MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

EXCAVATIONS AT RANCHO VIEJO DE SANTA FE:
ANCIENT PATTERNS OF MOBILITY AND LAND USE

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ADMINISTRATIVE SUMMARY

Between October 20 and November 6, 1997, the Office of Archaeological Studies, Museum of New Mexico, conducted a data recovery program at two archaeological sites for the Village at Rancho Viejo, Unit-1 development, Santa Fe County, New Mexico. The investigation was completed at the request of Rancho Viejo de Santa Fe, Inc. Data recovery was conducted in compliance with Santa Fe County Land Development Code, Article VI, Special Review Districts, Section 3.

Excavation was completed at three areas within LA 116418. Area 1 was an artifact cluster, probably dating to the Coalition period (A.D. 1200 to 1325). Area 2 was a chipped stone cluster associated with a thermal feature (Feature 1) that could not be assigned to a time period. Area 3 was a chipped stone cluster associated with a thermal feature (Feature 3) that could not be assigned to a time period. Excavation of these areas revealed no buried cultural deposits and demonstrated that the archaeological record was restricted to near surface or surface contexts. Areas 4 and 7 had thermal features (Features 2 and 6) examined, mapped, and described, but not excavated. Area 7 had an associated metate that was mapped and collected. These five areas reflect short-duration and low intensity resource procurement and processing during the Late Archaic (1200 B.C. to A.D. 1) and Coalition (A.D. 1200 to 1325) periods. The remaining areas (5, 6, 8, 9, 10, 11, 12, 13) were recorded and photographed, but not excavated, and temporally diagnostic artifacts were mapped and collected.

Excavation was completed at three areas within LA 116420. Area 1 was an extensive concentration of ground and chipped stone artifacts and pottery associated with five thermal features. The surface artifacts were mapped and collected; excavation within clusters revealed no buried cultural deposits. Excavation of Features 1, 2, 3, 4, and 6 revealed deflated thermal features used for plant processing and meat roasting. In Area 1 a radiocarbon date indicated an A.D. 700 to 800 occupation with additional evidence of discontinuous occupations during the Late Archaic (1200 B.C. to A.D. 1) and Coalition (A.D. 1200 to 1325) periods. Area 2 was a cluster of chipped stone debris and ground stone fragments. Excavation revealed a single episode projectile point manufacture station using Cerro del Medio obsidian and evidence for resharpening of tools made from basalt, chert, and chalcedony. Over 1,800 chipped stone artifacts were recovered and analyzed. The cluster yielded a complete projectile point of an En Medio style that dates to the 800 B.C. to A.D. 400 period. Area 3 had two deflated thermal features of similar content and structure suggesting that they were contemporaneous. No temporally diagnostic materials were recovered. Areas 4 through 8 were recorded and photographed, but not excavated, and temporally diagnostic artifacts were mapped and collected.

The research design for LA 116418 and LA 116420 focused on chronology, occupation history, and subsistence. These broad research domains were addressed through artifact collection and mapping, feature excavation and sample collection, and the analysis of artifact and feature data. Excavation produced unexpected results, such as the high density obsidian flake concentration in Area 2 of LA 116420, and the three hearths in Area 1 of LA 116420. Distribution and morphological analysis of the chipped and ground stone artifacts provides data that can be compared with other Late Archaic and ancestral Pueblo foraging sites of the Santa Fe River drainage and the eastern Galisteo Basin. Piece-plotting and refitting of ground stone artifacts provided clues to occupation history with regard to the number and intensity of occupations. The hearths yielded morphological and structural information that reflect subsistence strategy and occupation history.

LA 116418 had 11 areas with thermal features and artifacts, one dispersed artifact scatter, and the buried remains of a burned pit structure. The data potential of Areas 1, 2, 3, 4, and 7 has been

exhausted by the excavation and recording. No further investigation or protection of these areas should be required. The remaining areas (5, 6, 8, 9, 10, 11, 12, 13) have data potential beyond their surface evidence and are significant under Santa Fe County Land Development Code, Article VI, Special Review Districts, Section 3. These areas have designated protective easement limits. No ground-disturbing activities will be allowed in these areas during construction or by the future landowners and residents. The easements will be shown on the final plat with the prohibition of any ground-disturbing activities.

LA 116420 consists of seven areas with thermal features and artifacts and the buried remains of a burned pit structure. The data potential of Areas 1, 2, and 3, has been exhausted by the excavation. No further investigation or protection of these areas should be required. The remaining Areas (4, 5, 6, 7, and 8) have data potential beyond their surface evidence and are significant under Santa Fe County Land Development Code, Article VI, Special Review Districts, Section 3. These areas have designated protective easement limits. No ground-disturbing activities will be allowed in these areas during construction or by the future landowners and residents. The easements will be shown on the final plat with the prohibition of any ground-disturbing activities.

With the completion of the data recovery effort and submittal of this final report, it is recommended that the Santa Fe County Land Use Administrator grant archaeological clearance to Rancho Viejo de Santa Fe, Inc. for all areas within LA 116418 and LA 116420, except for the protective easements that are defined in this report and shown on the final plat. No further archaeological investigation within LA 116418 and LA 116420 should be required.

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INTRODUCTION

Between October 20 and November 6, 1997, the Office of Archaeological Studies, Museum of New Mexico, conducted a data recovery program at two archaeological sites for the Village at Rancho Viejo, Unit-1 development, Santa Fe County, New Mexico. The investigation was at the request of Ranch Viejo de Santa Fe, Inc. Data recovery was conducted in compliance with Santa Fe County Land Development Code, Article VI, Special Review Districts, Section 3. Stephen Post was the project director and Timothy D. Maxwell was the principal investigator. The project director was assisted in the field by OAS staff members, Raul Troxler and Steve Lakatos, and volunteers George Price, Bob Greene, and Annabelle Karper.

The two archaeological sites are LA 116418 and LA 116420. Legal descriptions of the sites are on file in the New Mexico Cultural Resources Information System at the Archeological Records Management Section, Historic Preservation Division in Santa Fe. The project vicinity is shown in Figure 1. Site locations are shown in Appendix 2 (removed from copies in general circulation).

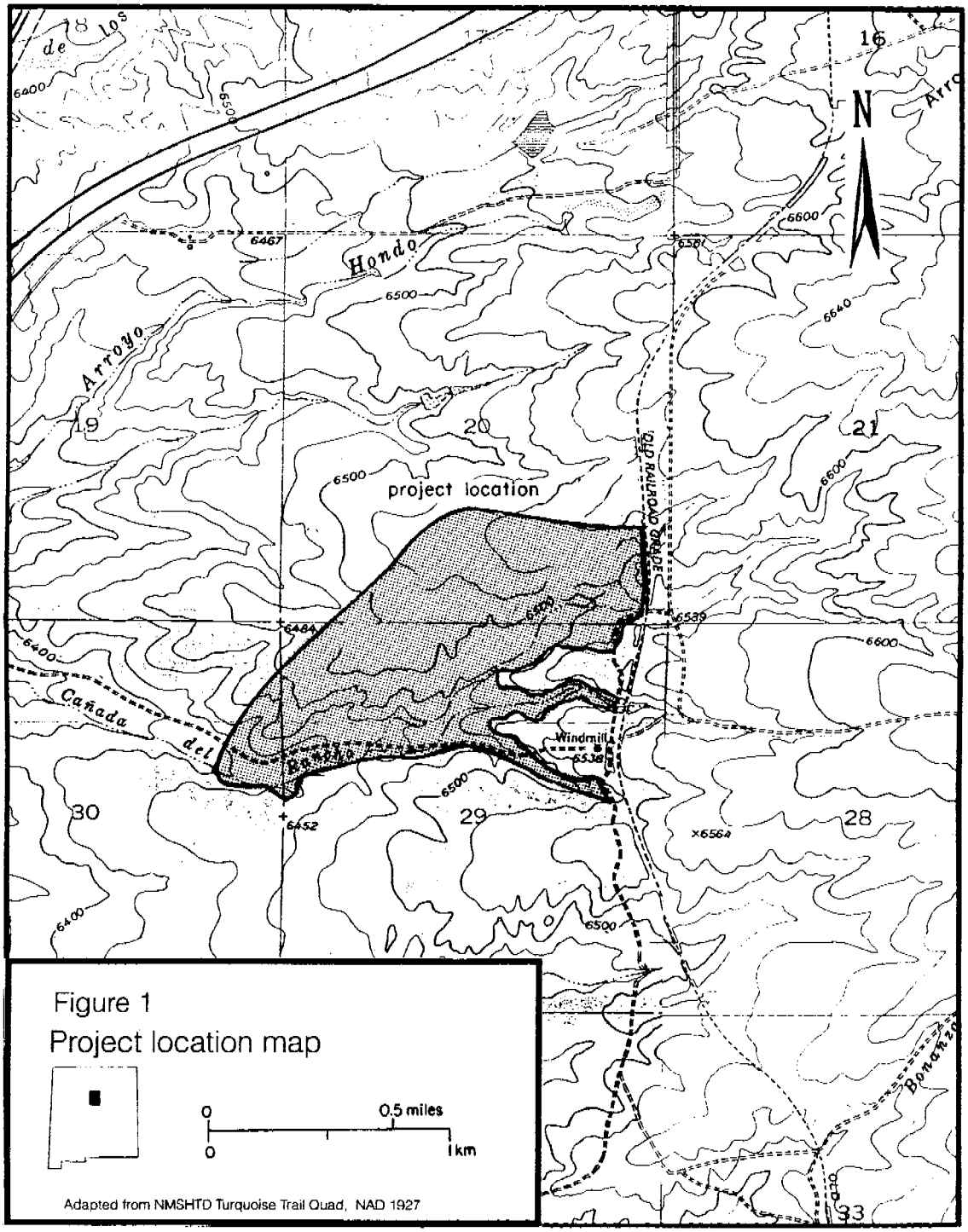

Figure 1
Project location map

PROJECT ENVIRONMENT

The project area is in the Southern Rocky Mountain Physiographic Province (Folks 1975:110). The area is at the western edge of the piedmont that extends from the foot of the Sangre de Cristo Mountains to the eastern edge of the juniper grasslands of the Galisteo Basin. This is an area of rolling hills and broad ridges that are dissected by the tributaries of the Arroyo Hondo. This area is the southern portion of the Santa Fe River Basin.

The project area is within the physiographic unit called "the plains" (Spiegel and Baldwin 1963:12). This area is capped by undulating, but mostly thick Ancha formation soil and gravel. The plains are characterized by low broad ridges that separate major drainages. In the immediate area, these low ridges separate the Cañada del Rancho from Cienega Creek on the south and Arroyo Hondo on the north. Within the project area, Cañada del Rancho is joined by two primary tributaries that have narrow, grassy flood plains and undissected channels. The Cañada del Rancho flood plain is broad with a braided and slightly dissected channel. A series of finger-ridges extend to the north edge of the Cañada del Rancho flood plain. These finger ridges range from highly eroded and dissected in the eastern project area to relatively stable, gravel terraces separated by grassy swales in the western project area. Elevation ranges from 1,988 m (6,520 ft) in the northeast to 1,964 m (6,440 ft) in the western project area.

Important to the project area is the lithology of the Ancha formation. It contains reworked gravel deposits of pre-Cambrian age that are primarily metamorphic granite, schist, and gneiss (Spiegel and Baldwin 1963). Large tabular cobbles of these materials outcrop on the terrace slopes and are found within the channels of the major arroyos, including the Cañada del Rancho. These cobbles were a primary source of raw material for grinding tools. North of the Santa Fe River, similar pre-Cambrian gravel are more heavily reworked and occur in smaller size affecting their utility as grinding implements. Lacking from the Ancha formation are the reworked gravel deposits of the Rio Grande and the Pennsylvanian age deposits of the Sangre de Cristo foothills. These deposits contain chert and quartzite that were sought for stone tool manufacture. Because no suitable chipped stone raw materials are locally available, all tools had to be made from imported materials. The lack of suitable raw material strongly conditions the frequency and density that chipped stone artifacts occur within the archaeological record (Andrefsky 1994).

The soils in the project area correspond to Kelley's Piedmont Soil I as defined for the Arroyo Hondo project (1980:53-54). Piedmont Soil I associations that occur in the project area include Silver-Pojoaque association, undulating; Pojoaque-Rough broken land complex; and Fivemile loam.

The majority of the project area is covered by Silver-Pojoaque association, undulating soils. Silver loam makes up 50 percent of the association and occurs on slopes of 1 to 5 percent. It is primarily a silty clay loam that has a subangular, blocky structure, very to moderately sticky when wet, and ranging from alkaline to highly calcareous. Silver loam is mainly on the ridge tops. The Pojoaque clay loam makes up 30 percent of the association. It occurs on 5 to 9 percent slopes and is similar to other Pojoaque series soil, except that it has a clay surface layer. These soils are not suitable for dry farming (Folks 1975:47).

There is a patch of Pojoaque-Rough broken land complex in the northeastern portion of project area (Folks 1975:43). The complex is 50 percent Pojoaque sandy clay loam and 40 percent

Rough broken land. The remaining 10 percent includes Panky, Fivemile, and Bluewing soils. The latter two series occur in the flood plain of the primary arroyos. Pojoaque soil is moderately permeable and prone to severe erosion. Rough broken land consists of steep shallow soils on ridges and mesas that are broken by intermittent drainages. The surface soil is sandy to sandy loam with deep colluvium at the base of the escarpments. LA 116418 and LA 116420 occurred within this patch of Pojoaque-Rough broken land complex soil.

Fivemile loam is in the flood plain of Cañada del Rancho. Fivemile loam grades from loam to silty loam and has low alkalinity; calcium carbonate content increases with depth. It has a water-holding capacity from 3 to 10 inches deep and effective rooting depth of 16 inches with poor to moderate irrigation potential. Dry-farming potential is poor, though under optimal conditions these soils could have been farmed (Folks 1975:87).

The biotic community is part of the Plains and Great Basin Grassland (Brown 1982). Kelley (1980) identified four plant communities within the Arroyo Hondo Pueblo sustaining area. Two plant communities described by Kelley (1980) are prominent in the project area: the piñon-juniper woodlands and the rabbitbrush community.

Piñon-juniper woodlands had 135 of the 271 plant species observed within the Arroyo Hondo Pueblo catchment (Kelley 1980:60). Of these, 63 species are edible or have medicinal qualities. However, with the exception of piñon, most of the species are not abundant or are most productive in disturbed soils. Economic plant species besides piñon found in the piñon-juniper woodland and in archaeological context include: yucca, prickly pear and pin cushion cacti, *Chenopodium* (sp.) *Amaranthus* (sp.), and Indian ricegrass. Wetterstrom (1986) suggests that intensive gathering of these species might off-set years of moderately poor agricultural production. However, consecutive years of poor moisture would affect the productivity of wild plants and cultigens alike, rendering their buffering potential unpredictable. Total available economic plant species of the piñon-juniper woodland project high wild resource productivity, but conditions that favor grasses and shrubs might off-set piñon-juniper productivity.

The rabbitbrush community of the arroyo channels and terrace slopes might provide the abundance and variability in plant species that are unpredictable for the piñon-juniper woodland. Through runoff, flooding, and erosion, arroyo channels and terraces are more disturbed and support the grasses, shrubs, and succulents that favor disturbed conditions. The arroyo channels or terraces also may have been dry-farmed, which would have left disturbed soils, while lying fallow. Plant species of the rabbitbrush community include prickly pear, yucca, *Chenopodium* (sp.), *Amaranthus* (sp.), and Indian ricegrass.

The area has a semiarid climate. Most of the local precipitation occurs as intense summer thunderstorms that produce severe runoff and little usable moisture. The area receives an average of 229 to 254 mm of precipitation per year and a mean snowfall of 356 mm (Kelley 1980:112). The growing season ranges from 130 to 220 days and averages 170 days. The last spring frost usually occurs in the first week of May, and the first fall frost occurs around the middle of October. The mean yearly temperature is 10.5 degrees C.

Precipitation and temperature combined with soil type are three environmental factors that influence plant and animal productivity and distribution, and the probability of success for irrigation and dry-farming techniques. Prior to A.D. 1050 low population density permitted mobility as an option when crop and wild resource productivity were low. After A.D. 1050 settlement along the

Santa Fe River and in other major drainage basins of the Northern Rio Grande increased and mobility options may have decreased. The effects of unpredictable climate may have strongly conditioned the timing and rate of community growth, and the ability to maintain the highest population levels.

Rainfall and temperature ranges similar to modern patterns may have been sufficient to maintain small populations along the Santa Fe and Galisteo rivers and their tributaries. Consecutive years or long periods of better than mean spring and summer rainfall may have increased crop production and supported larger populations. Between A.D. 1050 and 1450 periods of greater than average spring precipitation occurred. These periods are A.D. 1050 and 1080, A.D. 1195 and 1210, A.D. 1290 and 1340, A.D. 1390 and 1415, and A.D. 1430 and 1435 (Rose et al. 1981:98-99). These would have been periods when agricultural productivity could have surpassed the average and established villages could have increased population. By the same token, settlement in the best watered areas may have occurred when rainfall was low and surface water availability was critical to survival. Between A.D. 1250 and 1290 there were more bad years than good, and this is the time that a small settlement was established at Pindi Pueblo (Rose et al. 1981; Ahlstrom 1989).

During the Coalition period (A.D. 1175 to 1350) rainfall and temperature fluctuation would have affected settlement and subsistence patterns. The piñon-juniper wood lands would have been used as resource abundance permitted. Consecutive good years may have boosted piñon nut crops resulting in intensive gathering. Poor years might have hampered piñon, but still supported cheno-am production resulting in gathering in the grasslands between piñon-juniper woodlands and on the short-grass plains. Severity of drought and effect on productivity may have regulated distances traveled for foraging and strategies for procuring and transporting resources. Environmental conditions undoubtedly had an effect on hunting and gathering practices and the formation of the Rancho Viejo archaeological record. Timing of environmental effects and the formation of sites may be difficult to correlate, but clearly they were strongly intertwined.

CULTURAL-HISTORICAL BACKGROUND

The cultural-historical background will cover the adaptations and periods that are most likely represented in the archaeological record of LA 116418 and LA 116420. The review is general; specific information is drawn from investigations along and south of the Santa Fe River, Arroyo Hondo, and Cañada de los Alamos.

Archaic Period

In the northern Southwest, the Archaic period (5500 B.C. to A.D. 400 or 600) is generally described in terms of two major material culture traditions: the Oshara Tradition (Irwin-Williams 1973) and Cochise Tradition (Sayles 1983). These traditions are characterized by a hunting and gathering adaptation based on seasonal availability of critical resources, such as edible plants, game animals, and water. They are divided into phases or stages based on temporal changes in material culture, site structure, and settlement patterns. Mostly the Oshara and Cochise phases are recognized by temporally diagnostic projectile point styles.

In the upper Middle Rio Grande, sites with projectile points that are similar to Oshara and Cochise commonly occur (Lang 1977; Thoms 1977; Post 1996). Early and Middle Archaic period materials are similar to the Jay (5500 to 4800 B.C.), Bajada (4800 to 3200 B.C.), and San Jose (3200 to 1800 B.C.) phases of the Oshara Tradition (Irwin-Williams 1973). The Late Archaic-Basketmaker II period materials are defined by the Armijo (1800 to 800 B.C.) and En Medio (800 B.C. to A.D. 1) phases of the Oshara Tradition (Irwin-Williams 1973) and Chiricahua (6000 to 1000 B.C.) and San Pedro (1000 B.C. to A.D. 1) stages of the Cochise Tradition (Sayles 1983). The following discussion focuses on the Armijo and En Medio phases of the Late Archaic period.

Armijo Phase

The Armijo phase is dated between 1800 and 800 B.C., based on sites excavated in the Middle Rio Puerco River Valley (Irwin-Williams 1973). Two major changes were observed in settlement and subsistence. The settlement pattern showed the first evidence of seasonal aggregations as indicated by the dense and extensive occupation floors at the Armijo shelter (Irwin-Williams 1973:10). A change in subsistence is evidenced by the first indications of corn use and the presence of a stone tool kit that exhibited a wider selection of plant processing implements. The temporal indicator is the Armijo-style projectile point, which has an ovate blade with shallow corner notches and a concave or slightly indented base.

Locally, the best evidence for Armijo phase occupation is from the margins of the Santa Fe River, near the Santa Fe Airport at Tierra Contenta (Schmader 1994) and along Airport Road (Post n.d.a). The data from the Tierra Contenta and Airport Road sites suggest that during the Armijo phase the Santa Fe drainage was repeatedly occupied seasonally by small groups during episodes of abundant subsistence resources. Different occupation spans are evidenced by the presence of shallow pit structures or dense clusters of hearths, roasting pits, and processing and discard areas. Sites with pit structures show evidence of generalized subsistence (Schmader 1994). Wood charcoal from pit

structures and associated features yielded calibrated two-sigma date ranges between 1930 and 830 B.C. The tightest cluster of dates indicate occupations during the ninth and tenth centuries B.C. (Schmader 1994:92). The Airport Road site, LA 61282, had a cluster of 30 thermal and processing features and a high density biface manufacture discard area (Post n.d.a). Faunal remains indicated hunting and processing of deer and antelope at different times between the twentieth and fifteenth centuries B.C. The clustered spatial distribution of these sites indicates that a periodic, semipermanent water source was available. The occurrence of these sites suggest Armijo populations regularly moved in and out of the Santa Fe area with site clustering reflecting proximity to water sources as well as a desire to be situated near the juniper grass plains and at the edge of the higher elevation piedmont.

En Medio to Basketmaker II Periods

Between 800 B.C. and A.D. 400-600, during the En Medio to Basketmaker II periods in the northern American Southwest, important changes in settlement patterns and subsistence strategies are recognized in material culture and subsistence data, site structure, and site distributions. Changes in mobility and the gradual adoption of cultigens were the strongest conditioners of settlement and subsistence strategies (Wills 1988; Vierra 1985). As a result of a less mobile lifestyle and an increased dependence on cultigens, occupation duration increased, technological organization focused more on expedient tool manufacture, and more formal facilities, such as pit structures and storage pits, were constructed (Vierra 1990; Stiger 1986; Fuller 1989; Irwin-Williams 1973; Schmader 1994). Chipped stone technology, which was dominated by biface manufacture before the En Medio phase, included increasingly more evidence of local raw material use and manufacture of expedient or less formal tools (Kelly 1988; Andrefsky 1994). To date, how and when these changes occurred in the upper Middle Rio Grande Valley is poorly understood because of the small number of excavated sites with reliable absolute dates. Currently, most explanations and interpretations of upper Middle Rio Grande settlement and subsistence patterns rely heavily on the data from the Middle Rio Puerco Valley (Irwin-Williams 1973; Biella 1992).

The Late Archaic-Basketmaker II site survey data for the Santa Fe area are presented in Post (1996). They are all open-air sites consisting of lithic artifact scatters with or without hearth complexes or fire-cracked rock concentrations. Site clusters in the Airport Road area (Hannaford 1986; Schmader 1994), southwest of Santa Fe, along the Cañada de los Alamos to the south of Santa Fe (Lang 1992), and along the Santa Fe River suggest that certain lowland locations were repeatedly occupied for short periods by small groups over a long period of time. Basketmaker II sites are reported in all environmental zones from the Santa Fe River Valley to the foothills of the Sangre de Cristo Mountains. This distribution suggests that Late Archaic-Basketmaker II populations exploited resources available in all environmental zones. Because the Santa Fe River Basin and the surrounding montane and piedmont environments offer considerable resource diversity, it is possible that Late Archaic-Basketmaker II groups were the first to occupy the area year-round. A vertical mobility pattern was suggested by Chapman (1980) from the Cochiti Dam and Reservoir data. This spatially less extensive settlement pattern is in direct contrast to large area mobility patterns suggested for San Juan Basin Late Archaic-Basketmaker II populations (Elyea and Hogan 1983; Vierra 1990; Fuller 1989).

Most of the sites from the Santa Fe area were identified as limited or temporary base camps and limited activity sites. Characteristics typical of these two site types are a lack or low numbers of processing facilities and equipment, a low density artifact scatter or small artifact cluster, and very

few unbroken tools. Brief occupation is suggested by low artifact counts and limited artifact variability. A number of characteristics that would suggest longer, more permanent settlement are lacking from the survey data. Facilities and equipment are usually associated with longer occupations or planned reoccupations (Binford 1980; Vierra 1980; Elyea and Hogan 1983; Camilli 1989; Nelson and Lippmeier 1993). Formal tools are minimally reported, and can be considered personal gear, which was highly curated and rarely deposited at limited activity sites (Binford 1979; Kelly 1988). Reuse of a limited base camp or activity area may result in overlapping or refurbishment of features and a higher artifact density (Camilli 1989). Reoccupation may result in a more scattered feature and artifact distribution, but higher artifact counts. Most sites exhibit low surface artifact density with evidence of multiple occupations resulting in spatially extensive sites with low artifact densities.

Excavations in the last five years have furnished evidence for longer duration occupation and common evidence of reuse or reoccupation of desirable locations. Pit structures have been excavated within the Tierra Contenta area (Schmader 1994:83-88), along the Arroyo Gallinas and Arroyo de las Trampas, north of the Santa Fe River (Post 1998a), and in the Santa Fe-Tesuque divide (Post n.d.b). These shallow, roughly circular, basin-shaped structures often have intramural hearths, sometimes with multiple remodeling episodes, a suite of extramural roasting pits and hearths, and at LA 61315 (Post n.d.b) and LA 61286 (Post 1998a), well-defined discard areas containing charred bone fragments, core reduction and tool manufacture debris, and abundant fire-cracked rock. Increased attention to placement of activity and discard areas reflects longer occupation and perhaps organization that facilitated annual or semiannual reoccupation. These sites have yielded radiocarbon dates ranging between 200 B.C. and A.D. 200. Excavations of pit structures in the Tierra Contenta and Las Campanas areas suggest that seasonal occupation of pit structures may have continued in the A.D. 800 or 900s, before full-scale year-round sedentism became the occupation pattern in the Northern Rio Grande (Post 1996; Schmader 1994).

Investigations at the Dos Griegos Subdivision, south of the project area, focused on three sites with Late Archaic period components: LA 75680, 75681, and LA 75686 (Lang 1992). These sites typify the short-term, logistically organized hunting and foraging pattern that makes up the bulk of the Late Archaic occupation pattern. These sites were on the terraces of the middle reaches of Cañada de los Alamos. Each site yielded surface distributions indicative of palimpsest deposition over a long period of time. The artifact counts are low, but the assemblage diversity is moderate to high. Assemblage distributions reflect many brief occupations primarily related to hunting and small-scale gathering. A low frequency of features and facilities combined with low artifact counts supports this observation. Obsidian hydration dates ranging from 100 B.C. to A.D. 700 suggests use by small groups or individuals for resource procurement and processing with the resources transported to a base camp or habitation for final processing, consumption, or storage. It is possible that Cañada de los Alamos served as a migratory route for medium and large game mammals during the fall. The presence of burned bone and the evidence of multiple occupations strongly suggest that successful hunting expeditions were staged from these sites.

Pueblo Period

Developmental Period (A.D. 600-1200)

The Developmental period (Wendorf and Reed 1955) is divided into Early (A.D. 600-900), Middle (A.D. 900-1000), and Late (A.D. 1000-1200) subperiods. This temporal framework roughly

corresponds to the Pecos Classification system, developed by Kidder (1924).

Early Developmental sites are uncommon in the Northern Rio Grande (Wendorf and Reed 1955:138). Archaeological survey at Cochiti Reservoir found only 12 sites that could be assigned to this period (Biella and Chapman 1977:203). McNutt (1969:70) located no Early Developmental components north of La Bajada and White Rock Canyon. Only two nonresidential components from the Early Developmental period have been recorded in the south Santa Fe area (Dickson 1979; Scheick and Viklund 1989). In the eastern Galisteo Basin only five components may date to this period (Lang 1977; Scheick and Viklund 1989). The lack of extensive sedentary settlement suggests that there was a long-term hunter-gatherer pattern in the Northern Rio Grande. This continued focus on hunting and gathering may be in part attributed to the rich resource diversity of the Northern Rio Grande Valley, forestalling an early reliance on small-scale farming (Cordell 1979:2).

The Middle Developmental period (A.D. 900-1000) showed an increase in sites in the Northern Rio Grande. Excavations in the Santa Fe and Tesuque river valleys revealed pithouses associated with contiguous surface rooms, and perhaps a kiva (Honea 1971; McNutt 1969:58). These sites do not necessarily suggest that population increased. Instead, the settlement and subsistence pattern had shifted from mobility, which left ephemeral archaeological remains, to a more sedentary lifestyle, which left substantial structural remains and artifact accumulations. The overall picture is still one of low population density. No sites from this period have been identified in or near the project area.

The Late Developmental period (A.D. 1000-1200) showed the first substantial population increase in the Santa Fe area, as inferred from increased site numbers and size (Wendorf and Reed 1955:140-141). Larger sites for the first time indicate village-size settlements with year-round residential occupation. The predominant pottery was Kwahe'e Black-on-white, originally identified by Mera (1935) as a local Rio Grande variant of Chaco-style pottery. Occurrence of this pottery style coincided with the growth of the Chaco system in the San Juan Basin in northwestern New Mexico. Site size in the Northern Rio Grande area ranges from 1 to 100 rooms. Known sites include LA 835, north of Santa Fe; LA 114 (Arroyo Negro), along the Santa Fe River; and LA 191 (Mocho), along the Arroyo Hondo south of Santa Fe, one of the largest sites in the surrounding area (Stuart and Gauthier 1981). Pindi Pueblo (LA 1) had a minor Late Developmental component, indicating that some large Coalition sites had their origins in this period (Wiseman 1989:5). McNutt (1969:76-77), in providing a detailed description of this period, noted an abundance of manos, trough metates, and animal bones at the Tesuque Bypass site, suggesting that farming and hunting were the subsistence mainstays.

Coalition Period (A.D. 1200-1325)

The Coalition period is marked by three major changes in the archaeological record in the Northern Rio Grande: (1) a significant increase in the size and number of sites, suggesting an increase in population and an extension of the early village-level organization noted in the Late Developmental period; (2) pithouses as domiciles were replaced by contiguous arrangements of adobe and masonry surface rooms; and (3) a change in pottery decoration from mineral paint to organic base paint. These changes were of sufficient import to warrant a new period in the Northern Rio Grande cultural sequence, which was divided into two phases: Pindi (A.D. 1220-1300) and Galisteo (A.D. 1300-1325) (Wendorf and Reed 1955). The decorated pottery was divided into Santa Fe Black-on-white and all of its local variants (Stubbs and Stallings 1953) for the Pindi phase, and Galisteo Black-on-

white (Mera 1935) for the later phase. Most of the large sites were established during the Pindi phase, and the largest continued to grow into the Galisteo phase in anticipation of the large villages of the Classic period. Site sizes ranged from 2 to 200 rooms, most often between 15 and 30 (Stuart and Gauthier 1981:51). Site numbers in all areas of the Northern Rio Grande increased enormously at this time (Biella and Chapman 1977:203; Orcutt 1991; McNutt 1969; Lang 1977).

In the south Santa Fe area, villages were established at upper Arroyo Hondo Pueblo (LA 76 [Dickson 1979]), Arroyo Hondo pueblo (LA 12 [Dickson 1979]), Pueblo Alamo (LA 8 [Allen 1973]), Chamisa Locita (LA 4 [Dickson 1979]), and Peña Negra (LA 235 [Allen 1973]). Previously uninhabited resource areas of the south Santa Fe area would have been divided as each village claimed the land and resources necessary for survival (Dickson 1979:79-81). Small sites that reflect a logistical resource procurement and processing strategy (Binford 1980) occur within a 2 km radius of Chamisa Locita (Viklund 1989) and Arroyo Hondo Pueblo (Ware 1991; Dickson 1979).

Upper Arroyo Hondo, Pueblo Alamo, and Chamisa Locita were occupied contemporaneously during the Pindi phase. Continued growth occurred during the Galisteo phase at Arroyo Hondo and Chamisa Locita, but upper Arroyo Hondo and Pueblo Alamo were abandoned, suggesting that the sustaining areas along Arroyo Hondo and Cañada Ancha were shared by the neighboring villages but not between residents of the two drainages.

Classic Period (A.D. 1325-1600)

Wendorf and Reed (1955) mark the beginning of the Classic period (A.D. 1325-1600) by the appearance of Glaze A and locally manufactured red-slipped pottery (see also Mera 1935; Warren 1979). During this period, characterized by Wendorf and Reed as a "time of general cultural fluorescence," regional populations reached their maximum extent, and large communities with multiple plaza and roomblock complexes were established. Although the reasons for the appearance and proliferation of the glaze wares are debatable, many researchers including Eggan (1950), Hewett (1953), Mera (1935, 1940), Reed (1949), Stubbs and Stallings (1953), and Wendorf and Reed (1955) believe that the similarity of the new pottery to White Mountain Redware is evidence for large-scale immigration into the area from the San Juan Basin and Zuni region. However, Steen (1977) argues that the changes seen during this period resulted from rapid indigenous population growth. Steen believes that the population growth was enabled by favorable climatic conditions, allowing Rio Grande populations to practice dry-farming in previously unusable areas. Steen also suggests that there was "free and open" trade between the Northern Rio Grande region and other areas, accounting for the observed changes in Classic material culture.

It is therefore unclear how much of the population increase during this period resulted from immigration or from intrinsic growth. In addition to populations migrating from the west, it has been suggested that people came north from the Jornada branch of the Mogollon, and perhaps from northern Mexico (Schaafsma and Schaafsma 1974).

Large villages of this period found in the Santa Fe vicinity include the Agua Fria School House site (LA 2), Arroyo Hondo (LA 12), and Cieneguilla (LA 16). However, by the time that Glaze B pottery appeared (ca. 1425), only Cieneguilla was still occupied by a substantial population. Dickson (1979) believes that abandonment of the large villages was due to drought, revealed by tree-ring studies (Fritts 1965; Rose et al. 1981), and subsequent agricultural failure.

