 2 FS 65	St. 7 FS 76	St. 8 FS 131	Fea. 2 FS 307	Fea. 5 FS 211	Fea. 6 FS 201	Fea. 3 FS 216
Possible Economics							
Oryzopsis (ricegrass)					5/3.8*		12/8.3*
Gramineae (grass family)	1/.5*	2/1.5*	1/.9*				
Echinocereus (hedgehog)	1/.5*?		1/.9*				
Chenopodium (goosefoot)		2/1.5*				18/12.9*	2/1.4*
Amaranthus (pigweed)	B	5/3.8*				7/5.0*	
Cheno-am						5/3.6*	
Cycloloma (winged pigweed)					6/4.6*	31/22.1*	2/1.4*
Descurainia (tansy mustard)	1/1.5						
Zea mays (corn)	C*	C*			C*		C*
Probable Contaminants							
Cryptantha (stickweed)	1/.5						
Phacelia (scorpionweed)	1/.5						
Salsola (Russian thistle)	2/1.0						
No. of taxa	8	4	2	0	3	3	4
No. of burned taxa	2	4	2	0	3	3	4
Total seeds: actual	7	9	2	0	11	61	16
Total seeds:estimate/liter	3.5	6.8	1.8	0	8.4	43.6	11.1

a/b = number before slash represents the actual number of seeds recovered; number after slash represents estimated number of seeds per liter of soil; * = some or all specimens burned; B = bracts; C = cupules

Table 32. Flotation Results, Midden Features, LA 15260

Possible Economics	Feature 3, #539	Feature 8, #661
Cycloloma (winged pigweed)	1/.8*	
Zea mays (corn)	C*	C*
Number of taxa	2	1
Number of burned taxa	2	1
Total seeds:actual	1	0
Total seeds:estimated/liter	.8	0

a/b = number before slash represents the actual number of seeds recovered; number after slash represents estimated number of seeds per liter of soil; * = some or all specimens burned; C = cupules

A very eroded and unburned *Cucurbita* sp. seed was recovered in the plaza area from Stratum 2 (possibly associated with a prehistoric plaza surface). Historic contamination is also a possibility, this close to the present ground surface. The specimen is incomplete in length and thickness, and measures 9.6 mm in width.

Pit Structure 2

Pit Structure 2 represents an occupation subsequent to abandonment of Pit Structure 1. Density of charcoal, and abundance and diversity of cultural plant remains are all higher in Pit Structure 2 compared to Pit Structure 1. As in Pit Structure 1, upper fill (Stratum 2) contained known contaminants (scorpionweed and Russian thistle) in addition to cultural plant debris (charred corn and goosefoot seeds; Table 35). On the floor, pollen sample 140 contained abundant Cheno-am pollen, including aggregates (Clary, this volume). Flotation sample 141 from the same location contained charred seeds of two economic genera in the Chenopodiaceae family (goosefoot and winged pigweed) plus *Amaranthus,* lending support to the interpretation of Cheno-am pollen related to food use. Use of chenopodiaceous fuels (saltbush or greasewood) is also documented in three charcoal assemblages from Pit Structure 2 (Table 36).

Table 35. Flotation Results, Pit Structure 2

	St. 2	St. 8, Floor					Fea. 1	Fea. 2
	FS 109	FS 141	FS 159	FS 160	FS 164	FS 174	FS 203	FS 235
Possible Economics								
Oryzopsis (ricegrass)	3/2.4*			77/61.6*	13/7.9*	3/1.8*	3/2.5*	2/.9*
Chenopodium (goosefoot)	1/.9*	3/2.4*	1/.8*	1/.8*		4/2.4*	1/.8*	1/.4*
Amaranthus (pigweed)		2/1.6*	2/1.7*	4/3.2*	1/.6	1/.6*	1/.8*	1/.4*
Cheno-am		2/1.6*					1/.8*	
Cycloloma (winged pigweed)		14/11.2*	2/1.7*	9/7.2*	6/3.6*		3/2.5*	1/.4*
Zea mays (corn)	C*	C*1/.8*	C*1/.8*	C*	C*	C*	C*	C*
Probable Contaminants								
Phacelia (scorpionweed)	5/4.3							
Salsola (Russian thistle)	1/.9							
Arabis							1/.8	
No. of Taxa	4	6	4	5	4	4	6	5
No. of burned taxa	2	6	4	5	3	4	5	5
Total seeds: actual	7	25	6	91	20	8	10	5
Total seeds:estimated/liter	6.1	20.0	5.0	72.8	12.1	4.8	8.2	2.1

Table 36. Charcoal Composition of Flotation Samples, Pit Structure 2

	FS 141		FS 159		FS 235		Pieces		Weight	
	n =	g	n =	g	n =	g	n =	%	g	%
Conifers										
Juniperus	3	.1	3	+	1	+	7	12	.1	8
Undetermined	3	+	1	+			4	7	+	+
Total	6	.1	4	+	1	+	11	19	.1	8
Non-Conifers										
Atriplex/Sarcobatus	9	.4	3	+	5	.1	17	28	.5	42
Artemisia					1	+	1	2	+	+
Populus/Salix	2	+	11	.2	3	.1	16	27	.3	25
Undetermined	3	.1	2	+	10	.2	15	25	.3	25
Total	14	.5	16	.2	19	.4	49	82	1.1	92
Total	20	.6	20	.2	20	.4	60	101	1.2	100

+ = less than .05 g or .5%

Pollen from under a mano near the west wall (F.S. 144; Clary, this volume) gives some indication of mano use in the form of Cheno-am aggregates and abundant corn pollen. Flotation from the same provenience (F.S. 160) by contrast reveals a large concentration of charred Indian ricegrass seeds, together with charred goosefoot, pigweed, and winged pigweed seeds (all three annuals are found in nearly every Pit Structure 2 sample location).

Flotation from the adobe-lined hearth (F.S. 203) reflects all carbonized economic species found elsewhere in Pit Structure 2 (ricegrass, weedy annuals, and small amounts of corn). These materials are most likely indicative of general trashy fill within Pit Structure 2 rather than any specific activities related to the hearth, especially given the nature of the hearth fill. Fill consisted of roof fall overlying sand, with no ash or charcoal present. Two floor samples immediately adjacent to the hearth to the west (F.S. 159) and north (F.S. 164) contain plant materials similar to the hearth.

Adjacent to the hearth, a cylindrical ash-filled pit (Feature 2) contained the same charred plant taxa found throughout Pit Structure 2. Small pieces of charcoal in this flotation sample are scattered among several taxa--juniper, saltbush/greasewood, sage, cottonwood/willow, and an undetermined nonconifer. Carbonized food plant and wood fragments are probable remnants of general trash fill, and pollen (concentrations of corn and cholla in F.S. 230) may be a more direct indicator of pit function.

Discussion

Given the moderate recovery of plant materials at LA 15260, the assemblage is generally consistent with those from other Anasazi sites of the Middle and Upper Rio Grande Valley. Sites from this area and period for which we have paleofloral data are few, and the most thoroughly documented are much larger Pueblo III-IV pueblos on an entirely different level of economic organization, such as Arroyo Hondo (Wetterstrom 1986) and Howiri (Toll 1987a) to the north, and LA 282, Pargas, and Qualacu (Toll 1982, 1987b, 1987c) in the Lower Rio Grande. In these river valley sites the very general pattern we see reiterated is utilization of food and fuel types from a variety of habitats, spanning the bosque to the mesas, incorporating both annual and perennial species and items harvestable from late spring to fall. At the larger, better sampled and better preserved sites, we see a greater variety of wild plant species recorded, and beans, squash, and sometimes cotton add to the ubiquitous corn remains.

