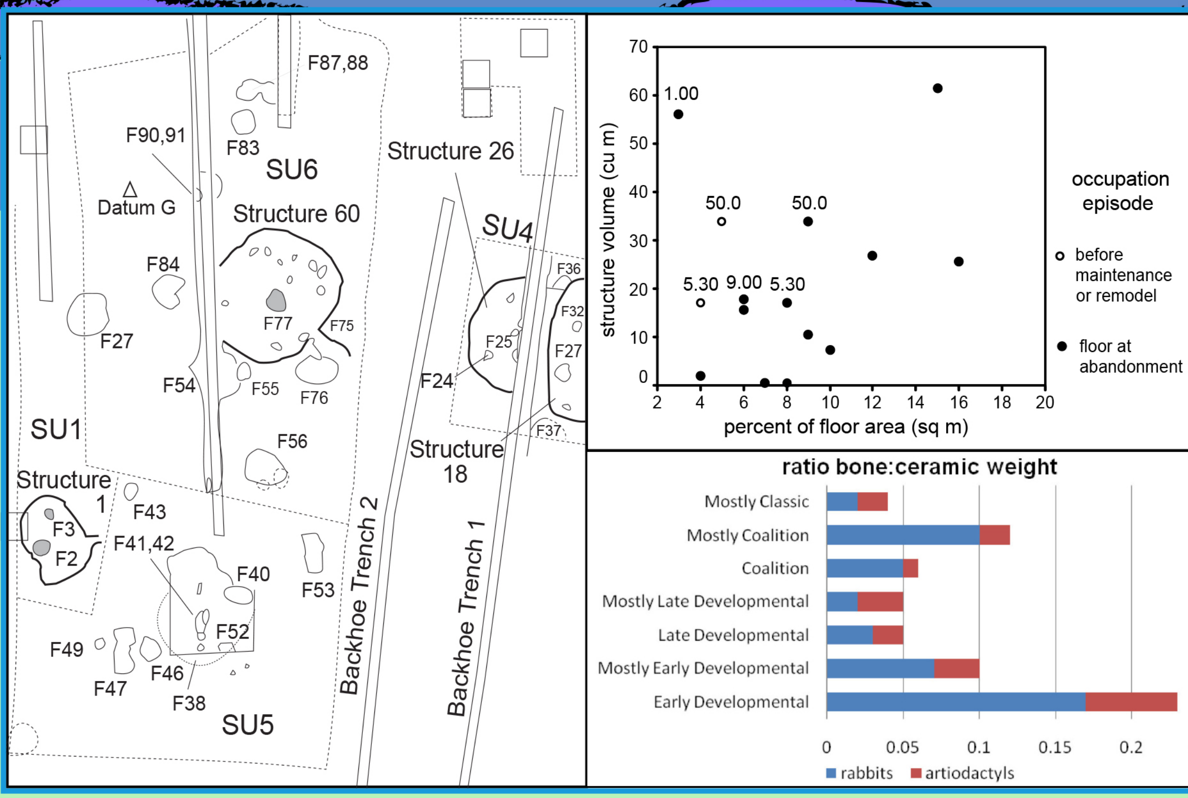
Excavations along NM 22:
Agricultural Adaptation from AD 500 to 1900 in the Northern Santo Domingo Basin, Sandoval County, New Mexico

compiled by Stephen S. Post and Richard C. Chapman

Volume 6
Site Structure and Conclusions

Jessica A. Badner, Stephen S. Post, Andrea J. Carpenter, Lori S. Reed,
M. Steven Shackley, Ronna J. Bradley, Gary Smith, Nancy J. Akins



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SITE STRUCTURE and CONCLUSIONS
References Cited and Appendixes

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CHAPTER 25
PEÑA BLANCA OCCUPATION PATTERNS: SITE STRUCTURE FROM THE EARLIEST DEVELOPMENTAL TO COALITION PERIODS

Jessica A. Badner

INTRODUCTION

A critical question regarding Early Developmental occupations in the Middle and Northern Rio Grande is one of cultural derivation. Are occupations at Peña Blanca part of in situ population growth, or are they derived from Basketmaker III groups living on the Colorado Plateau (Post, Chapter 26).

Ceramic assemblages from Peña Blanca have ware and form patterns consistent with those assigned to the San Marcial phase, a detailed description of which can be found in Wilson's contribution, Chapter 16. San Marcial phase assemblages are characteristic of most Middle Rio Grande and Colorado Plateau occupations that date from AD 520 to 620 (Ware 1997). Broad geographic distribution of these assemblages may indicate congruities in subsistence and regional interaction between populations and could indicate derivation of Rio Grande sites from earlier Basketmaker III settlements to the west (Akins et al. 1996:4). Other researchers have characterized early populations of the Northern Rio Grande as peripheral populations, influenced by change that first occurred in the Colorado Plateau–San Juan Basin core (Post, Chapter 26).

While acknowledging the importance of potential interaction between the two regions, Lakatos suggests otherwise (Lakatos 2003). A review of Developmental pit structure morphology in the Northern Rio Grande leads him to suggest that cultural developments in the Rio Grande differed greatly from those in the San Juan. A comparison of structure construction using ventilator complex and hearth attributes leads Lakatos to propose that "integrative architecture of the Northern Rio Grande was developed and maintained by the intrinsic population." This strong architectural pattern reflects a cultural area distinct from the San Juan and Mesa Verde regions (Lakatos 2003:1). Ware (1997:45) states that to resolve the conflicting views, there should be more basic research on patterns of continuity and change in the Middle and Northern Rio Grande. To this end, a summary of Early Developmental structures and related intramural features is provided along with comparisons to regional data.

While morphological and functional differences of intramural features may reflect "general organizing principles and behaviors of occupation intensity, duration, and seasonality"(Post and Blinman 2001:8), extramural features provide information about site structure that can be related to regional settlement and subsistence patterns and may "reflect changes in subsistence focus from farming to hunting and gathering or a change in their relative contribution to the subsistence regime" (Post and Blinman, Chapter 3). Storage capacity has been linked to over-wintering (Gilman 1987) and storage facility location may have implications regarding social organization and economic interaction (Wilshusen 1988b). Furthermore, bell-shaped pit use in the Southwest is an early component of corn storage (Huckell et al. 2002:196). Thermal pit morphology can be indicative of the type of food that is being processed (Wandsnider1997).

Excavations at Peña Blanca exposed some of the earliest ancestral Puebloan sites in the northern Middle Rio Grande. The 719 features (714 cultural features, 3 noncultural swales, and two unexcavated features) exposed during excavation provide a unique opportunity to examine the nature of, and variability in, earliest Developmental to Coalition period components. Regional data for Early Developmental components, consisting of 443 features from three sites along the Middle Rio Grande, were compiled for comparison to NM 22 data.

Another database consisting of intramural data from 118 structures was used to compare structure morphology.

Chapter Organization

This chapter is divided into three sections: (I) In order to characterize the feature assemblage, the first section is primarily descriptive and concentrates on defining and discussing feature types and characterizing feature classes by feature location and dimensions. Because of low frequencies in most feature classes a few selected feature types are also compared. (II) This section is a comparison of Early Developmental period feature data from NM 22 sites and LA 109129 and LA 57024/26, and (III) the third section concentrates on structure morphology. Architecture and associated household facilities and structures excavated at NM 22 for all periods are compared and described. (IV) The fourth section compares structure data from NM22 to structure data compiled from 55 sites along the Northern Rio Grande. Finally, three remodeled structures, one from each site, are discussed in light of changing storage volume and their relationship to the associated feature assemblage. These data were interpreted relative to occupation duration, intensity, temporality, and social organization.

Section I. Features

Analytical Methods and Dates

At six sites along NM 22, 714 cultural features were excavated. To insure that feature types were reported consistently, a definition sheet was distributed to all site directors. Using the template and data collected in the field, site directors produced feature summaries. These summaries, feature maps, and thumbnail cross sections, as well as archaeobotanical data, were used to create an electronic database in SPSS. The database was made up of 27 variables recording feature type, shape, location, temporal period, contents, condition, fill, as well as association with other features and feature dimensions.

Features were separated into unburned and burned classes. Unburned feature types included in analysis were small and large unburned pits, storage pits, postholes, divots and divot clusters, wall niches, mealing bins, pot rests, wall niches, foot drums, and off-chamber cists. Burned features included large and small burned pits, large cobble-filled thermal pits, and fire pits, both collared and uncollared hearths and ash pits. Storage/roasting pits may have been used as both thermal pits and later as storage. Features not discussed in this analysis either because of insufficient numbers, or because they were not related to food processing, storage, or available intramural space included ventilator shafts, ventilator tunnels, human burials, animal burials (dog and turkey), ritual art, metate rests, cobble piles, ash and rock deposits, stains, and natural depressions. Definitions as well as all coding conventions are detailed in Appendix 7.

Volumes and areas for each feature were calculated in order to compare storage and productive capacity. Feature volumes were calculated from dimensions provided by project directors using one of four volumetric equations determined by the feature's cross-section profile. Because feature shape was variable, these calculations are approximations of feature capacity, and particularly in the case of deep basin-shaped pits, are conservative estimates.