The project area is on the fringe of the daily foraging and farming range for Arroyo Hondo Pueblo residents. At 7.2 km from Arroyo Hondo Pueblo, access to the Cañada del Rancho was at the limit of daily foraging. There is no evidence of the establishment of an extensive fieldhouse system 5 to 7 km away from the villages along the Cañada del Rancho, Cienega Creek, Bonanza Creek, and middle Arroyo Hondo. Instead, the land-use pattern and resulting archaeological record is one of dispersed artifact scatters, occasional hearths from overnight stays or hunting and foraging expeditions, and a low frequency of domestic refuse, such as decorated jars and bowls and utility wares, and debris from expedient tool production. These items do occur near the project and surrounding area, but mostly as isolated occurrences or low frequency clusters. Flood plain and specialized farming strategies may be indicated by the alleged garden plots identified along Cienega Creek (Legare 1995). Recent reevaluation of these sites by the author calls into question their authenticity. Typically, small garden plots are situated to avoid flooding, but capture slope runoff and maximize solar exposure. Similar garden plots are found around San Marcos Pueblo (Lightfoot and Eddy 1995) and along the Rio Chama and Ojo Caliente (Maxwell and Anschuetz 1992).

EXCAVATION METHODS

LA 116418 and LA 116420 had components that were defined through surface artifact concentrations and features. The general excavation and recording methods were suited to site configurations and research issues with particular emphasis on isolating individual occupation components for intrasite and intersite comparisons between Rancho Viejo sites and other sites in the south Santa Fe area. The following are the general and specific field methods that were used at LA 116418 and LA 116420.

1. Each site surface was reexamined and the concentrations, artifact scatters, features, and site limits were pinflagged.

2. A 1-by-1-m grid system was superimposed within the limits of the activity areas or artifact concentrations. Each 1-by-1-m unit had a north and east designation with the southwest corner as the signature corner.

3. Surface artifacts were piece-plotted and collected before excavation began. Temporally diagnostic artifacts outside excavation areas were also piece-plotted and collected.

4. Excavation emphasized data collection from contiguous units to support site structure analysis. The excavation methods included a combination of surface stripping and deeper grid excavation to document the extent and depth of the cultural materials remaining from the different occupations.

Each excavation area coincided with the highest artifact density or was centered on a feature. All units were surface-stripped by hand. In most cases, the artifact density was monitored and 10 percent of 1-by-1-m units with the highest artifact counts were excavated to nonartifact bearing strata. In only one unit were subsurface cultural materials encountered, and therefore only a single unit was excavated.

The exception was Area 2, LA 116420, where an obsidian biface reduction debris concentration was observed on the surface. Surface-stripping showed increased artifact counts with greater depth. It was determined that artifacts occurred up to 35 cm below the modern ground surface depending on the slope. A 5 m north-south by 6 m east-west area (42N/60E) was excavated in 10- to 15-cm levels within the cultural stratum, until artifact counts dramatically decreased. All soil was screened through ⅛-inch mesh. Excavation revealed a buried slope that was cut by a shallow erosion channel exposing the periphery of the artifact concentration. Stratigraphic profiles were drawn for the north, east, and south excavation walls.

5. Nine hearths or roasting pits were excavated at LA 116418 and LA 116420. The area surrounding each feature was surface stripped. The excavated space ranged between 4 and 72 sq m. Usually, 2-by-2 m or 3-by- 3-m areas were initially excavated and expanded as additional features or artifacts were encountered. Excavation area fill was screened through ¼-inch mesh.

Once the area surrounding the feature was exposed, excavation proceeded by exposing the top of the feature. The stain or soil change was mapped and photographed (if appropriate). The feature was excavated in cross section in 5-cm levels, exposing the natural stratigraphy. The exposed cross section was profiled and the soil levels described using a Munsell Color Chart and standard

geomorphological terms. The second half of the feature was excavated in natural levels or 5-cm arbitrary levels. At least 3 liters of fill were collected from each feature for water-screening and ethnobotanical analysis.

Once the feature was completely excavated, feature maps and profiles were drawn and tied into the grid system and site elevations. Drawings included a scale, north arrow, and key to abbreviations and symbols. Written descriptions were on standard forms that included provenience, dimensions, soil matrix, artifact, construction, time frame, excavation technique, and other data. Photographs recorded the feature excavation progress and the final excavated form. Photographs included a metric scale, north arrow, and mug board with the LA, feature number, and date. All photographs were recorded on a photo data sheet.

7. General excavation documentation consisted of field notes and grid forms compiled by the excavator. The forms contain locational, dimensional, stratigraphic, and contextual information. General notes outlining excavation strategy and rationale, field interpretations, and decisions were kept by the project director and site assistants.

Artifacts recovered from each provenience were bagged and labeled by unit, stratigraphic or arbitrary level, date, and excavator's name. A specimen number was assigned to all bags by provenience, and a running field artifact catalogue was maintained for each site.

LA 116418 is a multicomponent sherd and lithic artifact scatter with associated hearths and the foundation of a burned pit structure. The inventory identified 12 areas that had features and artifacts from Late Archaic (1800 B.C. to 1 A.D.) and late Coalition or early Classic (A.D. 1275 to 1425) period occupations (Post 1997). The site covers a 150 m north-south by 120 m east-west area of 10,000 sq m (Fig. 2). The artifacts and features are distributed across a gentle, deflated and dissected, south-southeast-facing slope. This slope is intermediate to the gravel terraces that border the north flood plain of the Cañada del Rancho south of the site, and the open, grass plain that covers a large area north of the site. The vegetation is typical of piñon-juniper woodland. The soils are unconsolidated sand mixed with gravel and cobbles. Sandstone bedrock occurs at or near the surface throughout most of the site with up to 2 m of colluvial deposition in the southern portion of the site.

Excavation Results

Based on development needs, Areas 1, 2, and 3 were excavated. Areas 4 and 7 were examined and trowel-tested for subsurface cultural deposits or intact features. The remaining areas were left untouched and will be protected by archaeological easements. Results are presented by area and include feature descriptions. Artifact analysis and specialists results will be presented for the entire site, followed by an assessment of the research questions and conclusions.

Area 1

Area 1 was a dispersed artifact scatter with three low frequency artifact clusters and a possible feature. Four 2-by-2-m areas were surface-stripped with limited results. The soil within Area 1 was 10 to 15 cm of loose, brown, eolian sandy loam with 1 to 2 percent gravel, loose, blocky structure, and no carbonate filaments. The soil reflects a highly active geomorphological environment subject to water and wind erosion. Within and immediately adjacent to the area, four shallow erosion channels have transported artifacts down slope and reduced features and adjacent activity surfaces. Table 1 lists the excavation areas within Area 1 and the artifact counts and types that were recovered.

Twenty-nine artifacts were piece-plotted and collected prior to excavation. Artifact types included utility ware sherds, obsidian and chert flakes, a hammerstone, manos, metate fragments, and ground stone fragments. Figure 3 shows the artifact distribution, which is primarily clustered in the south with an apparent east-west linear distribution. There are actually three clusters that are at or near the head of shallow erosion channels resulting in a down-slope spread.

The four excavation areas did not yield subsurface cultural deposits or features. A cluster of angular granite rocks was at the east edge of 28N/55E. Surface-stripping at the perimeter of the rocks did not yield artifacts or soil staining. If the cluster was a thermal feature, it had been completely eroded. Only five subsurface sherds were recovered from the excavation units (35N/45E, two sherds; 45N/46E, three sherds).

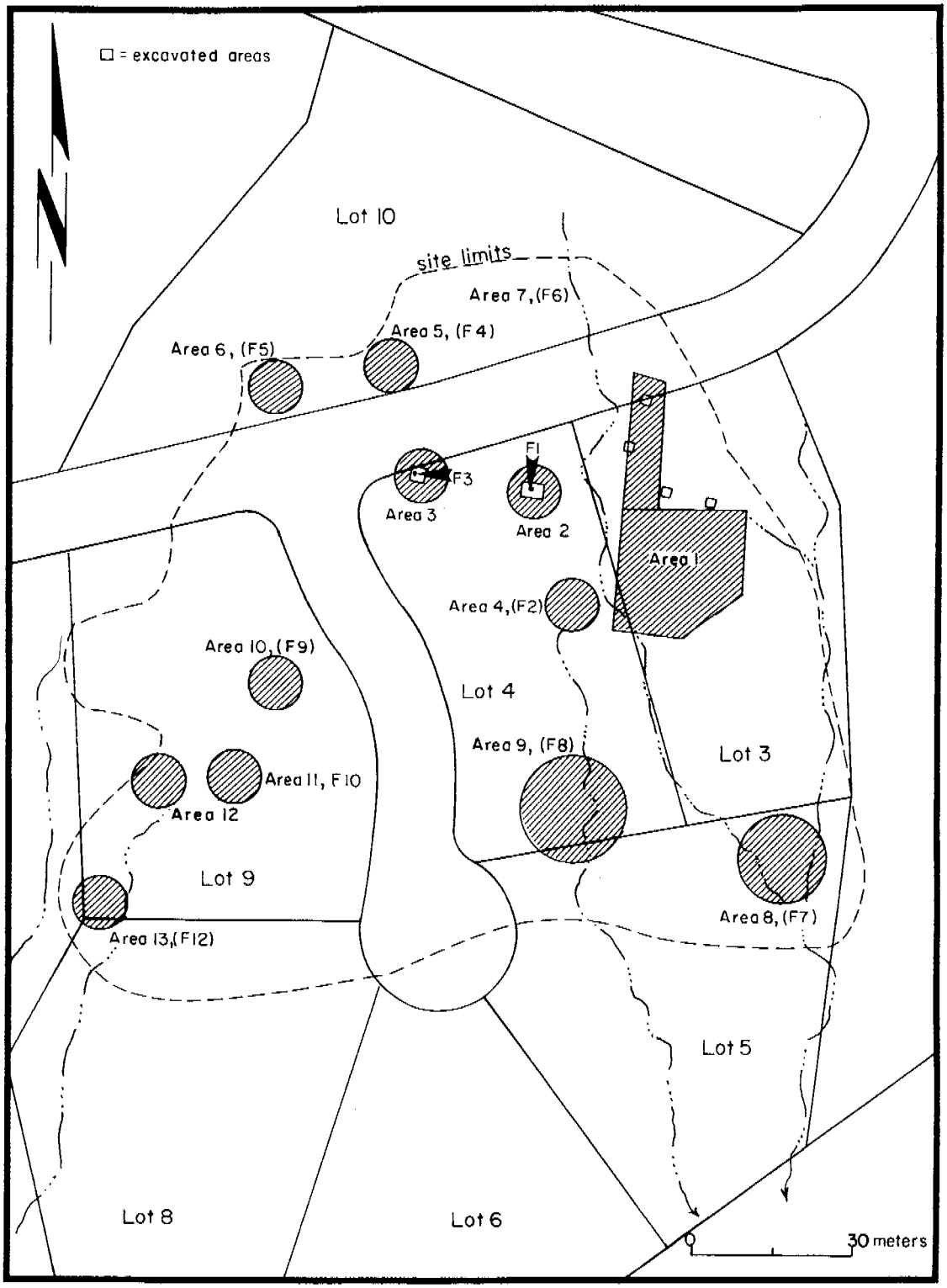

Figure 2. LA 116418, site map.

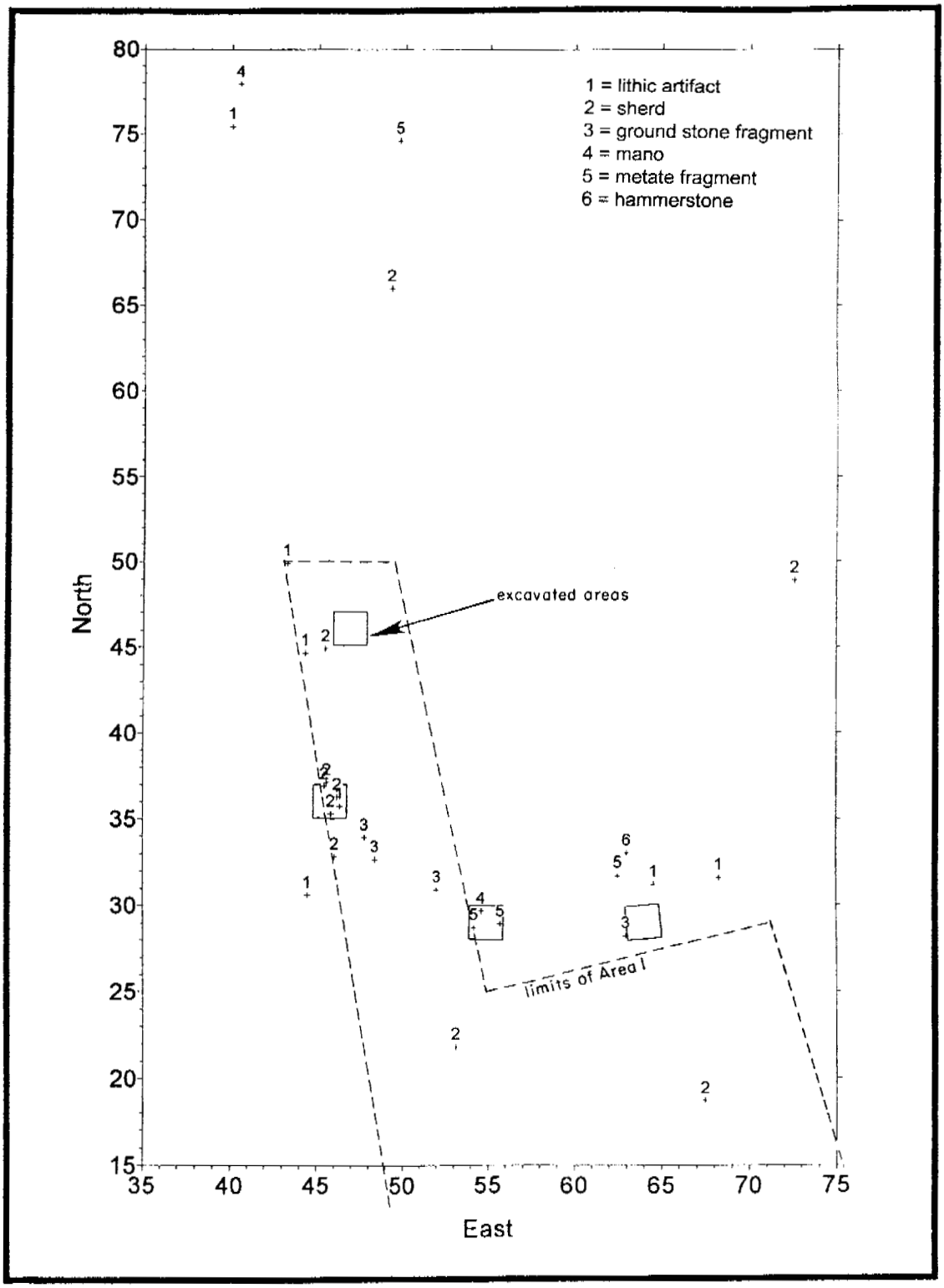

Figure 3. Artifact distribution plot for Area 1, LA 116418.

Table 1. Area 1, Excavation Area Data

LA/Area	Setting	Condition	Size (m)	Description	Artifacts
28N/54E	On a gentle south southeast-facing slope	Surface is deflated with areas stabilized by trees	2 x 2	Concentration of artifacts and rock	No artifacts
28N/63E	On a gentle south southeast-facing slope	Surface is deflated with drainage channels present	2 x 2	Artifact concentration	No artifacts
35N/45E	On a gentle south southeast-facing slope	Surface is deflated with areas stabilized by grass	2 x 2	Artifact concentration	2 sherds
45N/46E	On a gentle south southeast-facing slope	Surface is deflated with areas stabilized by grass	2 x 2	Ceramic concentration with charcoal-stained soil	3 sherds

The sherds were gray corrugated pottery from the A.D. 1200 to 1350 period. All sherds may have come from the same vessel or vessels from the same occupation.

Excavation of Area 1 yielded no subsurface cultural deposits. Their absence indicates that the artifacts originate from occupation surfaces that have been deflated or eroded leaving an artifact distribution that is best described as a dispersed palimpsest. The only temporally diagnostic artifacts were the gray corrugated sherds, which signify an ancestral Pueblo occupation contemporaneous with Arroyo Hondo or Chamisa Locita pueblos. Slab and basin metates with one-hand manos are characteristic of hunter-gatherer or Late Archaic occupation. In this upper slope setting, under stabilized conditions, it is possible that occupations 1,500 to 2,000 years apart may have been separated by a shallow soil deposit that has been removed by modern erosion collapsing the components into a single deposit. Occupation sequence, components, and site structure will be addressed later in this report.

Area 2

Area 2 was a 3 m north-south by 4 m east-west excavation area (20N/27E, southwest corner) that was centered on Feature 1, a deflated, fire-cracked rock concentration (Fig. 4). Feature 1 was initially interpreted as the deflated remains of a fire-cracked rock-filled roasting pit. It was 10 to 15 m west of Area 1 in the same topographic setting at the head of a shallow erosion channel. The soil is a colluvial and eolian deposit of fine-grained sandy loam with 1 to 2 percent gravel, loose, blocky structure, and no carbonate filaments. The artifact distribution is sparse and elongated, reflecting down-slope movement due to erosion. Feature 1 is considered a single occupation component within LA 116418 and the nearest artifacts are probably temporally and functionally associated.

Before excavation, seven artifacts, including three metate fragments, a scraper, two chert flakes and one obsidian core flake were piece-plotted. The artifacts are loosely clustered around Feature 1. Surface stripping yielded one metate fragment and three chert core flakes. Feature 1 excavation yielded a slab metate fragment. Excavation revealed no difference in surface and surface-strip density and distribution, except an increase in the artifacts more closely associated with Feature 1. This supports the observation that the artifacts and Feature 1 are a single component.

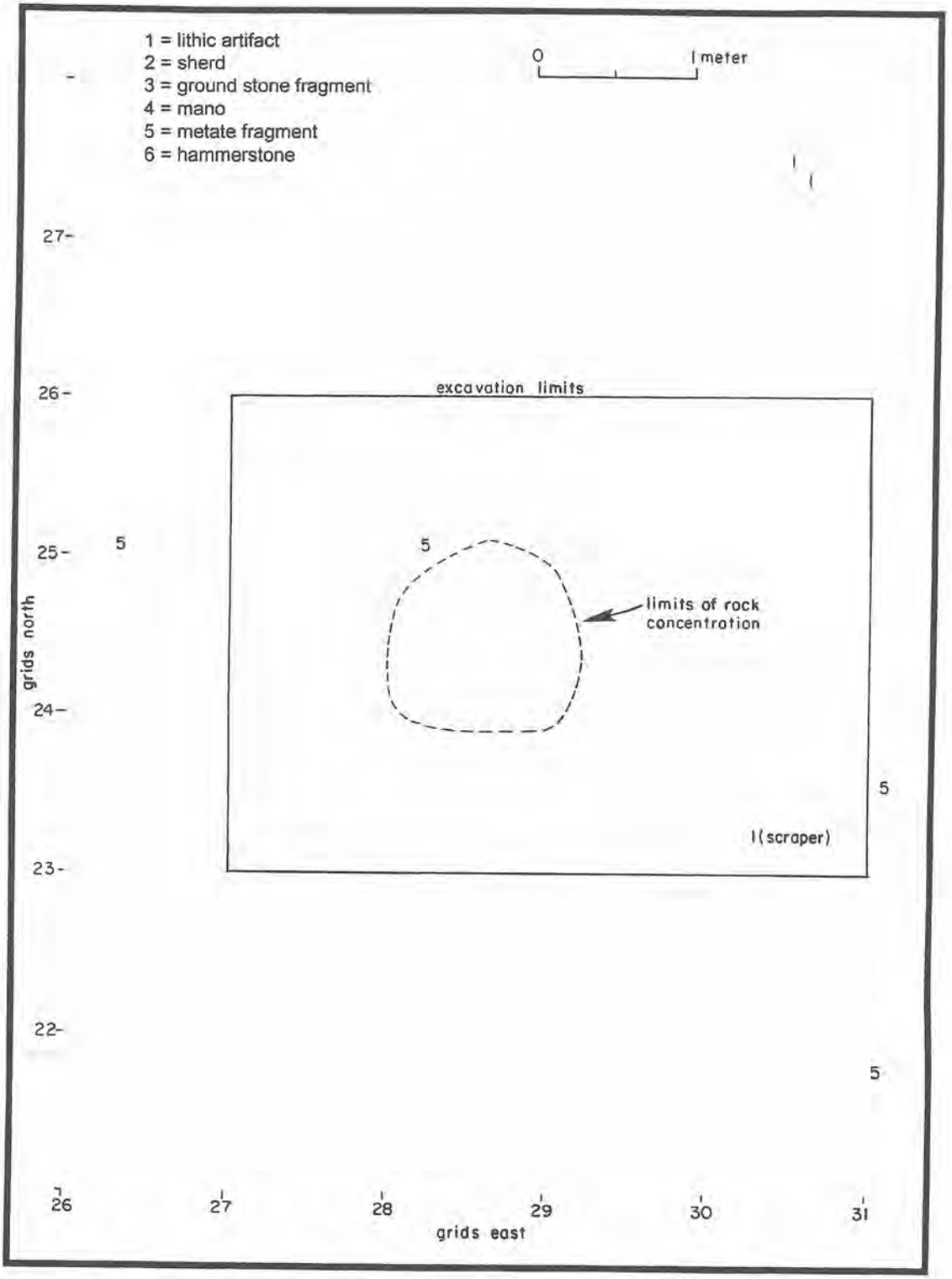

Figure 4. Area 2 map, LA 116418.

Feature 1. Feature 1 appeared as a concentration of fire-cracked rocks on the surface. The concentration was mainly in 24N/28E and consisted of 51 rocks on the surface and 21 more rocks exposed by excavation (Figs. 5, 6). The rocks were typical of the metamorphic Ancha formation gravel that occurs on the terrace slopes along the Cañada del Rancho. The concentration was about 120 cm in diameter. Surface soil within the feature was a loose, light yellowish brown (10YR 6/4, dry) silty loam with less than 10 percent metamorphic gravel. Within a 50 cm northwest-southeast by 40 cm northeast-southwest area the soil is charcoal-infused, though no flecks were visible. The soil is similar to the surface stratum, except that its color is gray (10YR 5/1) and it is 5 to 10 cm deep. This stained locus may be the central portion of the deflated hearth. Paleobotanical analysis of the contents yielded 13 charred goosefoot seeds and indicated that juniper was the primary fuel remaining in the hearth (see Toll and McBride, this report). The feature may have been rock-filled with rock spread out during hearth cleaning or by erosion and deflation. Open, rock-filled thermal features are mostly used for meat-roasting and seed, nut, or fruit processing. Shallow, open facilities could be easily accessed and the coals maintained by adding fuel from the outside without disturbing the contents. Feature age and cultural affinity could not be determine by excavation or from the associated artifacts. The associated plant processing tools and core flakes suggest a briefly occupied foraging camp such as might have emanated from Arroyo Hondo Pueblo (Wetterstrom 1986).

Figure 5. Feature 1, plan view, LA 116418.

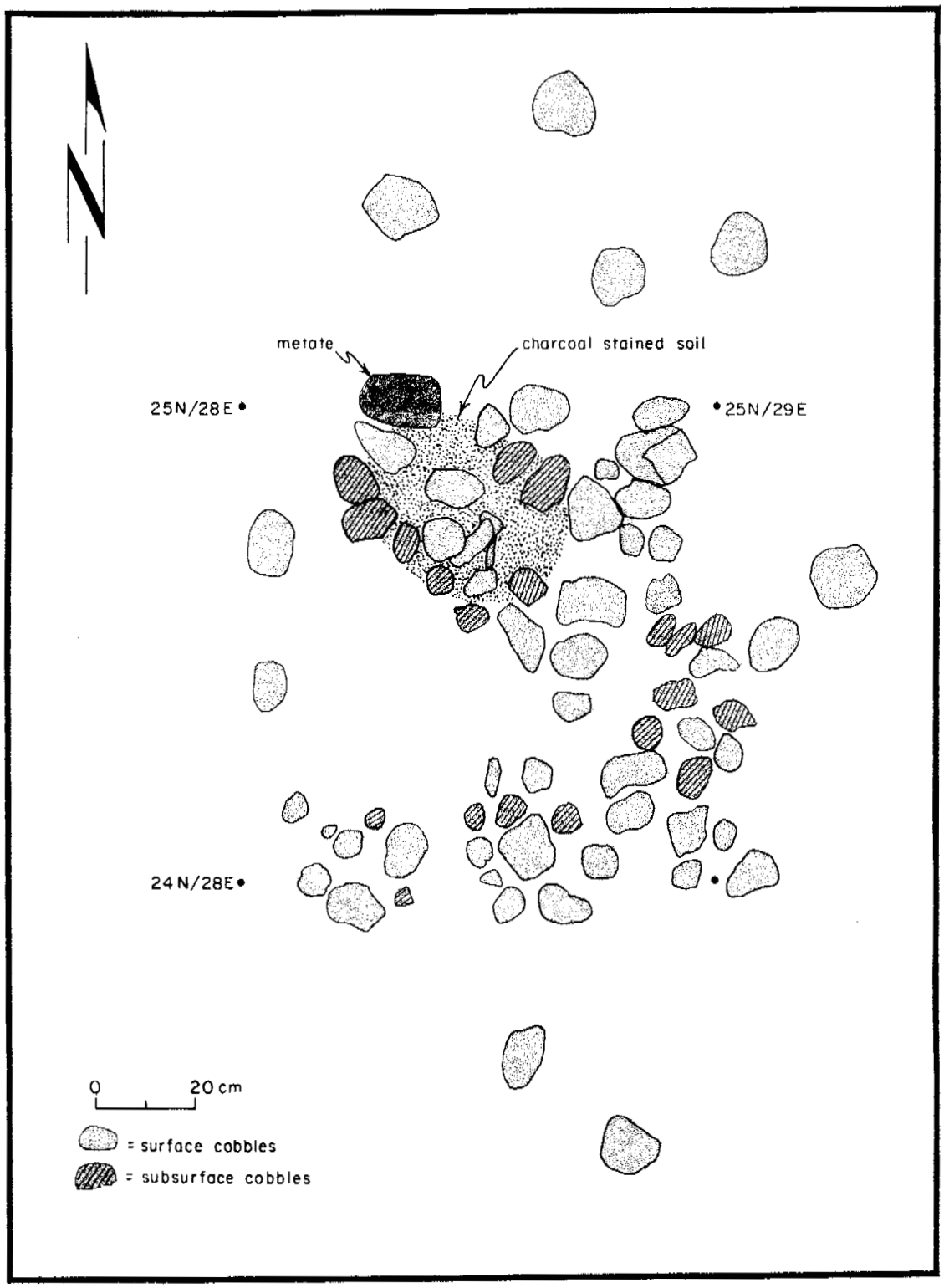

Figure 6. LA 116418 detail of Feature 1, Area 2, roasting pit.

Area 3

Area 3 was a 3-by-3-m area (20N/4E, southwest corner) centered on Feature 3. It contained the deflated remains of a thermal feature. It was in a setting similar to and 20 m southwest of Feature 1. The soil is a colluvial and colian deposit of fine-grained sandy loam with 1 to 2 percent gravel, loose, blocky structure, and no carbonate filaments. Two shallow drainages enter and join within the 6E grid line to the east of Feature 1. The fire-cracked rock distribution is elongated and follows the erosion pattern. Feature 3 is considered a single occupation component within LA 116418, and the nearest artifact is probably temporally and functionally associated.

Before excavation, one basalt core flake was piece-plotted. Surface-stripping and feature excavation yielded no artifacts. A charcoal-infused stain was exposed possibly marking the original feature location.

Feature 3. Feature 3 appeared as a concentration of fire-cracked rocks on the surface. The concentration was mainly in 20-21N/5E and consisted of 22 rocks on the surface. The rocks were typical of the metamorphic, Ancha formation gravel that occurs on the terrace slopes along the Cañada del Rancho. The concentration was about 200 cm long north-south by 100 cm wide east-west. Surface soil within the rock concentration was a loose, light yellowish brown (10YR 6/4, dry) silty loam with less than 10 percent metamorphic gravel. Within a 75-cm diameter locus at the northwest extent of the rock concentration there was a charcoal-infused soil stain, though no flecks were visible (Fig. 7). The soil was similar to the surface stratum, except that its color was gray (10YR 5/1) and it was 2 cm deep. This stained locus may be the central portion of the deflated hearth. The feature may have been rock-filled with discarded rock scattered by erosion and deflation. Open, rock-filled thermal features are mostly used for meat-roasting and seed, nut, or fruit processing. Shallow, open facilities could be easily accessed and the coals maintained by adding fuel from the outside. Feature age and cultural affinity could not be determined by excavation or from the associated artifacts.

Areas 4 and 7

Areas 4 and 7 each had a single deflated thermal feature (Feature 2 and 6, respectively). Their locations are shown in Figure 2. These features were examined and trowel-tested. They yielded no indication of subsurface deposit or intact structure. They were not further excavated, but were documented.

Area 4 is in a heavily deflated area bounded on the east and west by shallow erosion channels. A shallow erosion channel washes through Feature 2 and has distributed the hearth rocks downslope in a north-south orientation. The hearth rocks cover an area that is 3.0 m north-south by 1.7 m east-west (Fig. 8). There is no depth to the feature fill nor are artifacts present. The 19 hearth rocks are local metamorphic cobbles that range from 10 to 20 cm in maximum dimension. The size of the rocks and the clustering of the largest rocks within a 1.0 m by 0.80 m area suggest that it was a cobble-lined hearth or campfire. No age or cultural affinity could be assigned.

Area 7 is 35 m northwest of Areas 1 and 2 in an upper slope location with slightly more stable surface soil. A whole basin metate was face down 45 cm northeast of Feature 6. The metate was piece-plotted and collected. Feature 6 consists of a ring of 12 metamorphic cobbles. There was no interior charcoal-staining or structure. The cobble outline suggests a rock-ringed hearth. Its

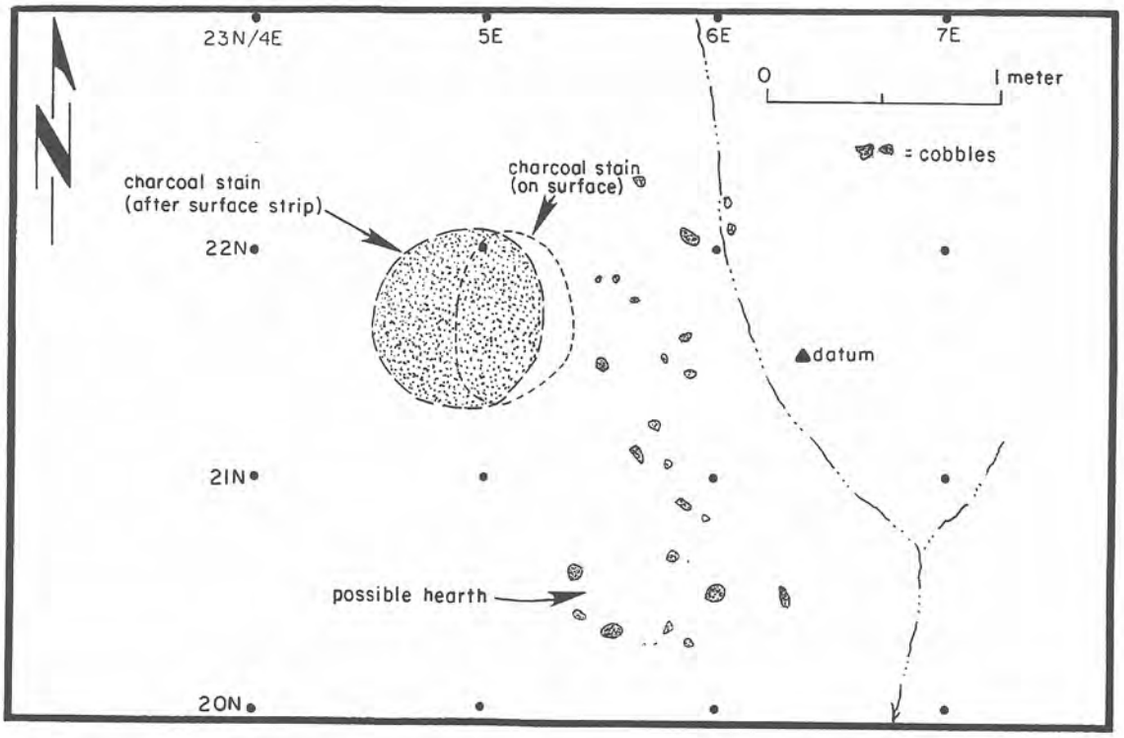

Figure 7. LA 116418, Feature 3, Area 3, charcoal stain and possible hearth.