In seeking information on economics and the role of external communication at LA 15260, one subject of interest is the relationship between agricultural crop types grown here and at other sites up and down the Rio Grande Valley. Though tiny fragments of corn cobs or kernels are found throughout deposits at LA 15260, the sample of measurable macrobotanical corn is very small (Table 37). Further complicating our evaluation of its morphometric relationship to other populations is the presence of two cobs on the high end of site row numbers and cob diameters, found in upper fill of Pit Structure 1 (F.S. 39) and Pit Structure 2 (F.S. 134). There is the nagging possibility that these specimens (25 percent of the tiny site population) might relate to a later historic reoccupation. These troubles aside, cob and cupule dimensions of corn from the Coors Road site fall within the range observed at other, generally later Anasazi sites in the river valley. Average cob row number at Qualacu is 12.6 (n = 28, cv 0.157; Toll 1987b) and at LA 282 is 12.5 (n = 100, cv 0.150; Toll 1982); average cob diameter of eroded cobs is 11.4 mm at Qualacu (n = 5, cv 0.124) and 11.2 mm at LA 282; average cupule width is 5.6 mm at Qualacu (n = 4, cv 0.122) and 5.4 mm at LA 282 (n = 187, cv 0.218); average cupule height is 3.3 mm at Qualacu (n = 4, cv 0.062) and 3.1 mm at LA 282 (n = 187, cv 0.190). From this small population we have no evidence of radically different genetic stock or growing conditions from the few populations for which we have comparative data.

Table 37. Morphometrics[1] of Carbonized Corn Cobs

	Row number		Cob diameter		Cupule width		Cupule height	
	n =	mean	n =	mean	n =	mean	n =	mean
Pit Structure 1[2]	3	12.0	4	11.7	5	5.5	5	3.1
Pit Structure 2[3]	1	14.0	1	8.3	1	3.3	1	2.9
Midden features[4]	1	12.0	1	11.3	2	5.9	2	3.5
Site total	5	12.4	6	11.1	8	5.3	8	3.2
cv	.135		.230		.181		.166	

1 = not corrected for shrinkage during carbonization. High erosion also affects dimensions.
2 = upper fill, Stratum 7 (n=3); Stratum 8/Floor (n=1); Feature 2 (n=1).
3 = Stratum 2 (n=1).
4 = Stratum 2 (n=1); Feature 3 (n=1); Feature 8 (n=1).

Table 38. Presence (in Percent of Flotation Samples) of Carbonized Economic Plants

	Pit Structure 1	Pit Structure 2	Midden Features
Oryzopsis (ricegrass)	29	75	0
Echinocereus (hedgehog cactus)	20	0	0
Chenopodium (goosefoot)	43	88	0
Amaranthus (pigweed)	29	75	0
Cycloloma (winged pigweed)	43	75	50
Zea mays (corn)	57	100	100
No. of samples	7	8	2
Density (average no. of seeds/sample)	10.7	16.4	.4
Diversity (average no. of taxa/sample)	2.6	4.3	1.5

Flotation data from LA 15260 suggests some intriguing differences between deposits in the two pit structures. With the exception of hedgehog cactus, which appears only in Pit Structure 1, all cultural economic plant taxa occur more frequently in Pit Structure 2 samples (Table 38). The numbers are compelling, but on the other side of the balance are observations that corn pollen is more ubiquitous in Pit Structure 1 (Clary, this volume), and that a slight increase in recovery from Pit Structure 1 would probably erase most observed differences in the flotation record.

Summary

Economic plant taxa present included ricegrass, hedgehog cactus, a few weedy annuals, corn and squash. The low profile of squash and complete absence of beans is not surprising, given preservation problems common to all but the best-preserved sites. Diversity of weedy annuals is lower than that found generally at later Anasazi sites; this may also be a preservation effect, however, given the low quantities in which seeds and corn remains occurred at LA 15260. Overall contamination was low; a few unburned noneconomic taxa were found only in upper fill of both structures. Charcoal includes riparian species from the river corridor, shrubby species from a wide elevation range, and juniper from the benches and higher mesas.

The later-occupied Pit Structure 2 stands out as higher in both density and diversity of economic floral materials compared with Pit Structure 1. In Pit Structure 2, flotation remains were homogeneous throughout, and seem to be indicative of general trash fill related to occupation of the structure. Hedgehog cactus seeds were present only in two locations in Pit Structure 1, and plant remains were patchy and in lower frequency. Midden features produced very few cultural plant remains.

Floral remains present in deposits of LA 15260 illustrate long-term generalized habitation use of this small Puebloan settlement. Materials from several ecological zones (river corridor, floodplain, benches, and mesas) and from all segments of the growing season are present throughout the site. With the exception of hedgehog cactus found only in Pit Structure 1, no locations or provenience types with plant debris are limited to a specific procurement type or season. Higher density and diversity of flotation remains in Pit Structure 2 versus Pit Structure 1 may be in part the effect of slightly different preservation conditions in the two structures.

FAUNA

The faunal assemblage from the Coors Road site consists of 548 pieces of unworked bone, 8 pieces of worked bone, and 70 egg shell fragments. This report is primarily a subsistence analysis. The main goals are to examine animal utilization by the prehistoric population and compare this information with other Albuquerque area sites.

Methodology and Definitions

The faunal identifications were made using my comparative collection and those of the Museum of Southwest Biology at the University of New Mexico. The basic information recorded includes the taxon, the element, fragmentation or portion represented, the age of the individual (immature is defined as less than 2/3 adult size, young adult is 2/3 to adult size with unfused epiphyses), burning, evidence of butchering, and taphonomic observations such as checking and root etching.

Bags were arranged and identified by the F.S. number. Within a bag, all freshly broken pieces from the same element were counted as one piece, fresh breaks that could not be determined to be the same element were not. Old breaks from the same element were counted as separate pieces. Reconstruction of elements with fresh breaks can substantially decrease the sample size.

Burning was recorded as amount: partial, slight, or complete. The color of the burn was also noted. "Cooking brown," a slight discoloration often accompanied by a waxy texture is, unfortunately, identical in appearance to the discoloration found in scatological bone and at this site may or may not represent boiling. Complete burning is problematical. Cooking rarely results in complete burns. The most likely causes include discard of waste into a firepit during meal preparation or consumption, or it may occur during house cleaning activities. Accidental burning of a structure may also result in complete burns, however, this will affect all bone in that unit.

Two kinds of MNI (minimum number of individuals) frequencies are given, the minimum and cumulative. The minimum assumes that all elements, regardless of provenience, could represent the same individual. Thus, only the taxon, element, fragmentation, and age of the individual are considered in determining the number represented. A cumulative MNI is the sum of a number of assemblages and is based on the assumption that bones from different proveniences have no relation to one another. Provenience divisions were made after consulting the site excavator (Richard Sullivan, pers. comm., July 1986).

Taxa Recovered

Most of the taxa recovered are mammals. Only two species of birds could be identified but the presence of a third is indicated by size. A single turtle and an amphibian or reptile element were also found. None of the taxa recovered are necessarily imports. Table 39 gives the common and scientific names or definition for the unknown taxa, the element counts, and the minimum and cumulative MNIs for the assemblage.

Table 39. Summary of LA 15260 Faunal Remains

Taxon	Common Name	n =	%	MNI min.	MNI max.	Tools
Sylvilagus cf. *auduboni*	desert cottontail rabbit	59	10.8	4	13	
Lepus californicus	black-tailed jack rabbit	135	24.6	4	15	
Cynomys gunnisoni	Gunnison's prairie dog	1	.2	1	1	
large sciurid	prairie dog or rock squirrel	1	.2			
Geomyidae	pocket gopher	1	.2	1	1	
Dipodomys cf. *ordii*	Ord's kangaroo rat	2	.4	1	2	
Peromyscus sp.	mouse	1	.2	1	1	
Canis sp.	canid (dog or coyote)	6	1.1	1	3	1
Taxidea taxus	badger	1	.2	1	1	
Odocoileus hemionus	mule deer	5	.9	2	3	
Antilocapra americana	pronghorn	5	.9	1	3	
Meleagris gallopavo	turkey	5	.9	1	2	
Grus canadensis	sandhill crane	2	.4	1	2	
Testudinata	turtle	1	.2	1	1	
herp	amphibian or reptile	1	.2	1	1	
Unknowns						
rodent	mice, rats, small squirrels	3	.5	1	1	
small mammal	jack rabbit or smaller	68	16.0			
small to medium mammal	coyote or smaller	19	3.5			
medium mammal/carnivore	fox to large coyote	13	2.4			
medium to large mammal	coyote or larger	63	11.5		1	
large mammal/artiodactyl	wolf or larger	65	11.9			6
artiodactyl	hoofed mammal	23	4.2		1	
aves	bird	1	.2			
small aves	quail or smaller	1	.2	1	1	
medium to large aves	crow or larger	4	.7		1	
large aves	raptor, turkey or crane size	17	3.1		1	1
small mammal/medium to large aves		2	.4			
small mammal/large aves		7	1.3			
small to medium mammal/large aves		5	.9			
unknown		11	2.0			
Totals		548	100.2	23	56	8
Egg shell		70				

Sylvilagus *cf.* auduboni

Cottontail rabbits comprise the second largest group of identified taxa. None of the mandible fragments was complete enough to make a species identification. *Sylvilagus auduboni,* the desert cottontail, is the most likely species given the site location (Findley et al. 1975). Desert cottontails are particularly numerous in areas where eroded hillsides are cut by arroyos and are found along the river in tamarisk-saltgrass flats, arid rock slopes, mesas, alluvial fans, and sand drift areas in Bernalillo County (Ivey 1957). Given the availability, inclination to invade crop lands, and the ease of capture, it is not surprising that cottontail remains are relatively numerous.