Basin-shaped pit volumes were calculated using an equation that describes the volume of half an ellipsoid. This calculation was also used for features with irregular or indeterminate cross sections because the calculation for an ellipsoid's rounded edges provides a minimum volume for any given area and depth:

$$v = 2/3\pi abc$$

where a, b, and c are radii of a sphere (see Figure 25.1).

Bell-shaped pit volumes were calculated using an equation that describes the volume of a circular frustum. Because two base measurements were not always available for all features, the frustum equation was calculated using the average radius of both feature top and base:

$$V = 1/3\pi h(R^2 + Rr + r^2)$$

where h = height, R = base radius, r = top radius. Volumes of cylindrical features, such as postholes, pits with vertical sides, and most pit structures were calculated with:

$$v = \pi r^2 h$$

where r = radius and h = height.

Volumes for cone-shaped features, usually postholes and divots, were calculated using:

$$v = 1/3\pi r^2 h$$

where r = radius and h = height.

Feature dates and periods are those assigned by individual project directors using a combination of absolute and relative dating techniques including archaeomagnetic analysis, ^{14}C reduction, ceramic seriation, and stratigraphic analogy. Dating techniques varied with material availability at each component and are summarized in individual site reports.

Data summaries and scatterplots were produced using SPSS and are refered to in the following text. Feature types with insufficient numbers to be included in a summary below are defined in Appendix 7 and are summarized in Table 25.1.

Of the 719 features excavated along NM 22, two were later identified as natural depressions and two were not recorded, leaving 715 cultural features. The majority (n = 575, 80 percent) were from Early Developmental components. Other represented time periods in order of frequency were Coalition (n = 51, 8 percent), Late Developmental (n = 27, 4 percent), earliest Developmental (n = 21, 3 percent), Developmental/Coalition (n = 13, 2 percent), and other periods (n = 3, 0.03 percent). Features to which time periods could not be assigned made up 4 percent of the sample (n = 28). Feature frequencies and types are summarized by site and time period in Table 25.1. Feature type definitions were influenced by a well-referenced typology proposed by Dickens (1985) and by ethnoarchaeological descriptions of feature use reported by Binford (1983).

The bulk of the feature assemblage was intramural features or structural components. Twenty-five structures housed 364 intramural features, which made up 50 percent of the total

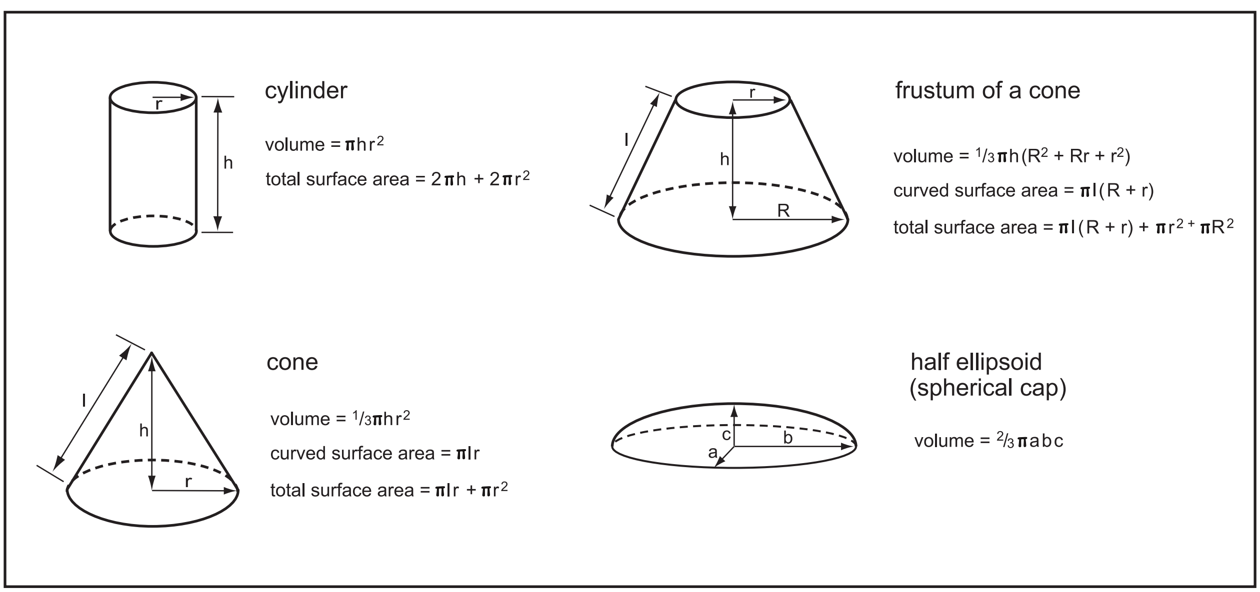

Figure 25.1. Half ellipsoid, frustrum, cylinder, and cone..

Table 25.1. NM 22, Features, Site by Period

	LA 249			LA 265			LA 6169			LA 6170			LA 6171			LA 115862			Table Total	
	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Col %
Storage pit	-	-	-	-	-	-	1	100.0%	4.2%	-	-	-	-	-	-	-	-	-	1	3.6%
Small cobble-filled pit	-	-	-	-	-	-	1	100.0%	4.2%	-	-	-	-	-	-	-	-	-	1	3.6%
Large cobble-filled	-	-	-	-	-	-	1	100.0%	4.2%	-	-	-	-	-	-	-	-	-	1	3.6%
Post hole	-	-	-	-	-	-	6	100.0%	25.0%	-	-	-	-	-	-	-	-	-	6	21.4%
Ventilator	-	-	-	-	-	-	1	100.0%	4.2%	-	-	-	-	-	-	-	-	-	1	3.6%
Human burial	-	-	-	-	-	-	1	50.0%	4.2%	-	-	-	1	50.0%	100.0%	-	-	-	2	7.1%
Small burned pit	-	-	-	-	-	-	2	100.0%	8.3%	-	-	-	-	-	-	-	-	-	2	7.1%
Small unburned pit	-	-	-	-	-	-	8	100.0%	33.3%	-	-	-	-	-	-	-	-	-	8	28.6%
Large unburned pit	-	-	-	-	-	-	3	100.0%	12.5%	-	-	-	-	-	-	-	-	-	3	10.7%
Natural depression	1	100.0%	33.3%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3.6%
Not included in list	2	100.0%	66.7%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	7.1%
Table Total	3	10.7%	100.0%	-	-	-	24	85.7%	100.0%	-	-	-	1	3.6%	100.0%	-	-	-	28	100.0%
Earliest Developmental																				
Small sub-pit	-	-	-	-	-	-	-	-	-	-	-	-	8	100.0%	38.1%	-	-	-	8	38.1%
Ash&rock redeposit	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%	4.8%	-	-	-	1	4.8%
Storage/roasting	-	-	-	-	-	-	-	-	-	-	-	-	5	100.0%	23.8%	-	-	-	5	23.8%
Large burned pit	-	-	-	-	-	-	-	-	-	-	-	-	3	100.0%	14.3%	-	-	-	3	14.3%
Small unburned pit	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%	4.8%	-	-	-	1	4.8%
Large unburned pit	-	-	-	-	-	-	-	-	-	-	-	-	2	100.0%	9.5%	-	-	-	2	9.5%
Activity area	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%	4.8%	-	-	-	1	4.8%
Early Developmental																				
Small sub-pit	-	-	-	-	-	-	1	50.0%	1.4%	1	50.0%	0.7%	-	-	-	-	-	-	2	0.3%
Storage pit	-	-	-	35	79.5%	14.2%	-	-	-	8	18.2%	5.4%	1	2.3%	1.3%	-	-	-	44	7.6%
Off chamber cist	-	-	-	-	-	-	2	100.0%	2.7%	-	-	-	-	-	-	-	-	-	2	0.3%
Small cobble- filled pit	-	-	-	3	50.0%	1.2%	1	16.7%	1.4%	2	33.3%	1.4%	-	-	-	-	-	-	6	1.0%
Large cobble-filled pit	-	-	-	15	57.7%	6.1%	-	-	-	7	26.9%	4.7%	2	7.7%	2.5%	2	7.7%	7.1%	26	4.5%
Fire pit	-	-	-	1	100.0%	0.4%	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2%
Hearth	-	-	-	1	14.3%	0.4%	1	14.3%	1.4%	2	28.6%	1.4%	2	28.6%	2.5%	1	14.3%	3.6%	7	1.2%

Table 25.1. Continued.