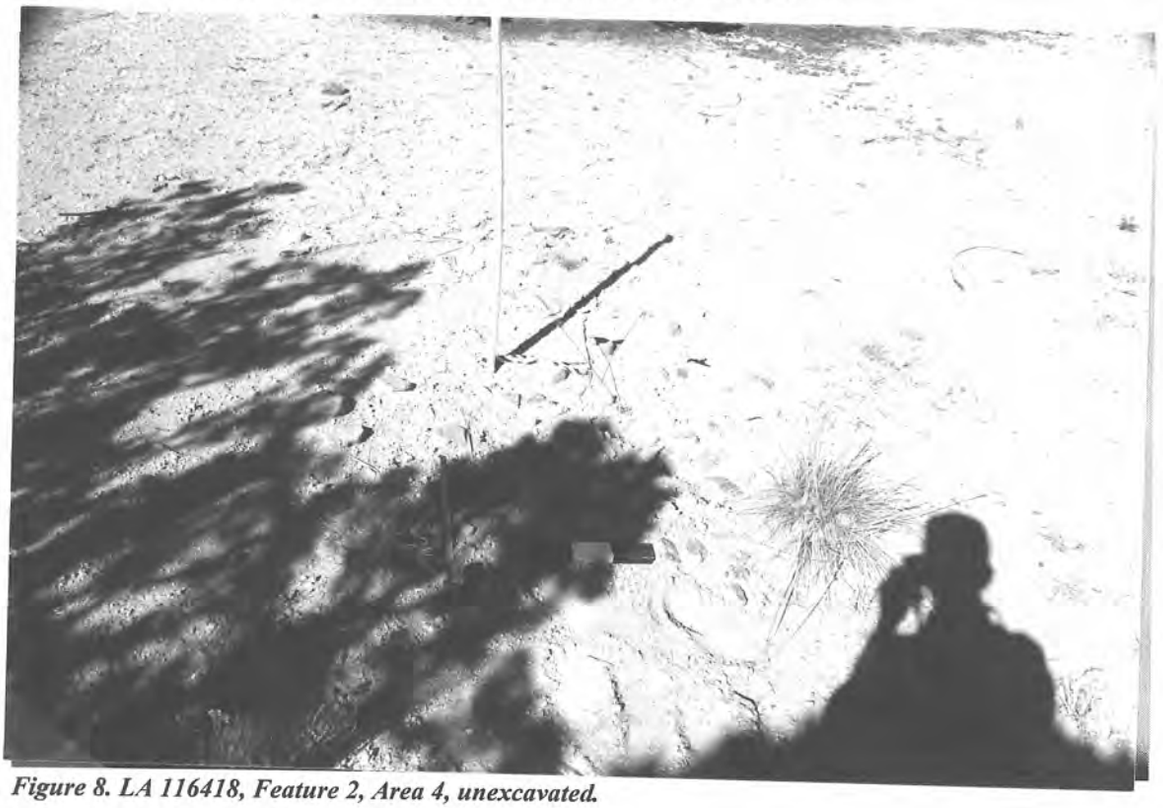

Figure 8. LA 116418, Feature 2, Area 4, unexcavated.

Figure 9. LA 116418, Feature 6, Area 7, unexcavated. Note metate in upper center of photograph.

dimensions were 52 cm north-south by 48 cm east-west (Fig. 9). Plant processing is suggested by the close position of the hearth and metate. However, the feature dimensions are more consistent with a small hearth or campfire, rather than a roasting pit. No definite temporal association can be made, although basin metates are more commonly associated with Late Archaic hunter-gatherers. Association between the metate and thermal feature would indicate a single occupation component of very brief duration.

Other Areas

Table 2 lists the areas and features that were retained as archaeological preservation easements. All areas have at least one feature exposed on the surface or in the bank of an erosion channel. Most have associated low frequency chipped or ground stone scatters. Each represents a single occupation component that, with the exception of Area 9, Feature 8, cannot be reliably assigned to a particular period. Area 9, Feature 8, is a 2- to 3-m-diameter cultural deposit, which may be the remains of a pit structure foundation, dating to the Late Archaic period (1800 B.C. to A.D. 400). The buried context of Area 9, Feature 8, testifies to the long-term gradual colluvial soil deposition that preceded the most recent erosional episode. It also underscores the role that lower slope areas played in catching gradual soil deposition and causing subtle changes in the local topography. The upslope surface components may primarily date to the ancestral Pueblo period. However, the abundant one-hand manos and slab or basin metates in the upslope areas of LA 116418 and LA 116420 suggest that Late Archaic and ancestral Pueblo deposits were only separated by a thin veneer of soil that has been removed by erosion. The result is collapsed components that lack stratigraphic separation.

Table 2. Unexcavated Areas with Features, LA 116418

Area	Setting	Condition	Component Area	Description
5	On a gentle south, southeast-facing slope	Surface is deflated with areas stabilized by grass	5 m radius from thermal feature	Feature 4 is a dark charcoal-stained soil and burned rock concentration with collapsed slabs. Probable roasting pit with low frequency artifact scatter.
6	On a gentle south, southeast-facing slope	Surface is deflated with areas stabilized by grass	5 m radius from thermal feature	Feature 5 is a charcoal-infused soil stain with burned bone and a low frequency lithic artifact scatter.
8	On a south, southeast-facing slope	Surface is deflated with feature and artifacts exposed on top of and on slopes of the arroyo bank	8 m radius from thermal feature	Feature 7 is a deflated cobble-lined hearth with scattered metate fragments and obsidian flakes. Single component foraging camp.
9	On a south, southeast-facing slope	Area is cut by deeply incised drainages that have exposed the cultural deposit	10 m radius from pit structure	Feature 8 is a 2 to 3 m diameter charcoal-infused soil stain, 50 to 100 cm below the ground surface. May be a pit structure with associated metates eroding from cultural deposit. Definite Archaic period deposit.
10	On a gentle south, southwest-facing slope	Surface is deflated with drainage gullies	5 m radius from thermal feature	Feature 9 is a 1.25 diameter fire-cracked rock concentration with intact deposits. No associated artifact concentration.
11	On a south, southwest-facing slope	Surface is deflated with deep drainage channels	5 m radius from thermal feature	Feature 10 is a 1.80 m diameter burned sandstone concentration. The sandstone has oxidized gray and shattered into fragments that are smaller than 10 cm maximum dimension.
12	On a south, southeast-facing slope	Surface is dissected with deep drainage channels	5 m radius from thermal feature	Feature 11 is a 2.5 m long by 1.7 m wide collapsed roasting pit. There are 50 to 100 metamorphic cobbles, most with a maximum dimension greater than 10 cm. The cobbles are on top and have spilled down the erosion channel bank. Feature is deflated but may retain intact deposits. This is an unusually large roasting pit.
13	On a southeast-facing slope	Surface deflated and dissected by deep drainage channels	5 m radius from thermal feature	Feature 12 is a 5 m long east to west by 3.5 m wide north to south, deflated, cobble-filled roasting pit. 50 to 100 cobbles are visible. Similar to Feature 11, Area 12 this is an exceptionally large roasting pit.

Material Culture

Excavation focused on piece-plotting and surface-collecting artifacts within the excavation areas. Additional artifacts were recovered from surface-stripping excavation areas and feature excavation. Pottery, chipped stone, and ground stone artifacts were recovered from LA 116418. This section will present the artifact assemblage descriptive data. Interpretations will be general and will primarily addressed in the research question discussion. Comparisons with LA 116420 and other sites in the area will also be made in a later section.

Pottery by Steven A. Lakatos

Excavations at LA 116418 recovered 29 sherds. Ceramic types identified are listed in Table 3. The 27 utility ware sherds were recovered from surface and surface-strip contexts within Area 1. These sherds represent a minimum of three cooking/storage jars. Separation by vessel is based on temper types and surface treatment. The exterior surface of most sherds are smeared with some indented coil junctures visible. The paste is fine, gray in color, and tempered with sand.

The principal utility ware identified was smeared-indented corrugated. This was the most common utility ware surface treatment during the Coalition and Classic periods (A.D. 1200-1400) in the Northern Rio Grande (Habicht-Mauche 1993).

Decorated wares are represented by two Galisteo Black-on-white bowl body sherds. These sherds were recovered from the surface of the general site area. Galisteo Black-on-white was produced between A.D. 1300 and 1375 (Habicht-Mauche 1993). The sherds are from the same vessel based on similar paste and surface treatments. The paste is white, blocky, and tempered with sand and crushed sherd. A gray carbon streak is present. The interior and exterior were treated with a thick, crazed white slip. The interior surfaces were decorated with hatching and solid line design elements, executed in a thick, black organic paint.

The ceramic assemblage is consistent with expectations for foraging camps occupied by inhabitants of Arroyo Hondo or Chamisa Locita pueblos. The most intense occupation of these villages was between A.D. 1310 and 1350, which is when Galisteo Black-on-white and smeared indented corrugated pottery were commonly made. Partial vessels may have been brought from villages to foraging camps as tools or temporary containers for holding or transferring processed foods. Such expedient tools could have been left at the camp and reused in subsequent visits.

Table 3. LA 116418 Ceramic Types by Vessel Form and Portion

Type	Plain Undifferentiated	Corrugated, Indented	Smeared-Indented	Smeared Indented, micaceous	Plain Corrugated	Galisteo B/w	Total
Bowl body						2	2
Cooking/ storage jar rim					2		2
Cooking/storage jar body	13	1	5	5			24
Single coil handle	1						1
Total	14	1	5	5	2	2	29

Chipped Stone Artifacts

Sixteen chipped stone artifacts were recovered from the excavation areas within LA 116418. All artifacts were analyzed and recorded according to the *OAS Standardized Lithic Artifact Analysis: Attributes and Variable Coding List* (Office of Archaeological Studies Staff 1994). Definition and discussion of the attributes is provided in the analysis manual, which can be obtained from the OAS. The lithic analysis is designed to monitor technological organization. Recorded morphological and functional attributes emphasize reduction stage, manufacture and maintenance, and tool use and discard. These are the main foci of the research orientation and implementation. The following describes and characterizes the assemblage.

Table 4 shows the artifact assemblage by raw material type by area. Area 1 had eight artifacts, Area 2 had seven artifacts, and Area 3 had one artifact. Low artifact frequency limits interpretation as does the fact that this assemblage represents an unquantified sample of the site assemblage. However, some strong patterns exist that do reflect aspects of hunter and gatherer or forager technological organization important for this project.

Table 4. LA 116418, Lithic Morphology by Material Type by Excavation Area

Count Row Pct Col Pct	Pedernal Chert	Madera Chert	Silicified Wood	Jemez Obsidian	Polvadera Obsidian	Rabbit Mountain Obsidian	Non-vesicular Basalt	Quartzite	Row Total
Area 1									
Core flake					1 100.0 25.0				1 12.5
Biface flake	1 25.0 100.0			1 25.0 100.0	2 50.0 50.0				4 50
Uniface, undifferentiated				1 50.0 33.3	1 50.0 25.0				2 25.0
Biface, undifferentiated				1 100.0 33.3					1 12.5
Column Total	1 12.5			3 37.5	4 50.0				8 100.0
Area 2									
Angular debris		1 100.0 33.3							1 14.3
Core flake		1 100 33.3							1 14.3
Biface flake		1 25.0 33.3				1 25.0 100.0	1 25.0 100.0	1 25.0 100.0	4 57.1

Count Row Pct Col Pct	Pedernal Chert	Madera Chert	Silicified Wood	Jemez Obsidian	Polvadera Obsidian	Rabbit Mountain Obsidian	Non-vesicular Basalt	Quartzite	Row Total
Uniface, late stage			1 100.0 100.0						1 14.3
Column Total		3 42.9	1 14.3			1 14.3	1 14.3	1 14.3	7 100.0
Area 3									
Biface flake							1 100.0 100.0		1 100.0
Column Total							1 100.0		1 100.0

Raw material type is different between Areas 1 and 2. Area 1 artifacts are primarily obsidian (87.5 percent), while Area 2 artifacts are a wide range of raw materials that may originate in the gravel deposits of the Ancha formation (Kelley 1980:11). Obsidian would have been obtained from the east slope of the Jemez Mountains, perhaps as water-deposited nodules along the Rio Grande. Obsidian was favored for bifacial tool manufacture, while local raw materials were more likely to be used for general tool needs. This is illustrated by Area 1 tools, which are formally shaped tools and made from obsidian. The one tool from Area 2 is a silicified wood side scraper made from a core flake. Use of high-quality nonlocal materials for formal tool manufacture can be an indicator of logistically organized hunting expeditions by Archaic hunter-gatherers. However, given the site proximity to Arroyo Hondo Pueblo, where formal tools were often made from obsidian, it is just as possible that obsidian use is an ancestral Pueblo characteristic (Phagan 1993).

Artifact types show a heavy emphasis on tool production, use, and discard. In Area 1, tools or tool production debris account for 87.5 percent of the lithic artifacts. In Area 2, tools and tool production debris account for 71.5 percent. These percentages may be affected by the size of the sample areas and, in Area 1, the collection of two tools that were isolated from the main artifact cluster. Other reduction debris occurred between activity areas, but was not collected or recorded. However, the pattern of heavy emphasis on tools is strong, even with the sampling biases.

The characteristics of the tools are described in Table 5, and edge wear and other modification data are summarized in the narrative. There are three side scrapers and one biface. Only the end scraper from Area 2 is made from silicified wood, the remaining tools are obsidian. All tools are whole, except for FS 1. For the other tools, dimensions may be meaningful in terms of tool function. The obsidian tools are medium sized with maximum dimensions between 20 and 34 mm. The silicified wood end scraper is a large tool with a 52 mm length. Though size is not always a good functional indicator, it is likely that such a great difference between the silicified wood and obsidian is functional.

Table 5. LA 116418, Tool Type Morphology

Area	FS	Tool Type	Material	Portion	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
1	1	biface, undifferentiated	Jemez obsidian	edge fragment	26	13	4	1.1
1	21	side scraper	Jemez obsidian	whole	34	24	4	2.7
1	31	side scraper	Polvadera obsidian	whole	31	26	7	6.5
2	201	end scraper	silicified wood	whole	52	48	18	47.4

FS 1 is the only tool fragment. It is a bidirectionally worn, unidentifiable edge. The worn edge exhibits numerous flake scars and it is rounded. The edge angle is 50 degrees. The edge wear pattern suggests that the tool primarily was used for cutting.

FS 21 is a whole side scraper of Jemez obsidian. The lateral edges of the obsidian core flake display unidirectional wear in the form of continuous microflake scars. One edge is convex and the second edge is concave, but the wear pattern is the same on both indicating that edge outline was not related to function. The used edges are 70 to 80 degrees with original spline angles of 30 to 40 degrees. The radical difference in edge angles suggests heavy tool use on a hard material such as bone or wood.

FS 31 is a side scraper made from a Polvadera obsidian biface flake. The convex edge exhibits heavy unidirectional wear and secondary bidirectional wear. The unidirectional wear is continuous scalar flake scars and rounding on the dorsal surface. The secondary wear is light scalar flake scars on the ventral surface. The utilized edge and spline angle are within the 40 to 50 degree range. Edge wear and angle are consistent with cutting and scraping. Multipurpose tools would be an expected component of a forager's toolkit.

FS 201 is an end scraper made from a silicified wood nodule. The distal end of the primary flake has been unimarginally retouched with utilized and spline edge angles within the 80 to 90 degree range. The utilized edge is heavily step-fractured as though it was used on a very hard material. Steep edge angles are consistent with wood processing. This scraper is an example of an expedient tool that was made for immediate, heavy-duty use, and then discarded.

Ground Stone Artifacts by Steven A. Lakatos

Ground stone artifact identification and analysis was performed according to the guidelines presented in the *Standardized Ground Stone Artifact Analysis Manual* used by the Office of Archaeological Studies. The manual contains the artifact morphology, function definitions, and basic interpretations that stem from the attribute analyses. This information will not be reiterated in this report, but can be obtained from the Office of Archaeological Studies by the interested reader.

The main focus of the ground stone artifact analysis was to monitor variables that reflect probable function, intensity or duration of use, and changes in use that may reflect different activities

or recycling of artifacts by subsequent site occupants. With definite Late Archaic and ancestral Pueblo components, any differences in ground stone assemblage morphology might be related to different plant procurement and processing strategies. Implications of morphology and function relative to subsistence behavior will be more completely addressed by the research questions.

Seventeen ground stone tools were recovered from LA 116418. Tool types include one-hand manos (n=3), a hammerstone (n=1), basin metates (n=4), basin metate fragments (n=2), a slab metate fragment (n=1), and undifferentiated metate fragments (n=5). These artifacts were recovered from Areas 1 (n=11), 2 (n=2), 7 (n=1), and 9 (n=3).

Manos. Table 6 lists manos by their type, morphological attributes, and location. The manos were made from fine-grained quartzite or sandstone cobbles. The two sandstone manos displayed heavy amounts of use wear and exhibited faceted cross sections. These tools were pecked along the edges to modify the cobbles into their present forms. Manos have similar dimensions with lengths from 9 to 12 cm, widths from 7 to 9 mm, and 4 cm thicknesses.

Two manos and a hammerstone were recovered from the surface of Area 1 and one mano was recovered from Area 9. The tools recovered from Area 1 were not associated with any identifiable features. However, the mano recovered from Area 9 may be associated with a pit structure and a basin metate.

Metates. Thirteen metates were recovered, including basin metates or basin metate fragments (n=7), a slab metate fragment (n=1), and undifferentiated metate fragments (n=5). Table 7 lists metate types, morphological attributes, and location for all metate and metate fragments recovered.

Table 6. LA 116418, Manos

FS	Area	Mano type	Material	Texture	Portion	Plan view	Length (cm)	Width (cm)	Thickness (cm)	Weight (kg)
13	1	one-hand mano	quartzite	fine grained	whole	oval	12	9	4	.85
19	1	one-hand mano	sandstone	fine grained	whole	oval	10	8	4	.50
32	9	one-hand mano	sandstone	fine grained	whole	oval	9	7	4	.50

Table 7. LA 116418, Metates

FS	Area	Metate #	Metate Type	Material	Texture	Portion	Length (cm)	Width (cm)	Thick (cm)	Weight (kg)
9	1	.	metate fragment	granite	medium grained	internal fragment	5	4	3	.10
11	1	.	metate fragment	sandstone	fine grained	internal fragment	8	4	2	.07
12	1	.	metate fragment	granite	fine grained	internal fragment	11	8	3	.34

FS	Area	Metate #	Metate Type	Material	Texture	Portion	Length (cm)	Width (cm)	Thick (cm)	Weight (kg)
14	1	.	basin metate	sandstone	fine grained	Edge fragment	16	10	3	.45
15	1	.	basin metate	sandstone	fine grained	edge fragment	10	6	2	.10
27	1	.	metate fragment	sandstone	fine grained	edge fragment	7	5	1	.07
202	2	.	metate fragment	sandstone	fine grained	internal fragment	9	6	1	.09
209	2	.	slab metate	sandstone	fine grained	corner fragment	13	10	2	.47
23	1	1	basin metate	rhyolite	fine grained	edge fragment	10	9	7	.90
200	1	1	basin metate	rhyolite	fine grained	edge fragment	5	5	4	.19
700	7	2	basin metate	schist	medium grained	whole	32	30	10	14.60
33	9	6	basin metate	rhyolite	medium grained	whole	42	35	8	11.90
34	9	7	basin metate	granite	medium grained	end fragment	22	29	5	4.50

Refitting of metate fragments was accomplished by examining artifacts for metate form, condition, material type, and texture. Fragments that could be matched were assigned consecutive numbers. Refitting provides information on movement of tools within the site, and in the case of this project, between sites. Five of the thirteen artifacts were assigned a metate number; Metates 2 and 6 occurred as complete specimens, Metate 7 is a nearly complete specimen, and Metate 1 is represented by two fragments of a tabular rhyolite slab.

Basin-type metates dominate the assemblage with one slab metate fragment identified. Only two basin metates were complete (Metates 2 and 6) and range in size between 32 and 42 cm long, by 30 and 35 cm wide, by 8 and 10 cm thick. Metates were made from fine to medium-grained sandstone slabs less than 5 cm thick (n=6), fine to medium-grained granite slabs less that 5-10 cm thick (n=3), fine-grained rhyolite slabs 5-10 cm thick (n=3), and a schist slab greater than 10 cm thick (n=1). All materials, with the exception of rhyolite, are available within the project area.

Metates and metate fragments displayed varying degrees of modification and use wear. Metate 1 exhibited moderate amounts of use wear and displayed a moderately developed basin. The grinding surface displayed peck marks indicating it was resharpened. Metates 2 and 7 exhibited heavy amounts of use wear and well-developed basins. Metate 7 also exhibited resharpening of the

grinding surface. Metate 6 exhibited a moderately developed basin with flaking along the margins suggesting that raw material was made to conform with predetermined size or shape constraints. The remaining eight metate fragments displayed moderate to heavy amounts of use wear. Sharpening of the grinding surface was present on five of these eight fragments.

Spatial distribution of metates and metate fragments shows a close association with features. All identified metates were recovered from areas that contained features. A fragment of Metate 1 and two additional fragments were recovered from Area 2, a deflated roasting pit; Metate 2 was recovered from Area 7, a deflated hearth, and Metates 6 and 7 were recovered from Area 9, a probable pit structure. The close association of metates and features suggests they were functionally related. These associations highlight the importance of plant processing during the site occupation. Implications of metate forms and wear will be examined later in this report.

Site Summary

Excavation focused on Areas 1, 2, and 3; additional recording of Areas 4-13 assessed data potential and proposed preservation easements. LA 116418 is a spatially extensive site that is comprised of many short-term occupation components located on the terrace slope above the Cañada del Rancho flood plain. Artifact types and stratigraphic context are indicative of occupation dates sometime between 1200 B.C. and A.D. 1350. Excavations revealed surface or shallow cultural deposits within Areas 1, 2, 3, 4, and 7. Low frequency artifact concentrations consisting of high proportions of tools and tool manufacturing debris, grinding implements, and clusters of ancestral Pueblo utility ware pottery remain from processing resources acquired by hunting and foraging. The presence of 12 thermal features scattered across the site are additional evidence for a focus on acquisition and processing of a wide range of biotic resources.

LA 116420 is a multicomponent sherd and lithic artifact scatter with associated hearths and the probable buried remains of a Late Archaic burned pit structure. The inventory identified eight areas that had features and artifacts from Late Archaic (1800 B.C. to A.D. 1) and late Coalition or early Classic (A.D. 1275 to 1425) periods (Post 1997). The site covers 15,000 sq m and is 230 m east-west by 115 m north -south (Fig. 10). The artifacts and features are distributed across a gentle, deflated and dissected south-southeast-facing slope at the same elevation as LA 116418. This slope is intermediate to the gravel terraces that border the north flood plain of the Cañada del Rancho to the south of the site and the open, grass plain that covers a large area north of the site. The vegetation is typical of piñon-juniper woodland. The soils are unconsolidated sand mixed with gravel and cobbles. Sandstone bedrock occurs at or near the surface throughout most of the site with colluvial deposition accumulating to 2 m in the southern portion of the site. Prior to excavation, Areas 1 and 2 were designated for investigation. The decision was made in the field to excavate Area 3. The remaining areas (4-8) were placed in protective easements.

Excavation Results

Based on development needs, Areas 1, 2, and 3 were excavated. Results are presented by area, including feature descriptions. Artifact analysis and specialists results will be presented for the entire site. Interpretation of the excavation results relative to the research design will be presented in another section, where it can be combined with the results and site data from LA 116418 and other nearby sites.

Area 1

Area 1 was an artifact cluster of pottery and lithic artifacts associated with charcoal-infused soil stains that were expected to be deflated remains of thermal features. Area 1 excavation involved six areas with artifact clusters or charcoal-infused soil stains. Excavation of these areas resulted in the recovery of 86 artifacts from excavated areas and surface collection. Piece-plotted surface artifacts in Area 1 included two sherds of utility ware pottery, 11 pieces of core reduction and tool manufacture debris, 38 metate fragments, 5 manos, and 4 cutting or scraping tools (Fig. 11). The remains of 5 thermal features were excavated (Features 1, 2, 3, 4, and 6). Table 8 lists the excavation areas within Area 1 and the artifact counts and types that were recovered.

Most of the artifacts and features were clustered on a gentle to moderate, southeast-facing slope. Erosion channels have cut through the cultural deposit forming an elongated artifact distribution. Livestock have trampled the activity areas breaking the metates into small pieces, which have also spread downslope. Artifacts occur in a loose, weakly structured, colluvial sandy loam that has 1 to 5 percent gravel. Excavation below surface revealed a more consolidated, clayey sandy loam with diffuse, carbonate filaments, and 5 to 10 percent pea gravel. This soil resembles the ancient hill

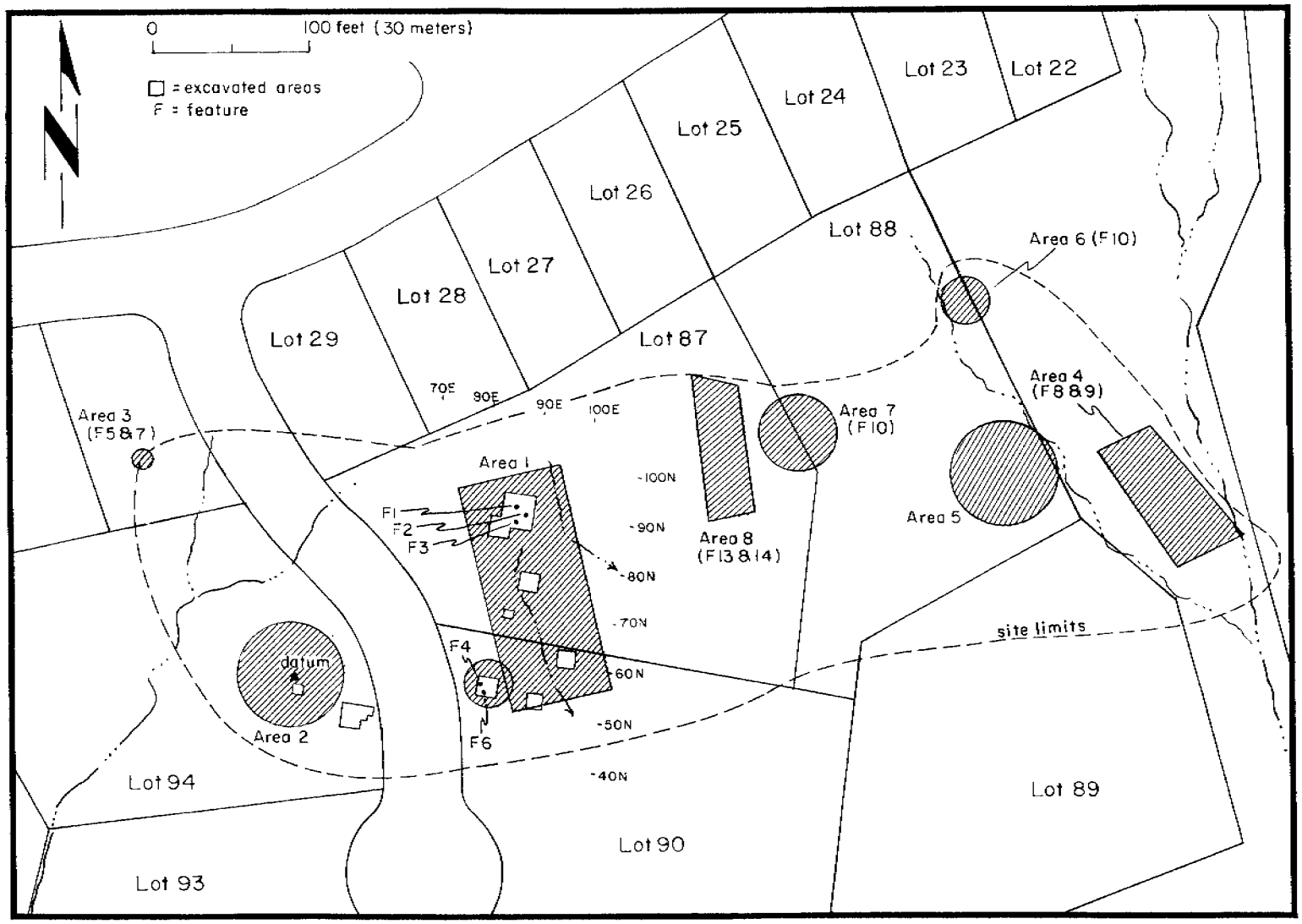

Figure 10. LA 116420 area map.

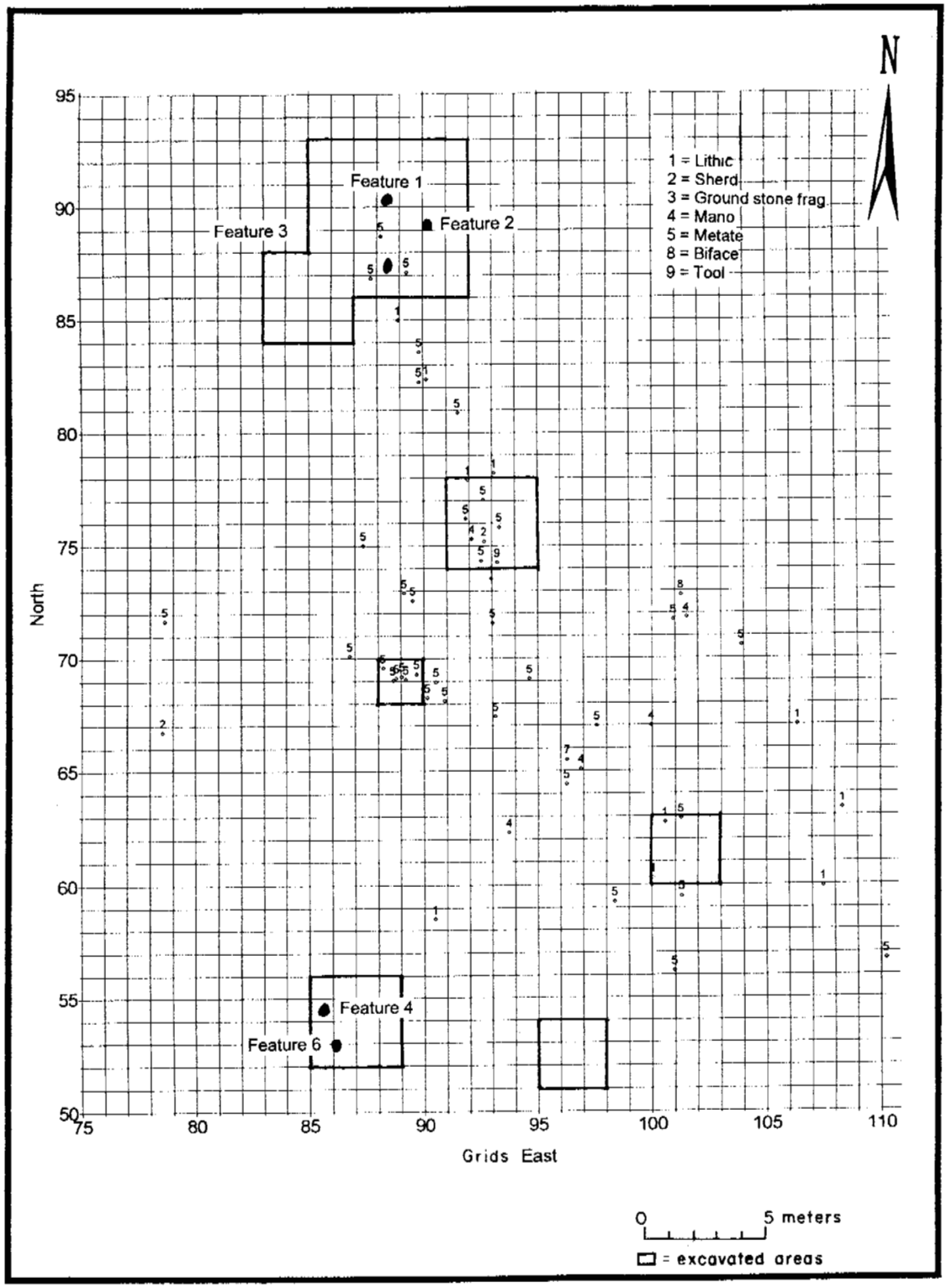

Figure 11. Artifact distribution plot for Area 1, LA 116420.

Table 8. Excavation Area Data, Area 1, LA 116420

Excavation Area	Setting	Condition	Size (m)	Description	Artifacts
51N/95E	On a gentle southeast- facing slope	Surface is deflated	3 x 3	Charcoal stained soil, but no feature identified.	None
52N/85E	On a gentle southeast-facing slope	Surface is deflated and bisected by drainage gullies	4 x 4	F. 4, fire-cracked rock concentration; F. 6, undifferentiated burned pit	3 lithics; 1 small mammal bone (w/in F. 6); 1 flotation sample
60N/100E	On a gentle southeast-facing slope	Surface is deflated and dissected by drainage channels	3 x 3	Artifact concentration	3 lithics
68N/88E	On a southeast-facing slope	Surface is deflated and bisected by drainage gullies	2 x 2	Ground stone concentration	Ground stone from surface, no ground stone recovered by excavation.
74N/90E	On southwest-facing slope	Surface is deflated and dissected main drainage channel that cuts through Area 1.	4 x 4	Artifact and ground stone concentration	13 lithics and 3 ground stone
84N/83E	On south southeast-facing slope	Surface is deflated with bedrock at 15 to 20 cm below the ground.	9 n-s x 8 e-w (irregular)	F. 1, fire-cracked rock concentration; F. 2, hearth; F. 3, fire-cracked rock-filled roasting pit	3 lithics; 7 ground stone; 1 C-14 sample; 3 flotation samples

slope exposed in the excavation of Area 2. This soil may be a former B1 or Archaic period horizon. The mixing of this B1 soil with the modern A1 soil strongly demonstrates the effect that modern erosion has had on the site structure. Clearly, in these middle to upper slope deflated areas, materials from ancestral Pueblo and Archaic occupations overlap, but have no temporal or functional relationship. Figure 10 shows the spatial distribution of artifacts and the linear patterning caused by erosion. Even though there is strong evidence mitigating against identification of temporal components, spatial analysis presented in a later section allows arguments to be made for quantity and location of components.

Excavation Areas 51N/95E, 60N/100E, 68N/88E yielded less than or equal to what was expected based on the surface distribution of artifacts or presence of lightly charcoal-infused soil. These areas were highly deflated and were in or on the margins of erosion channels. Rather than occupation loci, these areas reflect the down slope spread of the artifacts and fire-cracked rock that occur in Areas 52N/85E, 74N/90E, and 84N/83E. The charcoal stain in Area 51N/95E may be the deflated remains of a hearth, but no depth or outline could be discerned. It is possible that the stain is from a historic era surface fire used by travelers or ranch hands.