Burned cottontail rabbit bones were found only in the midden, but it is unlikely that the others were intrusive. Immature, young adult, and mature individuals are present. The majority appear to have been mature.

Lepus californicus

The black-tailed jack rabbit is the most common species identified and was found in more proveniences than any other. Jack rabbits are found in most habitats in Bernalillo County, ranging from river bottoms to pinyon-juniper foothills. Ivey (1957) found jack rabbits most often in arroyos along the alluvial slopes forming the sides of the Rio Grande and Puerco valleys and on tamarisk-saltgrass flats in the river bottom. Jack rabbits can become quite dense in areas of heavy food concentration, such as agricultural fields, and can cause considerable crop damage (Dunn et al. 1982). The predominance of this species may indicate that the site's location was favorable for jack rabbits rather than serving as an indication of hunting practices. While jack rabbits are usually assumed to be hunted by communal groups, their local distribution and abundance should be considered.

Burned jack rabbit bones were found in most proveniences. An immature element was found in Pit Structure 2 and young adult elements in both pit structures and the midden.

Cynomys gunnisoni

One prairie dog element, a scapula, was all that represents this species. A partial femur, identifiable only as large sciurid, may also be from this species and possibly from the same individual. According to Bailey (1931), the prairie dog is less numerous along the Rio Grande than in other parts of the state and tends to live in small scattered colonies. A similar distribution in prehistoric times may be responsible for the few remains recovered from the site.

Geomidae

Two species of pocket gopher occupy the Rio Grande Valley, *Thomomys bottae* and *Pappogeomys castanops.* The latter does not compete well with Botta's pocket gopher (Findley et al. 1975). *Thomomys bottae* has been identified as a post-occupational burrower in sites further north, near Rio Rancho (Akins 1986a, 1986b). Today, Botta's pocket gopher is abundant in old fields off the Rio Grande Valley, tamarisk-saltgrass flats, and even residential yards. They also occur on the mesas and alluvial slopes (Ivey 1957). Given their ubiquitous distribution, it is unusual that only one element was found at the site. The Rio Rancho sites are in similar topographic situations but

5. 3 and 1. 4 percent of the total elements were from pocket gophers (Akins 1986a, 1986b).

This taxon occurs as both a common post-occupational burrower and a field pest and it is not possible to determine which it was in this case. The element, a partial mandible, was not burned.

Dipodomys *cf.* ordii

This small kangaroo rat is a common post-occupational burrower in archaeological sites. They prefer friable soils and will burrow into accumulations of wind blown sand or alluvial soils along arroyos (Findley et al. 1975). Not only are they small, but are also strictly nocturnal (Bailey 1931), making *Dipodomys* an unlikely food source, except possibly in times of severe food shortage or when a colony becomes a nuisance to a community. The mandible and tibia from an immature individual were recovered from the midden and may represent one or two individuals.

Peromyscus *sp.*

Ivey (1957) records five species of *Peromyscus* from Bernalillo County. *P. maniculatus* (deer mouse) ranges from Sandia Crest down to brushy areas of the Rio Grande bottomland; *P. leucopus* (white footed mouse) is most characteristic of bottomlands, including saltgrass flats; *P. boylii* (brush mouse) is found on arid, rocky, and brushy slopes; *P. truei* (piñon mouse) is found mainly in piñon-juniper foothills; and *P. nasutus* (rock mouse) also likes rocky and brushy gullies.

Peromyscus is a common human commensal that does not burrow but will move into the burrows of other species or into structures, especially if food or scraps are present (Bailey 1931). Again, because they are quite small and nocturnal, *Peromyscus* is more likely to occur as post-occupational residents, although some may have been captured while raiding human stores.

Canis *sp.*

The canid elements are from a dog or a coyote. The body parts, skull and vertebra fragments and a foot element, are not diagnostic. The absence of gnawed or punctured bone in the assemblage argues against keeping dogs at the site; yet, midden Feature 1 did have a badly preserved canid element and nine medium mammal pieces that could represent the remains of a dog burial. Two of the canid bones, from the midden, were burned suggesting food items.

Taxidea taxus

Ivey (1957) found badgers on the mesas, along river bottoms, and in piñon-juniper foothills. They are most numerous where there are burrowing rodents (Bailey 1931) but may also raid corn fields (Bradfield 1973). Their rank odor, the fact that they will put up a fight when cornered (Bailey 1931), their fairly sparse distribution (two to six per sq km), and nocturnal and solitary habits (Lindzey 1982) make badgers an unlikely, but apparently an occasional prey. The element from this site was the basal portion of a skull.

Odocoileus hemionus

Mule deer range throughout New Mexico. It is difficult to say how abundant they were even in early historic times (Findley et al. 1975). Densities are determined by the habitat. Relatively high numbers are found in mountain-foothill habitats (four to seven per sq km in Montana and four per sq km in Arizona chaparral). Winter concentrations may be much higher but body weight is greatest during summer and early fall and decreases in late fall and winter (Mackie et al. 1982).

Densities near the site were probably low but it is possible that a few deer were locally procured. The identified elements from this site are all foot parts, a distribution that is often interpreted as being a result of the feet returned attached to hides. The lack of other parts, especially antler, may indicate travel or trade to acquire deer meat. Two of the elements were small enough to suggest more than one deer, even though there are no duplicated body parts.

Antilocapra americana

Pronghorn were much more widespread and abundant in earlier times, inhabiting open grasslands below the woodlands (Findley et al. 1975). They tend to form large herds in winter and later break up by age and sex to form small herds or solitary animals (Kitchen and O'Gara 1982).

The body part distribution for pronghorn is similar to that of deer, mostly foot elements. It is possible some of those represented in this assemblage were procured on the West Mesa.

Meleagris gallopavo

At one time, wild turkeys were found in all the timbered mountains of New Mexico (Bailey 1928). Domestic turkeys probably reached the Albuquerque area in Basketmaker III times. The bones from LA 15260 were fragmentary and could represent wild or domestic birds. Egg shell, found throughout the site, suggests they were domestic.

Body parts include leg and wing bones and a vertebra. A spurred tibiotarsus indicates at least one male bird was present. None were burned and they were found in two proveniences, Pit Structure 1, fill and Stratum 2, Level 2 in the midden.

Grus canadensis

Early explorers found abundant sandhill cranes in corn fields along the Rio Grande (Bailey 1928). Presently, cranes winter in the Lower Rio Grande Valley with concentrations occurring from Belen south. Cranes are casual to occasional at Dixon and Cedar Crest. They migrate northward in February and return in fall (Hubbard 1978). Two sandhill crane elements, a humerus shaft and a distal tibiotarsus, were recovered from the midden.

Testudinata

The single plastron (lower shell) fragment from a turtle shell could represent either the land form *Terrapene ornatta* (ornate box turtle) or the aquatic species *Chrysemys pictabelli* (western painted turtle). The latter is found in ponds along river edges and the sandy bottomed inlets and eddies or rivers (Degenhart and Christiansen 1974). There is debate among biologists whether the box turtle is native to the Albuquerque area or the current presence is from specimens released outside their natural range (i.e., escaped pets) (Degenhart and Christiansen 1974; Hink and Omart 1984). Recent identifications from an early site near Rio Rancho suggests they were present prehistorically and were utilized for food (Akins 1986a).