	LA 249			LA 265			LA 6169			LA 6170			LA 6171			LA 115862			Table Total	
	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Col %
Ash pit	-	-	-	3	30.0%	1.2%	1	10.0%	1.4%	2	20.0%	1.4%	3	30.0%	3.8%	1	10.0%	3.6%	10	1.7%
Wall niche	-	-	-	2	20.0%	0.8%	2	20.0%	2.7%	6	60.0%	4.1%	-	-	-	-	-	-	10	1.7%
Post hole	-	-	-	52	35.6%	20.9%	24	16.4%	32.0%	41	28.1%	27.7%	18	12.3%	22.8%	11	7.5%	45.8%	146	25.4%
Pot rest	-	-	-	14	42.4%	5.7%	5	15.2%	6.8%	8	24.2%	5.4%	6	18.2%	7.6%	-	-	-	33	5.7%
Divot	-	-	-	4	14.8%	1.6%	2	7.4%	2.7%	15	55.6%	10.1%	6	22.2%	7.6%	-	-	-	27	4.7%
Ventilator	-	-	-	3	42.9%	1.2%	1	14.3%	1.4%	-	-	-	2	28.6%	2.5%	1	14.3%	3.6%	7	1.2%
Human burial	-	-	-	4	30.8%	1.6%	6	46.2%	8.1%	-	-	-	-	-	-	3	23.1%	10.7%	13	2.3%
Ash&rock redeposit	-	-	-	3	37.5%	1.2%	1	12.5%	1.4%	-	-	-	4	50.0%	5.1%	-	-	-	8	1.4%
Storage/roasting	-	-	-	1	100.0%	0.4%	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2%
Warming pit	-	-	-	-	-	-	-	-	-	-	-	-	1	50.0%	1.3%	1	50.0%	3.6%	2	0.3%
Small burned pit	-	-	-	6	37.5%	2.4%	2	12.5%	2.7%	2	12.5%	1.4%	6	37.5%	6.3%	-	-	-	16	2.8%
Large burned pit	-	-	-	5	26.3%	2.0%	4	21.1%	5.4%	3	15.8%	2.0%	4	21.1%	5.1%	3	15.8%	10.7%	19	3.3%
Small Unburned pit	-	-	-	37	40.7%	14.9%	10	11.0%	13.3%	31	34.1%	20.9%	13	14.3%	16.5%	-	-	-	91	15.8%
Large Unburned pit	-	-	-	29	78.4%	11.7%	2	5.4%	2.7%	2	5.4%	1.4%	4	10.8%	5.1%	-	-	-	37	6.4%
Ventilator tunnel	-	-	-	1	33.3%	0.4%	-	-	-	2	66.7%	1.4%	-	-	-	-	-	-	3	0.5%
Ventilator shaft	-	-	-	2	33.3%	0.8%	2	33.3%	2.7%	2	33.3%	1.4%	-	-	-	-	-	-	6	1.0%
Metate rest	-	-	-	-	-	-	-	-	-	1	100.0%	0.7%	-	-	-	-	-	-	1	0.2%
Activity area	-	-	-	3	75.0%	1.2%	1	25.0%	1.4%	-	-	-	-	-	-	-	-	-	4	0.7%
Pit structure	-	-	-	5	33.3%	2.0%	2	13.3%	2.7%	3	20.0%	2.0%	4	26.7%	5.1%	1	6.7%	3.6%	15	2.6%
Cobble pile	-	-	-	-	-	-	1	100.0%	1.4%	-	-	-	-	-	-	-	-	-	1	0.2%
Stain	-	-	-	-	-	-	-	-	-	2	100.0%	1.4%	-	-	-	-	-	-	2	0.3%
Dog burial	-	-	-	6	100.0%	2.4%	-	-	-	-	-	-	-	-	-	-	-	-	6	1.0%
Foot drum	-	-	-	3	100.0%	1.2%	-	-	-	-	-	-	-	-	-	-	-	-	3	0.5%
Divot cluster	-	-	-	5	83.3%	2.0%	1	16.7%	1.4%	-	-	-	-	-	-	-	-	-	6	1.0%
Turkey burial	-	-	-	1	100.0%	0.4%	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2%
Ladder rest	-	-	-	-	-	-	-	-	-	4	100.0%	2.7%	-	-	-	-	-	-	4	0.7%
Collared hearth	-	-	-	2	28.6%	0.8%	2	28.6%	2.7%	1	14.3%	0.7%	2	28.6%	2.5%	-	-	-	7	1.2%
Sipapu	-	-	-	-	-	-	1	16.7%	1.4%	3	50.0%	2.0%	2	33.3%	2.5%	-	-	-	6	1.0%
Natural depression	-	-	-	2	100.0%	0.8%	-	-	-	-	-	-	-	-	-	-	-	-	2	0.3%
Table Total	-	-	-	249	43.3%	100.0%	75	13.0%	100.0%	148	25.7%	100.0%	79	13.7%	100.0%	24	4.2%	100.0%	575	100.0%

Table 25.1. Continued

	LA 249			LA 265			LA 6169			LA 6170			LA 6171			LA 115862			Table Total	
	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Col %
Late Developmental																				
Small sub-pit	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Large cobble-filled pit	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Hearth	-	-	-	-	-	-	-	-	-	1	100.0%	20.0%	-	-	-	-	-	-	1	3.7%
Post hole	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Divot	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Mealing bin	-	-	-	-	-	-	-	-	-	2	100.0%	40.0%	-	-	-	-	-	-	2	7.4%
Human burial	-	-	-	-	-	-	2	100.0%	9.1%	-	-	-	-	-	-	-	-	-	2	7.4%
Small burned pit	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Large burned pit	-	-	-	-	-	-	3	100.0%	13.6%	-	-	-	-	-	-	-	-	-	3	11.1%
Small unburned pit	-	-	-	-	-	-	6	100.0%	27.3%	-	-	-	-	-	-	-	-	-	6	22.2%
Large unburned pit	-	-	-	-	-	-	2	100.0%	9.1%	-	-	-	-	-	-	-	-	-	2	7.4%
Ventilator tunnel	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Pit structure	-	-	-	-	-	-	1	50.0%	4.5%	1	50.0%	20.0%	-	-	-	-	-	-	2	7.4%
Cobble pile	-	-	-	-	-	-	-	-	-	1	100.0%	20.0%	-	-	-	-	-	-	1	3.7%
Collared hearth	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Adobe wall support	-	-	-	-	-	-	1	100.0%	4.5%	-	-	-	-	-	-	-	-	-	1	3.7%
Table Total	-	-	-	-	-	-	22	81.5%	100.0%	5	18.5%	100.0%	-	-	-	-	-	-	27	100.0%
Late Developmental/Coalition																				
Large cobble-filled	-	-	-	-	-	-	1	100.0%	100.0%	-	-	-	-	-	-	-	-	-	1	7.7%
Fire pit	2	100.0%	18.2%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	15.4%
Small unburned pit	6	100.0%	54.5%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	46.2%
Large unburned pit	1	100.0%	9.1%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7.7%
Activity area	-	-	-	-	-	-	-	-	-	1	100.0%	100.0%	-	-	-	-	-	-	1	7.7%
Pit structure	1	100.0%	9.1%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7.7%
Stain	1	100.0%	9.1%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7.7%
Table Total	11	84.6%	100.0%	-	-	-	1	7.70%	100.0%	1	7.70%	100.0%	-	-	-	-	-	-	13	100.0%

Table 25.1. Continued.

	LA 249			LA 265			LA 6169			LA 6170			LA 6171			LA 115862			Table Total	
	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Row %	Col %	Count	Col %
Coalition																				
Hearth	-	-	-	-	-	-	3	75.0%	6.8%	-	-	-	1	25.0%	14.3%	-	-	-	4	7.8%
Ash pit	-	-	-	-	-	-	2	100.0%	4.5%	-	-	-	-	-	-	-	-	-	2	3.9%
Post hole	-	-	-	-	-	-	7	100.0%	15.9%	-	-	-	-	-	-	-	-	-	7	13.7%
Pot rest	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%	14.3%	-	-	-	1	2.0%
Divot	-	-	-	-	-	-	1	100.0%	2.3%	-	-	-	-	-	-	-	-	-	1	2.0%
Ventilator	-	-	-	-	-	-	2	100.0%	4.5%	-	-	-	-	-	-	-	-	-	2	3.9%
Mealing bin	-	-	-	-	-	-	3	100.0%	6.8%	-	-	-	-	-	-	-	-	-	3	5.8%
Human burial	-	-	-	-	-	-	4	100.0%	9.1%	-	-	-	-	-	-	-	-	-	4	7.8%
Small burned pit	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%	14.3%	-	-	-	1	2.0%
Large burned pit	-	-	-	-	-	-	2	100.0%	4.5%	-	-	-	-	-	-	-	-	-	2	3.9%
Small unburned pit	-	-	-	-	-	-	10	71.4%	22.7%	-	-	-	3	21.4%	42.9%	-	-	-	13	25.5%
Large unburned pit	-	-	-	-	-	-	1	100.0%	2.3%	-	-	-	-	-	-	-	-	-	1	2.0%
Pit structure	-	-	-	-	-	-	3	75.0%	6.8%	-	-	-	1	25.0%	14.3%	-	-	-	4	7.8%
Ritual art	-	-	-	-	-	-	2	100.0%	4.5%	-	-	-	-	-	-	-	-	-	2	3.9%
Surface structure	-	-	-	-	-	-	2	100.0%	4.5%	-	-	-	-	-	-	-	-	-	2	3.9%
Collared hearth	-	-	-	-	-	-	2	100.0%	4.5%	-	-	-	-	-	-	-	-	-	2	3.9%
Table Total	-	-	-	-	-	-	44	86.3%	100.0%	-	-	-	7	13.7%	100.0%	-	-	-	51	100.0%
Late Developmental/Classic																				
Cobble pile	1	100.0%	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%
Table Total	1	100.0%	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0%
Historic																				
Large unburned pit	-	-	-	-	-	-	1	100.0%	100.0%	-	-	-	-	-	-	-	-	-	1	100.0%
Table Total	-	-	-	-	-	-	1	100.0%	100.0%	-	-	-	-	-	-	-	-	-	1	100.0%
Site Total	15	2.1%	100.0%	248	34.6%	100.0%	167	23.3%	100.0%	152	21.2%	100.0%	108	15.1%	100.0%	27	3.8%	100.0%	717	100.0%

feature assemblage. Sixteen additional features were related to structure support and architecture. Extramural features (n = 255) comprised 36 percent of reported features. Six were superimposed within structure fill. Three "activity areas" with suites of closely constructed or superimposed facilities contained the remainder of the extramural features (n = 31).