Area 52N/85E was on the east-facing slope above the main erosion channel that cut through Area 1. It is cut by a side erosion channel that has spread the fire-cracked rock and removed most of the interior charcoal-infused primary fill from within Feature 4. No artifacts were visible on the surface. Surface-stripping the loose colian sand revealed that the rocks were floating in matrix and not well embedded in an old ground surface. Surface-stripping exposed another charcoal-infused soil stain, which when excavated, revealed a small, shallow thermal feature, Feature 6. Three biface reduction flakes were recovered during the surface-stripping and are probably associated with the use of Feature 4 or 6. A single small mammal bone was recovered from the fill of Feature 6. Features 4 and 6 appear to represent a discrete component separate from the main artifact concentration and the Feature 1 through 3 complex in 84N/83E.

Area 74N/90E was centrally located in a lithic and ground stone artifact cluster. This cluster included 12 piece-plotted artifacts bisected by the main erosion channel that cut through Area 1. The excavation area straddled the drainage. Surface-stripping the loose eolian sandy loam exposed the top of the B1 horizon that corresponds with an Archaic period tool manufacture area in Area 2. This soil was described earlier in this section. Excavation 10 to 20 cm into the B1 horizon did not yield cultural materials. The artifacts only occurred within the loose top soil that covered the Archaic horizon. Excavation yielded 13 lithics and 3 ground stone fragments, which is a slightly higher density than was observed on the surface. This area is a discrete activity locus or is discard from the feature cluster upslope and to the north.

Area 84N/83E focused on a fire-cracked rock cluster and an extensive charcoal-infused soil stain. Surface-stripping revealed three thermal features (1, 2, and 3), but few associated artifacts. Feature 1 was the deflated remains of a fire-cracked rock-filled roasting pit with rocks floating in the top soil and not embedded in an old surface. Feature 2 was a small hearth that was excavated into the shallow top soil and filled with large pieces of juniper charcoal. Feature 3 was a fire-cracked rock-filled roasting pit excavated down to the bedrock, which was oxidized to a gray color. The presence of bedrock within 20 cm of the surface negated the possibility that deeply buried cultural deposits existed in this area.

A concentration of charcoal-infused soil was in the southwest part of Area 84N/83E within Grids 85-87N/84-86E. Excavation yielded no artifacts, but did reveal the sinuous outline of a burned area that was 5 to 15 cm deep, ending at the bedrock. Large pieces of burned and partly burned wood were exposed, but lacked a formal outline. The sinuous outline and presence of partly burned wood indicated the stain and burn remained from a lightning strike. Three meters to the west there was a burned stump that may come from the same burning episode. There was no further investigation of the burn.

Features. The remains of five thermal features were excavated. Features 1 and 2 were recorded during the inventory. Features 3, 4, and 6 were exposed by surface stripping. Feature descriptions follow.

Feature 1 was the deflated remains of a fire-cracked rock-filled roasting pit. It was located within 90N/87E. It appeared as a surface concentration of 18 metamorphic cobbles (Figs. 12 and 13). Excavation revealed one other subsurface cobble. The cobbles covered an area of 74 cm north-south by 60 cm east-west. There was no depth to the feature fill and no charcoal flecks were observed. The soil was A1 brownish yellow (10YR 6/4) sandy loam with less than 5 percent gravel. Deflation had left the cobbles floating in the A1 soil with no evidence of formal construction or a basin. No artifacts were recovered and a flotation sample was not collected because the primary deposit was absent.

Feature 2 was the deflated remains of a hearth. The hearth appeared as a charcoal-infused soil stain below the surface strip. It was located within 89N/89E. Its excavated dimensions were 34 cm north-south by 26 cm east-west with a 7 cm depth (Figs. 14 and 15). It had an oval outline with steep sides and a relatively flat base. The feature fill was a black (2.5Y 2/0) silty sandy loam with less than 5 percent gravel and almost 20 percent juniper charcoal. There were no associated cobbles or artifacts. A C-14 sample yielded a calibrated date of A.D. 550 to 675 (2-sigma, 95 percent probability). This places the age of the tree in the Early Developmental phase (A.D. 500 to 900) of the Rio Grande sequence (Dickson 1979). Paleobotanical analysis revealed that the fuel was predominantly juniper (98 percent) with a minor presence of piñon. Economic plant species were represented by 51 charred seeds of goosefoot, which is commonly found at hunter-gatherer or forager camps. Feature 1 is located 1.5 m to the southwest and may be temporally associated. Feature 2 is typical of a small campfire or meat-roasting fire used on an overnight hunting or foraging foray.

Feature 3 was a fire-cracked rock-filled roasting pit. It was located in Grids 87-88N/87-88E and appeared as a subsurface charcoal-infused soil stain and fire-cracked rocks. Its excavated dimensions were 75 cm northwest-southeast by 60 cm northeast-southwest by 12 cm deep (Figs. 16 and 17). It had steep sides with a relatively flat bottom. It is similar in size to Feature 1. The feature fill was a very dark gray (7.5YR 3/0) silty sandy loam and less than 5 percent gravel. The feature is deflated and may have lost up to 10 cm of its original depth. A total of 55 cobbles were exposed and removed from the feature. The cobbles were mostly metamorphic with a few sandstone and quartzite rocks observed. The rocks were between 7 and 10 cm long by 5 and 7 cm wide. The cobbles were embedded in and on top of charcoal-infused soil indicating that they were placed into an active fire, rather than the fire built on top of the rocks. A single ground stone fragment was found within Feature 3. Feature 3 appears to be associated with Feature 2. Paleobotanical analysis identified charred Cheno-ams, goosefoot, and a mint family seed. These seeds would have been available for harvest in the late summer or fall. Fuel was predominantly juniper, but included two fragments of saltbush/greasewood indicating wood gathering along the margins of the Cañada Rancho.

Feature 4 was a fire-cracked rock concentration on the west slope of the erosion channel that cuts through Area 1. It was located in Grids 52-53N/87-88E and was visible on the surface. It appeared as a surface concentration of 24 metamorphic cobbles. The cobbles covered an area 60 cm north-south by 50 cm east-west (Fig. 18). There was no depth to the feature fill and no charcoal flecks were observed. The soil was A1 brownish yellow (10YR 6/4) sandy loam with less than 5 percent gravel. Deflation had left the cobbles floating in the A1 soil with no evidence of formal construction or a basin. Three lithic artifacts were recovered from surface strip, but these could be

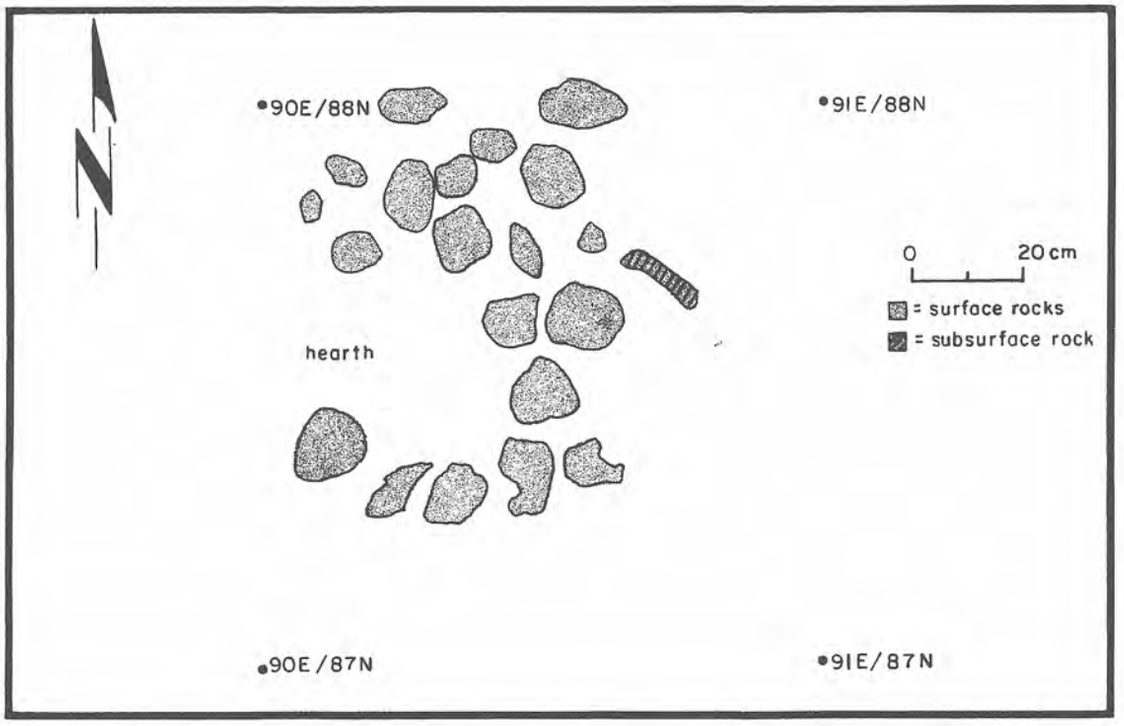

Figure 12. LA 116420, Feature 1, hearth, plan view.

Figure 13. LA 116420, Feature 1, excavated.

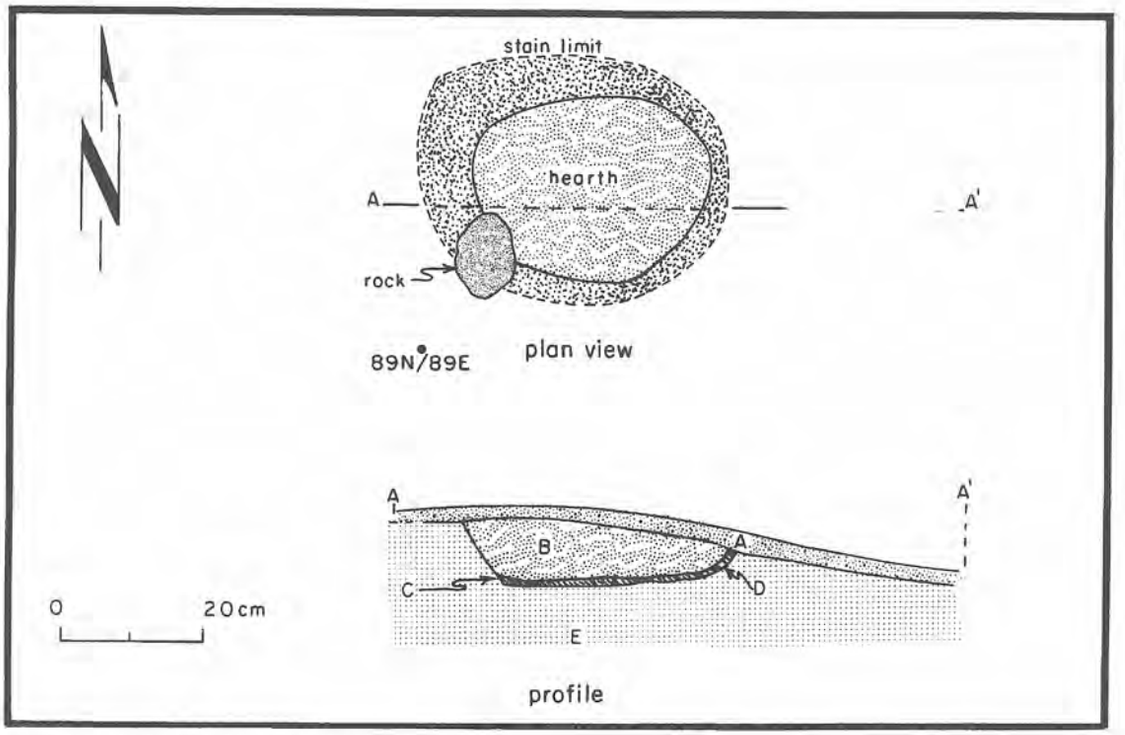

Figure 14. LA 116420, Feature 2, hearth.

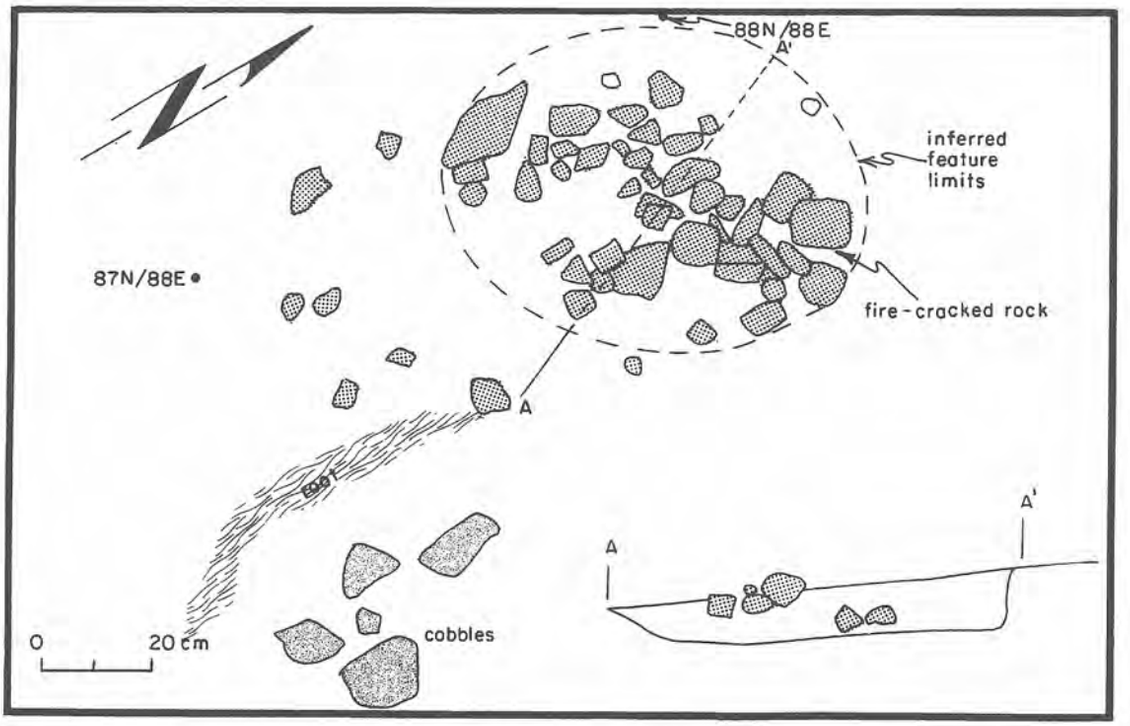

Figure 16. LA 116420, Feature 3, Area 1, plan and profile.

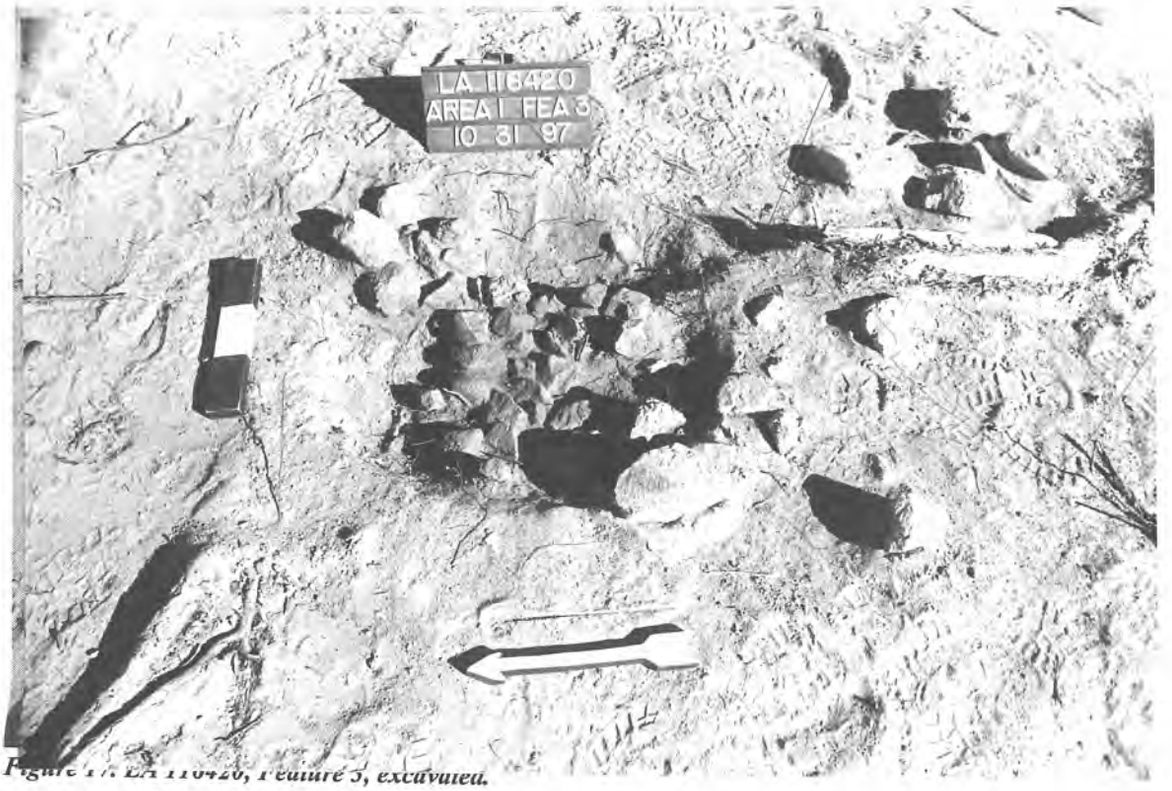

Figure 17. LA 116420, Feature 3, excavated.

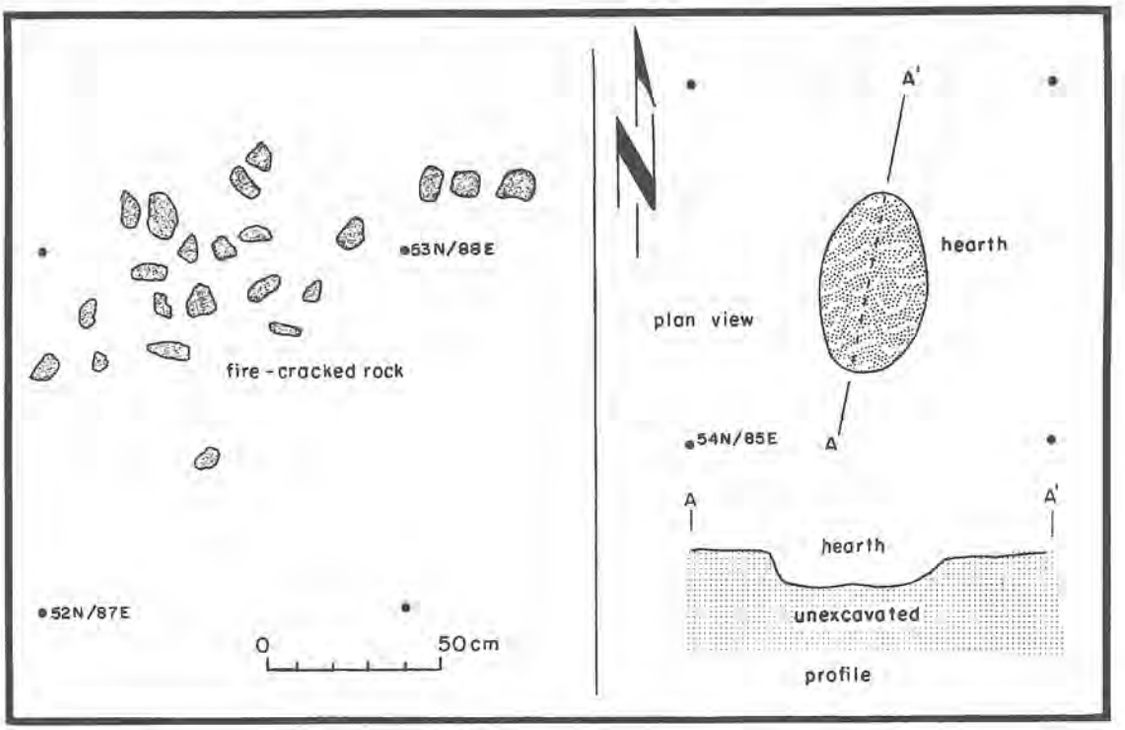

Figure 18. (left) LA 116420, Feature 4, (right) LA 116420, Feature 6.

associated with Feature 4 or 6. A flotation sample was not collected because the primary deposit was absent.

Feature 6 was an undifferentiated burned pit. It was located in Grid 54N/85E and was exposed by surface-stripping as a lightly charcoal-infused soil stain. Its excavated dimensions were 50 cm north-south by 30 cm east-west by 9 cm deep (Fig. 18). It had an oval outline, steep walls, and an uneven base. Feature fill was very dark gray brown to dark gray brown (10YR 4-5/2) colluvial silty sandy loam with three burned cobbles. No charcoal and one small mammal bone was recovered by excavation. The feature was deflated; the east or down slope side was most affected by erosion. Feature 6 is similar to Feature 2, but only yielded small charcoal flecks of piñon. Association between a fire-cracked rock and hearth or undifferentiated burned pit is a repeating pattern and suggests that the features were temporally and functionally related.

Area 2

Area 2 was originally described as an artifact concentration of chert and obsidian flakes. Reexamination of the area revealed a 40-cm-diameter surface charcoal stain and a chipped stone concentration at the southeast limit of the preliminary 10-m radius easement. Thirty-four obsidian flakes were piece-plotted within the cluster. Other artifacts within Area 2 included two sherds of utility pottery, a siltstone flake, an obsidian tool, two metate fragments, and a mano fragment. Well to the east of excavation areas, four metate fragments and a mano were piece-plotted and collected

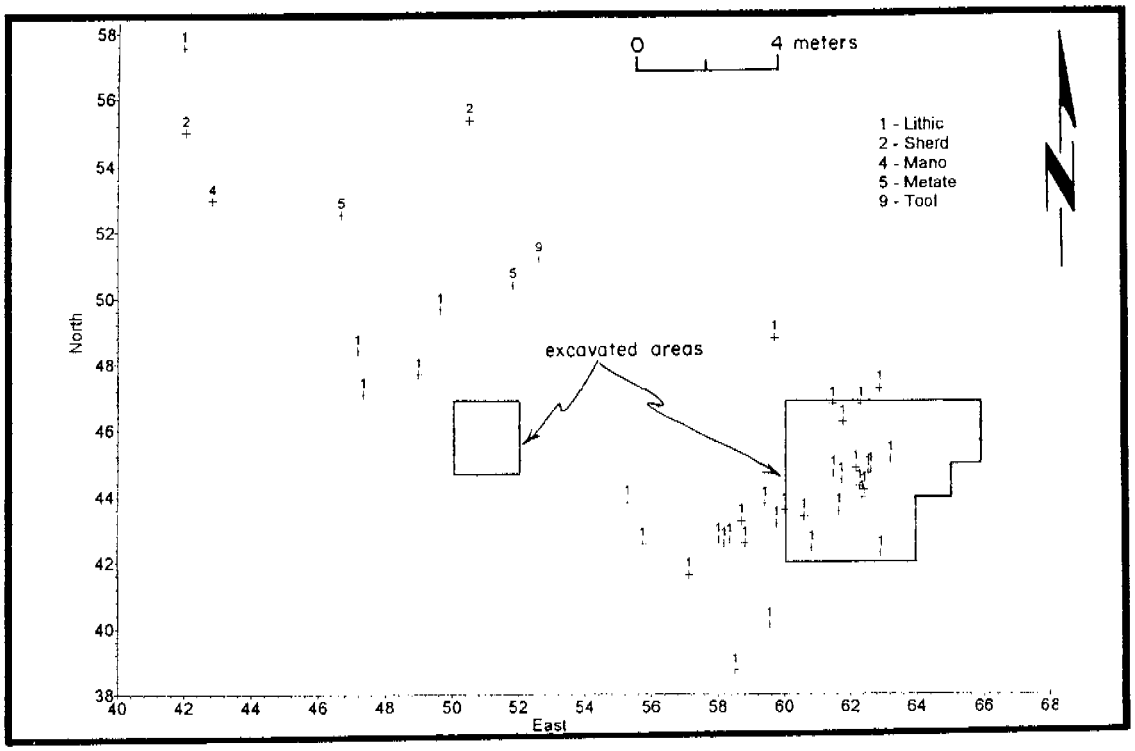

Figure 19. LA 116420, Area 2, map showing artifact distributions.

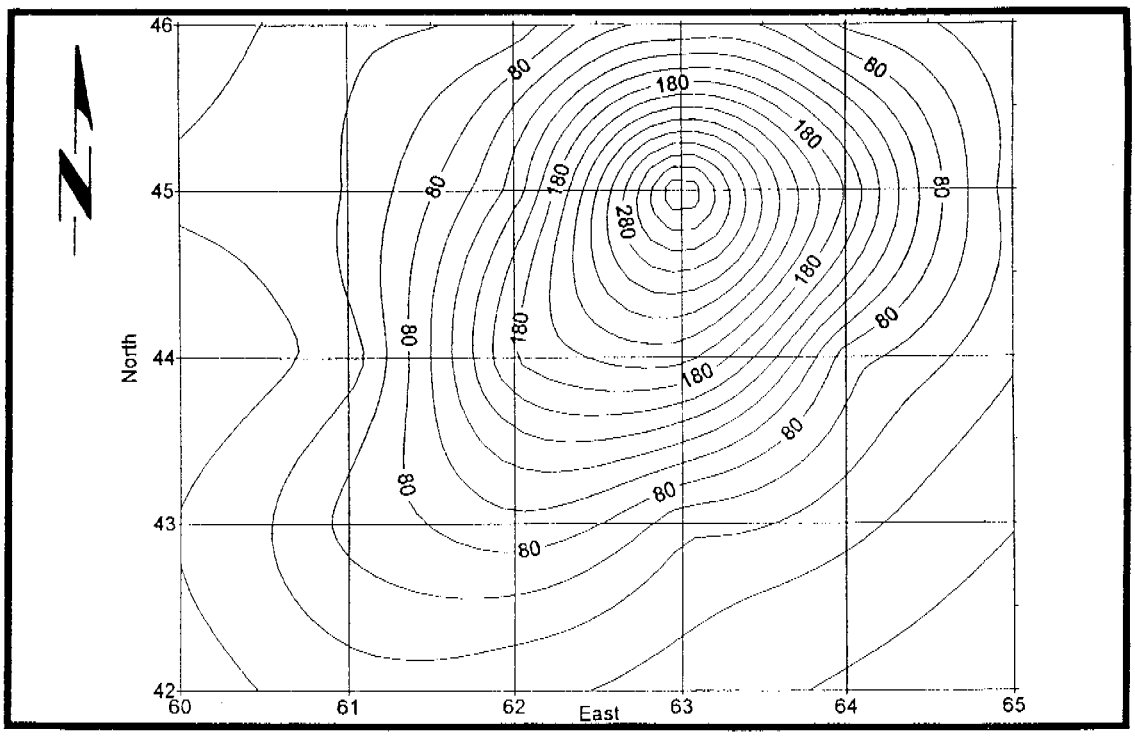

Figure 20. LA 116420, Area 2, density plot.

(Fig. 19). Two excavation areas were established to investigate the charcoal-infused soil stain and the obsidian artifact concentration.

Excavation Area 47N/50E was a 2-by-2-m unit focused on the surface charcoal stain. Surface-stripping yielded no artifacts and removed most of the stain. The stain contained no charcoal and did not exhibit limits reflecting formal preparation. Since the actual nature of the stain remained ambiguous, there was no further examination and it was not designated a feature.

Excavation Area 42N/60E covers most of a 5 m north-south by 6 m east-west area that yielded a much higher density and frequency of lithic reduction debris than was evident on the surface. Figure 20 shows the location of the excavation units relative to the surface artifact distribution. Excavation within a 3-by-3-m area, with Grid 43N/60E in the southwest corner, yielded between 12 and 84 obsidian artifacts per unit from the surface strip, which was 10 to 15 cm deep. Additional excavation in these grids in 10 and 15 cm levels yielded from 6 to 211 artifacts, mainly made from obsidian, but also a few chert, basalt, and chalcedony flakes. Artifact frequencies decreased with depth, but additional units were excavated to better define the limit of the highest frequency concentration. Figure 20 shows the artifact count by grid distribution. A total of 1,823 artifacts were recovered from 25 units at a mean artifact frequency of 73 per unit. The highest density units form an elongated northeast to southwest distribution. This distribution mirrors the modern topographic contour and, based on excavation, corresponds to the past topography. Artifact density decreases in all directions from the core concentration in Grids 43-45N/62E, 44-46N/63E, and 45N/64E. The artifacts recovered from these seven grids account for 69 percent (n = 1,256) of the sample. Excavation was confined to the 25 units because of the change in frequency and the obvious redundancy in artifact types that were recovered, which were mostly small (less than 5 mm maximum dimension) biface reduction or resharpening flakes.

Four natural stratigraphic levels were exposed by excavation. Stratum A1 was a loose, grayish brown (10YR 5/2) very fine silt without gravel. This 5- to 8-cm-thick layer covers all of Area 2. Stratum A2 was a consolidated, yellowish brown (10YR 5/4) silty sandy loam that is plastic when moist, highly root intruded, and contained less than 5 percent pea gravel. This 10- to 15-cm-thick layer is a slightly disturbed upper limit of the Archaic level and, with Stratum B1, contains the majority of the artifacts. Stratum B1 is a loose, silty sand with less than 10 percent loam, decreased clay content, and 10 to 20 percent pea gravel. This 10 to 25 cm layer is the transition between the old ground surface and the active soil layer that is being affected by post-abandonment erosion. This layer incorporates the upper 5 to 10 cm of the ancient hill slope of the B1 layer. Stratum C was the old hill slope, below the old ground surface, and in the consolidated, stabilized slope. The soil was a very pale brown (10YR 7/4) consolidated, silty sand with less than 5 percent gravel and no root intrusion.

The cultural material primarily occurred within the A2 and B1 levels. These layers formed the old hill slope, the unstable remnant of the old ground surface, and the active colluvial deposit formed by modern erosion and deflation. These levels are homogeneous and slope gradually to the south and west. From the stratigraphy it appears that the tool manufacture location was on a gentle slope that is not substantially different from the modern topography. The near-surface occurrence of B1 and C in grid row 42N reflects downslope deflation and erosion, which created a steeper slope than was present during occupation. The fact that the artifacts are still highly concentrated suggests

that the geomorphological environment was highly stable and has only recently been destabilized by loss of vegetative cover. The artifact distribution within A2 and B1 is well preserved and closely corresponds to the distribution left by the flintknapper.

Area 2 had an unusually high artifact frequency compared with the areas observed in LA 116418 and LA 116420. In this case, the surface artifact concentration was less dense and concentrated than the artifact cluster below the surface. The artifacts were eroding from a high-density discard area that had been gradually covered by colluvial soil after abandonment. Recent erosion has increased the geomorphological activity and begun to expose the artifacts on the surface and spread the artifact distribution downslope to the southwest. While the observed extent of the distribution covers a 64 sq m area, excavation demonstrated that the original distribution was restricted to a 16-sq-m area. This restricted distribution reflects a single episode of tool manufacture and maintenance, probably by a single individual.

Area 3

Area 3 was 3 m north-south by 4 m east-west and was fire-cracked rock concentrations. The southwest corner of the area was 85N/13E or 50 m northwest of 50N/50E in Area 2. The fire-cracked rock concentrations were located on the upslope portion of a narrow finger ridge. The finger ridge is formed by two deeply dissected erosion channels that join at the tip of the ridge and flow into the north flood plain of the Cañada del Rancho. The ridge top is gently sloped to the southwest. The top soil is loose sandy loam typical of the sites' deflated surface. The ground cover is a sparse grama grass and there is a moderately dense overstory of piñon-juniper.

Surface-stripping of the loose top soil revealed two well-defined, but collapsed and deflated, cobble-filled roasting pits, Features 5 and 7. No artifacts were recovered from the surface-stripped grids.

Features. Features 5 and 7 were the main focus of the Area 3 excavation. They were side-by-side and separated by only 1 m. They appear to be functionally and temporally related.

Feature 5 was a fire-cracked rock-filled roasting pit. It was located in Grids 85-87N/13-14E and appeared as a surface charcoal-infused soil stain and fire-cracked rocks. Its excavated dimensions were 140 cm northwest-southeast by 110 cm northeast-southwest by 6 to 8 cm deep (Figs. 21 and 22). It is so deflated that its original form could not be determined by excavation. It is similar in size to Feature 7. The feature fill was a very dark gray (10YR 4/1) silty sandy loam and contained less than 5 percent gravel. The feature is deflated and may have lost up to 10 cm of matrix; the minor remnant of the primary deposit is captured by the interior cobbles. A total of 45 cobbles were within the feature limit and 7 cobbles were just outside the feature perimeter. The cobbles were metamorphic or granitic. The rocks were between 7 and 15 cm long by 6 and 12 cm wide. The cobbles were embedded in and on top of charcoal-infused soil indicating that they were placed into an active fire, rather than the fire built on top of the rocks. The cobbles sit on bedrock indicating that the old ground surface has been reduced by erosion and the original soil depth may have been only 20 cm deep. Paleobotanical analysis identified juniper as the main fuel with one piece of charred greasewood/saltbush.