Herp

A shaft from a double-tubed long bone (such as a calcaneum, ulnare, or tibio-fibula) representing a fairly large toad, frog, or lizard was found in the vent shaft (a fairly common trap for toads and lizards) of Pit Structure 3. It most likely represents a post-occupational intruder.

Unidentified Groups

The size ranges included in the unknown or unidentifiable groups can be found in Table 39. Nearly all of the elements represent the taxa identified above. Only the small aves indicates a distinct form. Small birds are quite similar osteologically and the carpometacarpus fragment could represent any one of a large number of species that inhabit the area.

Egg Shell

Seventy fragments of egg shell were recovered from the site. All represent large eggs that are cream in color and are probably turkey eggs. Schorger (1966) gives an average thickness of . 35 mm for modern domestic turkey egg shell. Those from LA 15260 were approximately . 30 mm thick.

While all of the fragments could have originated from a single egg, the spatial distribution (Table 40) suggests at least three clusters: one in and around midden Feature 1, another in and around midden Feature 3, and one thinly scattered through the plaza area.

Egg shell does not always indicate that turkeys were raised, especially when no elements from immature birds are found. Eggs themselves may have been used (for example, as a binder in paints) and could have been traded. Accidental laying of eggs by a captive bird is another possibility. Raising domestic turkeys requires active participation by humans.

Table 40. Egg Shell Distribution

Provenience	Pieces of Shell
Pit Structure 1, Stratum 2	1
Midden, Feature 1, Stratum 2	26
Midden, Feature 3, fill	15
Midden, Feature 8, Stratum 2	1
Midden, Stratum 1, Level 1	1

Provenience	Pieces of Shell
Midden, Stratum 2, Level 1	7
Midden, Stratum 2, Level 2	8
Midden, Stratum 2, Level 3	2
Plaza, Stratum 2	4
Plaza, Feature 10	1
Test Pit 97N/100E, Stratum 2	4
Total	70

Taphonomic Considerations

Four kinds of bone weathering were observed. The most common, effecting a large proportion of the sample, is root etching. A dendritic pattern of shallow grooves, probably caused by the association with growth and decay of roots (Behrensmeyer 1978), was found in even the deepest portions of the site. This may suggest relatively slow deposition or that the rootlets penetrated deeply into the relatively soft and disturbed soil at the site. Unfortunately, the extreme etching found on elements from this site led to further fragmentation and a reduction in the overall identifiability of the remains. It also obscures evidence of butchering, modification, use, and possibly carnivore gnawing.

Checking or cracking, exfoliation, and erosion result from exposure. These were found most often in shallow deposits and on larger elements that take longer to be buried.

Purple staining on portions of a bone is a relatively frequent occurrence in prehistoric samples. The cause is unknown. It occurs more frequently in the pit structure samples (around 25 and 37 percent) than in the midden (about 6 percent), and on bones from animals of all body sizes from rodents to artiodactyls and among the large birds. It is most common on bird elements, followed by small mammal. Few large mammal elements exhibit stains. Some of this is undoubtedly a function of sample size, especially for the birds, where overall numbers are low and the percentages appear large.

Butchering Observations

The extreme root etching found on most of the sample prevented positive identification of any butchering marks. Rootlets tend to follow grooves and possible cuts. The only mark suggestive enough to mention is a possible cut just below the acetabulum on a pronghorn pubis.

Worked Bone

Eight pieces of worked bone and possible worked bone were recovered. Most were extremely fragmentary and burning or etching obscures evidence of both manufacture and utilization. Two appear to represent awls (Pit Structure 1, floor fill, and midden, Stratum 2, Level 2), one is a bone bead or tube (midden, Stratum 2, Level 3), and the others are very small fragments (Pit Structure 1, Stratum 2; Plaza, Stratum 2; midden, Stratum 2, Level 1 [n = 2]; midden, Stratum 2). Complete or near complete modification by grinding is found on all but the bead and one unburned fragment. Expediently used fragments of bone could not be identified because of the root etching.

One awl is a *Canis* sp. right ulna with extensive modification by grinding. It measures 13.3 cm long, 1.5 cm maximum width, and 1.3 cm maximum thickness. The tip is missing but slight polish indicates use. The other awl is a burned tip made from a large mammal or artiodactyl long bone shaft fragment. It measures 4.0 cm long, .5 cm wide, and .3 cm thick. It is completely modified with no visible evidence of use.

The bead is made from a long bone shaft of a large bird. It is 3.1 cm long, oval in cross section, and ranges from 1.5 to 1.2 cm in diameter. Both ends were cut then rounded. Etching obscures any other evidence of modification.

Four of the remaining fragments were burned. All are large mammal or artiodactyl long bone shaft fragments and tend to be completely modified or so eroded modification cannot be discerned.

Proveniences

Stratum 1

Upper level materials (Table 41) were recovered from fill that was mixed prehistoric and historic trash disturbed by agricultural use, grazing, and mechanical equipment. The fifteen elements represent taxa found in the prehistoric portion of the site and all were either etched or burned. Because of the disturbance, these are not included in the cumulative MNI totals. In no case would an additional individual be added to the minimum MNI if these were included.

Table 41. Stratum 1 Faunal Remains

Taxon	Elements
Sylvilagus sp.	1
Lepus californicus	3
small mammal	4
medium to large mammal	3
large mammal/artiodactyl	1
artiodactyl	2

Taxon	Elements
unknown (small)	1
Total	15
Percent checked	6.6
Percent etched	53.3
Percent burned	46.7

Pit Structure 1

A reasonably large number of bones was recovered from this structure (n=158). Table 42 shows that small mammals, particularly jack rabbits and cottontails, dominate the assemblage. Some bird and medium mammal, and very little artiodactyl are also present in the sample. Root etching was most prevalent in Strata 3, 4, 5, and Stratum 7. Burning was uncommon but present on jack rabbit, small mammal, small to medium mammal, and large mammal/artiodactyl elements.

Table 42. Pit Structure 1 Fauna

Taxon	St. 2	St. 3-5	St. 7	Stratum 8		Fea. 2	Fea. 3	Total	MNI		Burn/ c.b. %
				Level 1	Level 2				Min.	Max.	
Sylvilagus sp.	7	2	8	2	1	1		21	2	4	
Lepus californicus	30	2	26		2[1]		2[1]	62	4	5	14.5
Geomyidae		1						1	1	1	
Peromyscus sp.			1					1	1	1	
Taxidea taxus			1					1	1	1	
Meleagris gallopavo	1		1	1				3	1	1	
Rodent	2							2			
Small mammal	12	2	28	3				45			17.8
Small-med. mammal				1				1			100.0
Med. mam./carnivore				1				1			
Med.-large mammal		5	2					7			
Large mam./artio.	2				1			3		1	33.3
Artiodactyl	1							1	1	1	
Large aves	5			1				6			
Unknown	1	1	1					3			
Totals	61	13	68	9	4	1	2	158	11	15	
% checked/eroded	1.6							.6			
% etched	50.8	84.6	77.9	22.2	25.0		50.0	62.7			
% burned	14.7		8.8	22.2	50.0			12.0			
% cooking brown	3.3							1.3			

Note: cumulative MNI treats St.8, L.2, Fea. 2, and Fea. 3 separate from the general fill. [1]indicates the MNI for the separated levels when the taxon has more than one element.

When an infrequently occurring species is found throughout a single feature, this suggests disturbance and mixing of deposits so that lumping is advisable. Since this was the case for turkey in this structure, most of the fill levels were lumped for MNI calculations. The floor and features are considered separately. Treating each of the latter as a unit significantly increases the MNIs.

Pit Structure 2

The assemblage from Pit Structure 2 is smaller (n = 91 elements). Again, most of the collection is rabbit and small mammal bones (Table 43). This is the only location where prairie dog and, possibly, large squirrel were found. Like the Pit Structure 1 assemblage, the amount of root etching is greatest in Strata 3, 4, 5, and Stratum 7. More checking/eroding was observed, possibly indicting a slower rate of filling. Burning was relatively common, occurring primarily in the unknown categories. It was highest in Stratum 2 and the roof fall (Stratum 8).

Fill was considered as two units for calculating the cumulative MNI. The use of four divisions (two fill units, roof fall, and floor features) in such a small sample accounts for the large differences in the minimum and cumulative MNI figures.