In order to track site abandonment processes, feature fill type was defined by content and depositional process. Fill was classified a as primary deposit, intentionally deposited, or was naturally occurring. Subsets of each category are discussed in the following overview, detailed descriptions are provided in Appendix 7.

Primary deposits were defined as fill from the last feature use and usually contained burned materials. Intentional deposits were usually found in burials and in intramural features that were filled during remodeling, sometimes these features were capped. "Clean" or sterile fill contained no cultural material. "Dirty" fill had low frequency cultural material including charcoal and artifacts. Trash-filled features were filled with high frequency, redeposited refuse visible in profile as either a continuous deposit or as a series of deposits interspersed with natural fill. Features with trash-natural fill exhibited a discrete episode of trash dumping covered with alluvium or colluvium.

Natural fill was defined as fill deposited by alluvial or colluvial processes with variable (but generally low) artifact frequencies. Roof fall/closing material was defined as derived from a fallen roof and occurred in structures and intramural features. Fill often incorporated reed matting, baked clay, and wooden roof beams. Roof fall, closing material, and natural fill incorporated both roof fall and natural fill as defined above. Burned material was not always incorporated in this fill.

Undifferentiated fill refers to fill that had characteristics of both natural and suspected intentional filling, for instance the occurrenceof large ground stone in what appeared to be alluvium. In some cases, feature fill was impossible to characterize because of missing or vague recording. In these cases, fill was coded as not recorded or indeterminate.

Most features filled naturally or with wall or roof fall. Eighty-seven features had primary deposits and 83 were filled intentionally with either clean or dirty fill. An additional 40 were trash-filled and 24 were filled with a combination of trash and natural material. Forty-eight had fill that was either indeterminate, undifferentiated, not recorded, or not present because the feature was convex. Forty-nine features were capped with adobe plaster, 23 were remodeled, and 12 were reused.

Feature dimensions were used in two ways, both as criteria for defining feature type (small unburned pits were all less than 0.50 m in diameter) and as a basis for area and volume calculations. Complete measurements were those of length, width, and depth. If a feature was bell shaped, the bell's maximum dimension was also included. Of the total feature count, 626 features had complete measurements, meaning that all feature dimensions were completely defined and measured. Features with partial measurements (n = 81) were deflated by natural forces or backhoe intrusion and had less accurate measurements. These features were not considered when reporting median volume data or in scatter plots for size comparisons, but are considered when reporting locational data and were also included in regional data. Features with missing dimensions were excluded. Five were not recorded or were not cultural. Flotation samples from 195 features were sorted in hopes of recovering archaeobotanical remains, 131 contained charred taxa.

Research Questions

NM 22 excavations provided an uncommonly large feature database. Emphasis was put on providing detailed feature characterizations in order to address issues of site structure and organization. Archaeobotanical data were included in hopes of correlating the presence or absence of charred species with feature function. Although 38 feature classes were identified, emphasis was placed on those related to food processing and storage, or to structure layout. Because most fea-

Table 25.2. NM 22, All Features with Complete Measurements; Statistics: Depth, Area, and Volume by Feature Type

Type		Depth (m)	Area (sq m)	Volume (cu m)
Small sub-pit	N=11			
	Mean	0.2	0.15	0.0232
	Median	0.2	0.16	0.0189
	Std. Deviation	0.09	0.09	0.0192
	Minimum	0.06	0.02	0.001
	Maximum	0.4	0.33	0.0641
	Variance	0.01	0.01	0.0004
Storage pit	N=43			
	Mean	0.56	0.64	0.4986
	Median	0.44	0.29	0.1039
	Std. Deviation	0.32	1.21	0.9082
	Minimum	0.14	0.01	0.0016
	Maximum	1.29	6.12	4.4191
	Variance	0.1	1.47	0.8248
Off chamber cist	N=2			
	Mean	1.08	0.65	0.6982
	Median	1.08	0.65	0.6982
	Std. Deviation	0.1	0.23	0.1906
	Minimum	1.01	0.48	0.5634
	Maximum	1.15	0.82	0.833
	Variance	0.01	0.05	0.0363
Small cobble-filled pit	N=6			
	Mean	0.18	0.16	0.0195
	Median	0.13	0.15	0.0167
	Std. Deviation	0.11	0.11	0.015
	Minimum	0.1	0.04	0.0033
	Maximum	0.35	0.37	0.0414
	Variance	0.01	0.01	0.0002
Large cobble-filled	N=26			
	Mean	0.21	0.57	0.1547
	Median	0.17	0.27	0.035
	Std. Deviation	0.14	0.89	0.4044
	Minimum	0.1	0.18	0.0133
	Maximum	0.67	4.49	2.0157
	Variance	0.02	0.79	0.1636
Fire pit	N=3			
	Mean	0.09	0.11	0.0075
	Median	0.08	0.12	0.0085
	Std. Deviation	0.02	0.05	0.0031
	Minimum	0.08	0.05	0.0039
	Maximum	0.12	0.16	0.0099
	Variance	0	0	0

Table 25.2. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Hearth	N=11			
	Mean	0.11	0.33	0.3091
	Median	0.09	0.24	0.0098
	Std. Deviation	0.1	0.31	0.8828
	Minimum	0.04	0.07	0.0025
	Maximum	0.38	0.94	2.9537
	Variance	0.01	0.09	0.7794
Ash pit	N=11			
	Mean	0.21	0.1	0.016
	Median	0.23	0.09	0.0138
	Std. Deviation	0.07	0.06	0.0125
	Minimum	0.08	0.03	0.0023
	Maximum	0.28	0.21	0.0401
	Variance	0.01	0	0.0002
Wall niche	N=8			
	Mean	0.4	0.11	0.0328
	Median	0.35	0.11	0.024
	Std. Deviation	0.25	0.06	0.0251
	Minimum	0.19	0.02	0.0024
	Maximum	0.9	0.22	0.0688
	Variance	0.06	0	0.0006
Post hole	N=143			
	Mean	0.29	0.05	0.0161
	Median	0.24	0.03	0.005
	Std. Deviation	0.2	0.05	0.0243
	Minimum	0.03	0	0.0001
	Maximum	0.9	0.29	0.1375
	Variance	0.04	0	0.0006
Pot rest	N=34			
	Mean	0.08	0.04	0.0043
	Median	0.05	0.02	0.001
	Std. Deviation	0.15	0.1	0.0168
	Minimum	0.02	0	0.0001
	Maximum	0.9	0.57	0.0988
	Variance	0.02	0.01	0.0003
Divot	N=29			
	Mean	0.06	0	0.0002
	Median	0.06	0	0.0002
	Std. Deviation	0.03	0	0.0002
	Minimum	0.01	0	0
	Maximum	0.12	0.01	0.0008
	Variance	0	0	0
Ventilator	N=9			
	Mean	0.69	0.42	0.5126
	Median	0.41	0.28	0.231
	Std. Deviation	0.49	0.4	0.6956
	Minimum	0.3	0.09	0.0428
	Maximum	1.52	1.34	1.8137
	Variance	0.24	0.16	0.4838

Table 25.2. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Large burned pit	N=19			
	Mean	0.23	0.64	0.1178
	Median	0.22	0.31	0.0712
	Std. Deviation	0.12	0.75	0.1682
	Minimum	0.07	0.18	0.0105
	Maximum	0.5	3.16	0.7198
	Variance	0.01	0.57	0.0283
Small unburned pit	N=117			
	Mean	0.13	0.06	0.0095
	Median	0.1	0.05	0.0028
	Std. Deviation	0.09	0.06	0.027
	Minimum	0.03	0.01	0.0002
	Maximum	0.52	0.24	0.2777
	Variance	0.01	0	0.0007
Large unburned pit	N=40			
	Mean	0.3	0.63	0.1383
	Median	0.27	0.46	0.0772
	Std. Deviation	0.18	0.63	0.1666
	Minimum	0.08	0	0.0096
	Maximum	0.77	3.51	0.8247
	Variance	0.03	0.4	0.0277
	Mean	1.61	0.11	0.226
	Median	2.03	0.11	0.1515
	Std. Deviation	0.79	0.1	0.1776
	Minimum	0.69	0	0.0978
	Maximum	2.1	0.2	0.4288
	Variance	0.63	0.01	0.0315
Ventilator shaft	N=6			
	Mean	0.77	0.5	0.3787
	Median	0.79	0.48	0.3476
	Std. Deviation	0.45	0.19	0.2821
	Minimum	0.18	0.27	0.0324
	Maximum	1.32	0.8	0.744
	Variance	0.21	0.04	0.0796
Metate rest	N=1			
	Mean	0	0.33	0
	Median	0	0.33	0
	Std. Deviation	-	-	-
	Minimum	0	0.33	0
	Maximum	0	0.33	0
	Variance	-	-	-