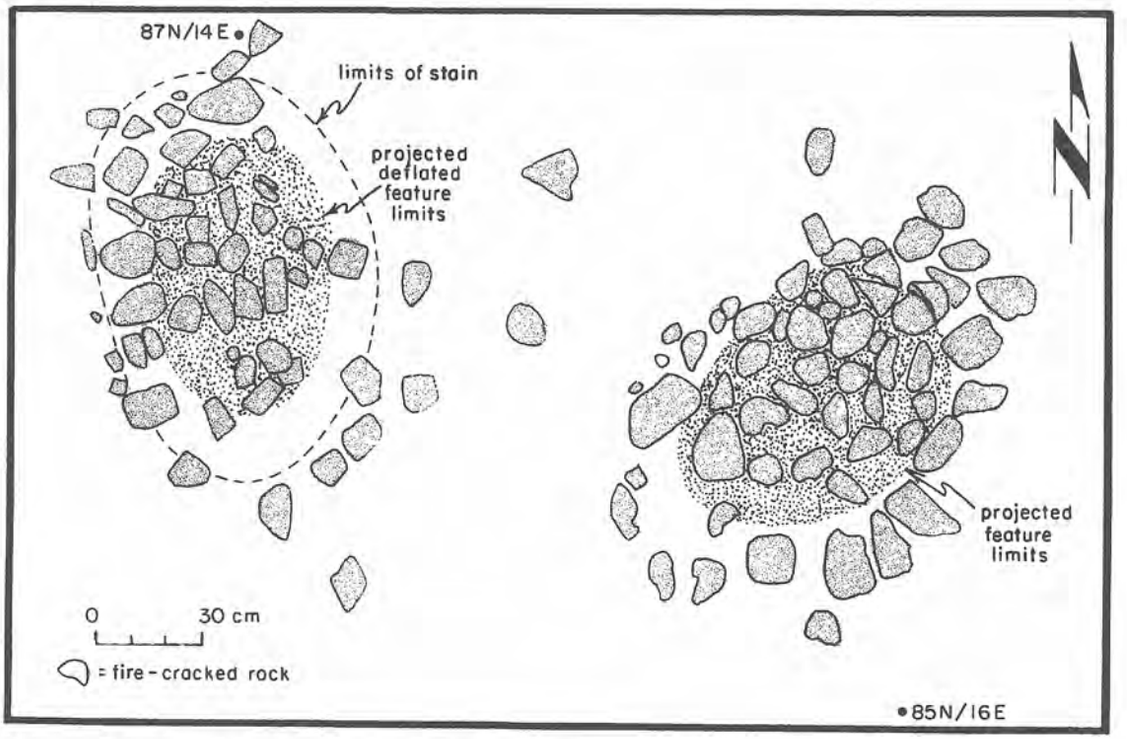

Figure 21. LA 116420, Features 5 and 7, plan view.

Figure 22. LA 116420, Features 5 and 7, excavated.

Feature 7 was a fire-cracked, rock-filled roasting pit. It was located in Grids 85-86N/15-16E and appeared as a surface charcoal-infused soil stain and fire-cracked rocks. Its excavated dimensions were 150 cm northeast-southwest by 100 cm northwest-southeast by 9 cm deep (Figs. 21 and 22). The oval outline of the interior charcoal-infused stain suggests a similar shape and size as Feature 5. The feature fill was a very dark gray (10YR 4/1) silty sandy loam and contained less than 5 percent gravel. Paleobotanical analysis identified juniper as the predominant fuel. The feature is deflated and may have lost up to 10 cm of matrix; the minor remnant of the primary deposit is captured by the interior cobbles. A total of 70 cobbles form the feature limit. The cobbles were metamorphic or granitic. The rocks were between 7 and 15 cm long by 6 and 12 cm wide. The cobbles were embedded in and on top of charcoal-infused soil indicating that they were placed into an active fire, rather than the fire built on top of the rocks. The cobbles sit on bedrock indicating that the old ground surface has been reduced by erosion and the original soil depth may have been only 20 cm deep.

Excavation of Features 5 and 7 failed to yield datable material or any artifacts. Their temporal affiliation or cultural affinity remains undetermined. The occurrence of complementary roasting pits has been observed in other locations within the Santa Fe area and may represent the need to process gathered foods or roast meat at a higher capacity than could be supported by a single thermal feature. Typically, these features reflect ancestral Pueblo foraging as was evident in the Las Campanas area (Post 1996). More discussion of feature morphology and possible cultural and functional implications will be presented in a later section.

Other Areas

Table 9 lists the areas and features that were retained within archaeological preservation easements. All areas have at least one feature exposed on the surface or in the bank of an erosion channel. Most have associated low frequency chipped or ground stone scatters. Each represents one or two occupation components that, with the exception of Area 5, cannot be reliably assigned to a particular period. Area 5 is a 2- to 3-m-diameter cultural deposit that may be the remains of a pit structure foundation probably dating to the Late Archaic period (1800 B.C. to A.D. 400). The buried context of Area 5 testifies to the long-term gradual colluvial soil deposition that preceded the most recent erosional episode. It also underscores the role that lower slope areas played in capturing soil and subtly changing the local topography. The abundant one-hand manos and slab or basin metates in upslope areas of LA 116418 and LA 116420 suggest that Late Archaic and ancestral Pueblo deposits were only separated by a thin veneer of soil that has been removed by erosion. The result is collapsed components that lack stratigraphic separation.

Table 9. Other Areas with Features, LA 116420

Area	Setting	Condition	Component Area	Description
4	On a gentle south, southeast-facing slope	Surface is deflated with areas stabilized by grass	30 x 15 m area	This area has two deflated thermal features and an associated lithic and ground stone scatter. Feature 8 is 50 cm in diameter and is probably a deflated hearth. Feature 9 is a collapsed fire-cracked rock-filled thermal feature.

Area	Setting	Condition	Component Area	Description
5	On a gentle south, southeast-facing slope	Area is highly dissected with considerable colluvial soil accumulation	20 m diameter	Possible burned remains of a pit structure, 50 to 75 cm below the surface evidenced by a charcoal-infused soil lens
6	On a south, southeast-facing slope	Surface is deflated.	10 m diameter	Feature 10 is a deflated cobble-lined hearth with an associated metate fragment. Probable single-component foraging camp.
7	On a south, southeast-facing slope	Area is cut by deeply incised drainages that have exposed the cultural deposit.	16 m diameter	Feature 11 is a 90 cm diameter cobble-filled hearth with an associated metate and mano. Feature 12 is a charcoal-infused stain covering a 75 cm area. Also associated are 10 to 20 lithic artifacts and ground stone fragments.
8	On a gentle south, southwest-facing slope	Surface is deflated with drainage gullies and deeply incised erosion channels.	30 x 8 m	Feature 13 is a deflated cobble-filled thermal feature that is 90 to 100 cm in diameter. Feature 14 is a charcoal-infused soil stain that is probably a deflated hearth. Area has a light scatter of Glaze F pottery and Late Archaic age projectile points and chipped stone debris.

Material Culture

Work focused on piece-plotting and collecting surface artifacts within the excavation areas. Additional artifacts were recovered by surface-stripping excavation areas, feature excavation, and from the high-density tool manufacture locus in Area 2. From LA 116420, pottery, chipped stone, ground stone artifacts, and faunal remains were recovered. This section will present the artifact assemblage descriptive data. Comparisons with LA 116418 and other sites in the area will be made in a later section.

Pottery by Steven A. Lakatos

Excavations at LA 116420 recovered six sherds. Ceramic types identified are listed in Table 10. Utility wares were from cooking/storage jars and recovered from the surface of Areas 1 and 2. The decorated sherds are from a glaze ware bowl from the surface of Area 8. The utility ware sherds represent a minimum of two vessels based on temper types and surface treatment. The exterior surface of most sherds is smeared with some indented coil junctures visible. The paste is fine, gray in color, and tempered with sand. Smeared-indented corrugated was the preferred utility ware surface treatment during the Coalition and Classic periods (A.D. 1200-1500) in the Northern Rio Grande (Habicht-Mauche 1993).

Table 10. LA 116420 Ceramic Types by Vessel Form and Portion

Type	Smeared-Indented	Plain Corrugated	Glaze Polychrome	Total
Bowl body or rim			2	2
Cooking/storage jar neck		1		1
Cooking/storage jar body	3			3
Total	3	1	2	6

The decorated pottery is from a late glaze polychrome bowl body and rim. The rim form resembles Glaze F (A.D. 1625 to 1700) (Warren 1979; McKenna and Miles 1990). The interior is covered with a thick brown glaze, while the exterior is white slipped and polished. The paste is gray with crushed latite temper. The temper and surface finish are similar to late ancestral Pueblo period or early historic glaze wares identified as Kotyiti Polychrome from the Cochiti area (Warren 1979) and found in assemblages from Albuquerque and as far south as Valencia, New Mexico, along the Rio Grande (Mensel 1995). This sherd may reflect travel between Galisteo Basin pueblos or more southern pueblos and Pecos Pueblo. Tigges (1997) has documented the intricate and long-distance road system that crosses the Rancho Viejo property. It is likely that Indian trails were adopted by Spanish settlers, clergy, and military.

Chipped Stone Artifacts

Chipped stone artifacts were the most abundant artifact type recovered from LA 116420. They were recovered in low frequency from Area 1 (n=34) and from a high-frequency concentration in Area 2 (n=1,847). Three projectile points were surface collected from Area 8.The assemblage from each area will be discussed and then compared. Table 11 shows the artifact type by material type for Areas 1 and 2. Table 12 presents the formal and expedient tools.

Area 1. Area 1 lithic raw materials reflect procurement from a variety of sources. Local raw materials include quartzite, undifferentiated chert, and chalcedony, and were available in the Ancha formation along the Arroyo Hondo. Intermediate distance sources are indicated by Madera chert, which is most common in the Ancha formation gravel in the piedmont north of the Santa Fe River. Long-distance sources are indicated by obsidian from the Jemez Mountains. This variability in raw material sources could result from highly mobile populations or trade and travel between residents of Arroyo Hondo and Chamisa Locita pueblos and the villages of the Pajarito Plateau. Origins of the Jemez and Cerro del Medio obsidian have already been discussed. Obsidian represents 43 percent of the assemblage and was primarily used for tool manufacture and use (87 percent). Madera chert occurs as redeposited gravel in the Ancha formation, especially north of the Santa Fe River in the piedmont hills (Post 1996; Lang and Scheick 1991; Lang 1997). It originates in Pennsylvanian age limestone beds in the Sangre de Cristo foothills. These beds contain extensive deposits that were quarried by Archaic and ancestral Pueblo populations (Lang 1993; Post 1992; Ambler and Viklund 1995). Pedernal chert originates at a volcanic formation by the same name at the north end of the Jemez Mountains. Pedernal chert quarries at the source are vast and display considerable variability in color, texture, and overall quality. Pedernal chert also occurs in the axial gravel of the Rio Grande and may be

Table 11. LA 116420 Lithic Morphology by Material Type

Count Row Pct Col Pct	Chert Undiff-erentiat.	Pedernal Chert	Alibates Chert	Madera Chert	Chalce-dony	Jemez Obsidian	Cerro del Medio Obsidian	Nonvesicular Basalt	Siltstone	Quartzite	Row Total
Area 1											
Angular debris				1 50.0 12.5		1 50.0 11.1					2 5.9
Core flake	3 50.0 100.0			6 30.0 75.5			1 16.7 100.0			1 16.7 100.0	6 17.6
Biface flake		1 5.0 33.3		6 30.0 75.5	2 10.0 100.0	7 35.0 77.8	2 10.0 40.0	2 10.0 100.0			20 58.8
Uniface, early stage		1 100.0 33.3									1 2.9
Uniface, middle stage			1 100.0 100.0								1 2.9
Biface, early stage		1 50.0 33.3				1 50.0 11.1					2 5.9
Biface, middle stage							2 100.0 40.0				2 5.9
Column Total	3 8.8	3 8.8	1 2.9	8 23.5	2 5.9	9 26.5	5 14.7	2 5.9		1 2.9	34 100.0

Count Row Pct Col Pct	Chert Undiff-erentiat.	Pedernal Chert	Alibates Chert	Madera Chert	Chalce-dony	Jemez Obsidian	Cerro del Medio Obsidian	Nonvesicular Basalt	Siltstone	Quartzite	Row Total
Area 2											
Angular debris	2 0.9 28.6	1 0.5 12.5			1 0.5 33.3		218 98.2 12.1				222 12.0
Core flake		1 1.2 12.5		2 2.4 66.7			79 92.9 4.4	2 2.4 12.5	1 1.2 50.0		85 4.6
Biface flake	4 0.4 57.1	6 0.6 75.0		1 0.1 33.3	2 0.2 66.7	1 0.1 16.7	1052 97.5 58.4	12 1.1 75.0	1 0.1 50.0		1079 58.4
Resharp-ening flake	1 0.2 14.3					3 0.7 50.0	448 98.7 24.9	2 0.4 12.5			454 24.6
Notching flake							4 100.0 0.2				4 0.2
Bidirec-tional core						1 100.0 16.7					1 0.1
Biface, early stage							1 100.0 0.1				1 0.1
Biface, late stage						1 100.0 16.7					1 0.1
Column Total	7 0.4	8 0.4		3 0.2	3 0.2	6 0.3	1802 97.6	16 0.9	2 0.1		1847 100.0

Table 12. LA 116420, Tools

Area	FS	Function	Material	Portion	Length (mm)	Width (mm)	Thickness (mm)	Weight
1	210	end/side scraper	Pedernal chert	whole	35	21	14	152.0
1	216	biface, undifferent-iated	Cerro del Medio obsidian	proximal	11	26	6	22.0
1	241	biface, undifferent-iated	Cerro del Medio obsidian	proximal	21	8	5	18.0
1	248	side scraper	Alibates chert	medial	13	23	6	28.0
1	250	multipurpose scraper	Jemez obsidian	whole	32	21	11	53.0
1	264	retouched biface flake	Cerro del Medio obsidian	lateral	16	12	5	8.0
1	272	biface, undifferent-iated	Pedernal chert	indeter-minate	9	16	5	18.0
2	36	flake tool	Cerro del Medio obsidian	medial	39	31	7	100.0
2	49	early stage biface	Cerro del Medio obsidian	lateral	35	15	1	36.0
2	98	unutilized core	Jemez obsidian	whole	32	19	17	91.0
2	109	wide-notched straight-base En Medio	Jemez obsidian	whole	25	18	5	18.0
8	281	short wide-barbed En Medio	Jemez obsidian	whole	20	18	5	18.0
8		Santa Cruz-Barbed-En Medio	Jemez obsidian	whole	34	24	5	33
8		Probable En Medio	Jemez obsidian	blade and one tang	22	24	6	27

found 100 miles from the source. Examples found in this assemblage were probably obtained from secondary gravel sources. This could have occurred in conjunction with obsidian procurement and other activities along the Rio Grande. The one highly exotic raw material is Alibates chert. Alibates chert is best known from its west Texas sources, north of Amarillo. It was widely traded and is found throughout eastern New Mexico from sites along the east flank of the Sangre de Cristo Mountains, south to the western edge of the Llano Estacado. There are reports that it occurs as occasional

nodules in gravel beds along the Pecos River, near Santa Rosa, New Mexico. Small amounts of Alibates were recovered from Pindi Pueblo (Stubbs and Stallings 1953) and small sites along the Cañada de los Alamos southeast of the project area (Lang 1992). Other raw materials occur at less than 10 percent of the lithic assemblage, reflecting their low occurrence in local gravel or the Rio Grande axial deposits. Nonobsidian raw materials occur equally as core reduction and tool production debris, suggesting an emphasis on hunting and specialized resource processing with no apparent selectivity in regards to raw material.

Artifact types show a heavy emphasis on tool production, use, and discard. Tool manufacture debris and discarded tools account for 77 percent of the assemblage. Biface reduction flakes occur as six different material types. Seven formal tools were identified. Core flakes are mainly Madera chert, but no cores were recovered indicating that even local materials were brought to the site in a reduced form. Twenty percent formal tool occurrence is typical for the Rancho Viejo sites and was a pattern observed in the lithic artifact loci along the Cañada de los Alamos to the southeast (Lang 1992). The high proportion of tool manufacture debris and discarded tools suggests a heavy emphasis on hunting. The sparse distribution of local raw material forced site occupants to bring cores, blanks, or flakes from residential locations. Core reduction and manufacture debris indicate that some of the discarded tools were replaced by items made on site.

The tool types are described in Table 12. This table lacks edge wear and other modification data, which is summarized in the narrative. Tool types include a side scraper, two end/side scrapers, three undifferentiated bifaces, and a retouched flake. The tools were made from a wide range of raw material including Cerro del Medio and Jemez obsidian, Pedernal chert, and Alibates chert. Five of the tools are fragments, indicating they were used until broken or exhausted, and then replaced. The two complete end/side scrapers are small to medium (maximum dimension between 21 and 40 mm).

FS 210 is an end/side scraper. It has two unimarginally retouched lateral edges and a unimarginally retouched proximal end. One edge has a sinuous and convex outline with a 70 degree edge angle. The other edge is sinuous with a 70 degree edge angle. The proximal end has two retouch flake scars and a 70 degree edge angle. There is no obvious wear, but the steep edge angles suggest that they were suited for heavy-duty scraping.

FS 216 is a proximal fragment of a late stage biface. One edge exhibits a perverse snap fracture indicating that the tool was broken during manufacture. There is no obvious evidence of use wear, though the 30 to 40 degree edges are suitable for cutting.

FS 241 is the proximal end of a late stage biface. It exhibits a regular flaking pattern on the margins and faces. It appears that one edge was reworked after it was broken. Additional use resulted in a break perpendicular to the reworked edge making the tool unsuitable for cutting or scraping. Reworked tools may reflect logistically organized tool manufacture; curated tools or raw materials were used until they became too worn, small, or broken. Intense tool use would be expected where the potential for replacement was low. This expectation would be high for the project area and a large part of the Galisteo Basin.

FS 248 is a side scraper fragment made from a heat-treated Alibates-like chert. Both lateral edges exhibit retouch. One edge is unimarginally retouched. The retouched edge displayed heavy step fractures on a 75 degree edge angle. This edge may have been used on hard material such as bone or wood. The opposite edge is also unimarginally retouched, but exhibits no edge damage. The edge angle is 40 degrees; an edge that would have been suitable for cutting or light-duty scraping.

This tool has been well used and modified to perform a wide range of tasks.

FS 250 is a multipurpose tool that served as a scraper, knife, and graver. It exhibits retouch or edge damage on both edges and at both ends. This is the most intensively used piece of obsidian recovered from the site. One edge has a concave outline with unidirectional wear on a 70 degree edge angle. The opposite edge has a straight outline with bimarginal retouch and intermittent step fractures on a 60 degree edge angle. This edge was used for cutting and scraping a hard or dense material. This formed the step fractures and perhaps contributed to its eventual discard. The proximal end is bimarginally retouched with heavy step fractures on a 60 degree edge angle. This edge also was used for cutting and scraping. The distal end forms a projection and probably functioned as a graver. The tip is rounded and worn. The intensive and exhaustive use of this tool is consistent with a curation strategy that supported intensive processing in the absence of suitable raw material.

FS 264 is the lateral portion of a late stage biface. It has been regularly flaked on the edges and both faces. There is no evident use wear and it is most probable that this is a knife or projectile point fragment that was used until a suitable replacement was found, perhaps through site scavenging.

FS 272 is similar to FS 264, except for the material type. It is the indeterminate portion of a late stage biface. It was undoubtedly a knife or projectile point.

Area 2. Area 2 was identified as a surface artifact concentration consisting mostly of obsidian reduction debris. Piece-plotting and excavation recovered 1,847 lithic artifacts from surface and buried contexts. Table 11 shows the artifact type by material type frequencies.

Identified lithic raw materials resemble the Area 1 assemblage, except for the absence of Alibates chert and quartzite. Cerro del Medio obsidian is the most abundant material type followed by nonvesicular basalt. The high frequency of Cerro del Medio obsidian comes from an apparent single biface reduction episode. As mentioned before, the Cerro del Medio obsidian source is in the eastern Jemez Mountains. Raw material would have been brought to the site in nodule or partly reduced blank form. The other nonobsidian raw materials are available in the Ancha formation gravel. Nonvesicular basalt may also originate in the axial gravel of the Rio Grande. Except for a siltstone core flake, all the raw materials were mixed with the Cerro del Medio obsidian concentration in the 42N/60E area.

Artifact types are overwhelmingly dominated by debris from biface manufacture and maintenance. Of course, this pattern reflects the high-density biface reduction debris concentration at 42N/60E. Biface and resharpening flakes predominate, although Cerro del Medio obsidian core flakes and angular debris occur as 4.4 and 12.1 percent, respectively. This suggests that early stage biface manufacture may have entailed the trimming of nodules by detaching and clearing platforms. It also may indicate that some expedient tool manufacture occurred. Nonobsidian artifacts are also dominated by biface reduction debris. Only low counts of Madera chert and siltstone occur primarily as core reduction debris. This further illustrates the overall emphasis on biface manufacture and tool maintenance. Besides manufacture debris, an obsidian late stage biface fragment and a whole obsidian En Medio style projectile point were recovered. The bidirectional obsidian core supports the observation that debris occurs from all stages of biface reduction.

Four tools were recovered from Area 2. Basic data are provided in Table 12. More detail is provided in the following descriptions.

FS 36 is the medial portion of a Cerro del Medio core flake that was made into a side scraper with two utilized edges. The most complete edge is sinuous with unimarginal retouch. The edge displays rounding and step fractures suggesting it was used on hard materials. The used edge angle is 70 degrees and the original angle was 60 degrees, indicating relatively intense edge attrition. The second edge is partial, has a straight outline, and is unimarginally retouched. The edge is rounded and displays some step fractures. The used edge angle is 60 degrees and the original edge angle is 50 degrees.

FS 49 is the lateral fragment of an early stage biface of Cerro del Medio obsidian. The remnant lateral edge is marginally and facially retouched. It appears that this tool fragment was accidentally detached from the biface during manufacture. Since it was recovered from the obsidian concentration and is the result of manufacture breakage, it is strong evidence that early stage biface flakes were part of the production trajectory.

FS 98 is a small bidirectional Jemez obsidian core. It is evidence that raw material was brought to the site in small, partly reduced nodules, as well as blanks. It lacks cortex and is exhausted.

FS 109 is a small projectile point recovered from the obsidian concentration. It is made from a Jemez obsidian flake, and therefore, was not made on-site. There are only six Jemez obsidian artifacts in the assemblage. The projectile point is whole, indicating that factors other than breakage contributed to its discard. Its maximum dimensions are 25 mm long by 18 mm wide by 5 mm thick. It has a straight edge triangular blade that is 19 mm long and 18 mm wide. The stem length is 6 mm and 14 mm wide at the base. It has wide corner notches. This point is similar to specimens from the Northern Rio Grande that Thoms calls Wide-Notch Straight-Base (1977:142). He suggests a date of 100 B.C. to A.D. 200.

Tools from Area 8. Three projectile points were collected from the surface of Area 8. These artifacts were piece-plotted and occurred in the vicinity of Features 13 and 14.

FS 281 is a nearly complete En Medio style projectile point that is missing one tang. The maximum blade length is 20 mm, the maximum width is 17 mm, and thickness is 4 mm. This artifact is unusual because of the low ratio between the blade length and width. The blade is 14 mm long by 17 mm wide with one the missing tang. The stem is 2 mm long and 13 mm wide. The base width is 16 mm. The projectile point is made from a large biface flake. Diagonal/parallel flake scars are on the blade. The base is thinned by bimarginal retouch. It appears that the tip was broken once and reworked, which contributes to the short blade length. This projectile point style is typical of the Late Archaic or Basketmaker II period. Thoms classifies this style as "Short Wide-Barbed" with a suggested date range of A.D. 1 to 400 (1977:139).

FS 120 is a complete projectile point recovered 5 m west of Features 13 and 14. It is made from Jemez obsidian. The point is whole suggesting accidental discard. Its maximum dimensions are 34 mm long by 24 mm wide by 5 mm thick. It has a biconvex triangular blade that is 26 mm long and 24 mm wide. The stem is 8 mm long and 17 mm wide at the base. It has deep, broad corner notches that form well-defined tangs. This point is similar to specimens from the Northern Rio Grande that Thoms calls Santa Cruz Barbed (1977:133). He suggests a date of 1000 B.C. to A.D. 400.

FS 121 is a partial projectile point recovered 5 m south of Features 13 and 14. It is made from a Jemez obsidian core flake that has minimal random facial flake scars, but consistent and

extensive marginal flaking. Only the blade and one tang are present and the tip may have been reworked. Its maximum dimensions are 27 mm long by 22 mm wide by 7 mm thick. The blade has convex edges and a plano-convex cross section. It is difficult to determine when the projectile was broken or if it had been reused as a blade. Its shape and size are consistent with En Medio style projectile points.

Ground Stone Artifacts by Steven A. Lakatos

Fifty-nine ground stone artifacts were recovered during the excavations at LA 116420. Tool types include one-hand manos (n=7), basin metates (n=21), slab metates (n=8), trough metates (n=2), an undifferentiated mano (n=3), and metate fragments (n=18). These tools were recovered from two areas, Areas 1 (n=54) and 2 (n=5).

Manos. Table 13 lists manos by type, morphological attributes, and location. One-hand manos are the only type identified. These tools were made from fine- to coarse-grained quartzite cobbles (n=5), fine- to coarse-grained sandstone cobbles (n=4), and a medium-grained granite cobble (n=1). Four manos displayed moderate to heavy use-wear and modification. These tools were used on both sides and were pecked and ground along the margins to modify the cobble into its present form. The remaining six manos displayed light to moderate use on two sides. Whole manos had similar morphology with lengths from 11 to 13 cm, widths from 8 to 11 cm, and 4 to 6 cm thickness.

Table 13. LA 116420, Manos

FS	Area	Mano Type	Material	Texture	Portion	Plan View	Length cm	Width cm	Thick cm	Weight kg
40	2	mano fragment	sandstone	coarse grained	internal	indeter-minate	7	6	5	0.45
118	1	one-hand mano	quartzite	medium grained	whole	circular	11	11	4	0.80
208	1	one-hand mano	quartzite	medium grained	whole	oval	13	10	6	1.20
215	1	one-hand mano	quartzite	fine grained	whole	oval	11	9	4	0.85
218	1	one-hand mano	sandstone	fine grained	edge fragment	indeter-minate	9	7	4	0.37
220	1	one-hand mano	sandstone	Coarse grained	edge fragment	indeter-minate	6	4	4	0.08
244	1	one-hand mano	sandstone	medium grained	whole	circular	11	8	3	0.52
263	1	mano fragment	granite	medium grained	edge fragment	indeter-minate	8	5	4	0.11
271	1	mano fragment	quartzite	coarse grained	edge fragment	indeter-minate	5	3	1	0.02
282	1	one-hand mano	quartzite	medium grained	whole	circular	11	9	4	0.85

Nine manos and mano fragments were recovered from Area 1 and one mano fragment was recovered from Area 2. Area 1 contained five deflated features and Area 2 contained no features. The nine manos recovered from Area 1 were centrally located between the identified features. The difference in mano counts and identified features between Area 1 and Area 2 suggests distinct activities.

Metates. The assemblage includes basin metates (n=21), slab metates (n=8), trough metates (n=2) and undifferentiated metate fragments. (n=18). Table 14 lists metates by type, morphological attributes, and location.

A minimum of six metates were identified in the assemblage, Metates 1, 3, 4, 5, 8, and 9. Metates 5, 8, and 9 are nearly complete, and Metate 3 was 10 fragments of the same sandstone parent material. Metate 4 was 6 fragments of schist basin metate. Metate 1 (n=2) displayed the same material, texture, and wear pattern as fragments recovered from LA 116418.

Basin-type metates predominate in the assemblage followed by slab, and finally trough metates. Metates were predominately made from fine- to medium-grained sandstone slabs less than 5-10 cm thick (n=25), followed by fine- to coarse-grained schist slabs less than 5-10 cm thick (n=8), medium- to coarse-grained granite slabs 5-10 cm thick (n=2), fine-grained rhyolite slabs 5-10 cm thick (n=2), a fine-grained vesicular basalt slab 5-10 cm thick (n=1), a coarse-grained metamorphic slab greater than10 cm thick (n=1), and finally a coarse-grained quartzite slab less than 5 cm thick

Table 14. LA 116420, Metates

FS	Area	Metate #	Metate Type	Material	Texture	Portion	Length cm	Width cm	Thick cm	Weight kg
41	2	.	slab metate	schist	coarse grained	corner fragment	12	7	4	0.42
116	2	.	metate fragment	sandstone	medium grained	edge fragment	6	4	3	0.11
117	2	.	slab metate	schist	medium grained	end fragment	24	10	2	0.75
200	1	.	basin metate	sandstone	fine grained	internal fragment	6	4	2	0.68
201	1	.	slab metate	sandstone	fine grained	edge fragment	10	8	1	0.14
202	1	.	basin metate	sandstone	fine grained	edge fragment	13	7	3	0.26
204	1	.	metate fragment	sandstone	fine grained	internal fragment	5	4	2	0.06
206	1	.	slab metate	sandstone	fine grained	edge fragment	6	5	1	0.05
209	1	.	slab metate	sandstone	fine grained	edge fragment	10	6	2	0.12
219	1	.	basin metate	schist	fine grained	edge fragment	10	7	4	0.28
222	1	.	slab metate	sandstone	fine grained	edge fragment	7	4	2	0.09

FS	Area	Metate #	Metate Type	Material	Texture	Portion	Length cm	Width cm	Thick cm	Weight kg
228	1	.	slab metate	sandstone	fine grained	edge fragment	6	3	3	0.09
229	1	.	metate fragment	sandstone	fine grained	edge fragment	8	6	3	0.24
233	1	.	metate fragment	metamorphic	medium grained	indeterminate	6	5	4	0.19
235	1	.	metate fragment	sandstone	fine grained	edge fragment	7	5	2	0.11
237	1	.	slab metate	sandstone	fine grained	corner fragment	1	6	2	0.15
242	1	.	metate fragment	sandstone	fine grained	indeterminate	4	3	1	0.01
245	1	.	basin metate	sandstone	fine grained	internal fragment	8	7	3	0.02
246	1	.	metate fragment	sandstone	fine grained	edge fragment	8	7	2	0.12
247	1	.	metate fragment	quartzite	coarse grained	indeterminate	11	6	6	0.53
256	1	.	metate fragment	granite	medium grained	edge fragment	20	10	7	0.52
267	1	.	metate fragment	quartzite	medium grained	edge fragment	11	4	1	0.04
272	1	.	metate fragment	sandstone	fine grained	internal fragment	6	3	2	0.06
276	1	.	basin metate	sandstone	fine grained	edge fragment	11	6	2	0.15
277	1	.	basin metate	sandstone	coarse grained	edge fragment	9	5	3	0.12
278	1	.	metate fragment	quartzite	medium grained	indeterminate	7	5	3	0.16
285	1	.	metate fragment	granite	coarse grained	indeterminate	6	4	1	0.03
214	1	1	basin metate	rhyolite	fine grained	edge fragment	10	6	7	0.09
217	1	1	basin metate	rhyolite	fine grained	corner fragment	12	7	7	1.45
221	1	3	basin metate	sandstone	fine grained	internal fragment	10	8	5	0.40
223	1	3	basin metate	sandstone	fine grained	edge fragment	9	8	5	0.46
224	1	3	basin metate	sandstone	fine grained	internal fragment	7	5	5	0.24

FS	Area	Metate #	Metate Type	Material	Texture	Portion	Length cm	Width cm	Thick cm	Weight kg
225	1	3	basin metate	sandstone	fine grained	internal fragment	6	5	5	0.21
226	1	3	basin metate	sandstone	fine grained	edge fragment	7	7	5	0.22
227	1	3	basin metate	sandstone	fine grained	edge fragment	6	6	5	0.34
230	1	3	basin metate	sandstone	fine grained	corner fragment	9	7	5	0.59
232	1	3	basin metate	sandstone	fine grained	edge fragment	9	6	5	0.51
236	1	3	basin metate	sandstone	fine grained	edge fragment	10	5	5	0.33
231	1	3	basin metate	sandstone	fine grained	edge fragment	7	5	5	0.26
35	1	4	basin metate	schist	medium grained	edge fragment	10	7	6	0.95
249	1	4	basin metate	schist	medium grained	edge fragment	12	9	1	0.15
251	1	4	basin metate	schist	medium grained	internal fragment	16	12	7	2.30
257	1	4	basin metate	schist	medium grained	indeterminate	7	4	3	0.10
259	1	4	basin metate	schist	medium grained	indeterminate	6	5	3	0.10
260	1	4	basin metate	granite	medium grained	indeterminate	10	6	3	0.15
254	1	5	trough metate	granite	coarse grained	edge fragment	21	12	6	2.25
255	1	5	trough metate	granite	coarse grained	internal fragment	25	13	10	4.30
238	1	8	basin metate	vesicular basalt	fine grained	corner fragment	23	17	7	4.35
115	2	9	trough metate, open-end	metamorphic	coarse grained	end fragment	40	25	12	9.70

(n=1). All materials, with the exception of basalt and rhyolite, are available within the project area.

Metates displayed varying amounts of use-wear and modification. Metate 1 exhibited moderate amounts of wear and a moderately developed basin. The grinding surface exhibited peck marks consistent with reworking. Metates 3 and 4 exhibited moderately developed basins and sharpening of the grinding surface. Metate 4 has flaked margins suggesting it had been shaped into

its present form. Metates 5 and 9 exhibited heavy use-wear and well-developed troughs. Metate 9 was ground along the margins suggesting it was modified to its present form. Metate 8 displayed a moderately developed basin and was flaked along its margins.

Faunal Remains

A lightly burned rabbit scapula was recovered from Feature 6, Area 1. The light burning indicates it was discarded into a partly active fire, such as an ash and coal bed. Its context suggests that the small hearth was used for heating and meat-roasting.

Site Summary

Excavation focused on Areas 1, 2, and 3 with additional recording of Areas 4-8 to assess their data potential and delineate preservation easements. LA 116420 is a spatially extensive site that is comprised of many short-term occupation components located on the terrace slope above the Cañada del Rancho flood plain. Artifact types and stratigraphic context are indicative of occupation dates sometime between 1200 B.C. and A.D. 1350. Excavations revealed surface or shallow cultural deposits within Areas 1 and 3 with a deeper cultural deposit reflecting tool manufacture and maintenance in Area 2. Low frequency artifact concentrations consisting of high proportions of tools and tool manufacturing debris, grinding implements, and clusters of ancestral Pueblo utility ware pottery remain from processing resources acquired by hunting and foraging. The presence of 14 thermal features scattered across the site are additional evidence for a focus on acquisition and processing of a wide range of biotic resources. The pit structure foundation indicates seasonal settlement of the area during years when environmental conditions were favorable.