Table 43. Pit Structure 2 Fauna

Taxon	St. 2	St. 3-5	St. 7	St. 8	Fea. 2	Total	MNI		Burned %
							min.	max.	
Sylvilagus sp.	5		3	1	1	10	1	5	
Lepus californicus	4	1	30	6	1	42	2	6	4.8
Cynomys gunnisoni			1			1	1	1	
large sciurid	1					1		1	
Odocoileus cf. *hemionus*		1				1	1	1	
small mammal	5	1	4	6		16			12.5
small-medium mammal			2			2			50.0
medium-large mammal	3					3		1	66.7
large mammal/artiodactyl	7	2	2			11			72.7
large aves			2			2	1	1	50.0
unknown		1		1		2			
Totals	25	6	44	14	2	91	6	16	
% checked/eroded		16.7		21.4		4.4			
% etched	52.0	83.3	61.4	42.9	50.0	57.1			
% burned	32.0	16.7	9.1	21.4		17.6			

While jack rabbit bones appear to greatly outnumber those from cottontail rabbits, this is not as extreme as indicated by the number of elements. A single jack rabbit foot consisting of 19 elements was found in Stratum 7. Adjusting for this makes the proportion of jack rabbit to cottontail closer to that from Pit Structure 1. Stratum 2 is similar to the midden deposits with slightly more or equal proportions of cottontail and jack rabbit.

Plaza and Exterior Features

Excavation in the plaza produced few bones (n = 6) (Table 44). While this may suggest the area was kept relatively free of debris, it is also possible that bone was poorly preserved in this location. All of the elements were etched and half were also checked. No burning was found. In general, the exterior features had small assemblages that were often etched, eroded, and had little potential for identification.

Table 44. Exterior Features, Plaza, and Test Pit 1 Fauna

	Midden, Exterior Features				P.S. 3	Plaza	Test Pit
Taxon	1	3	8	11	13, vent	St. 2	St. 2
Sylvilagus sp.			4 (1)				1/1
Lepus californicus	1		4 (1)				
Dipodomys cf. *ordii*			1/1?				
Canis sp.	1						
Odocoileus hemionus						3/1	
Antilocapra americana			(1)				1/1
herp					1/1		
small mammal			6				
small-medium mammal		1	1				
medium mammal/carnivore	9		(2)				
medium-large mammal		1	(2)				1
large mammal/artiodactyl	1		2			2	
artiodactyl						1	
small mammal/large aves				1			
cf. aves			1				
medium-large aves			(1)				
large aves		1	1				
unknown		(1)					
unknown small					1		
Totals	12	4	26	1	2	6	3
% checked/eroded	8.3	50.0	3.8			50.0	
% etched	100.0	25.0	46.1			100.0	100.0
% burned		25.0	30.8	100.0			

Note: /1 indicates the element may represent an individual not found in other proveniences; ( ) = number burned.

Table 45. Midden, Stratum 2 Fauna

Taxon	Level 1	Level 2	Level 3	Total	Min.	Max.	% Burned
Sylvilagus sp.	2	12	8	22	3	3	18.2
Lepus californicus	6	11	6	23	3	4	17.4
Dipodomys ordii		1		1	1	1	
Canis sp.	2	2	1	5	1	3	60.0
Odocoileus hemionus	1			1	1	1	100.0
Antilocapra americana		2	1	3	1	2	100.0
Meleagris gallopavo		2		2	1	1	
Grus canadensis		1	1	2	1	2	
Testudinata		1		1	1	1	
rodent	1			1		1	
small mammal	4	10	3	17			29.4
small-med. mammal	7	7		14			63.4
med. mammal/carnivore	1			1			100.0
med.-large mammal	23	15	6	46			54.3
large mammal/artiodactyl	22	21	2	45			28.9
artiodactyl	10	9		19			36.8
small mammal/med.-large aves	2			2			100.0
small mammal/large aves	1	3	2	6			
small-med. mammal/large aves	2	1	1	4			50.0
med. mammal/large aves		1					
small aves		1		1	1	1	
med.-large aves	1		2	3		1	
large aves		3	4	7			28.6
unknown		1	2	3			
Totals	85	104	41	230	14	21	
% checked/eroded	32.9	18.3	7.3	21.7			
% etched	61.2	49.0	58.5	55.2			
% burned	42.3	34.6	21.9	35.2			

Midden

Approximately half of the midden was excavated in three levels (Table 45). Unlike the structure fill, cottontail slightly outnumbers jack rabbit elements in Levels 2 and 3 and the two taxa are nearly equal when all levels are combined. The splitting of two rare taxa, *Canis* sp. and crane, between levels suggests disturbance and mixing of the deposits. The taphonomic observations are as expected. Checking, etching, and burning are all highest in Level 1, implying that deeper burial in Strata 3-5 and burning aided in preservation.

Species Utilization

Table 46 examines possible changes in species use and disposal practices. It suggests that the utilization of small mammals decreased while that of the artiodactyls increased. Carnivore, turkey, and egg shell are more prevalent in the earliest occupation. The replacement of small mammals by large mammals in faunal assemblages is an increasingly recognized phenomenon in the Southwest (see Akins 1987). This has been interpreted as reflecting horticultural intensification and the need for scheduling of hunting activities (Speth and Scott 1985). On the other hand, differential deposition of refuse may account for much of the variability at this site. The Occupation 1 assemblage includes only 17. 9 percent midden deposits while Occupation 2 is 58. 7 percent midden deposits and Occupation 3 is 73. 3 percent midden deposits. Domestic trash consisting of small debris may have been dumped closer to the structure while larger mammals were processed and cooked outdoors and the remains deposited in the midden area.

Table 46. Comparison of Percent of Selected Taxa and Taphonomic Observations for the Three Occupations

Selected Taxa	Occupation 1	Occupation 2	Occupation 3
Sylvilagus sp.	15.3	13.1	8.5
Lepus californicus	35.1	34.5	13.4
small/small-med. mammal	27.2	21.4	20.7
carnivore/med. mammal	7.4	1.4	3.7
Odocoileus hemionus			2.4
Antilocapra americana	1.0	1.4	
artiodactyl/large mammal	4.4	22.1	50.0
Meleagris gallopavo	1.5	1.4	
Grus canadensis	.5	.7	
med.-large/large aves	7.4	4.1	1.2
Selected taxa sample size	202	145	82
Occupation assemblage size	229	177	116
% checked/eroded	3.5	12.4	25.0
% etched	59.8	54.2	60.3
% burned/cooking brown	17.5	24.3	38.8
Egg shell	45	8	7

The taphonomic observations are about as expected. The deeper buried bones had less checking and eroding. The increase in burning may indicate that larger portions of the upper level bone has decomposed or may simply reflect the greater proportion of midden deposits in the later occupations.

Rabbits. Table 46 suggests that jack rabbits were either preferred over cottontail rabbits or were available in greater numbers and thus utilized more. The proximity of the site to saltgrass flats favors the latter explanation.

Artiodactyls. The ten identifiable artiodactyl elements provide little information on how deer and pronghorn were utilized or procured. Table 47 examines the body part distribution by progressively including all potential artiodactyl material. While most body parts are present, the skull and flat bones are either underrepresented or were not preserved in this collection. A third possibility is that processing areas containing these parts were not excavated. Deer occurs only in Occupation 3 while pronghorn is only found in Occupations 1 and 2. This could possibly suggest a greater use of pronghorn earlier in the site occupation.

Carnivores. The few carnivore remains do not suggest intensive use. Occasional encounter is the most likely form of utilization.

Birds. Turkeys appear to have been kept at the site, at least during Occupation 1. It is doubtful that more than a few birds were present given the remains. Turkeys are expensive to maintain in areas lacking natural forage. Crane and the small birds could have been taken in the fields or as they foraged along the river.