Table 25.2. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Activity area	N=4			
	Mean	0.33	15.86	1.61
	Median	0.3	8.09	1.33
	Std. Deviation	0.16	15.32	1.68
	Minimum	0.19	0.56	0.00
	Maximum	0.53	36	3.77
	Variance	0.03	234.58	2.82
Pit structure	N=17			
	Mean	0.89	14.24	15.28
	Median	0.9	12.36	7.39
	Std. Deviation	0.5	9.55	16.35
	Minimum	0.3	3.37	1.20
	Maximum	2	33.31	56.52
	Variance	0.25	91.26	267.30
Cobble pile	N=2			
	Mean	0.3	3.27	0.00
	Median	0.3	3.27	0.00
	Std. Deviation	0.09	2.87	0.00
	Minimum	0.23	1.24	0.00
	Maximum	0.36	5.3	0.00
	Variance	0.01	8.25	0.00
Stain	N=1	1	2	2
	Mean	0.1	4.10	0.27
	Median	0.1	4.10	0.27
	Std. Deviation	-	0.00	0.00
	Minimum	0.1	4.10	0.00
	Maximum	0.1	4.10	0.27
	Variance	-	0.00	0.00
Midden	N=1			
	Mean	0.2	25.51	0.00
	Median	0.2	25.51	0.00
	Std. Deviation	-	-	-
	Minimum	0.2	25.51	0.00
	Maximum	0.2	25.51	0.00
	Variance	-	-	-
Ritual art	N=1			
	Mean	-	0.02	-
	Median	-	0.02	-
	Std. Deviation	-	-	-
	Minimum	-	0.02	-
	Maximum	-	0.02	-
	Variance	-	-	-

Table 25.2. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Dog burial	N=3	-	-	-
	Mean	-	-	-
	Median	-	-	-
	Std. Deviation	-	-	-
	Minimum	-	-	-
	Maximum	-	-	-
	Variance	-	-	-
Foot drum	N=3	3	3	3
	Mean	0.1	0.28	0.0198
	Median	0.11	0.27	0.0144
	Std. Deviation	0.02	0.15	0.0133
	Minimum	0.08	0.14	0.0101
	Maximum	0.12	0.44	0.035
	Variance	0	0.02	0.0002
Divot cluster	N=3			
	Mean	0.05	0	0.0003
	Median	0.05	0	0.0003
	Std. Deviation	0.01	0	0
	Minimum	0.05	0	0.0003
	Maximum	0.06	0.01	0.0003
	Variance	0	0	0
Turkey burial	N=1			
	Mean	0.13	0	0
	Median	0.13	0	0
	Std. Deviation	-	-	-
	Minimum	0.13	0	0
	Maximum	0.13	0	0
	Variance	-	-	-
Surface structure	N=1			
	Mean	0.9	3.04	5.539
	Median	0.9	3.04	5.539
	Std. Deviation	-	4.3	-
	Minimum	0.9	0	5.539
	Maximum	0.9	6.08	5.539
	Variance	-	18.51	-
Ladder rest	N=4			
	Mean	0.03	0.01	0.0002
	Median	0.04	0.01	0.0002
	Std. Deviation	0.01	0.01	0.0002
	Minimum	0.02	0	0.0001
	Maximum	0.04	0.02	0.0005
	Variance	0	0	0
Collared hearth	N=10			
	Mean	0.14	0.26	0.0233
	Median	0.12	0.19	0.0155
	Std. Deviation	0.07	0.15	0.0204
	Minimum	0.03	0.11	0.0067
	Maximum	0.24	0.54	0.0701
	Variance	0	0.02	0.0004

tures were Early Developmental, this analysis concentrates on that period.

Sites along NM 22 had an assortment of unburned facilities constructed for diverse and probably overlapping domestic and ritual functions. The majority were small and large undifferentiated pits, which, in conjunction with thermal features and pit structures, compose the "site framework": the basic units around which activities were organized providing evidence of activity type and labor organization (Binford 1983). Feature differentiation along with spatial patterning was used by Schmader to assign structure function (Schmader 1994). Site authors have already discussed pit features in their context. This chapter attempts to quantify facilities on a project-wide scale by providing a comparison of similar facilities across sites by time period and to address questions of cultural history and change, settlement and subsistence, and social organization initially posed by Post and Blinman in the NM 22 research design (2001). Site level comparisons will also be made with regional data compiled from LA 57024/26 and LA 109129 to provide a regional perspective.

Basic comparisons within a feature class were conducted by time, location, and between sites. Selected Early Developmental features were compared with one another to provide quantifiable measures of feature size in relationship to feature class. Tables 25.2 and 25.3 provide summary statistics for features with complete measurements. Features from all time periods are compared in Table 25.2, while Early Developmental features are compared in Table 25.3.

Unburned Features

The utility of quantifying and comparing unburned features is most readily apparent when discussing storage. Damp and Kotyk (2000:104) cite large storage facilities as one of the indications of year-round habitation in areas favorable for horticulture by Basketmaker III populations in the southern Chuska Mountains. Gilman (1987) not only associates "cold season sedentism" and food storage with pit structure use, but also makes a correlation between length of overwintering and the amount and type of food to be stored. Longer periods of overwintering are associated with larger storage capacity. Storage facility construction is also conditioned by surplus availability as well as population size (Gilman 1987:553–554). Gilman also state that extramural facilities are probably associated with pit structures during resource intensification. Storage features are also the most archaeologically evident element of food production and distribution, and their location and accessibility may inform on household vs. interhousehold social organization through control of access to foodstuffs (Wilshusen 1998a:639).

In addition to storage pits, sites along NM 22 had a plethora of both small and large undifferentiated pits created for diverse and probably overlapping domestic functions. Feature diversity can be used as a gauge of residential stability (defined by Lightfoot as the time spent at a location during a year [Lightfoot 1984]): the more diverse the feature types, the more stable a given habitation. When considered with feature density and material culture, feature diversity may provide evidence of use duration. A location with high feature density but a lack of material culture may have been seasonally revisited, whereas a site with diverse feature and artifact types was probably a more permanent residence (Gallivan 2002:542–543). Changes in feature size and location across time and between sites may expose patterns that indicate duration (the total amount of time an area is used), or seasonal vs. year-round use. Incidence of remodeling, superimposition, and human and dog interments could also provide data with which to evaluate occupation duration.

More specialized intramural facilities (mealing bins, foot drums, wall niches, pot rests, postholes, ancillary storage facilities), when coupled with data from undifferentiated pits and storage facilities, may also provide evidence with which to infer community or household and ritual or residential use and interplay between the two.

Small Unburned Pits

Small unburned pits (n = 126) were informal features less than 50 cm in diameter. This general

Table 25.3. NM 22, Early Developmental Features with Complete Measurements; Statistics: Depth, Area, and Volume by Feature Type

Type		Depth (m)	Area (sq m)	Volume (cu m)
Small sub-pit	N=2			
	Mean	0.1	0.09	0.0074
	Median	0.1	0.09	0.0074
	Std. Deviation	0.05	0.1	0.0091
	Minimum	0.06	0.02	0.001
	Maximum	0.13	0.16	0.0138
	Variance	0	0.01	0.0001
Storage pit	N=42			
	Mean	0.55	0.63	0.5
	Median	0.44	0.25	0.0956
	Std. Deviation	0.32	1.23	0.9192
	Minimum	0.14	0.01	0.0016
	Maximum	1.29	6.12	4.4191
	Variance	0.1	1.5	0.8449
Off chamber cist	N=2			
	Mean	1.08	0.65	0.6982
	Median	1.08	0.65	0.6982
	Std. Deviation	0.1	0.23	0.1906
	Minimum	1.01	0.48	0.5634
	Maximum	1.15	0.82	0.833
	Variance	0.01	0.05	0.0363
Small cobble-filled pit	N=5			
	Mean	0.19	0.12	0.0186
	Median	0.13	0.13	0.0088
	Std. Deviation	0.11	0.06	0.0166
	Minimum	0.1	0.04	0.0033
	Maximum	0.35	0.18	0.0414
	Variance	0.01	0	0.0003
Large cobble-filled	N=23			
	Mean	0.21	0.58	0.1682
	Median	0.17	0.26	0.029
	Std. Deviation	0.15	0.94	0.4292
	Minimum	0.1	0.18	0.0133
	Maximum	0.67	4.49	2.0157
	Variance	0.02	0.89	0.1842
Fire pit	N=1			
	Mean	0.08	0.05	0.0039
	Median	0.08	0.05	0.0039
	Std. Deviation	.	.	.
	Minimum	0.08	0.05	0.0039
	Maximum	0.08	0.05	0.0039
	Variance	.	.	.