LA 116418 and LA 116420 were expected to have strong potential for addressing problems of chronology, occupation history, subsistence, and mobility for Archaic and ancestral Pueblo populations. In this section the excavation and artifact data are analyzed at the site and intersite level and compared with data recovered from similar sites excavated in the Dos Griegos, Las Campanas, and Santa Fe River areas. Each research domain will be discussed by site and then comparative data will be incorporated into the analysis and discussion.

Chronology

Chronology was examined by collecting temporally diagnostic artifacts and recovering chronometric samples from features or other occupation contexts. Survey evaluation indicated that LA 116418 and LA 116420 were occupied discontinuously between 1800 B.C. and A.D. 1450, with even more transitory occupation occurring during the historic period until the late A.D. 1800s (Tigges 1997; Post 1997). The main question was, when were LA 116418 and LA 116420 occupied?

LA 116418

Chronometric data from LA 116418 were scant, at best. The best source remained the temporally diagnostic artifacts, even after the excavation of two features. Area 1 was the only locus with pottery in a cluster. Two Galisteo Black-on-white sherds were collected from the general site area. No temporally diagnostic artifacts were observed in other areas or recovered from excavations. One-hand manos and slab or basin-style metates are often attributed to Archaic occupations, but are also found in ancestral Pueblo villages (Phagan 1993; Stubbs and Stallings 1953).

In Area 1, there were 27 utility ware sherds from a minimum of three jars. These sherds exhibited plain and smeared-indented surface treatments and high quartz and feldspar and high mica granitic temper types. These sherds fall within the variation described for the Arroyo Hondo Pueblo ceramic assemblage. Over 43,000 utility sherds were tabulated from Arroyo Hondo Pueblo and most of the surface treatment and paste variability cross-cuts time with no significant temporal variation (Habicht-Mauche 1993:17). Unfortunately, the mica-tempered variety, which is more distinctive and might be more temporally sensitive, exhibited no temporal patterning. Therefore, the LA 116418 assemblage is typical of the period between A.D. 1310 and 1425 at Arroyo Hondo Pueblo. From Pindi Pueblo, which had a pre-A.D. 1300 component, Stubbs and Stallings (1953:56-57) observe that the micaceous utility ware is more abundant in the later or A.D. 1325 to 1350 levels. This supports the conclusion that the LA 116418 sherds remain from an A.D. 1325 to A.D. 1425 period and not from an earlier use, such as from Pueblo Alamo, LA 8. These sherds are loosely associated with a dispersed lithic and ground stone artifact scatter. It is tempting to assign this loose artifact cluster to a single component. However, the spatial distribution as shown in Figure 3 indicates a fairly distinct

distribution break between the sherds and ground stone. Lithic artifacts associated with the sherds may be temporally associated.

Dating the other spatial components at LA 116418 is problematic. The deflated remains of Features 1 and 2 did not yield charcoal samples suitable for C-14 dating. Surface obsidian is poorly suited for obsidian hydration dating. Deflated thermal feature morphology has rarely been promising as a temporal indicator. The artifact assemblages reflect hunting and gathering. The high proportion of tool manufacture and maintenance debris relative to debris from core reduction and expedient tool production has been suggested as typical of Archaic occupations (for example, see Hicks 1992; Vierra 1994). However, it does not seem prudent to assign all tool manufacture and maintenance debris or discard to an Archaic occupation when Arroyo Hondo and Chamisa Locita pueblos are distant enough to require some level of logistical organization for foraging and hunting. Foraging and hunting from Arroyo Hondo and Chamisa Locita would have spanned 40 to 75 years of occupation. Annual use of Cañada del Rancho could have produced dispersed, low-density artifact scatters and a high likelihood of reuse of any tools or material remaining from earlier Archaic occupations. One-hand manos are most commonly assigned to Archaic occupations. One-hand manos were also found at Arroyo Hondo and Pindi Pueblos, and are generally found in ancestral Pueblo village contexts. Their utility for processing wild plant products along with hides, pigments, and other substances made them a widespread and long-lasting part of native toolkits.

LA 116420

LA 116420 yielded more temporally sensitive artifacts and samples than LA 116418. Stratigraphy also provides some support for the chronological determinations that are made. Unfortunately, this information does not help with the LA 116418 dating and it increases the time depth of the interpretive framework.

Area 1. Area 1 had five thermal features and an artifact assemblage that included pottery and a projectile point. Unfortunately, only Feature 2 yielded enough charcoal for C-14 dating. The pottery and projectile point provide a general date range for other site occupations.

Area 1, Feature 2, yielded a 17-g juniper charcoal sample that was radiocarbon dated. The sample yielded a calibrated A.D. 550 to 675 (2-sigma, 95 percent probability) date range. This places the age of the tree in the Early Developmental phase (A.D. 500 to 900) of the Rio Grande sequence (Dickson 1979). This is the only reported radiocarbon date from south of the Santa Fe River for this period. Lang (1992) suggests that multicomponent sites along the Cañada de los Alamos, south of the project area, had Early Developmental components based on obsidian hydration dates from near surface contexts, and projectile point styles. This small hearth was spatially associated with Features 1 and 3, but had few artifacts. The presence of charred goosefoot seeds indicates processing.

Two gray corrugated jar sherds were collected from areas separated by 18 m. FS 234 is more similar to sherds recovered from Area 2. FS 234 was within the elongated artifact cluster that occurred within the central and north-central portion of the area. This cluster included a mano and metate fragment and chipped stone debris and tools. This cluster originates upslope near the Feature 1 through 3 cluster. The artifacts may be discard from the feature cluster. Temporal association

between the sherds and other artifacts would suggest intensive foraging and processing activities between A.D. 1325 and 1450. However, the heavily eroded condition of the area may have caused artifacts from temporally disparate occupations to cluster. These artifacts lie on top of the B1 horizon, the old ground surface that contained the biface manufacture debris and projectile point from the Late Archaic period in Area 2. The artifacts recovered from the surface strip in Area 1, 74N/90E, were mixed with the deflated remnant of upper levels of Stratum B1. Therefore, it cannot be said with certainty that some of the artifacts were not discarded during the Late Archaic period. In this case, deflation and erosion may have combined artifacts from occupations that were separated by 1,000 years.

The remaining dispersed scatter of chipped and ground stone artifacts and features derive from short-term occupations. There are no temporally diagnostic artifacts associated with the features that would provide even a general date range. The issues of association and age are clouded by the heavy deflation and erosion. While the distribution of artifacts and features represent numerous components, these components are difficult to date or temporally order.

In summary, Area 1 artifacts and features reflect occupation spanning A.D. 700 to 1450. The evidence for deflated deposits and the potential mixing of Archaic and Pueblo-aged artifacts muddles component and temporal distinctions. One-hand manos and basin metates are common on Archaic era sites, but may also remain from long-distance collecting forays by lower elevation Early Developmental period farmers.

Area 2. Area 2 has two spatially discrete components that may date to different periods. No features were excavated, so C-14 dating is not possible. Dating is relative and based on temporally diagnostic artifact types and stratigraphy.

A 12 m north-south by 10 m east-west area with 46N/42E as the southwest corner contained 11 artifacts. Two gray corrugated sherds were surface collected. These sherds are from the same jar as a sherd from Area 1. Unfortunately, gray corrugated sherds are not temporally sensitive. As discussed for LA 116418, it is most probable that these sherds were made in Arroyo Hondo Pueblo or Chamisa Locita Pueblo between A.D. 1325 and 1450. The dispersed artifact cluster included a mano and metate fragment, suggesting that some of the ground stone remains are from ancestral Pueblo foraging.

The high-frequency artifact concentration centered on the 42N/60E area contained no artifacts besides chipped stone. Most of the obsidian was from the same Cerro del Medio obsidian source. A full range of biface reduction and resharpening flakes was recovered. The artifacts were eroding from and lying on top of the B1 horizon. This B1 horizon appears to be the Archaic era soil level. It is exposed on the surface in the 42N row of the excavation area and is 30 to 40 cm below the modern ground surface in the upslope 43-46N rows. In Area 1, B1 is exposed at or near the surface accounting for the mixing of ancestral Pueblo and Archaic period materials. The single projectile point is similar to specimens from the Northern Rio Grande that Thoms calls Wide-Notch Straight-Base (1977:142). He suggests a date of 100 B.C. to A.D. 200. This date range places the reduction episode at the end of the Late Archaic period or into the Basketmaker II period. Similar projectile points are reported by Irwin-Williams for the En Medio phase along the Rio Puerco of the East (1973, fig. 6). Ojala Cave (LA 12566) along the west bank of the Rio Grande, in Bandelier National Monument, yielded two projectile points of similar size and morphology from Levels 5 and 6, which

are confusingly reported as Late Archaic (based on C-14 dates) or Basketmaker II-III (Waber et al. 1982:334). Occupation Level 5 was C-14 dated to 590 B.C. and 670 B.C. (uncorrected). This is 500 years earlier than suggested by Thoms (1977), but places the style firmly in the Late Archaic period. Also recovered from Occupation Level 5 were two kernels of corn. If the corn kernels are truly contemporaneous with the C-14 dated charcoal, then this is the earliest corn evidence found in the Northern Rio Grande.

Area 3. Area 3 had two side-by-side roasting pits at 85N/13E. The roasting pits were spatially isolated from other site features or components. No temporally diagnostic artifacts were recovered from near or within the features. The feature bases were on or near the sandstone bedrock, exposed on the surface, and heavily deflated. Cobble-filled roasting pits are common facilities throughout the piñon-juniper piedmont north of the Santa Fe River. Las Campanas de Santa Fe excavations exposed numerous cobble-filled roasting pits, often associated with Santa Fe Black-on-white pottery (LA 86150, LA 98690, and LA 86159 [Post 1996]). Other ancestral Pueblo era roasting pits and thermal features were excavated at sites along the Santa Fe Relief Route (LA 61286, LA 61287, LA 61289, LA 61293, LA 61290, LA 61302, LA 108902, and LA 113954 [Wolfman et al. 1989; Post 1998a]). Similar features have been excavated at Archaic period sites. The Archaic period thermal features are usually not as densely packed with cobbles and the cobbles tend to be more heavily fire-cracked. This is a subjective assessment, however, that still needs to be tested. Based on morphological similarity with other ancestral Pueblo thermal features, Features 5 and 7 can be tentatively assigned to the same period.

Area 8. Area 8 is east of Area 1 and consists of unexcavated thermal features and a scatter of chipped and ground stone artifacts and pottery. Two projectile points and two sherds of pottery were surface collected and represent a wide temporal range. The two projectile points are most similar to forms found on other sites in the Northern Rio Grande and assigned to the Late Archaic period (Thoms 1977; Irwin-Willams 1973). Distinctive morphology may indicate that the projectile points were made at different times during the Archaic period. The "Santa Cruz Barbed" style projectile point (Thoms 1977:133) has a suggested manufacture range of 1000 B.C. to A.D. 400. The "Short Wide-Barbed" style projectile point has a suggested date range of A.D. 1 to 400 (Thoms 1977:139). The multiple features and variety of artifacts suggest that Area 8 was formed by many occupations. It is likely that Late Archaic hunter-gatherers used this area repeatedly. Erosion has removed the top soil and exposed the older substrata so that sequencing occupations is virtually impossible. The evidence for Late Archaic period occupations fits well with the materials recovered from the other areas and LA 116418.

Two Glaze F or Kotyiti Polychrome sherds were collected from the surface of Area 8. This pottery type was manufactured from A.D. 1625 to 1700 and was a major type during pre-Revolt occupations of Galisteo Basin and Middle Rio Grande or Keres pueblos (Warren 1979). Its presence at Rancho Viejo is confirmation of the long-lasting pattern of transhumance. The New Mexico Southern Railroad grade can be followed to San Marcos Pueblo and likely follows a Pueblo and Spanish Colonial road or trail. Travel between San Marcos and Pecos Pueblo could have followed this route as would travel between Galisteo or San Marcos and Santa Fe. Because of the constant threat from Apachean groups it is unlikely that any concerted effort to collect or procure resources from this area occurred after the late fifteenth or early sixteenth centuries. The occurrence of artifacts from a 2,700-year span underscores the complexity and difficulty of assigning dates to isolated features and artifact clusters.

Comparison of Manos from Rancho Viejo, Las Campanas, and Arroyo Hondo Pueblo

One-hand manos are often interpreted as the mainstay of the Archaic hunter-gatherer vegetal processing toolkit and technology. The co-occurrence of one-hand manos and basin metates with an absence of pottery is often used to identify Archaic period sites. However, one-hand manos are regularly recovered from ancestral Pueblo contexts throughout the Anasazi and Mogollon culture areas. Therefore, one-hand manos found in landscape or field contexts cannot be unequivocally assigned to the Archaic period. Because of the obvious mixing of Archaic and ancestral Pueblo components at LA 116418 and LA 116420, a more informed perspective on one-hand manos and functional-temporal divisions was considered important.

The basic question was: Are there size differences between one-hand manos recovered from landscape or field contexts, Archaic hunter-gather camps and residences, and an ancestral Pueblo residential context that may reflect differing technological organization within foraging and collecting strategies? Conditioning factors that might influence one-hand mano dimensions are raw material source composition, season, and site type. In this example, material source composition and location should not be a major factor. All sites are located where gravel deposits contain a wide size range of metamorphic and igneous cobbles from basically the same geological formation. Season would condition the mano forms, since vegetal resources are seasonally dependent. Summer grass seed processing might require different, though probably not radically different, one-hand mano sizes than piñon nut grinding or yucca fruit mashing. Site type is not meant typologically, but more in terms of the range of activities. Residential sites with multiple facilities and a longer occupation length might experience a wider range of activities, which would require different sized manos. Also a more sedentary occupation would allow large, less portable one-hand manos to be incorporated into the grinding or processing toolkit. Certainly, the Arroyo Hondo Pueblo assemblage should reflect the widest range of activities possible, since it was occupied for 60 or 70 years. Archaic base camps also should show greater variability, though perhaps not as much as Arroyo Hondo Pueblo. Logistical base camps or extraction site activities may be focused on particular, seasonally available or abundant resources. Certain one-hand mano sizes may be more efficient for processing, small manos would be more portable, and if time was not spent on manufacturing one-hand manos, then they might have been part of the curated assemblage. Ancestral Pueblo foragers had many options available for field processing manos. Manos could be brought from the village with the relative short distance less of an influence on size, especially if manos were cached for annual use. Manos from exposed Archaic sites could be recycled and used, or manos may not have been brought into the field, rather unprocessed gathered vegetal resources were transported to the village.

A sample of 44 whole one-hand manos was selected from sites that represent the widest range of behaviors attributable to Archaic and ancestral Pueblo populations. Arroyo Hondo Pueblo represents the ancestral Pueblo long-term residential occupation. A component from LA 84787, a logistical or temporary base camp that dated to the Armijo-En Medio phases of the Archaic period was selected because it would have had a wide range of activities, but lacked the permanence associated with architecture. LA 84758 is an Archaiclike residential site with a pit structure and numerous processing facilities. From Rancho Viejo, LA 116418 and LA 116420 manos are included, as well a one-hand mano from LA 110738, which was identified by Legare (1995). In this sample there may be temporal and functional dimensions. For this analysis, the temporal dimension is the focus.

Table 15. Mano Data from Rancho Viejo, Las Campanas, and Arroyo Hondo Pueblo

Site	N	Mean	Standard Deviation	Minimum	Maximum
Length (mm)					
116418	3	103	15	90	120
116420	5	114	9	110	130
From Rancho Viejo	1	100			
Arroyo Hondo Pueblo	18	122	14	103	150
84787	8	104	10	85	118
84758	9	123	15	97	157
Width (mm)					
116418	3	80	10	70	90
116420	5	94	11	80	110
From Rancho Viejo	1	48			
Arroyo Hondo Pueblo	18	98	11	80	122
84787	8	78	12	55	90
84758	9	104	13	87	128
Thickness					
116418	3	40	0	40	40
116420	5	42	11	30	60
From Rancho Viejo	1	48			
Arroyo Hondo Pueblo	18	45	11	24	58
84787	8	45	7	31	50
84758	9	60	8	51	78

Table 15 shows the one-hand mano dimension data summarized by site. Empirically, LA 116418 and LA 84787 have the smallest manos, though the LA 116418 standard deviation is high for length and the sample size is only three artifacts. LA 116420 has a larger or intermediate mano size range with less variability. LA 84758 and Arroyo Hondo Pueblo appear to have the largest manos. There does seem to be functional and temporal variability in the mano dimension data. To test this observation further, a oneway ANOVA was conducted on the sites with more than one mano. The null hypothesis was that there is no significant difference in mano dimensions. Tables 16 and 17 show the results which reject the null hypothesis for all three dimensions. Furthermore a Least Squares Difference test provides a significance level for between site comparisons. It shows that at the .05 significance level, LA 84787 and LA 116418 manos are shorter and narrower than the other three sites (Table 17). LA 84758 manos are significantly thicker than manos from all other sites. LA 116420 manos are more similar in size to LA 84758 and Arroyo Hondo Pueblo manos. These comparisons suggest that LA 116418 manos are more similar to the LA 84787 Late Archaic logistical base camp, even though ancestral Pueblo artifacts were recovered from LA 116418. LA 116420 is

Table 16. Results of Oneway ANOVA for Mano Dimensions

	Sum of Squares	df	Mean Square	F	Sig.
Length-					
Between groups/	3058.672	5	611.734	3.3541	.013
Within groups	6937.056	38			
Total	9995.727	43	182.554		
Width					
Between groups/	3782.75	5	756.55	5.844	.0001
Within groups	4919.5	38			
Total	8702.25	43	129.461		
Thickness					
Between groups/	1910.626	5	382.125	4.488	.003
Within groups	3235.556	38			
Total	5416.182	43	85.146		

Table 17. Least Squares Difference Between Groups Comparison

Site	116418	116420	Arroyo Hondo Pueblo	84787	84758
Length					
116418			X		X
116420					
Arroyo Hondo Pueblo	X			X	
84787			X		X
84758	X			X	
Width					
116418			X		X
116420				X	
Arroyo Hondo Pueblo	X			X	
84787		X	X		X
84758	X			X	
Thickness					
116418					X
116420					X
Arroyo Hondo Pueblo					X
84787					X
84758	X	X	X	X	

Note: X is significantly different at the .05 level

more ambiguous, though small sample size probably has the strongest affect on the variance. From this analysis, we could very tentatively suggest that logistical or special activity sites with smaller manos are probably of Archaic age.

Another way to examine these data are to plot length by width, which provides a visual comparison of manos by site. Figure 23 shows all one-hand manos by length, width, and site. The mean length and width is plotted as a box. The length by width distribution is strongly linear with a Pearson's r value of .88. As mano length increases, so does the width. We can examine the site distribution of manos that fall below the mean length and width. Seventy-five percent of LA 84787 and LA 116420 and 67 percent of LA 116418 manos fall below the mean. Only 36 percent of Arroyo Hondo Pueblo and 11 percent of LA 84758 manos fall below the mean. Clearly, the nonresidential landscape or field sites tend to have smaller manos. This dichotomy between logistical and residential sites seems to have temporal dimension, though Arroyo Hondo Pueblo does have small manos that may have been used to process seasonally available plant resources.

From these analyses it seems that there is a temporal dimension to the one-hand mano distribution by site. If this pattern is robust it would be most useful for suggesting a broad occupation period for logistical sites where temporally diagnostic artifacts are absent. LA 116418 and LA 116420 have mixed temporal components, but it does seem that the one-hand manos primarily remain from the Archaic period or Archaiclike technological organization.

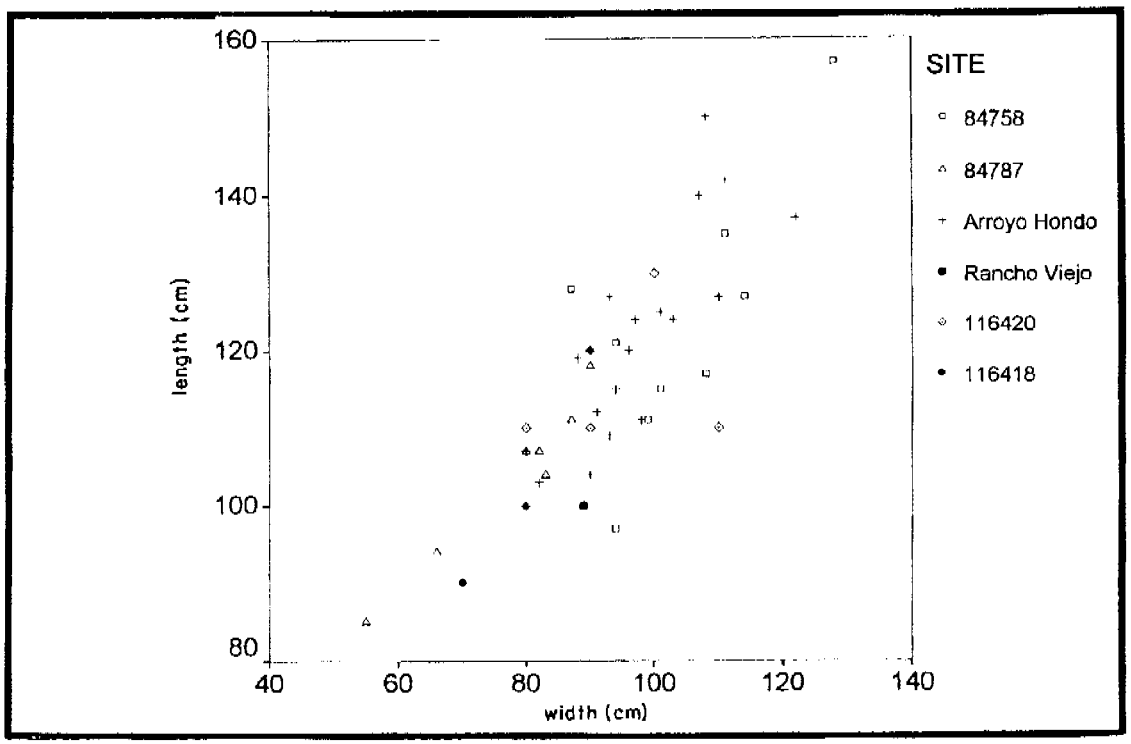

Figure 23. One-hand mano comparison, Archaic sites and Arroyo Hondo Pueblo.

Chronological Summary

Excavation of LA 116418 and LA 116420 yielded one absolute date and relative dates from individual artifacts and artifact assemblage patterns. These chronometric data show that the components of LA 116418 and LA 116420 span at least 2,500 years from an obvious Late Archaic projectile point manufacture station (En Medio period, 800 B.C. to A.D. 1) to early historic period occupations dating to the seventeenth century. Erosion and deflation have mixed deposits of all ages, obscuring potentially datable artifact distributions. The Early Developmental period radiocarbon date from LA 116420, Feature 2, introduces an unexpected dimension of temporal variability suggesting that Archaiclike technological organization was employed by early Pueblo farmers. The low occurrence of pottery from the early Classic period is unexpected given the relative proximity of Arroyo Hondo Pueblo. Clusters of smeared indented corrugated utility pottery mark Arroyo Hondo resident's foraging camps, but low frequencies indicate that pottery was not a regular part of their toolkit or it was rarely broken in the field. Finally, the seventeenth century A.D. pottery collected from LA 116420, Area 8, is a reminder that travel, perhaps between San Marcos or Galisteo pueblos and Santa Fe occurred, but left only the faintest evidence. Obviously, LA 116418 and LA 116420 reflect the full temporal range of occupation of the south Santa Fe area, but no one group stayed very long or regularly returned.

Occupation History

What is the occupation history of LA 116418 and LA 116420? Does the occupation history reflect changes in subsistence pattern and seasonality for Archaic and ancestral Pueblo occupations? Estimating the number of occupations represented by the artifact and feature distributions is critical to chronological and functional studies at the intrasite level. For LA 116418 and LA 116420, discrete spatial distribution of features and artifact concentrations may provide information on short-term occupations that can be used to unravel occupation patterns at sites that have mixed temporal or functional components. The study of site and activity area occupation history and formation will use patterns of artifact density and artifact type distribution to define and characterize occupation episodes.

A major expectation of this project was that LA 116418 and LA 116420 would yield temporally sensitive artifacts or datable samples in association with features or artifact clusters. Dating features and clusters might have allowed for chronological estimates for those areas that lacked temporally diagnostic materials. The research design was written under the assumption that a majority of the spatial components would be investigated, yielding a variety of occupation patterns. Instead, Areas 1, 2, and 3 in LA 116418 and Areas 1, 2, and 3 in LA 116420 were investigated. The others were preserved or no excavation was conducted. Examination of these areas yielded few datable samples or temporally diagnostic artifacts. Spatial distribution of artifacts and features are the best indicators of components, even though dating is sketchy.

LA 116418. How many components are represented by the artifact and feature distribution? LA 116418 had 13 areas with 12 features that were spatially discrete. Only Area 1 was a dispersed artifact scatter that lacked feature remains. It is tempting and probably appropriate to assume that each feature represents a single component. The Area 1 artifact scatter cannot be dealt with so simplistically. This discussion will focus on the artifact and feature distribution and dating, and their relevance to the occupation history and site formation.

Features are good indicators of occupation components because they are stationary. Once a feature is constructed and used, it is a relatively permanent occupation marker. Features could not be moved, but they could be reused or recycled. Reuse and recycling are strong indicators of use patterns that should be evident in the archaeological record and they are strong indicators of the intensity and periodicity of use. In the case of thermal features, feature reuse could be manifested as multiple stratigraphic layers within the feature, the formation of a rock halo outside the feature as unsuitable rocks are removed and replaced, and the accumulation of carbonaceous soil deposit where feature clean-out has been dumped. Any of these indicators would preserve in a moderately stable environment and would be picked up by surface-stripping the feature perimeter and adjacent space. By recycling, users would have removed suitable or intact cobbles for new feature construction, leaving a partial or disarticulated feature behind. Archaeological evidence of recycling would be a partial disarticulation of a feature or complete removal of rocks leaving a charcoal concentration. Recycling should have occurred where features are closely spaced and raw materials are more than a "stone's throw away."

The LA 116418 features can be examined for evidence of reuse and recycling using the traces just described. Excavated thermal features, Features 1 and 2, show no obvious evidence of reuse or recycling. Feature 1 was deflated and eroded, but the internal structure appeared to be intact. Based on rock distribution and frequency it was recorded as cobble-filled. Though it is impossible to know for certain that internal cobbles were not removed, Feature 1 does not appear to be scavenged or reused. A metate fragment within the feature limit suggests that rock was transported to Feature 1 from nearby abandoned activity areas, so that recycling played a part in feature construction. The evidence for reuse suggests that Feature 1 represents a single component. Feature 2 had no remaining pit and the fire-cracked rocks were scattered downslope from the light gray carbonaceous soil stain, which marked the original feature location. The scattered rock and heavily eroded condition obscure the original feature form and content. The scattered rocks and shallow fill deposit suggest that it was never robust. Though the feature condition is poor, there are no indicators that it was reused or recycled and most probably represents a single component.

The remaining nine thermal features that are spread across the site also appear to be single component. Differences in feature dimensions and rock content suggest that they served a wide range of functions. Features 4, 5, 7, and 9 are deflated remnants of hearths that had maximum dimensions of 80 to 125 cm. These features were associated with low frequency artifact scatters and show no obvious evidence of reuse and recycling. The low artifact frequency and the confined limits of the features suggest that they are single component campsites. Spacing between features ranges from 25 to 45 m, suggesting that they were used at different times and were less likely to be scavenged. There is no strong evidence for macroband or large foraging camps, instead most occupations reflect short duration and small group efforts. Feature 10 is unusual because it has oxidized sandstone associated with a historic knife handle. The fire appears to have been constructed on top of a decomposed outcrop of sandstone. A surface fire would be most compatible with overnight or travel-related camping. Features 11 and 12 are different because they are elongated and deflated remains of large roasting pits. Each contains 50 to 100 cobbles, many of which have 15 to 20 cm maximum dimensions. The roasting pits that contained these cobbles may have been 1.75 to 2.00 m in diameter. These two features are unlike the other thermal features at LA 116418 and LA 116420 because of their size and because they have larger and more cobbles. Their similar size and content suggest they represent single contemporaneous occupations.

Area 1 had 46 artifacts dispersed within three low frequency clusters. Artifact classes included sherds, chipped stone debris and tools, and ground stone artifacts. These artifacts were

dispersed, but the distribution plot (see Fig. 3) shows patterning that probably reflects disarticulated activity areas. Two main clusters are evident. The east cluster has chipped stone debris, a hammerstone, and two ground stone fragments. Spatially, these artifacts resemble a single component. The elongated linear scatter that extends the full length of the west half of the gridded area shown in Figure 3 may also be a single temporal component, but may represent many visits during the A.D. 1300 to 1350 period. Three utility ware vessels and small fragments of four different slab or shallow basin metates may be contemporaneous, but from different visits. The main cluster has 11 sherds, a lightly used one-hand mano, and 3 metate fragments. This may be a disarticulated activity area that was scavenged for tools by subsequent foragers. The different metates and ceramic vessels combined with the dispersed tools undoubtedly remain from at least two occupations. Based on spatial distribution and artifact variability, at least four occupations and probably more are suggested for Area 1. The small size of the metate fragments suggests that this area has been scavenged, and more recently, trampled by livestock.

Finally, the deeply buried cultural deposit associated with two metates and a mano is from a more intense, and probably seasonal residential occupation from the Late Archaic period. Based on the limited extent of the carbonaceous soil stain, the deposit probably represents a single component.

In summary, LA 116418 has at least 14 occupation components. Unfortunately, most cannot be dated. The hearths with few or no associated artifacts are from the shortest duration foraging or traveling. Pottery recovered from Area 1 and along the north site limit suggest occupation between A.D. 1300 and 1350 for the upper slope areas such as Areas 1 through 7. The larger hearths in Areas 12 and 13 and the oxidized sandstone in Area 11 are located in middle slope areas. These appear to be more specialized and larger-volume processing features. They may be more functionally specific, though in their eroded condition it would be difficult to ascertain their function or precisely what plant resource was processed. Except for the probable Late Archaic residential occupation in Area 9, use of LA 116418 was short-term and may have varied between general and specific foraging or hunting and traveling. The 13 non-Archaic components probably represent the minimum number of actual site visits by Arroyo Hondo or Chamisa Locita Pueblo residents or later transient groups or individuals. The highly dispersed and fragmentary artifacts in Area 1 suggest scavenging and recycling of tools. While this pattern complicates the identification of occupation components, it lends support to the observation that at least 13 and probably many more visits occurred.

LA 116420. How many occupation components are represented by the feature and artifact distribution of LA 116420? LA 116420 has eight spatially discrete areas that contain features and artifacts or a buried cultural deposit. Excavation of Areas 1, 2, and 3 revealed more complex cultural deposits than were expected from the surface indications. Areas 1 and 3 yielded seven thermal features and Area 2 contained a buried high frequency and density biface manufacture area. Evaluation of occupation components will begin with excavation Areas 1, 2, and 3.

Area 1 was initially recorded as a series of ground stone and lithic artifact clusters with at least two deflated thermal features on their periphery. Excavation exposed three thermal features in a cluster at the north limit and two thermal feature in a cluster at the south limit. Within a 35-m north-south by 32 m east-west area, 1 utility sherd, 34 chipped stone artifacts, and 54 ground stone artifacts were found. The utility ware sherd was the only temporally diagnostic artifact, which minimally indicates at least one A.D. 1300 to 1350 component. Looking at the artifact distribution in Figure 11, there is a clear linear distribution of artifacts south and downslope from the Feature 1, 2, and 3 cluster. Two distinct metates were recognized, with Metate 5 downslope from Feature 1 and Metate

4 downslope from Feature 3. The artifact cluster that extends downslope from the Metate 4 cluster also appears to be an extension of the Feature 1, 2, and 3 activity area. Although the artifact distribution is not continuous, it closely follows the drainage pattern that originates from the Feature 1, 2, and 3 area. The artifact diversity within the cluster, including core and biface reduction flakes, and metate fragments, resembles a discard area from a seasonally occupied camp. Based on the distribution of the artifacts, and their down slope position relative to Features 1, 2, and 3, at least one, and probably no more than two contemporaneous occupations are suggested for this location.

The Feature 4 and 6 cluster at the south limit of Area 1 has only three lithic artifacts. The features are separated by 1.8 m suggesting that they are related. However, the features are morphologically distinct: Feature 4 contained the remains of a fire-cracked rock hearth, and Feature 6 was a basin-shaped thermal feature containing a lightly burned rabbit bone. The low artifact frequency and feature differences favor two brief occupations rather than one, although multiple, proximate features are a repeated pattern for LA 116420.

Within the Area 1 artifact scatter there are two metates that are isolated from the Feature 1, 2, and 3 and Feature 4 and 6 clusters. Their discrete positions within the artifact scatter suggest that they remain from single occupations unrelated to Features 1, 2, and 3 and Feature 4 and 6. It is also possible that they have been separated from the main clusters by post-abandonment scavenging since their location cannot be attributed to downslope erosion from one of the feature areas. Interestingly, four of five manos occur in association with the metates or downslope, suggesting that the mano and metates were toolkits that have been scattered and trampled.

In summary, feature and artifact distribution can be used to suggest that Area 1 had at least four and perhaps six components. This 960-sq-m area was intensively occupied at least during the Early Developmental and early Classic periods. The deep basin or trough metate fragment suggests a Late Archaic or Early Developmental logistically organized component or the use of earlier grinding implements recycled by ancestral Pueblo foragers.

Area 2 had two spatially discrete artifact distributions: the dispersed low frequency scatter of 11 artifacts in the 50N/50E area and the high frequency and density biface production and maintenance area in 42N/60E. These artifact clusters remain from at least two separate occupations.