Table 47. Artiodactyl and Potential Artiodactyl Body Part Distribution

	Number of Elements					Cumulative Percent		
Body Part	deer	pronghorn	artio	lge/artio	med/lge	artio	lge/artio	med/lge
skull				1			1.0	.6
Thorax								
vertebra			1			3.0	1.0	.6
sternum			1			3.0	1.0	.6
st. cartlidge					1			.6
rib				3	2		3.1	3.1
scapula			1	1		3.0	2.0	1.2
Thorax totals			3	4	3	9.1	7.1	6.2
pelvis		1	1			6.1	2.0	1.2
flat bone frags.					3			1.9
unknown frags.				10	11		10.2	13.0

Body Part	Number of Elements					Cumulative Percent		
	deer	pronghorn	artio	lge/artio	med/lge	artio	lge/artio	med/lge
Non-Long Bones		1	4	15	17	15.1	20.4	23.0
Long bones								
front leg			2			6.1	2.0	1.2
rear leg			2			6.1	2.0	1.2
shaft frags.			4	47	46	12.1	52.0	60.2
end frags.				3			3.1	1.9
Long bone Total			8	50	46	24.2	59.2	64.6
Feet								
front foot	2	2	7			33.3	11.2	6.8
rear foot	2	1				9.1	3.1	1.9
foot	1	1	4			18.2	6.1	3.7
Foot Total	5	4	11			60.6	20.4	12.4
Sample size	5	5	23	65	63	33	98	161

Seasonality

The faunal assemblage contains a number of taxa useful for determining seasonality. Prairie dogs, squirrels, and turtles either hibernate or have periods of reduced activity. When found in a deposit, these species suggest late spring through fall. Similarly, eggs are lain in April and May and usually hatch in May (Schorger 1966). Cranes, if distributed as at present, pass through the area during migration and would have been available between October and February (Hink and Omart 1984).

Because they are common and grow rapidly, rabbits can give some indication of season. Very young animals occur from April or May through September (Bailey 1931). Epiphyses are fused and full growth is achieved by or during the first winter for cottontails (Chapman et al. 1982) and at six to seven months for jack rabbits (Dunn et al. 1982). Winter deposits should not contain remains of immature individuals and young adults would be less common in late spring and early summer, assuming that remains are discarded immediately and deposits are not mixed.

Table 48 gives the immature and young adult percentages for all deposits in which they were present. Immature rabbit bones are restricted to Pit Structure 1, Stratum 2 and Pit Structure 2, Stratum 7. Young adult elements are more common and found in both pit structures and the midden. There is ample evidence for late spring through fall use of the site. Crane is the only taxon that might suggest winter occupation.

Table 48. Immature and Young Adult Elements for Taxa and Proveniences

Provenience/Taxa	N =	% Immature	% Young Adult
Pit Structure 1, Stratum 2			
Sylvilagus sp.	7	14.3	
Lepus californicus	30		6.7
Pit Structure 1, Stratum 7			
Lepus californicus	26		3.8
Pit Structure 2, Stratum 7			
Lepus californicus	30	3.3	*63.3
Pit Structure 2, Feature 8			
Sylvilagus sp.	4		50.0
Midden, Stratum 2, Level 2			
Lepus californicus	11		9.1
Dipodomys ordii	1	100.0	
Artiodactyl	9		11.1
Unknown	1	100.0	
Midden, Stratum 2, Level 3			
Sylvilagus sp.	8		12.5

* the large percent here is due to a complete foot from a young adult individual

Regional Overview

Adequate reporting of faunal assemblages from the Middle Rio Grande area is rare. More work has been done in the Tijeras Canyon area and provides a good basis for comparison.

Reviewing the available information from sites along the Rio Grande reveals very few differences in the taxa found (Table 49). Reinhart (1968) reports two early pithouse sites (BR 16 and BR 45) 18. 5 and 20 km west of the river. Neither had large samples of bone but a diversity of taxa is reported (Harris 1968). Both contained cottontail rabbit, jack rabbit, pocket gopher, and kangaroo rat bones. BR 16 also had canid, pronghorn, toad, and bird remains. Frequencies are given in MNIs rather than number of elements but jack rabbit remains appear to outnumber cottontail. A third site, Boca Negra Cave, located 9 km west of the river, had a much larger sample but also contains historic materials as well as those resulting from use of the cave by raptors and carnivores. In addition to the usual rabbits, pocket gopher, and woodrats, taxa that could have resulted from human exploitation include turtle, duck, quail, prairie dog, badger, bobcat, deer, and pronghorn. The MNI counts given suggest that cottontail remains were more common than those of jack rabbit in all levels of the site.

Table 49. Taxa Recovered from Rio Grande Valley Sites

Period:	BM II		BM III, BM III-P I					PII-III		P IV	P IV-Historic			No.
Site:	BR 16	Boca Negra	BR 45	TRF	CAS 8	CAS 9	CAS 16	Isleta	LA 15260	Taylor Ranch	LA 677	Kuaua	Puaray	
Cotton-tail	X	X	X	X	X	X	X	X	X	X	X		X	12
Jack rabbit	X	X	X	X	X	X	X	X	X	X	X		X	12
Prairie dog		X							X					2
Sciurid		X		X	X		X		X		X		X	7
Pocket gopher	X	X	X	X	X		X		X	X	X		X	10
Wood-rat	X	X	X	X	X		X			X	X			8
Beaver				X			X	X					X	4
Musk-rat											X			1
Racoon											X			1
Badger		X		X	X				X					4
Canid	X	X		X		X	X				X	X	X	8
Bobcat		X			X						?		X	4
Bear												X	X	2
Deer		X		X	X	X	X	X	X		X	X	X	10
Elk				X						X	X		X	4
Prong-horn	X	X		X			X	X	X			X	X	8
Mt. sheep				X			X	X						3
Bison		?											?	2
Crane									X				X	2
Quail		X		X			X							3
Duck		X					X				X			3
Turkey				X	X			X	X	X	X	X	X	8
Turtle		X		X	X		X		X		X		X	7
Fish										X			X	2
Sample size	*158	*168	>3000	?	875	65	1024	55?	548	493	1300	?	?	

Note: all sites on west side of river except LA 677 on east side; some rodents that are primarily post-occupational burrowers, most birds, and herpes not included on table.
* number of identifiable elements

Frisbie (1967), working at three sites [TRF] slightly closer to the Rio Grande, lists almost all of the above taxa plus turkey, beaver, elk, and mountain sheep. More recent excavations at one of these same sites and two nearby sites (Akins 1986a, 1986b) add only bobcat to Frisbie's list. Jack rabbits consistently outnumber cottontails at all three sites.

Pueblo II and especially Pueblo II sites with faunal remains are by far the rarest. One site near Isleta (Vivian and Clendenen 1965) dating between A. D. 930 and 1030, contained the same taxa as LA 15260, with the addition of mountain sheep. Jack rabbit remains outnumber cottontail (25 to 5). LA 15260 contains forms common to earlier dating sites. Crane is added to the list of species while woodrat is absent from this and the Isleta site.

Pueblo IV sites (post A.D. 1300) are more numerous but most are large pueblos that also have historic occupations. The Taylor Ranch site (O'Leary and Biella 1986; Stiner 1986), a smaller site located on the floodplain west of the river, is a mix of Basketmaker II and Pueblo IV deposits. The deposits containing bone all include later sherds and are assumed to represent that period. It is one of the few valley sites where cottontail outnumber jack rabbit elements by a ratio of about ten to eight. A single fish bone was found.

LA 677 (Bertram 1982; Marshall 1982) or Nuestra Señora de Dolores Pueblo, is a mix of Pueblo IV and historic remains. Raccoon and muskrat are additions to the faunal list but could result from historic use. Quantitative information is given in MNIs calculated by F.S. number. From these figures it appears that jack rabbit remains outnumber those of cottontails.

The large sites of Kuaua (Sinclair 1951) and Bandelier's Puaray (Tichy 1939) had extensive excavations and probably recovered large numbers of bones. Unfortunately, only a partial species list and a species list are published. Both sites have historic components.

In summary, even a presence/absence analysis reveals consistent use of some taxa. Rabbits are always found (assuming that Sinclair's intention was to list only the more interesting species) and when quantification is given, there are only two instances where cottontails outnumber jack rabbits. The taxa found next most frequently are pocket gophers, which may indicate little more than this taxon's propensity to burrow into archaeological sites, and deer. These are followed by woodrats, canids, pronghorn, and turkey, then by turtle and sciurids. The remaining taxa are found sporadically and appear inconsistent in use. Four taxa--muskrat, raccoon, fish, and bear--do not appear before Pueblo IV. The fact that three of these are water species may suggest some change in use of the environment, possibly related to the presence of large-scale irrigation after this time.