Table 25.3. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Hearth	N=6			
	Mean	0.12	0.43	0.0667
	Median	0.07	0.26	0.0094
	Std. Deviation	0.13	0.39	0.1364
	Minimum	0.04	0.07	0.0025
	Maximum	0.38	0.94	0.3447
	Variance	0.02	0.16	0.0186
Ash pit	N=9			
	Mean	0.22	0.1	0.0182
	Median	0.26	0.09	0.0138
	Std. Deviation	0.06	0.06	0.0128
	Minimum	0.11	0.03	0.0023
	Maximum	0.28	0.21	0.0401
	Variance	0	0	0.0002
Wall niche	N=9			
	Mean	0.4	0.11	0.0328
	Median	0.35	0.11	0.024
	Std. Deviation	0.25	0.06	0.0251
	Minimum	0.19	0.02	0.0024
	Maximum	0.9	0.22	0.0688
	Variance	0.06	0	0.0006
Post hole	N=135			
	Mean	0.3	0.05	0.0163
	Median	0.25	0.03	0.0052
	Std. Deviation	0.2	0.05	0.0244
	Minimum	0.03	0	0.0001
	Maximum	0.9	0.29	0.1375
	Variance	0.04	0	0.0006
Pot rest	N=33			
	Mean	0.09	0.04	0.0042
	Median	0.05	0.02	0.001
	Std. Deviation	0.15	0.1	0.0171
	Minimum	0.02	0	0.0001
	Maximum	0.9	0.57	0.0988
	Variance	0.02	0.01	0.0003
Divot	N=27			
	Mean	0.07	0	0.0002
	Median	0.06	0	0.0002
	Std. Deviation	0.03	0	0.0002
	Minimum	0.01	0	0
	Maximum	0.12	0.01	0.0008
	Variance	0	0	0
Ventilator	N=7			
	Mean	0.79	0.48	0.6361
	Median	0.48	0.38	0.3052
	Std. Deviation	0.52	0.44	0.7514
	Minimum	0.32	0.09	0.0428
	Maximum	1.52	1.34	1.8137
	Variance	0.27	0.19	0.5646

Table 25.3. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Ash and Rock deposit	N=7			
	Mean	0.18	0.78	1.4032
	Median	0.1	0.5	0.0295
	Std. Deviation	0.14	0.67	3.3924
	Minimum	0.05	0.24	0
	Maximum	0.46	2.19	9.0884
	Variance	0.02	0.45	11.5086
Storage/roasting	N=1			
	Mean	0.98	0.29	0.5763
	Median	0.98	0.29	0.5763
	Std. Deviation	.	.	.
	Minimum	0.98	0.29	0.5763
	Maximum	0.98	0.29	0.5763
Warming pit	N=2			
	Mean	0.08	0.14	0.0074
	Median	0.08	0.14	0.0074
	Std. Deviation	0	0.03	0.0014
	Minimum	0.08	0.12	0.0064
	Maximum	0.08	0.16	0.0084
	Variance	0	0	0
Small burned pit	N=15			
	Mean	0.12	0.08	0.0082
	Median	0.1	0.08	0.0068
	Std. Deviation	0.06	0.05	0.0063
	Minimum	0.03	0.02	0.0005
	Maximum	0.28	0.18	0.018
	Variance	0	0	0
Large burned pit	N=13			
	Mean	0.23	0.56	0.1089
	Median	0.2	0.28	0.0306
	Std. Deviation	0.12	0.82	0.1902
	Minimum	0.07	0.18	0.0105
	Maximum	0.42	3.16	0.7198
	Variance	0.01	0.66	0.0362
Small unburned pit	N=87			
	Mean	0.13	0.06	0.0069
	Median	0.11	0.05	0.0028
	Std. Deviation	0.08	0.05	0.0085
	Minimum	0.03	0.01	0.0002
	Maximum	0.48	0.23	0.0358
	Variance	0.01	0	0.0001
Large unburned pit	N=31			
	Mean	0.32	0.69	0.1535
	Median	0.28	0.5	0.0883
	Std. Deviation	0.19	0.69	0.1796
	Minimum	0.08	0	0.0096
	Maximum	0.77	3.51	0.8247
	Variance	0.04	0.47	0.0322

Table 25.3. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Ventilator tunnel	N=3			
	Mean	1.61	0.11	0.226
	Median	2.03	0.11	0.1515
	Std. Deviation	0.79	0.1	0.1776
	Minimum	0.69	0	0.0978
	Maximum	2.1	0.2	0.4288
	Variance	0.63	0.01	0.0315
Ventilator shaft	N=6			
	Mean	0.77	0.5	0.3787
	Median	0.79	0.48	0.3476
	Std. Deviation	0.45	0.19	0.2821
	Minimum	0.18	0.27	0.0324
	Maximum	1.32	0.8	0.744
	Variance	0.21	0.04	0.0796
Metate rest	N=1			
	Mean	0	0.33	0
	Std. Deviation	.	.	.
	Minimum	0	0.33	0
	Maximum	0	0.33	0
	Variance	.	.	.
Activity area	N=3			
	Mean	0.31	18.2	1.6784
	Median	0.2	18.11	1.4719
	Std. Deviation	0.19	16.62	1.9321
	Minimum	0.19	0.56	0
	Maximum	0.53	36	3.77
	Variance	0.04	276.3	3.7332
Pit structure	N=11			
	Mean	0.97	18.1	20.8503
	Median	0.9	18.23	17.697
	Std. Deviation	0.55	9.78	17.9819
	Minimum	0.35	3.37	1.7907
	Maximum	2	33.31	56.52
	Variance	0.3	95.73	323.3496
Cobble pile	N=1			
	Mean	0.36	1.24	0
	Median	0.36	1.24	0
	Std. Deviation	.	.	.
	Minimum	0.36	1.24	0
	Maximum	0.36	1.24	0
	Variance	.	.	.
Stain	N=1			
	Mean	0.1	4.1	0.2744
	Median	0.1	4.1	0.2744
	Std. Deviation	.	.	.
	Minimum	0.1	4.1	0.2744
	Maximum	0.1	4.1	0.2744
	Variance	.	.	.

Table 25.3. Continued.

Type		Depth (m)	Area (sq m)	Volume (cu m)
Dog burial	N=1			
	Mean	0.11	0.13	0.0055
	Median	0.11	0.17	0
	Std. Deviation	.	0.12	0.0095
	Minimum	0.11	0	0
	Maximum	0.11	0.22	0.0165
	Variance	.	0.01	0.0001
Foot drum	N=3			
	Mean	0.1	0.28	0.0198
	Median	0.11	0.27	0.0144
	Std. Deviation	0.02	0.15	0.0133
	Minimum	0.08	0.14	0.0101
	Maximum	0.12	0.44	0.035
	Variance	0	0.02	0.0002
Divot cluster	N=3			
	Mean	0.05	0	0.0003
	Median	0.05	0	0.0003
	Std. Deviation	0.01	0	0
	Minimum	0.05	0	0.0003
	Maximum	0.06	0.01	0.0003
	Variance	0	0	0
Turkey burial	N=1			
	Mean	0.13	0	0
	Median	0.13	0	0
	Std. Deviation	.	.	.
	Minimum	0.13	0	0
	Maximum	0.13	0	0
	Variance	.	.	.
Ladder rest	N=4			
	Mean	0.03	0.01	0.0002
	Median	0.04	0.01	0.0002
	Std. Deviation	0.01	0.01	0.0002
	Minimum	0.02	0	0.0001
	Maximum	0.04	0.02	0.0005
	Variance	0	0	0
Collared hearth	N=7			
	Mean	0.11	0.29	0.0223
	Median	0.12	0.2	0.0151
	Std. Deviation	0.07	0.16	0.0221
	Minimum	0.03	0.13	0.0067
	Maximum	0.24	0.54	0.0701
	Variance	0	0.02	0.0005
Sipapu	N=6			
	Mean	0.11	0.01	0.0004
	Median	0.11	0.01	0.0004
	Std. Deviation	0.03	0	0.0002
	Minimum	0.07	0	0.0002
	Maximum	0.15	0.01	0.0006
	Variance	0	0	0
Total	N=517			
	Mean	0.27	0.74	0.5601
	Median	0.17	0.06	0.0093
	Std. Deviation	0.3	3.56	3.9271
	Minimum	0	0	0
	Maximum	2.1	36	56.52
	Variance	0.09	12.64	15.4219

category is defined by size encompassing all unburned pits, both intramural and extramural, that have no readily interpretable function. There were 98 small unburned pits with complete measurements ranging in depth from 0.04 to 0.52 m. They had surface areas between 0.0050 to 0.2375 sq m. Figure 25.2 demonstrates some categorical overlap between small unburned pits, pot rests and divots, and ladder holes. Pot rests and divots are intramural features with implied function. Pot rests stabilize a round-bottomed container. Divots may have held paho sticks, drying racks, ladders, or loom poles. Because of implied function, site directors occasionally elected to classify some intramural pits that fell into this size range as "small unburned." Extramural features of similar depth and area were also classified as unburned pits.