The 50N/50E cluster had sherds, a mano, metate fragments, a tool, and five pieces of chipped stone debris. The artifacts are scattered over a 110-sq-m area. Unpatterned low frequency artifact scatters displaying even or random distribution might result from resource extraction or short duration specialized activities. The high artifact diversity relative to artifact count may represent a closed correspondence between activity and discard, which would be expected from a single component limited activity site. A diverse, low frequency assemblage may also result from many brief visits, where artifacts are collected from other locations, reused and discarded. Therefore, a series of unrelated activities could produce an assemblage that is clustered and functionally similar, but temporally unrelated (Binford 1982). Low frequency artifact clusters thus present an interesting, but intractable problem in equifinality. Assemblages that look the same may be formed from a totally unrelated sequence of behaviors and events. Given the potential for many short-term occupations, it is unlikely that this assemblage represents a single occupation.

The 42N/60E cluster occupies a 50-sq-m area with artifacts dispersed downslope to the west and southwest. The 1,847 artifacts recovered from this area remain from a short-term, activity-specific occupation. Figure 20 shows an isopleth of artifact density with 20-artifact-contour intervals.

The density plot resembles a pile or dump from which artifact densities radiate and decrease. The single locus concentration results from one biface production and maintenance episode. Most artifacts were from bifacial cores or blanks of Cerro del Medio obsidian with low frequencies of basalt, Madera chert, chalcedony, and Jemez obsidian intermixed. The distribution of non-Cerro del Medio obsidian artifacts closely follows the Cerro del Medio obsidian distribution. The majority of the non-Cerro del Medio obsidian artifacts occur within the seven highest density units, as shown in Figure 21. Co-occurrence of Cerro del Medio obsidian and other material types supports the interpretation that the cluster results from a single episode.

The Area 2 artifact distributions reflect two different occupation patterns with the 50N/50E cluster formed by multiple, short-term, low activity visits and the 42N/60E cluster remaining from a single, high intensity, biface manufacture and maintenance episode. At least two occupations are represented in Area 2, and three to five occupations are a more likely estimate.

Area 3 had two adjacent fire-cracked rock-filled roasting pits associated with a single obsidian flake. There were no other artifacts in the immediate vicinity that would delineate an activity area surrounding the features. Features 5 and 7 are very similar in size, structure, and condition, and can reasonably be interpreted as contemporaneous. Difficult to determine is the sequence of use or if they were used simultaneously. The features contain cobbles of a similar size range and the cobble density is also remarkably alike. Neither feature appeared to be dismantled or disarticulated as if they were scavenged for rock. Their only obvious physical difference is the orientation of the deflated, but discernible interior feature outline. Feature 5 is oriented closely to magnetic north, while Feature 7 is oriented approximately 45 degrees east of north. Feature orientation may reflect prevailing wind direction at the time of construction and use. If wind direction did influence feature orientation, then Features 5 and 7 may have been built at different times and constitute two separate components. However, there is little doubt that Features 5 and 7 date to the same general time period.

Five other areas were identified by survey, but were not excavated. They were reexamined briefly as part of the data recovery effort. Area 6, Feature 10, was isolated and had an associated metate fragment. Areas 4, 7, and 8 each had two thermal features and an associated artifact assemblage, though all artifacts occurred in low frequency. The thermal features have associated ground stone, which combined with the features, form the activity area or component. Low artifact frequencies in all areas suggest short-term logistical or foraging activities. These different assemblage characteristics and artifact-feature associations suggest each thermal feature represents a component. Areas 4, 6, 7, and 8 may represent seven different components. However, as argued in the next section, the dual feature areas may represent extended foraging trips by families, and the specific features were constructed for cooking and processing. The presence of Late Archaic period projectile points and early historic pottery indicate that the activity areas could have accumulated over a 2,500-year period. Finally, Area 5 has a buried carbonaceous soil deposit that could be the remains of a burned structure or heavily used logistical camp. The soil stain is restricted to a 16-sq-m area suggesting that it is a single occupation component. Its probable Late Archaic age fits well with the projectile points that were recovered from upslope in Areas 2 and 8.

In summary, LA 116420 feature and artifact distribution may represent a minimum number of occupations ranging between 15 and 20. Except for the Area 5 occupation, all occupations were relatively brief, but may have incorporated a wide range of foraging and hunting activities. Areas 1, 3, 6, 7, and 8 had multiple thermal features in close proximity with associated grinding implements, stone tools, and low counts of lithic manufacture debris. Artifact-feature clusters suggest that environmental and topographic factors, as well as the availability of reusable artifacts, may have

influenced camp location. Occupations occurred discontinuously over a 2,500-year period, but the hearth clusters suggest that many occupations occurred within a year or generation, as camp locations were reused for available raw materials, facilities, and tools. Dispersed artifact distributions reflect short-term resource extraction with a potentially high association between the artifacts left behind and the activities in which they were used. This potential correspondence among artifacts, activities, and occupation patterns is what makes small sites and components valuable interpretive tools.

Subsistence and Technology

Subsistence and technology are examined in terms of Late Archaic and ancestral Pueblo period occupation and use of the Cañada del Rancho environs. It is assumed that the 25 to 35 occupation components identified for LA 116418 and LA 116420 reflect a wide range of organizational and technological options that were available for seasonal procurement and processing of biotic and geological resources regardless of the primary subsistence strategy. These sites and activity areas represent only a portion of the seasonal round of the mobile Late Archaic hunter-gatherer groups that occupied the Santa Fe River and its north and south tributaries, and the hunting and foraging repertoire of the residents of Arroyo Hondo and Chamisa Locita pueblos.

Do feature and artifact assemblages reflect logistically or village-based subsistence organization? The Chronology and Occupation History discussions have demonstrated that functional-temporal components can be defined in some cases, but that most components are too ephemeral or mixed for conclusive determinations. While making temporal distinctions is important for comparative purposes, it is still useful to examine the overall subsistence and technology data for more universal patterns or variability that reflect different aspects of Late Archaic annual rounds, year-round Puebloan exploitative strategies, or universally employed land-use patterns. Direct evidence from resource processing or consumption should provide the best indicator of on-site activities. Indirect evidence comes from tool manufacture, use, and discard, and feature construction and use. Excavation results from LA 116418 and LA 116420 show indirect evidence of subsistence activities and are discussed in the following section.

LA 116418

Direct subsistence evidence in the form of charred economic plant or faunal remains was recovered only from Feature 1, Area 2. Flotation samples from Feature 1 identified 13 charred goosefoot seeds that may be cultural. Goosefoot is a common Cheno-am recovered from hunter-gathering and foraging thermal facilities. Goosefoot goes to seed in the late summer or early fall. Archaic hunter-gatherers could have combined fall hunting with seed gathering. Long distance to a basecamp may have influenced the decision to process before transport. Fall seed gathering would follow the end of the domesticated plant growing season for ancestral Puebloan foragers. Seeds may have been parched and consumed as field food by Archaic or ancestral Puebloan foragers. The charred goosefoot seeds suggest a processing function for Feature 1, though other activities were undoubtedly carried out.

To further examine subsistence and technology, indirect evidence of feature morphology and structure and tool manufacture is used. The LA 116418 artifact assemblage comprised 15 chipped and 16 ground stone artifacts and 27 sherds from a minimum of three utility ware jars and two

isolated sherds of Galisteo Black-on-white pottery. The assemblage is examined by area and then as a whole.

Area 1 comprised all of the utility ware sherds, eight chipped stone artifacts, two manos, a hammerstone, and eight metate fragments from at least two shallow basin metates. The assemblage was recovered from a 425-sq-m area. Functional associations between artifacts are tenuous. However, pottery was scattered throughout the area suggesting that much of the assemblage resulted from Pueblo foraging. The one-hand manos are more commonly assigned to Archaic hunter-gatherers, though the regular, albeit relatively low intensity use by Pueblo foragers could result in artifact reuse and curation. Because time and function are difficult to associate, the whole Area 1 assemblage is cautiously interpreted.

The Area 1 artifact assemblage seems to result from hunting and gathering. The pottery and ground stone are more commonly interpreted as plant gathering and processing tools. The lack of a large number of sherds from any vessel suggests that only partial containers were brought to the site. Partial pottery vessels may have been used as temporary containers or parching devices. Partial utility jar sherds were found with piñon nut processing features in the piedmont hills north of the Santa Fe River. In the case of LA 61290, nuts and cones were placed on top of the jar sherds within the active fire or coals (Post 1998a). This type of vessel use would be compatible with any seed or nut processing in the area. Unfortunately, direct evidence for ancestral Pueblo plant processing has always been poorly represented in the local archaeological record.

Heavy or intensive grinding of piñon nuts in the field is not expected for ancestral Pueblo foragers. Ethnographic accounts indicate that roasting in the shell for later storage was a common practice (Opler 1941; Ford 1968). Therefore, manos and metates would be unnecessary. It is possible that other seeds or fruits were processed prior to transport back to Arroyo Hondo or Chamisa Locita or that the manos and metates remained from earlier Late Archaic foraging. One mano (FS 19) shows evidence of heavy use on both ground surfaces, a condition that would correspond with intensive plant or resource processing. Another mano (FS 13) shows light and moderate wear on its two ground surface indicating less use, though not casual, expedient, or brief use such as might occur with a single foraging episode. Both manos would seem to indicate processing of seeds or nuts with immediate consumption or long-distance transport; a characteristic of Archaic hunter-gatherers. However, these manos may have been scavenged from exposed Archaic camp deposits and reused in an expedient or casual fashion by Pueblo foragers. This second aspect of a mano's life history can only be inferred by their loose association with other Pueblo era artifacts.

The chipped stone assemblage reflects a very limited reliance on expedient tools and a heavy reliance on formal tools, both in use and manufacture. Juxtaposition of expedient and formal tool manufacture technologies is often used to characterize differences between daily foraging and logistically organized collecting or hunting (Binford 1979, 1980). In this case, the lack of expedient tools and core reduction debris may reflect the lack of abundant, suitable local raw material for tool production as much as technological organization (Andrefsky 1994; Kelly 1988). Along the Arroyo Hondo and its tributaries all raw materials for tool manufacture had to be brought from residences or from a source more than 10 km away. Regardless if the people were Archaic hunter-gatherers or Pueblo foragers, tools or raw material to make tools had to be carried. The effect of raw material availability is evidenced by the fact that seven of the eight chipped stone artifacts recovered from Area 1 are formal tools or tool manufacture debris. These tools have used edges that show damage indicating a wide range of cutting and scraping tasks. FS 21, an obsidian side scraper, has a 70 to 80 degree edge angle that began as a 30 to 40 degree edge angle. FS 31, a side scraper, shows primary

heavy scraping wear, but also has evidence of cutting. Intensive use of available tools would have been another consequence of limited raw material availability. Through time, as debris accumulated, the lack of raw material might have encouraged later Pueblo foragers to scavenge earlier sites for suitable tools (Camilli 1989; Camilli and Ebert 1992). The intensity of tool use and the variety of wear patterns indicate a full range of activities.

The Area 2 assemblage, which was loosely associated with a deflated fire-cracked rock-filled roasting pit (Feature 1), had seven chipped stone and two metate fragments, one of which was incorporated into Feature 1. This assemblage reflects a mixed subsistence strategy based on chipped stone tools and tool manufacture debris. The incorporation of the metate fragment into the feature indicates scavenging or reuse of site furniture (Binford 1979:273-274; Camilli 1989). The occurrence of many whole and fragmentary metates lying on the site surface and in the nearby arroyos indicates that they were a ready-made and viable resource. The many metate fragments indicate that they were used until their utility was exhausted. The small fragment size for some examples results from livestock trampling.

The chipped stone assemblage included biface reduction flakes from four different tools made from four different materials. This one-to-one correspondence suggests systematic or careful reduction of raw materials or blanks, since replacement materials were unavailable. This kind of behavior would be more expected from a group that knew materials could not be easily replaced. Daily foragers from Arroyo Hondo or Chamisa Locita pueblos would have access to stockpiled materials collected from local or regional sources. Groups using the area seasonally would not have stockpiled materials and would have transported all materials. Depletion of raw material for tool manufacture would require an unscheduled trip to a gravel or bedded source. A day's travel for raw material would not be critical, unless the scheduling margin for hunting and processing was tight. Reliable raw materials and tools were critical to logistically organized hunter-gatherers (Binford 1979; Kelly 1988; Bleed 1986). The general lack of core reduction debris or expedient tools relative to the high proportion of heavily used discarded tools and tool-making debris indicate that tools were intensively used and replaced through the systematic reduction of tool blanks or prepared cores. If cores were brought to the site, they were rarely exhausted, since only one core was recovered from LA 116418 and LA 116420.

Area 1 and 2 artifact assemblages reflect the discard of intensively used stone tools for hunting and meat-processing, processing of hard or coarse raw materials, such as wood, plant processing, and temporary storage or containment of processed foodstuffs. The scattered spatial distribution of the artifacts makes it difficult to ascribe activities to a particular occupation or period. The low artifact frequencies indicate that no occupation lasted very long and that tools and raw materials were carefully conserved.

The feature distribution at LA 116418 is dispersed; multiple occupations resulted in the reuse of tools or raw material, but not the facilities. This dispersed distribution is complemented by feature morphology and structure, which exhibits considerable variability. Of course, without full excavation of the features, only general observations can be made about feature function. Even with excavation, thermal feature functions are difficult to identify. The features can be divided into four classes: simple (Features 5, 6, and 10), cobble or slab-ringed/lined (Features 2, 4, and 7), fire-cracked rock-filled (Features 1, 3, and 9), and cobble-filled (Features 11 and 12). The first three classes are small- to moderate-sized with maximum dimensions ranging between 52 and 180 cm and appear to be single-use or small group facilities, such as would support daily foraging or overnight hunting or traveling.

Simple hearths lack regular outline, rock-lining, internal fire-cracked rock, or burned cobbles. Features 5, 6, and 10 appear to be surface fires with ash and charcoal migrating into subsurface soils leaving an ephemeral, but erosion resistant, remnant. Simple hearths may have been used numerous ways, but the resulting archaeological feature lacks evidence that a fire was built for more than heat or immediate meat-roasting or cooking. Without internal structure or a lining, these features lack attributes that would promote or support reuse. Feature 5 has charred small mammal bone exposed, suggesting a minimal use for meat roasting. Feature 10 has an associated basin metate, but there are no other physical attributes or associated artifacts that indicate plant processing.

Cobble-ringed or slab-lined thermal features represent a more formalized feature with the limits bounded by a ring or lining that contained the fire or hot coals. Features 2, 4, and 7 have this enclosing structure. Possible benefits of a cobble-ring or slab-lining include fire containment (requiring less attention), fuel suspension and platform formation, increased temperature through radiated heat, and built features could have been relocated for subsequent use if desired. These features could have been intended for reuse, though the general absence of artifacts is more indicative of a single use.

Fire-cracked, rock-filled thermal features had altered metamorphic cobbles within the feature limit. Features 1, 3, and 9 had at least a shallow basin that contained live coals or fire that was covered with rock. The rock is fire-cracked from heat or repeated exposure to heat. The rocks absorbed heat and buffered processed resources from live coals or fire, while still parching or roasting the food. Features of this kind have been found with charred piñon nut shells along the Santa Fe River (Post 1998a), and ethnographically have been described for yucca shoot roasting (Opler 1941:355). Feature capacity for roasting is less than a bushel, suggesting that they were probably used by single families. Interior rocks would preserve the roasting pit for reuse and mark the area as a suitable camp and foraging location. Feature 1 has an associated dispersed artifact scatter, which indicates other activities were combined with gathering and processing. Features 3 and 6 are isolated and lack associated artifacts, which could indicate single event or daily gathering and processing by Arroyo Hondo or Chamisa Locita residents.

Cobble-filled thermal features are different from fire-cracked rock-filled thermal features because the lower interior portion of the feature was filled with cobbles. In contrast, fire-cracked rock-filled features were not completely filled, leaving air spaces or gaps between rocks. The former may have smothered the fire, while the latter would allow the fire to be reignited. Features 11 and 12 are clustered in the southwest portion of LA 116418. They were filled with fist-size and larger cobbles, and based on the cobble spread, were quite large. These facilities would have increased capacity and may represent communal gathering and processing. Large features could be reused and would be easily relocated. A similar feature was excavated at LA 86150 north of the Santa Fe River. This densely packed and heavily burned feature lacked associated artifacts, but was C-14 dated to two-sigma cal. A.D. 1020-1220 (Beta-81971) (Post 1996:196). Similarity in form does not mean similar age or function, but ancestral Pueblo processing of large quantities of seasonally available cactus or yucca fruits within these features is a reasonable interpretation.

An examination of the artifact and feature assemblages and their spatial distribution and relationships provides limited information with which to infer subsistence activities. Better demonstrated is the organization of subsistence activities. Obviously, hunting and gathering and traveling were the main activities. Artifact assemblages do not occur in concentrations that would suggest seasonal occupations focused on farming. Instead, artifact assemblage frequencies are low and dispersed and have a high proportion of discarded chipped and ground stone tools relative to

tool-making debris. In fact, many features have only one, two, or no associated artifacts. This indicates a high correspondence between features, tools, and activities. From the Archaic perspective, this pattern indicates highly mobile, brief occupations focused on a few abundant resources that could be gathered or acquired with a minimum of tool breakage and discard and accumulation. These would be the quintessential logistical camps, which were highly targeted with tools and raw materials brought to the site, used sparingly, and carried off for future use. From the ancestral Pueblo perspective, small foraging camps less than 5 km from Arroyo Hondo or Chamisa Locita villages would allow for maximum gathering of seasonal resources and limited processing, reducing the weight for transport. In-field processing or cooking for meals would leave roasting features on the landscape. The larger and more formal the feature construction, the more likely that processing was an integral part of annual foraging. Discontinuous occupation of the area left artifacts and features available for reuse, so that the cost of tool transport, especially grinding tools, was reduced.

LA 116420

Direct subsistence evidence in the form of charred economic plant or faunal remains was recovered from Features 2, 3, and 6 in Area 1. Charred goosefoot seeds came from Features 2 and 3, and Feature 3 yielded Cheno-am and mint seeds, as well. As discussed earlier, this feature was C-14 dated to the Early Developmental period, a time when there is very limited evidence of prehistoric occupation in the Northern Rio Grande. Goosefoot and mint seeds were available in the late summer and early fall, which was also a primary season for large-game hunting. Late Developmental farmers may have moved into the Northern Rio Grande from the south for food and resource acquisition. In other words, seasonal farmers became hunter-gatherers when farming task requirements diminished. Seeds recovered from these features may reflect pretransport processing and field consumption. Mint seeds and greasewood/saltbush charcoal suggest exploitation of a wide spectrum of plants within and on the margins of the riparian zone.

Feature 6 yielded one rabbit scapula suggesting that the feature was used for meat-roasting in conjunction with overnight travel or foraging. There is no formal feature construction beyond a shallow pit excavation and there were few associated artifacts indicating limited or brief occupation.

As was true for LA 116418, indirect evidence of feature morphology and structure, and tool manufacture and use is available to examine subsistence and technology. The LA 116420 artifact assemblage comprised 1,881 chipped and 59 ground stone artifacts, 6 sherds from a minimum of two utility ware jars, and 2 sherds of Glaze F pottery. The assemblage is examined by area and then as a whole.

Area 1 had 1 utility ware sherd, 34 chipped stone artifacts, 9 one-hand manos or mano fragments, 21 basin metates, 6 slab metates, 2 trough metates, and 17 indeterminate metate fragments. The assemblage was recovered from a 1,120-sq-m area. Clustering of chipped and ground stone artifacts suggest they are temporally and functionally associated. The one-hand manos are more commonly assigned to Archaic hunter-gatherers, though the regular, relatively low intensity use by Pueblo foragers could result in artifact reuse and curation. Also, the middle slope of Area 1 has Archaic period soils exposed by erosion. Erosion has removed soil that may have separated temporally disparate components. The C-14 date from Feature 2 indicates that part of the occupation occurred during the A.D. 600s. The single utility ware sherd indicates occupation between A.D. 1100 and 1400. The Area 1 artifact assemblage and distribution remains from at least 2,000 years of occupation make functional differentiation of temporal components difficult. Therefore, the

functional aspects of the Area 1 assemblage will be discussed as a whole.

The Area 1 artifact assemblage obviously results from hunting and gathering. Pottery and ground stone tools are most commonly interpreted as supporting plant gathering and processing. The single sherd recovered from Area 1 may remain from partial vessels that were used as temporary containers or parching devices. Partial utility jar sherds were found with piñon nut processing features in the piedmont hills north of the Santa Fe River. In the case of LA 61290, nuts and cones were placed on top of the jar sherds within the active fire or coals (Post 1998a). This type of vessel use would be compatible with any seed or nut processing in the area.

Heavy or intensive grinding of piñon nuts in the field is not expected for ancestral Pueblo foragers. Ethnographic accounts indicate that roasting in the shell for later storage was a common practice (Opler 1941; Ford 1968). Piñon nuts were often combined with other fruits or seeds as cakes or breads that could be easily transported and stored at a residence for winter consumption. Archaic collectors may have intensively processed and combined seed, nuts, or fruits before transporting foods to distant residences. Therefore, manos and metates would not necessarily be used to process only nuts, but may have been desirable for combining foodstuffs. Examination of mano surfaces for use-wear provides some insight into processing. Two manos (FS 215 and FS 244) show evidence of heavy use on both ground surfaces, a condition that would correspond with intensive plant or resource processing. Manos FS 118 and FS 208 have moderate wear on one ground surface indicating expedient or brief use such as might occur with a single foraging episode. Mano FS 282 exhibits moderate and heavy wear on two sides indicating intensive or heavy processing. All manos seem to indicate processing of seeds or nuts for immediate consumption or long-distance transport, a characteristic of Archaic hunter-gatherers. However, these manos may have been scavenged from exposed Archaic camp deposits and reused in an expedient or casual fashion by Pueblo foragers.

The chipped stone assemblage reflects a very limited reliance on expedient tools and a heavy reliance on formal tools, both in use and manufacture. Differences in expedient and formal tool manufacture technologies is often used to contrast daily foraging versus logistically organized collecting or hunting (Binford 1979, 1980). In this case, the lack of expedient tools and core reduction debris depends more on the lack of abundant, suitable local raw material for tool production (Andrefsky 1994; Kelly 1988). Without suitable raw material, all raw material had to be carried to the Arroyo Hondo tributary drainages. Twenty-nine of the 35 artifacts were made from materials that have sources 10 or more kilometers from the site. Longer distance to source areas may have conditioned formal tool and manufacture debris counts, which account for 77 percent of the chipped stone artifacts. These tools have used edges that show damage from a wide range of cutting and scraping tasks. Edge angles range between 40 and 75 degrees; the three tools that are not biface fragments have two or more used edges. The wide range of edge angles and the multiple edges suggest that flake tool use was varied and that scarce raw material promoted intensive tool use. In other words, suitable flakes were used until they were exhausted, broken, or the task completed and the site abandoned. One biface, FS 241, exhibited evidence of reworking, which is another indicator of intensive tool use. The lack of raw material might have encouraged later Pueblo foragers to scavenge earlier sites for suitable tools or debris to use as tools (Camilli 1989; Camilli and Ebert 1992).

Based on drainage patterns and artifact distribution, two possible artifact clusters can be distinguished. These are in the north and south halves of Area 1. To determine if these clusters exhibited artifact assemblage distributions from functionally specific occupations, artifact type, material type, and artifact size were examined. Artifact type showed almost identical percentages of

tools and tool-making debris for both clusters. Material type shows that all materials found in the south cluster occur in the north cluster. There is more variety in the north cluster, but all material types with two or more artifacts occur in both clusters, with the exception of chalcedony and nonvesicular basalt. Artifact size, as measured by a length-to-width scatterplot, showed no distinct patterning. The lower frequency south cluster artifacts were interspersed with the more abundant north cluster size distribution. Subjective examination of these three variables suggests that all chipped stone artifacts are from a similar range of activities. The combined chipped and ground stone assemblages reflect generalized subsistence with hunting and foraging equally represented. This highly curated chipped stone tool assemblage and evidence for intensive on-site plant processing may be the remains of logistical base camps, with small groups or families moving to abundant resource patches to gather, process, and transport resources back to seasonal residences.

The Area 2 assemblage is different from other site or project assemblages in its high frequency of debris from stone tool manufacture. The Area 2 artifact assemblage included 1,847 chipped stone artifacts with 1 complete dart point, 4 metate fragments, 1 mano fragment, and 2 sherds of utility ware pottery. The ground stone and pottery are scattered over a 110-sq-m area forming a similar distribution to Area 1 of LA 116418 (50N/50E cluster). This scatter remains from at least one, and probably multiple occupations. Two of the Area 2 metate fragments were recovered from 20 to 25 m west of the main cluster, reinforcing the impression that artifacts, and especially ground stone, were regularly moved between locations.

Within a 50-sq-m area, the main artifact cluster (42N/60E) had 1,842 pieces of tool manufacture debris and a small percentage of core reduction flakes and debris. The density plot (see Fig. 20) shows a spatially unimodal distribution with the highest artifact frequencies tied to four grids and then decreasing in all directions. The distribution spread reflects downslope movement of artifacts away from the central cluster. This pattern indicates a single occupation or manufacture episode. Tool manufacture and core reduction evidence is primarily from 1,798 pieces of Cerro del Medio obsidian. Other materials, including Jemez obsidian, total 44 artifacts. The non-Cerro del Medio obsidian materials were tool manufacture debris. Only Madera chert has more core flakes (n=2) than biface manufacture flakes (n=1). The low frequencies indicate that a variety of tools may have been produced or refurbished in addition to biface or projectile point production. The projectile point was made from Jemez obsidian that has a reworked impact scar at the tip. Size reduction caused by reworking may have led to its discard with the production debris. This discard behavior is somewhat unusual considering the tool-intensive use indicated by other assemblages, which suggested the maximum utilization regardless of use. However, in this case, the co-occurrence with the high-frequency debris pile suggests that abundant raw material existed for replacement. Two other bifaces were broken in manufacture, indicating that at least one production goal was projectile points.

Of main interest are the 1,798 pieces of Cerro del Medio debris. The Cerro del Medio obsidian was brought to the site in a reduced state as indicated by only 2 out of 319 whole flakes that had dorsal cortex. Reduction stages can be grossly modeled using flake dimensions. For this study, early stage flakes had a maximum dimension greater than 20 mm. Middle stage flakes have a maximum dimension ranging between 11 and 20 mm. Late stage flakes, which include most of the resharpening or edge thinning debris, had a maximum dimension between 1 and 10 mm. Table 18 shows the flake dimension distribution by size length and width class. Small flakes make up more than one-half of the assemblage. By comparison large flakes account for only 13 percent of the assemblage. This suggests that relatively small bifacial cores or tool blanks were reduced. The high proportion of small flakes suggests that finished bifaces were made, and the flintknapper(s) were

Table 18. Contingency Table for Whole Flake Length and Width Comparison, LA 116420, Area 2

count row column	Small Width (1-10 mm)	Medium Width (11-20 mm)	Large Width (21+ mm)	Total
Small length (1-10 mm)	291 87.9 78.4	40 12.1 26.5		331 58.9
Medium length (11-20 mm)	75 42.9 20.2	81 46.3 53.6	19 10.9 47.5	175 31.1
Large length (21+mm)	5 8.9 1.3	30 53.6 19.9	21 37.5 52.5	56 10.0
Total	371 66.0	151 26.9	40 7.1	562

gearing up for hunting and subsequent meat processing. The absence of other tool types or artifacts further emphasized this assemblage as dart production discard. This cluster would appear to be the last place a hunter(s) stopped before beginning the hunt. Hunters may have come from along the Rio Grande or edge of the Pajarito Plateau, up the Galisteo Creek, and north along one of the tributary arroyos to the Cañada del Rancho area (Lang 1992).

The remains of fourteen thermal features were recorded or excavated at LA 116420. Seven features were excavated in Areas 1 and 3 and seven features were identified by surface indications, but not excavated. The feature distribution at LA 116420 is different from LA 116418 in that most features occur in clusters of two or more; only Feature 10 in Area 6 occurs alone. The LA 116420 features can be divided into two classes: simple (Features 2, 6, 8, 12, and 14) and fire-cracked rock-filled (Features 1, 3, 4, 5, 7, 9, 10, 11, and 13). All thermal features were small to moderate-sized with maximum dimensions ranging between 34 and 150 cm. They appear to be single-use or small group facilities, such as would support daily foraging or overnight hunting or traveling.

Simple hearths, as they appear on the surface, lack regular outline, rock-lining, or internal fire-cracked rock or burned cobbles. Excavation of Features 2 and 6 indicate that some of the simple hearths may be small circular or oval-shaped. Feature 2 was filled with charred juniper, but no artifacts. The incompletely carbonized wood is an indication that the fire was smothered, while still active. It yielded 51 charred goosefoot seeds indicating some use for seed parching or roasting for transport and consumption. Feature 6 had lightly charcoal-infused soil, did not display obvious evidence of heavy burning, but did contain a single rabbit scapula indicating meat roasting. The pit was intentionally dug into the subsoil and was not formed by charcoal-infused soil percolation. Features 2 and 6 demonstrate that the simple hearths may look like surface hearths, but excavation may yield hearth contents and reveal formal or intentional structure. Features 8 and 10 have associated chipped and ground stone assemblages, suggesting integration with general foraging activities. The lack of internal structure or a lining indicate these are single-episode features.

Fire-cracked rock-filled thermal features had altered metamorphic cobbles within the feature limit. Features 1, 3, 4, 5, 7, 9, 10, 11, and 13 had at least a shallow basin that contained live coals or fire that was covered with rock. They were probably used in a manner similar to Feature 1 from LA 116418. Features 1 and 3 have an associated artifact concentration that has washed downslope and was previously described as the north cluster of Area 2. The artifact and feature association indicates construction and use of these features with a full range of hunting, gathering, and processing activities. Features 5 and 7 were side-by-side features separated by less than 2 m. The feature size, fire-cracked rock content, and general appearance are virtually identical. Neither feature shows evidence of scavenging and both are deflated. It is possible that side-by-side features were a way in which to increase roasting or processing capacity without constructing a large and potentially unmanageable feature. Feature 11 had a basin metate and one-hand mano lying within and next to the feature. This close spatial association strongly supports the observation that fire-cracked rock-filled features were closely tied to plant processing. While it is tempting to assign a Late Archaic age to this Feature 11 cluster, it is just as likely that the feature is an Early Developmental phase manifestation reflecting logistical hunting and gathering by nonlocal sedentary groups. As first observed, the fire-cracked rock-filled features show a strong tendency to cluster or to be associated with simple hearths. There is no absolute chronometric evidence with which to argue feature contemporaneity. However, it does seem likely that if long-distance gathering parties used this area, hunting would be an integral part of daily subsistence as well as a strategy to take dried meat back to the main residence. Opler (1941:355) describes long-distance gathering by historic Chiricahua Apache women as, "Should the destination be so distant that the group cannot hope to return for some days, men or youths go along to protect them and assist in the heavy work." He also observes that from early spring to the beginning of winter, women and sometimes their family or extended family will leave the village. Temporary residential camps were established, and while the women gathered the plant crop, the men would hunt (Opler 1941:364). It is this kind of occupation pattern that might result in feature clusters of different types. For LA 116420, this pattern is suggested by Features 1, 2, and 3, Features 4 and 6, Features 11 and 12, and Features 13 and 14. In other words, long-distance collecting and hunting may have been one of the primary behaviors that contributed to the LA 116420 site structure.

An examination of the artifact and feature assemblages and their spatial distribution and relationships provides limited information from which to infer subsistence activities. Better demonstrated is the organization of subsistence activities. Obviously, hunting, gathering, and plant processing and were the main activities. Area 1 had a feature cluster with a diverse stone tool assemblage, perhaps remaining from long-distance hunting and collecting forays. Area 1 may serve as the model for other artifact and feature clusters, such as Areas 4, 7, and 8. Area 2 has a low density concentration, which reflects low intensity occupation, perhaps by daily foragers or hunters from Arroyo Hondo or Chamisa Locita. Area 2 also has a high density, Late Archaic tool manufacture area that remains from a single-episode occupation by one or a small group of hunters. Area 3 has side-by-side fire-cracked rock-filled roasting pits with few associated artifacts. Their co-occurrence may reflect a strategy for increasing roasting capacity without building the large cobble-filled roasting pits found at LA 116418. From the archaeological evidence recovered from LA 116420, subsistence organization can be inferred to have incorporated a wide range of strategies related to daily and long-distance hunting, gathering, and foraging. In contrast to LA 116418, the LA 116420 activities may have been logistically organized—families or extended families moved to the Cañada del Rancho to collect and process resources for overwintering and early spring consumption. It appears that the gathering was accompanied by hunting, which would increase the potential food stores for winter consumption.

LA 116418 and LA 116420 initially seem to represent a similar range of activities and subsistence strategy and organization. Both sites have dispersed feature distributions with low to moderate artifact density, with the exception of LA 116420, Area 2. Both sites have stone tool assemblages that remain from hunting and gathering including primarily tool manufacture debris, exhausted tools with a wide range of edge angles, and raw materials of nonlocal origin. Differences exist in feature distribution: LA 116418 features occur singly and as four different morphological and potentially functional classes and LA 116420 features occur in clusters with only two morphological-functional classes recognized. Feature distribution and morphology do seem to reflect different subsistence organizations. LA 116420 was used primarily by logistically organized family groups and LA 116418 reflects a wider range of strategies related to long-distance collecting and daily foraging from Arroyo Hondo and Chamisa Locita villages.

LA 116418 and LA 116420 from a Regional Perspective

How do LA 116418 and LA 116420 compare with Late Archaic and Pueblo seasonal residences or hunting and gathering camps from the piñon-juniper piedmont north of the Santa Fe River and the Cañada de los Alamos drainage to the south (Fig. 24)? Geographically, these sites are intermediate to the Santa Fe River and the middle or lower Cañada de los Alamos. They are also peripheral to the largest Pueblo period settlements of the early Classic period, Arroyo Hondo and Chamisa Locita. Chamisa Locita residents would have more frequently used the Cañada de los Alamos drainage since it was nearer. The Cañada del Rancho is 7.3 km distant from Arroyo Hondo and at the edge of its probable daily foraging range. The piñon-juniper piedmont north of the Santa Fe River was within the daily foraging range of the inhabitants of Pindi, Agua Fria Schoolhouse, and La Cienegita pueblos. Extensive excavation and data collection for the Las Campanas project (Lang 1997; Post 1996) showed intensive, widespread use of the piedmont by Pueblo populations and more sporadic, but occasionally intensive use by Archaic and possibly Paleoindian populations. However, due to differences in the distribution of lithic raw materials and probably the structure of the biotic resources, there are differences in the artifact assemblage composition and site structure.