A similar view of the mountain-foothill environments of the eastern portion of the Rio Grande Valley can be found in Table 50. The earliest of these, Two Dead Juniper Village (Akins 1983) is located just below the foothills of the Manzano Mountains on Kirtland Air Force Base. The site, with nine pit structures and one kiva dating from the 1100s, produced few bones other than bison. These constitute between 60 and 90 percent of the assemblage and represent four or five animals. Most body parts for at least one bison were found. Few bones from small animals were recovered, but cottontail, jack rabbit, and two species of pocket gopher, and woodrat plus deer, pronghorn, and the bison are present. The only other small site, LA 14875 (Oakes 1979), dates slightly later but contains many of the same taxa, adding sciurid and turkey while woodrat and bison are not present.

The remaining prehistoric samples are from the larger sites of Tijeras Canyon Pueblo (Young 1980), Coconito (Teglia 1980), and San Antonio (Jarahian 1980). All have considerably larger samples of bone and as a consequence many more taxa, largely due to the increased sample sizes. Information on Paa-ko (Lambert 1954) consists of a species list with common and most common notations.

Table 50. Taxa Recovered from Mountain-Foothill Sites

Site:	Two Dead Juniper	LA 14875	Coconito	Early Tijeras	E. San Antonio	Late Tijeras	Paa-ko	M. San Antonio	L. San Antonio	No.
Dates:	1100s	1250-1325	1250-1350	1300s	1200-1300s	1300-1400s	1300-1500s	1600-1700s	1830s	
Cotton-tail	X	X	X	X	X	X	X	X	X	9
Jack rabbit	X	X	X	X	X	X	X	X	X	9
Prairie dog			X	X	X	X			X	5
Sciurid		X	X	X	X	X		X	X	7
Pocket gopher	X	X	X	X	X	X			X	7
Wood-rat	X		X	X		X		X	X	6
Porcu-pine				X	X	X			X	4
Muskrat			X					X		2
Badger				X	X		X			3
Fox			X	X		X				3
Canid			X	X		X		X		4
Mt. lion								X		1
Bobcat					X			X		2
Bear				X		X				2
Deer	X	X	X	X	X	X	X	X	X	9
Elk				X			X		X	3
Prong-horn	X	X	X	X	X	X	X	X	X	9
Mt. sheep				X		X	X	X	X	5
Bison	X		X	X			X			4
Crane				X						1
Quail				X						1
Turkey		X	X	X	X	X	X	X	X	8
Turtle							X			1
Fish								X		1
Sample size	480	185	4575	3000+	920	1500+	"much"	2100?	1724	

Note: Some rodents that are primarily post-occupational burrowers, most birds, and herpes are not included on the table.

As with the valley sites, both rabbits are found in all samples, but unlike the valley sites, cottontail is the more numerous and usually by considerable amounts, at all but LA 14875. Deer and pronghorn occur in every sample. By counts, deer is the more numerous at Two Dead Juniper, LA 14875, Coconito, and late Tijeras and was one of the "most common" species found at Paa-ko. Perhaps more significant is that at most, if not all, of these sites artiodactyl bone is far more numerous, relative to the rabbits, than at the valley sites. Turkey was found at all but Two Dead Juniper Village and usually in greater numbers than found in the valley sites. It is followed in frequency of occurrence by sciurid and pocket gopher, then mountain sheep, and finally by porcupine, canid, and bison. The remaining taxa are infrequent in their presence.

Conclusions

Species use in the Rio Grande Valley sites differs little between pre- and early agriculturalists and later groups. All exploited a diverse array of animals concentrating primarily on small terrestrial mammals. The consistent presence of deer and pronghorn suggests some availability, but not nearly that found in the mountain-foothill area.

In general, the differences between the valley and mountain-foothill adaptations are quantitative. Many of the same species were exploited by both groups with differences in proportions that relate to the immediate environments. Jack rabbits are more common than cottontails in the habitats found along the Rio Grande (Dunn et al. 1982) while cottontails are more numerous in the mountain-foothill environs (Cordell 1977). The mountain-foothill locales provided greater access to artiodactyls and turkeys and these species show a greater use in those sites. More quantitative information for small foothill sites and large valley sites would help to separate the effects of population aggregation from the effects of the local environment. Procurement strategies are often different for larger communities and may vary depending on the reliance on horticulture.

It appears that there was a subsistence trade-off between the two locales. Valley residents may have traded less access to animals and lower rainfall for more productive soils and longer growing seasons. Cordell et al. (1984) give a mean precipitation figure of 208 mm (corn requires 450 to 600 mm) and average growing season of 186 days (corn requires 120 days) for the Albuquerque area. The mountain-foothill residents had a shorter growing season (136 days at Tijeras Pueblo) and a lack of good soil, but more rainfall (343 mm) (Cordell et al. 1984) and greater access to wood and animal resources.

Early Spanish explorers found a number of large pueblos along the Rio Grande suggesting that valley residents were able to overcome the effects of inadequate rainfall and frequent flooding of the river. Large irrigation projects may have provided suitable habitats for previously rare species such as muskrats and beaver, made fish easier to capture, and provided the immense stores of corn mentioned in early historic records. Such stores would support large-scale turkey raising as well as the hunting and trading parties mentioned in the early chronicles.

EVALUATION OF THE RESEARCH OBJECTIVES

Anschuetz and Vierra (1985:31-33) proposed six research implications to evaluate their proposed model. The excavation phase confirmed only one of these, in part because the data cannot address those expectations, but also because the site was more extensive than they had anticipated based on the testing phase.

1. Even when found, tree rings will rarely, if ever, provide the requisite chronological control to place a site's occupation within a drought episode. Compounding the problem is poor preservation of wood, the possibility of reused wood, stockpiling, use of dead wood, use of species that will not date, and the preponderance of noncutting dates when wood is found. Especially pertinent here is the location of the site adjacent to the Rio Grande. The species most readily available to the Coors Road site inhabitants were cottonwood, willow, and an occasional juniper, species that are unlikely to date. No dendrochronological samples were obtained in the excavation phase. A sample of 60 pieces of charcoal identified from the site contained 7 pieces of juniper and 16 cottonwood or willow.

2. The flora and faunal assemblages did not establish that the site was seasonally occupied. Various taxa confirm occupation from early spring through fall; however, since stored foods are often relied on during winter and there are few species present or exploited only during the cold season, year-round occupation cannot be overruled on this basis. Evidence for the use of storable foods, such as corn and cholla buds, and the diversity of faunal and flotation remains are equally consistent with year-round residential use of the site.

3. The architectural features at the Coors Road site suggest some degree of residential stability, certainly more than expected of a seasonally occupied farming settlement. The presence of both pit structures and ramadas suggests year-round occupation. As proposed by Gilman (1987:552), pit structures may have only been used during the cold season. If true, the presence of pit structures at the Coors Road site is, in itself, evidence of year-round occupation, especially when combined with the paleobotanical and faunal evidence confirming early spring to fall occupation.

While Gilman bases her conclusions on ethnographic patterns, others take a more practical stance, which may be more pertinent to the Coors Road locale. McGuire and Schiffer (1983:292-293) propose that surface rooms require a greater energy expenditure in resources and labor than pit structures. Domed or conical structures, as the superstructures for pit structures may have been, can be constructed using odd shaped and branching pieces of wood. Rooms require long, straight material. Thus, the absence of a local supply of tabular sandstone and the species of wood readily available to the Coors Road inhabitants may have favored pit structure construction, especially if labor was in short supply because of small group size.

The inner limits of the site occupation, as dated by ceramic wares, may be a few as 50 years if Occupation 1 dates between A.D. 1125 and 1150 and Occupation 3 dates between A.D. 1200 and 1250. If, as it appears, no two pit structures were occupied at the same time, this is a use-life of around 17 years per structure, close to recent estimates of pit structure use-life. Cameron (1990:161) estimates a 10 to 15 year use-life and Schlanger (1986:507) no more than 30 years. Wood, particularly that in contact with soil, is vulnerable to decay and attack by insects. The superstructure must be constantly maintained, possibly even rebuilt after 10 to 12 years (Cameron 1990:157-161; McGuire and Schiffer 1983:291).