Very few flotation samples (n = 10) from small unburned pits were processed for archaeobotanical remains. Small unburned pits were not selected for analysis because the majority (n = 70) filled naturally or had a combination of roof fall and natural fill (n = 27). Small sample size precludes any conclusions about association between small unburned pits and archaeobotanical remains.

There was one small unburned pit identified during the earliest Developmental period. The feature was larger and deeper than most Early Developmental features (Fig. 25.3).

There were 92 Early Developmental pits; 68 had complete measurements that ranged from 0.04 to 0.50 m deep, and had areas ranging from 0.005 to 0.23 sq m. The median size was 0.12 m deep and 0.05 sq m in area with a volume of 0.0059 cu m . Almost all pits deeper than 0.10 m were Early Developmental. Early Developmental pits were consistently deeper than unburned pits from other time periods (Fig. 25.3).

Small unburned pits made up 16 percent of the total Early Developmental feature count. The majority, 49, were located in structures. Thirty-nine (42 percent) were extramural and four were located in activity areas. Fill type was diverse. In addition to features with natural fill, features were trash-filled and some were filled intentionally. In activity areas, small pits tended to be trash-filled and were larger than other small unburned pits. Similar in depth range, the majority of small pits were from activity areas and were larger than 0.15 sq m in area, where most small unburned pits were less than 0.10 sq m in area, regardless of whether they were intramural or extramural (Fig. 25.4). Intentionally filled small pit features were located in structures. Small pits with cultural fill (n = 5) were capped with adobe plaster, while features with sterile fill (n = 5) were not.

Figure 25.5 shows area and depth distributions of small unburned Early Developmental pits. LA 265 had the largest number of small unburned pits (n = 38) followed by LA 6170 (n = 31), LA 6171 (n = 13), and LA 6169 (n = 10). Although LA 265 had the largest number, the site had a smaller over all feature ratio (15 percent of the total assemblage) than LA 6170, where small unburned pits made up 21 percent of the Early Developmental features. This percentage may be slightly skewed when taking into account differences in reporting mentioned above. However, even if the five smallest features from LA 6170 are removed from the data set, LA 6170 still has the highest proportion of small, unburned Early Developmental pits. LA 6171 (17 percent) and LA 6169 (14 percent) have roughly comparable proportions of small unburned pits in relation to LA 265. LA 115862 and LA 249 had no small unburned pits.

There were six Late Developmental period small unburned pits comprising 22 percent of all Late Developmental features (Fig. 25.3). All were intramural features from LA 6169. They tended to be small and shallow, among the size range of the smallest Early Developmental features, and ranged in depth from 0.05 m to 0.10 m and from 0.0113 to 0.1735 m sq in area. The median size was 0.09 m deep, 0.0177 sq m in area, and a volume of 0.0009 cu m.

There were 11 Coalition pits, 9 of which had complete measurements. Most pits also tended to be in the size range of some of the smallest Early Developmental features, ranging in depth from 0.04 to 0.09 m and areas between 0.0106 and 0.0509 sq m. Median feature size was 0.08 m deep, with a 0.0151 sq m

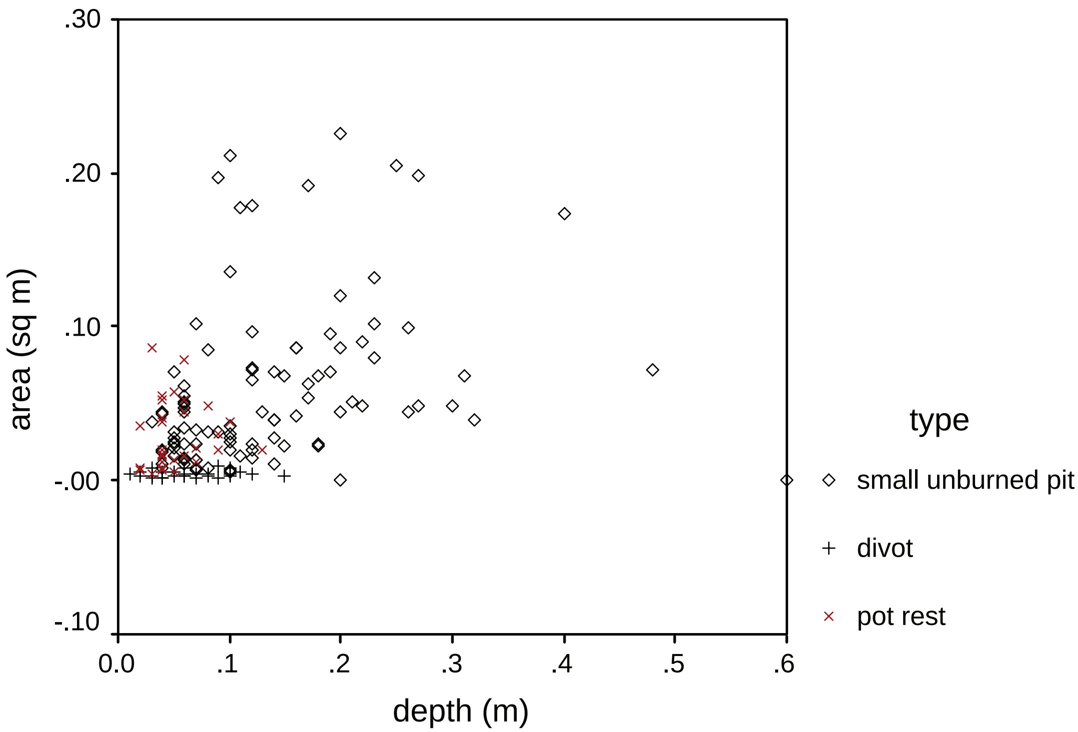

Figure 25.2. Early Developmental small unburned pits, pot rests, and divots by feature type, area, and depth.

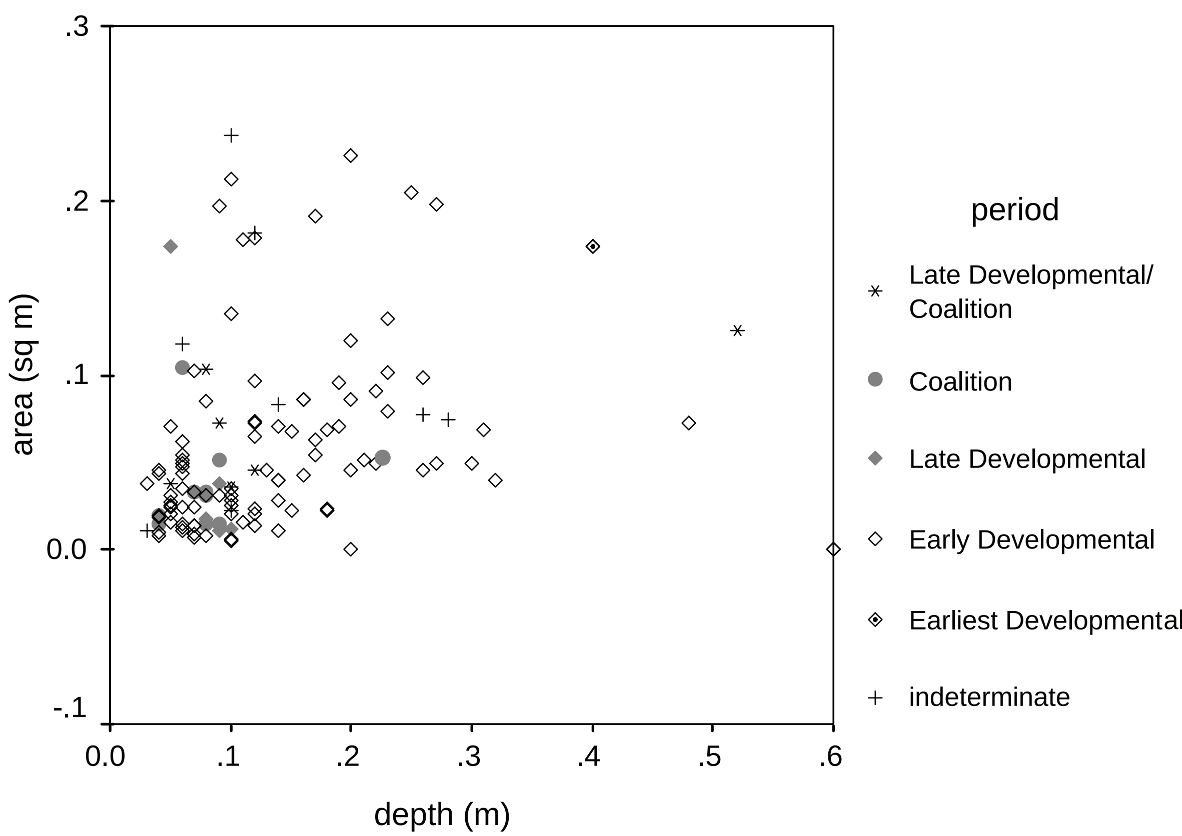

Figure 25.3. Small unburned pits by period, area, and depth.