Late Archaic settlement and subsistence differs quite dramatically between the piedmont north of the Santa Fe River and the tributary drainages, including those south of Arroyo Hondo. Recent inventory and excavations (Anschuetz and Viklund 1997; Post 1998a) show that within 5 km of the Santa Fe River on south to southeast-facing, protected and gentle slopes, there are Late Archaic camps in abundance. These camps are evidenced by buried charcoal-infused soil lenses that are 20 to 40 cm thick and range from 3 to 35 m long. They occur as single components and as clusters. For example, LA 113958 had 11 charcoal stains, of which 5 were suggested to be burned structure remains (Anschuetz and Viklund 1997:178-180). Excavation of stains exposed in arroyo banks and on deflated ridge slopes at LA 61286, LA 61289, LA 61290, LA 61293, and LA 67959 along the northwest Santa Fe Relief Route were highly successful. Excavations revealed evidence of intra- and intergenerational reoccupation of favored locations for seasonal foraging and residence. Site components often displayed a complex array of spatially discrete or superimposed thermal features, activity areas, discard areas, and structural remnants. The excavation evidence clearly shows that over a 1,500-year span, groups returned to these sheltered locations that were at or near water. The number of sites with buried stains combined with excavation evidence of intensive and repeated occupation of south or southeast-facing slopes, near or at a water source, show that the piedmont was an important part of Late Archaic seasonal subsistence rounds during suitable environmental intervals.

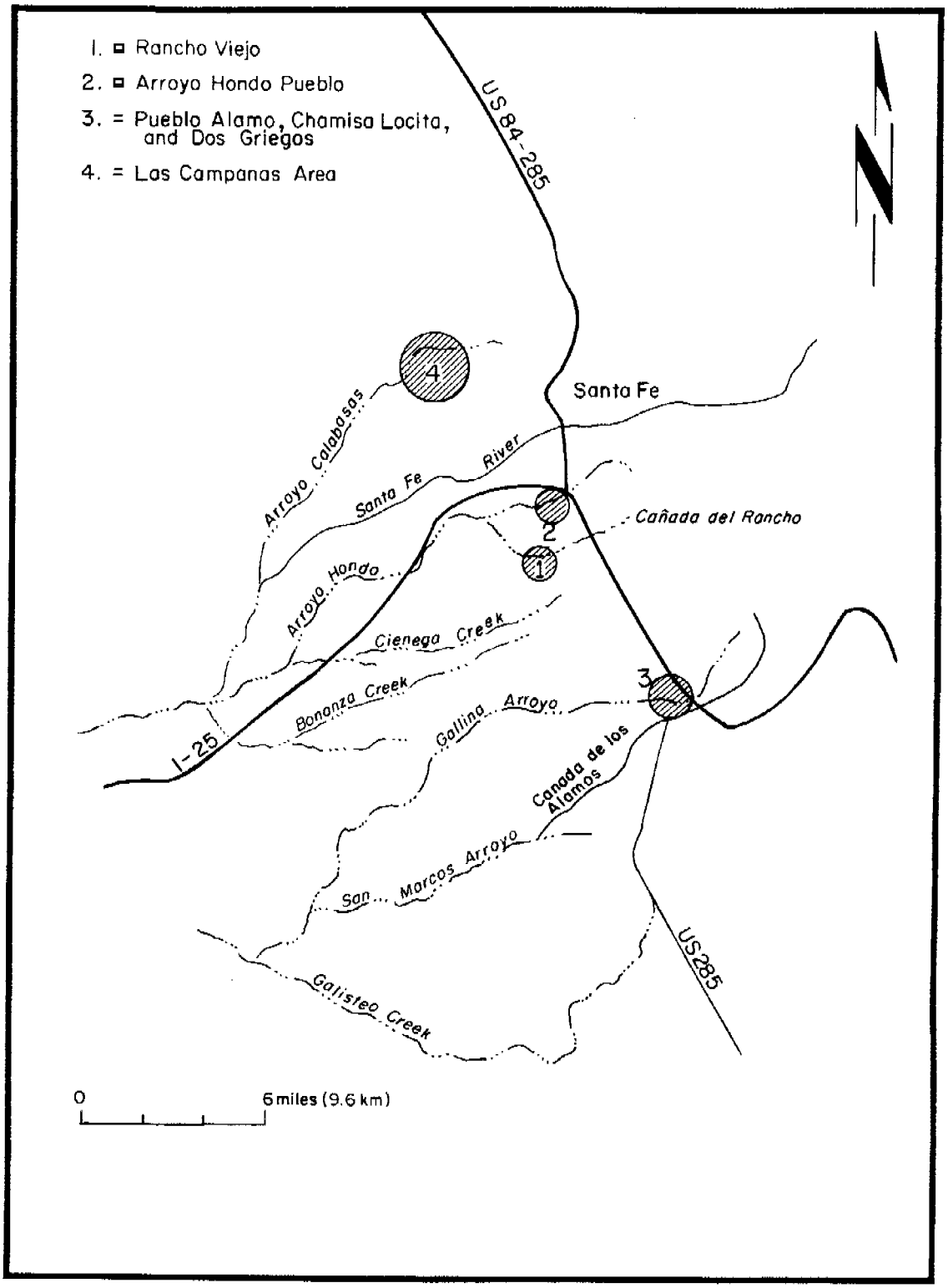

Figure 24. Nearby pueblos and study area.

Contrary to the suggestion that suitable conditions prevailed after A.D. 300 (Lang 1997), these excavations provide clear evidence that Archaic occupation was intensive 1,200 to 1,500 years earlier. Five to 8 km to the north of the Santa River, the evidence of hunting and gathering or residential occupation is less intensive. Reoccupation occurs at spatially discrete loci, in less sheltered locations, or at the periphery of less well watered tributaries, as is the case for LA 84787 and LA 86148 (Post 1996). These sites are marked by the heavy dependence on locally occurring chert and quartzite for tool manufacture. They have abundant chipped stone assemblages, manos and metates, but only a few thermal features of very limited form and structure.

South of the Santa Fe River, between and including the Arroyo Hondo and Cañada del los Alamos, the Late Archaic settlement and subsistence pattern is different, although survey coverage is not as comprehensive as the piedmont area. Evidence for intensive occupation of the Arroyo Hondo has been observed, but not fully reported (Richard W. Lang, pers. comm., April 1998). Outside the mouth of the upper Arroyo Hondo canyon, Late Archaic occupation evidence is more sketchy. Isolated charcoal-infused soil stains have been reported for the middle Arroyo Hondo periphery, but these probable base camps are few and they appear to reflect single-component occupations (Post 1998b; Schmader 1993). Two charcoal-infused soil stains were identified at LA 116418 and LA 116420 and they appear to represent single-component occupations. Seasonal residences incorporating shallow pit structures did exist along the Arroyo Hondo and Cañada del Rancho, but the evidence of multiple occupation and reuse is lacking.

The Late Archaic or Basketmaker II components identified along the Cañada de los Alamos reflect multiple short-term occupations that were primarily geared to hunting with less evidence for plant gathering and processing (Lang 1992). LA 75680, LA 75681, and LA 75686 (Dos Griegos sites) had a series of low density artifact concentrations, associated with a few thermal features, and one Coalition period fieldhouse. The concentrations of artifacts and features is a distribution pattern similar to LA 116418 and LA 116420. Lang (1992) suggests that the primary activities were related to hunting and could predate the later Pueblo period use. However, just as it was difficult to separate the Late Archaic/Basketmaker II-III components from the Pueblo components at LA 116418 and LA 116420, the same was true for the Dos Griegos sites.

It is obvious that the Rancho Viejo sites differ from the Dos Griegos sites in the greater frequency of features and grinding tools. These differences suggest a more generalized use of the Cañada del Rancho environs, while the Dos Griegos occupations focused on farming and hunting. To test for statistical differences in the site loci and chipped stone assemblages, which may reflect different technological organization, chi-square tests were conducted. The variables used were site or loci by material type or artifact type. The tests are designed to test for randomness in the samples as well as to use the post hoc adjusted residuals to identify cells that show the greatest divergence from the expected frequency. From Rancho Viejo, LA 116418 includes the combined frequencies of Areas 1, 2, and 3, and LA 116420 is represented by Area 1. LA 116420, Area 2, is excluded because it is an extreme outlier that would skew the analysis. From Dos Griegos, LA 75681 and LA 75686, Loci 1-5, were included for artifact type analysis, and LA 75680 was included for the material type analysis. The data and results are shown in Tables 19 and 20.

Table 19. Chi-square Contingency Table for Rancho Viejo and Dos Griegos Sites by Artifact Type

Observed Expected Adjusted Residual	Angular Debris	Core Flakes	Biface Flakes	Tools	Total
LA 75682	0 3 -1.79	7 12 -1.92	10 13 -1.14	20 9 4.48	37
LA 75686, Locus 1	3 1 1.27	5 7 -.93	3 7 -2.09	10 5 2.59	21
LA 75686, Locus 2	1 1 -.001	8 5 1.94	1 5 -2.26	4 3 .40	14
LA 75686, Locus 3	12 14 -.61	78 62 3.44	78 67 2.40	19 45 -6.10	187
LA 75686, Locus 4	4 2 1.06	9 11 -.86	8 12 -1.54	13 8 2.02	34
LA 75686, Locus 5	6 4 1.12	17 18 -.37	13 20 -1.99	19 13 1.96	55
LA 116418	1 1 -.16	2 5 -1.79	9 6 1.76	4 4 .005	16
LA 116420	2 3 -.37	6 12 -2.1	20 12 2.79	7 8 -.59	
Total	29	132	142	99	399

Includes observed and expected values and adjusted residuals

The sample of eight sites or loci used for the artifact type comparison had a combined assemblage of 399 artifacts. LA 75686, Locus 3, was the only assemblage with more than 100 artifacts. The chi-square value for the test was 79.18895 with 21 degrees of freedom, which is significant at the .01 level. This high chi-square value is partly caused by the nine cells that have expected values of less than five. However, there are also five cells with adjusted residuals of greater than 2.58 (significant at the .01 level). LA 75682 and LA 75686, Locus 1, have significantly greater than expected tool frequencies which account for 40 to 50 percent of the assemblages. LA 75686, Locus 3, which had the highest frequency of artifacts, had greater than expected core reduction debris and less than expected tools. This may reflect a broader range of activities or the production of tools

Table 20. Chi-Square Contingency Table for Rancho Viejo and Dos Griegos Sites by Material Type

Observed Expected Adjusted Residual	Obsidian	Chert/ Chalcedony	Metamorphic/ Igneous	Basalt	Total
LA 75681	293 268 3.42	96 139 -6.36	33 26 2.1	64 54 2.24	486
LA 75682	20 20 -.13	14 11 1.27	1 2 -.73	2 4 -1.11	37
LA 75686, Locus 1	7 12 -2.22	6 6 -.14	2 1 .79	7 2 3.16	22
LA 75686, Locus 2	7 8 -1.38	6 4 2.86	1 2 .30	0 2 -1.33	14
LA 75686, Locus 3	101 110 -1.38	73 57 2.86	6 11 -1.65	19 22 -.75	199
LA 75686, Locus 4	22 19 .95	11 10 .38	1 2 -.67	1 4 -1.57	35
LA 75686, Locus 5	22 30 -2.32	29 16 4.09	2 3 -.58	2 6 -1.80	55
LA 116418	8 9 -.41	5 5 .24	1 1 .16	2 2 .19	16
LA 116420	15 19 -1.48	17 10 2.67	1 2 -.67	2 4 -1.02	35
Total	495	257	48	99	899

Including observed and expected values, and adjusted residuals

without the co-occurrence of heavy tool use and discard. LA 116420, Area 1, had more than expected tool manufacture debris. Using the adjusted residuals as a gauge of general, but not necessarily statistically significant patterning, it can be observed that assemblages with fewer than expected tool manufacture debris usually had more than expected discarded tools. All sites, except LA 75686, Locus 2 and 3, had fewer than expected core reduction flakes. These patterns are complementary with the lower than expected core reduction debris occurring in the presence of higher than expected tool manufacture debris or discarded tools. This reflects the limited availability of raw materials and the overall focus on hunting and meat processing at the sites. The dichotomy of tool manufacture debris and discarded tools appears to reflect the end products of hunting and meat processing (discarded

tools) and gearing up for hunting or tool maintenance (tool manufacture debris). The fact that these activities are differentially distributed within a limited area may reflect land use and mobility behaviors relative to hunting and processing.

The sample of nine sites or loci in the material type comparison had a combined assemblage of 899 artifacts. LA 75686, Locus 3, and LA 75681 were the only assemblages with more than 100 artifacts. The chi-square value for the test was 70.82285 with 24 degrees of freedom, which is significant at the .01 level. This high chi-square value is partly due to 14 cells that have expected values of less than 5. However, there are 6 cells with adjusted residuals of greater than 2.58 (significant at the .01 level). LA 75681 has significantly more obsidian than expected, which would be expected to correspond to a high proportion of biface reduction and tool manufacture. However, LA 75681 had a fieldhouse and a well-represented A.D. 1200-1300 pottery assemblage. Obsidian in this case was used to produce core flakes for expedient tool use as well as formal tools. This assemblage is highly mixed, but it appears that Pueblo Alamo or Chamisa Locita residents brought raw material to the site as cores rather than tool preforms. Three assemblages, LA 75686, Locus 3, LA 75686, Locus 5, and LA 116420, Area 1, show higher than expected counts of chert or chalcedony. The latter two assemblages have more chert or chalcedony than obsidian. LA 75686, Locus 3, exhibited the highest frequency of core reduction debris, while LA 116420, Area 1, displayed a much higher proportion of tool manufacture debris. These differences between site or loci assemblages indicate that obsidian was not always a strong indicator of formal tool manufacture. Clearly, the chert or chalcedony acquired locally or in transit to the Cañada de los Alamos and Cañada del Rancho was suited to formal tool manufacture. Lang (1992:94) observed that more locally available material was used in core reduction later in the LA 75686, Locus 3, occupation. The suggested dichotomy between Pueblo period expedient tool production and Archaic period biface reduction seems to hold true in this field or camp situation. The material type variability found in this nine-assemblage study suggests that more intensive Pueblo era occupation, perhaps related to farming and embedded activities, results in the use of all raw materials for expedient tool production or core reduction regardless of material quality or distance to source. Sites or loci with less evidence of Pueblo period occupation show a similar pattern, except that obsidian, chert or chalcedony, and other raw materials were used more for tool manufacture and use. In other words, raw material selection does not seem to have a strong temporal dimension, although use of locally available material did seem to correspond with Pueblo period occupations along the Cañada de los Alamos. It does appear that sites or loci with a preponderance of tools or tool manufacture debris incorporate all regionally available raw materials.

During the Pueblo or Coalition-early Classic period resource areas within a 1- to 5-km radius of a village would be expected to have the greatest agricultural and foraging use. Areas beyond the 5-km range would have been exploited by overnight or longer duration forays. Daily foraging would be expected to result in a small number of processing or roasting features and an expedient tool production strategy. Longer distance resource areas might have a greater number of processing or roasting features and less expedient tool production and use, since replacements were not easily obtained, and as discussed for this general area, suitable raw materials were not locally abundant. Close range resource exploitation obviously fits well with the Dos Griegos sites, LA 75681, LA 75682, and LA 75686, since they are 1 to 1.6 km (0.6 to 1 mile) from Chamisa Locita and Pueblo Alamo. The lithic artifact assemblages display more core reduction and the use of obsidian for expedient tool production, and a higher frequency of artifact discard. Processing tools and features are rare and may not be distinguishable from older logistical camp tools and facilities. The Rancho

Viejo sites are 7.3 km (4.6 miles) from Arroyo Hondo Pueblo. At these sites and in instances where spatial components are not obviously from an earlier period, artifact frequencies are low, thermal feature variability is high, and processing tools are abundant. Pottery occurs in low frequency, core reduction debitage is in the minority, and the proportion of tool manufacture debris and tools is high. Evidence left by Arroyo Hondo foragers may be indistinguishable from earlier logistically organized Archaic and early Pueblo foragers. Isolated larger processing features may remain from Pueblo foragers who remained in the field for many days. The co-occurrence of features at LA 116420 may represent longer duration and perhaps more long-distance logistically organized foraging by populations residing to the south at lower elevations. Inventory to the east (toward Arroyo Hondo) from LA 116418 and LA 116420 yielded only a few isolated artifacts and low frequency artifact scatters (Legare 1995). This suggests that more intensively used ancestral Pueblo locations are even closer to Arroyo Hondo and probably more in the range of the Dos Griegos sites. Inventory of the topographically varied hills to the south of Arroyo Hondo also yielded few intensively occupied sites that could be directly attributed to Arroyo Hondo pueblo foraging (Ware 1991). It is somewhat mysterious that in areas within 1 to 5 km of a village occupied by 250 to 600 people over a 50-year period (Wetterstrom 1981), so few intensively used sites have been reported. Modern ranching, farming, and hydrological projects have probably obscured these remains or the Arroyo Hondo villagers were very tidy outside their village walls. Obviously, intensive inventory along the Arroyo Hondo both up and down the canyon is needed to better understand the exploitive strategies employed by village residents.

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APPENDIX 1. MACROBOTANICAL MATERIALS FROM MULTICOMPONENT SITES (LA 116418 AND LA 116420) NEAR ARROYO HONDO PUEBLO: THE RANCHO VIEJO PROJECT

by Mollie S. Toll and Pamela J. McBride[1]

Introduction

LA 116418 and 116420 belong to a group of small Santa Fe area sites from which we have very little direct archaeobotanical evidence of past subsistence. Included are Late Archaic (1800 B.C. to A.D. 1), Early Developmental (A.D. 600-900), and late Coalition-early Classic (A.D. 1275-1425) components. In each case, there are some remains of a pit structure probably attached to Archaic use of the site. Deflation and erosion have reduced both sites to a collection of artifacts and features from temporally distinct origins, now separated by little or no stratigraphic distance. These elusive sites represent short-term habitations, or specialized gathering-processing stations.

In the Santa Fe area, early sites (and smaller, limited activity sites of all periods) tend to be shallow and deflated and often lack structures, all traits militating against preservation of perishables, or even carbonized perishables. The few small sites with any depth and breadth to their botanical records are those with pit structures (e.g., Schmader 1994:12-14). Too often, early Santa Fe area sites suffer from a lack of botanical analyses (Gossett and Gossett 1991; Schmader 1987) or very low recovery of cultural botanical remains in the sampled proveniences (Dean 1993a, 1993b; Toll 1994; Toll and McBride 1995). Dating of Feature 2 at LA 116420 to the Early Developmental period provides some subsistence information for a little known era locally. There are few sites north of La Bajada dating to this period.

In the Coalition and Classic periods, the local occupation includes a variety of small site types (some apparently geared to specific short-term activities and some occupied repeatedly but for short periods) and fewer very large pueblos. The economic and social ties between these very different contemporary site types are of particular interest. The substantial, protective masonry structures of the large pueblos hold the possibility of far better preservation conditions for plant materials. Pindi (LA 1) was excavated in the 1930s, when flotation wasn't a part of the archaeological analysis repertoire; a small collection of macrobotanical remains were collected during excavation, and happily reported in print by Volney Jones (1953:140-142). Excavation of nearby Arroyo Hondo Pueblo by the School of American Research was a model of thoroughness for archeology of the early 1970s. Botanical studies gave attention to some vital interpretive and comparative issues, such as nutritional adequacy and productive capacity with respect to changing environmental and demographic traits (Wetterstrom 1986). The down side to such attention to interpretive objectives is difficulty in reconstructing the data used to support conclusions. Agua Fria Schoolhouse (LA 2) was excavated recently, but only partially; the data here are clear and dependable, but meager (five flotation samples; Cummings 1989). Thus, data available from large, complex, and potentially well-preserved pueblos is very uneven, and the contemporary small limited-activity sites have very little floral data at all (Cummings and Puseman 1992; Toll 1989). We are left with a common interpretive

[1] Office of Archaeological Studies, Ethnobotany Lab Technical Series #58

conundrum: does this lack of floral remains at small sites represent a genuine difference between site types in handling of subsistence resources, or is it an artifact of systematically different preservation conditions? The Rancho Viejo plant remains provide some additional data, but don't answer that question.

Rolling terrain dissected by multiple parallel drainages afforded a rich variety of resource opportunities to past residents of the Rancho Viejo area. The project area is in the Great Basin Conifer Woodland biotic community, which includes piñon-juniper, ponderosa pine-piñon-juniper, rabbit brush, and riparian vegetation zones (Brown 1982). Piñon-juniper is the dominant vegetation type, occurring on 78 percent of the landscape in Kelley's study area (a 25-sq-mile area centered on Arroyo Hondo Pueblo; 1980:2). Piñon's fall-ripening nut crop is a particularly valuable resource, packing in 740 calories per 100 grams (Woodin and Lindsey 1954). Both piñon and juniper were vital fuelwood and building materials. Other useful taxa of this zone include Gambel oak, mountain mahogany, sage, sumac, and yucca. Ground cover between woody specimens is sparse. Woodland with the addition of ponderosa pine occurs as small isolated stands in shaded arroyo bottoms at 2,164 to 2,286 m, and is widespread at elevations above about 2,400 m (Kelley 1980:65). The rabbit brush community is common on terrace deposits of the broader arroyo bottoms (Kelley 1980:66). Soil fertility and available water place this zone highest on Wetterstrom's list of potential arable land in the vicinity of Arroyo Hondo Pueblo (1986:38-39). Piedmont land was probably also utilized for farming in higher precipitation times. Permanent water in the narrow, upper reaches of Arroyo Hondo, less than 10 km to the northeast, is a rare and precious commodity in the Southwest landscape. Useful riparian plant taxa found today in this zone include sedges and bulrush, cat-tail, watercress, and mint (Kelley 1980).

Methods

The seven soil samples collected during excavation were processed by Pat Severts for the Museum of New Mexico, Office of Archaeological Studies, by the simplified "bucket" version of flotation (see Bohrer and Adams 1977). Samples ranged in size from 2.66 to 7.50 liters, with an average volume of 4.90 liters. Each sample was immersed in a bucket of water, and a 30-40 second interval allowed for settling out of heavy particles. The solution was then 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, until the recovered material had dried. 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. The smallest particles passing through all screens were subsampled, but all larger fractions were entirely examined.

From each flotation sample, a sample of 20 pieces of charcoal was identified from each flotation sample (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. Charcoal specimens examined prior to submission for radiocarbon dating were examined in the same fashion, but selection was adapted to securing a minimal sufficient sample (the objective was 5 g) with the fewest pieces, rather than aiming to examine both large and small pieces. 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.

Results

LA 116418

The site consists of hearths and foundations of a burned pit structure. Though neither feature age or cultural affinity were clear from excavation, the associated plant processing tools and core flakes suggest "a briefly occupied foraging camp," as may have been staged from nearby Arroyo Hondo Pueblo (Post 1998).

Feature 1, an open hearth filled with fire-cracked rocks, was likely used for meat-roasting or plant-processing (parching of seeds or piñon nuts, or cooking of chokecherries or cactus fruits, prior to consumption or storage). Potentially cultural plant materials recovered from the fill consisted of 13 charred goosefoot seeds (Appendix 1.1). Uncharred intrusives included juniper duff (male cones and twigs) and 21 uncharred goosefoot seeds. Goosefoot is an annual plant that was used widely by prehistoric groups of all time periods in New Mexico; the seeds were ground into meal and the fresh or dried leaves were used as a potherb (Castetter 1935:15-16). No remains of corn or other domesticated crops were encountered. Juniper dominated the fuelwood sample found in Feature 1 (Appendix 1.2).

LA 116420

Here the remains of a burned pit structure are also most likely Archaic, while scattered hearths and artifacts appear to belong to a Developmental period occupation, or a late Coalition-early Classic satellite foraging camp. A hearth (Feature 2) and associated roasting pit (Feature 3) were both deflated, but contained charred plant remains of probable cultural origin. The hearth, yielding 51 charred goosefoot seeds, was the most productive Rancho Viejo provenience (Appendix 1.1). This feature dated A.D. 599-657, by radiocarbon. Minuscule charcoal in the hearth flotation sample was identifiable only as coniferous (Appendix 1.2). The larger pieces selected for C-14 analysis were 98 percent juniper, and the remainder piñon (Appendix 1.3). Both samples analyzed from Feature 3 produced charred remains, including cheno-am, goosefoot, and mint family seeds, all in very low frequencies. This feature yielded the most diverse number of wood taxa including juniper, pine, and greasewood/saltbush (Appendix 1.2).

The samples from Features 5, 6, and 7 yielded only uncharred plant material. Differential preservation due to greater disturbance likely influenced recovery of cultural remains. Only a remnant of primary deposits were trapped by the interior cobbles of Features 5 and 7. Feature 6 was particularly eroded on its downslope portion. This feature lacked the abundant charcoal of morphologically similar Feature 2.

Juniper dominated the charcoal assemblage from thermal Features 2, 3, 5 and 7 at this site. Minor amounts of saltbush/greasewood provided the only indication of use of nonconiferous woody species.

Appendix 1.1. LA 116418 and LA 116420, Flotation Plant Remains

Site	116418	116420					
Feature	FS 208	FS 274 Feature 2 hearth	FS 278 Feature 3 E ½	FS 279 Feature 3 W ½	FS 289 Feature 6	FS 290 Feature 7 roasting pit	FS 291 Feature 5
CULTURAL							
Annuals:							
Cheno-am			1*	2*			
Chenopodium goosefoot		51*		5*			
Other:							
Labiatae mint family			1*	1*			
NON-CULTURAL							
Annuals:							
Chenopodium goosefoot			2	2	5	2	8
Portulaca purslane		1	1	12	5	15	50
Grasses:							
Sporobolus dropseed grass				1			
Other:							
Compositae composite family							1
Dicotyledonae dicot							l+
Euphorbia spurge				1			
Monocotyledonae monocot						l+	
Unknown						s+	
Perennials:							
Juniperus juniper			1	wood+,	2	t+	2, Econc+, t+
Pinus pine			b+	b+		Ecs+	
Pinus edulis piñon							n+

Note: Plant remains are seeds unless indicated otherwise.
* = charred, + = 1-10/liter.
b = bark, cs = conescale, l = leaf, n = needle, s = stem.

Appendix 1.2. LA 116418 and LA 116420, Flotation Wood Species (in number of pieces/grams).

Site	LA 116418	LA 116420						Totals	
Feature	FS 208	FS 274 Feature 2 hearth	FS 278 Feature 3 E ½	FS 279 Feature 3 W ½	FS 289 Feature 6	FS 290 Feature 7 roasting pit	FS 291 Feature 5	Weight	%
CONIFERS:									
Juniperus juniper			16/.66	13/.2		18/.4	19/.4		
Pinus pine				1/	5/				
Pinus edulis piñon			4/.06		1/				
Unknown conifer		20/.1		4/	3/	2/			
NON-CONIFERS:									
Sarcobatus/Atriplex greasewood/saltbush				2/			1/		
Unknown non-conifer									
Total		20/	20/	20/	9/	20/	20/		

Appendix 1.3. LA 116420, Species Composition of Wood from Feature 2 (C-14 Sample)

	Pieces		Weight	
	#	%	g	%
Conifers: *Juniperus* juniper	137	98	16.4	98
Pinus edulis piñon	3	2	.3	2
Total	140	100	16.7	100

Summary Discussion

From Rancho Viejo, we have evidence of cultural use of goosefoot (as well as cheno-ams, a broader category that includes goosefoot) and the mint family. Given the very broad archaeological recovery of goosefoot in the Southwest (see, for instance, Toll 1983) it is difficult to determine whether the Rancho Viejo assemblage represents short-term, focused collection strategies, or sampling error deriving from poor preservation. Goosefoot is found elsewhere in the Santa Fe area at Tierra Contenta Archaic sites (28 percent of samples) and two Coalition-early Classic sites (Agua Fria Schoolhouse, 40percent of samples; Arroyo Hondo Pueblo, 34 percent). Additional weedy annuals at local sites include pigweed, purslane, bugseed, doveweed, winged pigweed, beeweed, groundcherry, and sunflower (Appendix 1.4). As expected for location in a juniper-piñon woodland, perennial food plants such as piñon nuts, chokecherry, and cacti turn up repeatedly. As elsewhere in New Mexico, edible grasses do not figure prominently. No domesticated crop plants were recovered.

Appendix 1.4. Comparative Evidence for Utilization of Food Plants in the Santa Fe Area (Percent of Samples Found In)

Project/Site	N of samples	Annuals	Grasses	Trees	Other Perennials	Cultivars
ARCHAIC: Tierra Contenta[1]	40	*Amaranthus* 3% cheno-am 30% *Chenopodium* 28% *Corispermum* 8% *Cycloloma* 10% *Portulaca* 10% *Croton* 3%	Gramineae 3% *Sporobolus* 3%	*Juniperus* seeds 30%, twigs 25% *Pinus edulis* nutshell 3%, umbos 8%	*Platyopuntia* 5%	
COALITION-EARLY CLASSIC: Las Campanas[2] [LA 84759, 84793, 86150, 86159, 98683, 98690]	26	*Corispermum* 4%				
Agua Fria[3]	5	cheno-am 80% *Chenopodium* 40% *Portulaca* 20% *Cycloloma* 20% *Cleome* 20% undet. 40%	Gramineae 20%	*Juniperus* twigs 100% *Pinus* needles 80%, nutshell 40%, umbos 60% *Pseudotsuga* needle 20% *Quercus* acorn cap 20%	*Echinocactus* 20% *Equisetum* stem 20%	*Zea* 80% (*Cucurbita* pollen)
Arroyo Hondo[4]	174	cheno-am 34% *Portulaca* 16% *Cycloloma* 9% *Physalis* 5% *Cleome* 5% *Helianthus* 3%	*Oryzopsis* 7%	*Juniperus* berry 1% *Pinus* nutshell 4%, umbos also present	*Echinocereus* 10% *Mammillaria* 2% *Opuntia* 2% *Yucca* 3% *Prunus* 1%	*Zea* 82% *Cucurbita* 5% *Phaseolus* 7%

Specimens are seeds unless otherwise specified. [1]McBride 1994a; [2]Toll and McBride 1995; [3]Cummings 1989; [4]Wetterstrom 1986, table 34

Appendix 1.5. Comparative Wood Use in the Santa Fe Area

Assemblages	N of samples [total weight or pieces]	*Juniperus*	*Pinus*	Other species/ Comments
Predominantly JUNIPER: ARCHAIC: Las Campanas[1] [LA 84787, 86139, 86159]	9 [17.46g]	92%	3%	5% undetermined conifer
Tierra Contenta[2]	3	dominant in 2 samples	dominant in 1 sample	
UNKNOWN DATE: Las Campanas[1] [LA 86159]	2 [.44g]	55%	7%	2% undetermined conifer 5% undetermined nonconifer 32% unknown
Rancho Viejo	109 [2.05g]	98%	2%	
Predominantly PIÑON: DEVELOPMENTAL-MID CLASSIC: Dos Griegos[3] [site 283-3]	5 [108 pieces]	18%	80%*	2% Salicaceae
Major Portions of Both JUNIPER and PIÑon: ARCHAIC: Airport Road[4]	6 [22.60g]	37%	54%*	9% undetermined conifer
COALITION-EARLY CLASSIC: Las Campanas[1] [LA 84759, 84793, 86150, 86159, 98690]	10 [6.81g]	40%	55%	1% undetermined conifer 4% unknown
Agua Fria Schoolhouse[5]	4	dominant in 2 samples; co-dominant in 1	dominant in 1 sample; co-dominant in 1	
Arroyo Hondo[6]	[1108 pieces]	21%	37%*	33% ponderosa pine, 4% doug-fir, 6% other
Santa Fe ByPass[7]	2 [40 pieces]	43%	53%*	4% undetermined conifer

* *Pinus edulis* (piñon)
[1]Toll and McBride 1995
[2]McBride 1994
[3]Cummings and Puseman 1992
[4]Toll 1994
[5]Cummings 1989
[6]Creamer 1993, table 7.1
[7]Toll 1989, table 1

Wood use from sites in the Santa Fe area, as evidenced by charcoal remains, appears to be distinguished more by broad continuity than by any distinctive differences between time periods or geographic area. Everywhere, wood recovered was predominately coniferous, lacking a significant presence of shrubby or riparian species (Appendix 1.5). Sites heavily dominated by juniper seem to be limited to the Rancho Viejo sites, and Archaic and unknown period sites at Las Campanas. Only the Dos Griegos sites are heavily dominated by piñon, while most sites have major portions of both juniper and piñon, leaning slightly towards piñon. Arroyo Hondo Pueblo is the only place where significant amounts of higher elevation conifers like ponderosa pine and Douglas fir are found. Nowhere are Nonconifers more than 6 percent of an assemblage, and include cottonwood/willow, and saltbush/greasewood. This broad dominance of preferred fuelwood taxa through time in the Santa Fe area indicates that a consistent source of these coniferous wood taxa was present.

Previous studies in southern Colorado (Kohler and Matthews 1988) and northeast Arizona (McBride 1994b) have suggested that over-harvesting of preferred (coniferous) wood species led to pockets of deforestation as evidenced by a marked drop in the percent presence of preferred wood species over time. With the exception of tiny fractions of riparian and shrub woods at Rancho Viejo, Dos Griegos, and Arroyo Hondo, coniferous wood reigns supreme as fuel in all time periods (Appendix 1.5). Even at Airport Road, where present-day junipers and especially piñons are considerably sparser, there is no sign of saltbush use (Toll 1994), suggesting density and duration of population pressure was not sufficient to impact availability of preferred fuel types.

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