Storage facilities were found in Pit Structure 1, in the plaza area, and in the midden. Midden Feature 3, a roofed structure measuring 1.68 by 1.05 m and up to 75 cm deep could have held substantial stores. Hearths were found in both excavated pit structures and in two of the possible surface structure/ramadas. There were no formal milling features but the presence of manos, abundant corn pollen, cobs, and kernels confirm that corn was processed and stored.

Similarly, the amount of trash at the site favors a residential function. The occupation may or may not have been intermittent. Movement of a single household from one worn-out pit structure to a new one could produce the illusion of repeated occupation and abandonment of the site.

4. The ceramic temper study reveals that brown utility wares are tempered with materials believed to originate in the Socorro district. Warren (1982a:141) attributes some hornblende latite and fine grained quartz sandstone to the Ortiz gravels along the lower Rio Puerco and suggests that other hornblende latites, volcanic sandstone, and rhyolite come from the area between the La Joyeta Hills and Datil. Hornblende latite and rhyolite comprise 78 percent of the brown ware temper during the initial occupation of the Coors Road site, decreasing to 53 percent in Occupation 3. Mica schist tempered brown wares, which indicate a possible local source, comprise only 10 percent of the first Occupation assemblage, increasing to 26 percent of the Occupation 3 assemblage. The same is true of the sherd and hornblende temper in Socorro Black-on-white. It comprises 32.5 percent in the Occupation 1 and only 24.5 percent in the Occupation 3 assemblage. Crushed sherd and quartz temper increases from 46 to 51 percent of the Socorro Black-on-white temper. Sherd and mica schist temper makes an appearance in Occupation 2 (.7 percent) and grows to 3.5 percent of the Occupation 3 assemblage.

While these general patterns do seem to confirm interaction with areas to the south and a shift to a more local source, more precise information is needed. Petrographic analysis of potential temper sources in Tijeras Canyon, the Ortiz gravels south of Albuquerque and further down the Rio Grande, as well as rocks in the La Joyeta Hill to Datil area are necessary to better define this interaction.

5. As Post (this volume) points out, a study of Socorro Black-on-white designs must start with the source areas. At least seven temper types were found in the Socorro Black-on-white from the Coors Road site. Any analysis of design style should have sufficient assemblages from each major source--as confirmed by petrographic analyses. A much larger sample of Socorro Black-on-white is needed to pursue this line of study.

6. The Coors Road lithic assemblage consists primarily of materials that could have been procured locally. This test implication is hindered by the fact that both the Coors Road site inhabitants and groups to the south relied on the Ortiz gravels as the primary source of lithic materials (see Warren 1982b). Not only would there be no incentive to import lithic materials, but these would be indistinguishable from those procured locally. The only obviously imported tool in this assemblage is a projectile point of Washington Pass chert.

In general, Anschuetz's (1987) suggestion of a changing role for the Albuquerque area is supported. Initial occupation of the Coors Road site may represent an expansion into previously unutilized areas after A.D. 1150 (Anschuetz 1987:154), although it is not clear that this need be associated with periods of less than average precipitation. Changes in the temper found in the recovered ceramics seem to support the proposed shift from southern to more local interactions. Final assessment must await the petrographic analysis of local rock and a more precise identification of ceramic sources.

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APPENDIX 1. MEAN EDGE ANGLE FOR RETOUCH, DAMAGE, AND EDGE OUTLINE BY OCCUPATION

Retouch Type	Occupation 1 n/mean degrees	Occupation 2 n/mean degrees	Occupation 3 n/mean degrees	Total n/mean degrees
Cumulative				
Absent	102/53.5	81/48.2	101/50.8	284/51.2
Unidirectional dorsal	8/56.2	7/67.1	10/47.0	25/55.6
Unidirectional ventral	4/58.7	4/55.0	9/40.0	17/47.9
Bidirectional	2/62.0	0	4/68.7	6/66.6
Unidirectional on broken edge	1/85.0	0	0	1/85.0
Unidirectional angular debris	4/62.5	1/65.0	1/65.0	7/63.3
Unidirectional platform	1/75.0	1/85.0	0	2/80.0
Total edges	122	94	125	341
Edge Angle < 50°				
Absent	43/36.8	41/34.7	43/34.8	127/35.5
Unidirectional dorsal	2/40.0	1/35.0	6/34.1	9/38.0
Unidirectional ventral	1/45.0	1/45.0	7/33.5	9/36.1
Bidirectional	1/40.0	0	0	1/40.0
Unidirectional angular debris	1/40.0	0	0	1/40.0
Total Edges	48	43	56	147
Edge Angle ≥ 50°				
Absent	59/65.6	40/62.0	57/62.9	156/63.7
Unidirectional dorsal	6/61.6	6/72.5	5/59.0	17/64.7
Unidirectional ventral	3/63/6	3/58.3	2/62.5	8/61.6
Bidirectional	1/85.0	0	4/68.7	5/72.0
Unidirectional on broken edge	1/85.0	0	0	1/85.0
Unidirectional angular debris	3/70.0	1/65.0	1/65.0	5/68.0
Unidirectional platform	1/75.0	1/85.0	0	2/80.0
Total Edges	74	51	69	195
Damage Type				
Cumulative				
Absent	3/56.6	2/75.0	9/42.2	14/50.0
Unidirectional scarring	87/57.8	79/52.1	86/53.2	252/54.4
Bidirectional scarring	22/44.7	10/41.0	14/47.5	46/44.7

Retouch Type	Occupation 1 n/mean degrees	Occupation 2 n/mean degrees	Occupation 3 n/mean degrees	Total n/mean degrees
Unidirectional rounding	2/67.5	0	4/46.0	6/53.3
Unidirectional scarring and rounding	7/47.8	2/25.0	9/35.5	18/39.1
Bidirectional scarring and rounding	1/45.0	1/55.0	3/55.0	5/53.0
Total Edges	122	94	125	341
Edge Angle < 50°				
Absent	1/45.0	0	6/32.5	7/34.2
Unidirectional scarring	27/37.9	33/35/4	33/35.3	93/36.1
Bidirectional scarring	15/36.3	8/35.6	6/35.0	29/35.8
Unidirectional rounding	0	0	2/42.5	2/42.5
Unidirectional scarring and rounding	4/33.7	2/25.0	8/33.1	14/32.1
Bidirectional scarring and rounding	1/45.0	0	1/25.0	2/35.0
Total Edges	48	43	56	147
Edge Angle ≥ 50°				
Absent	2/60.0	2/75.0	3/61.6	7/65.0
Unidirectional scarring	60/66.7	46/63.2	53/64.3	159/64.9
Bidirectional scarring	7/60.7	2/62.5	8/56.8	17/58.8
Unidirectional rounding	2/67.5	0	2/50.0	4/58.7
Unidirectional scarring and rounding	3/66.6	0	1/55.0	4/63.7
Bidirectional scarring and rounding	0	1/55.0	2/70.0	3/65.0
Total Edges	74	51	69	194
Edge Outline				
Cumulative				
Straight	57/52.1	53/47.8	73/50.1	183/50.1
Concave	44/61.3	20/62.5	31/56.1	95/59.9
Convex	16/47.8	18/44.7	19/43.6	53/45.3
Concave/convex	5/58.0	3/50.0	2/50.0	10/54.0
Total Edges	122	94	125	341
Edge Angle < 50°				
Straight	24/37.1	28/34.1	35/36.6	87/36.0
Concave	12/37.9	3/33.3	9/32.2	24/35.2
Convex	11/38.2	11/36.8	11/32.7	33/35.9
Concave/convex	1/45.0	1/40.0	1/30.0	3/38.3

Retouch Type	Occupation 1 n/mean degrees	Occupation 2 n/mean degrees	Occupation 3 n/mean degrees	Total n/mean degrees
Total Edges	48	43	56	147
Edge Angle > 50°				
Straight	33/62.9	25/63.2	38/62.3	96/62.8
Concave	32/70.1	17/67.6	22/65.9	71/68.2
Convex	5/68.0	7/57.0	8/58.5	20/63.0
Concave/convex	4/61.2	2/55.0	1/70.0	7/60.7
Total Edges	74	51	69	194