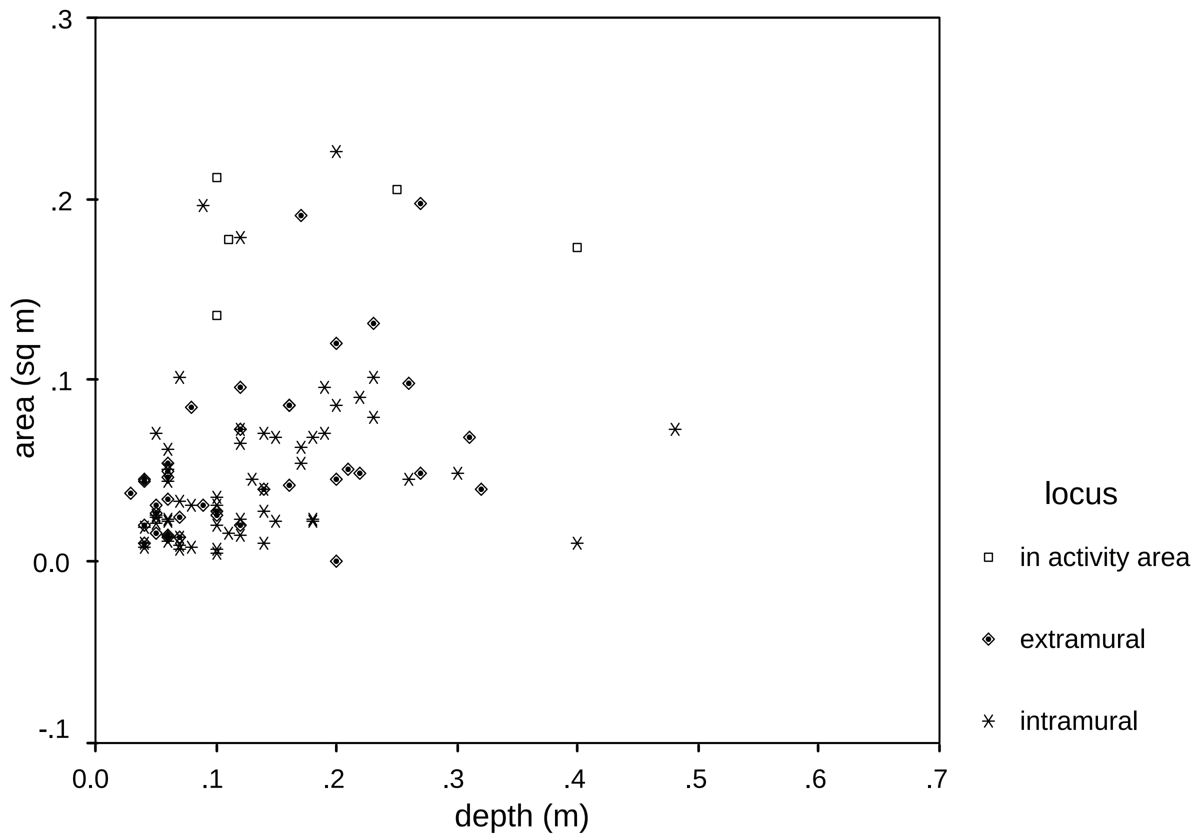

Figure 25.4. Early Developmental small unburned pits by locus, area, and depth.

area and 0.0016 cu m in volume. All of the features were located at LA 6169. Eight were intramural, one was extramural. Although all pits were less than 0.10 m deep, intramural pits tended to be deeper and had a smaller area (0.0106 to 0.0509 sq m) than extramural pits, which had an area of slightly more than 0.10 sq m and was not included in this comparison because of partial measurements.

One pit from LA 249 was assigned to a Late Developmental or Classic time period. Eight features with indeterminate dates were excavated at LA 6169. They all fall into typical size ranges defined for small unburned pits.

Small unburned pits occurred during all periods. These generalized, low capacity features undoubtedly supported a wide range of daily activities that left little or no archaeological evidence. Size and volume difference between unburned pits in activity areas and other small pits from Early Developmental period contexts suggests that the organization of food or resource processing varied depending on the activity locus. Undoubtedly there were some functional differences between intramural and extramural unburned pits based on the logical assumption that the range of indoor and outdoor activities varied. It is interesting that small unburned pits decreased in size from the Early Developmental to the Late Developmental, Coalition, and mixed periods. The change in size may reflect the duration of occupation and the size of the group living at the sites or at least regularly using the structures. The Early Developmental period occupations were strongly residential with some evidence for permanent occupation. Later periods were more seasonal in their occupations as evidenced by the decreased size and complexity of the structures.

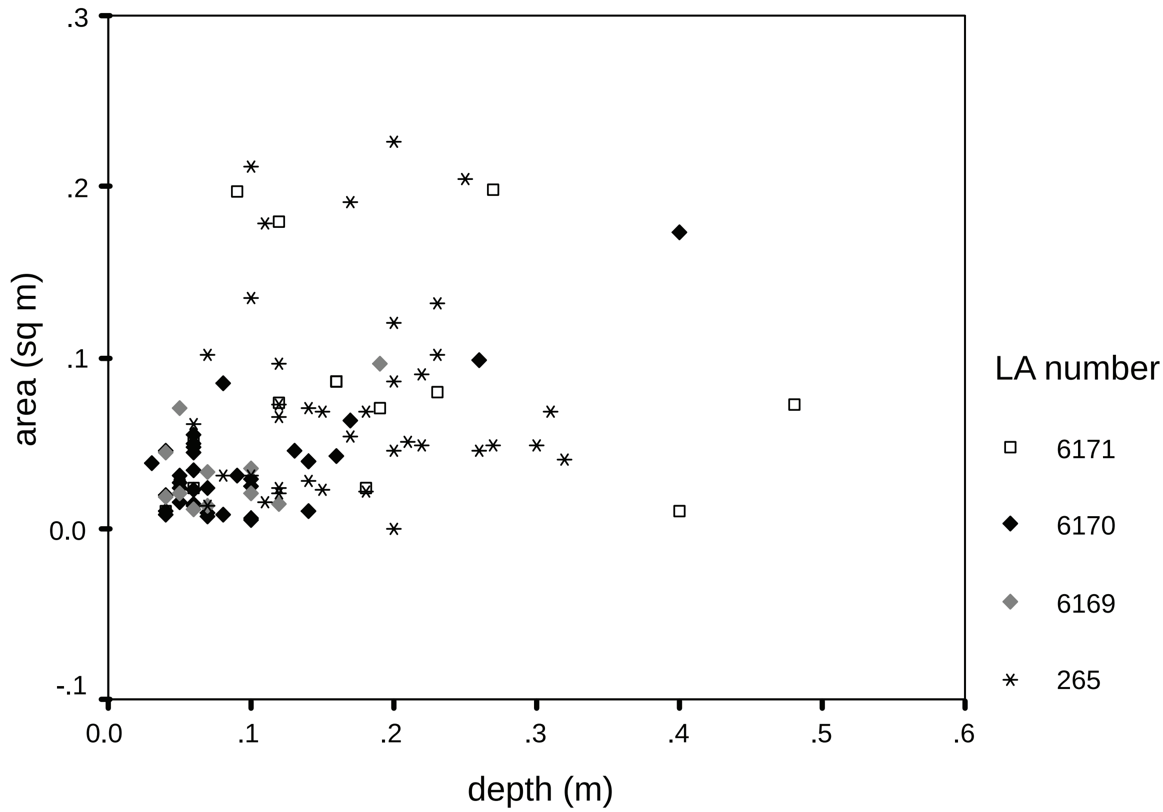

Figure 25.5. Early Developmental small unburned pits by site, area, and depth.

Large Unburned Pits

Large unburned pits (n = 47) were informal features larger than 0.50 m in diameter. Like small unburned pits, this category was defined by size and encompassed all large unburned pits not assigned to other functional categories. Pits with complete measurements (n = 40) ranged in depth from 0.08 to 0.77 m and had surface areas between 0.12 and 3.51 sq m. Median measurements were 0.25 m deep, 0.47 sq m in area, with a 0.0855 cu m volume. Although some large unburned pits are comparable in size to some storage pits (see Fig. 25.6), they tend to be shallower and have larger surface areas. Median volumes were also lower.

Archaeobotanical samples from five of the pits were processed. Two were from natural fill, two from trash fill, and one from an intentionally filled feature with dirty fill. Sample size is too small to make any generalizations about links to feature fill, condition, or shape.

The earliest Developmental component (Fig. 25.7) at LA 6171 had two large unburned pits, one was extramural and the other was located within an activity area (Fig. 25.8). Both were steep walled and deeper than features from most other time periods. Archaeobotanical samples from these pits were not processed because the pits filled naturally.

The majority of large unburned pits were from Early Developmental components. Pit sizes were similar to size ranges mentioned above but Early Developmental pits had a broader depth range. The majority, almost 70 percent of large unburned pits, were extramural (n = 26); seven were located in activity areas and four were in structures (LA 265, Structures 1 and 4, and LA 6169, Feature 87). Most Early Developmental pits were moderately steep (n = 11) or steep walled (n = 6). Four had vertical sides and three were gen-

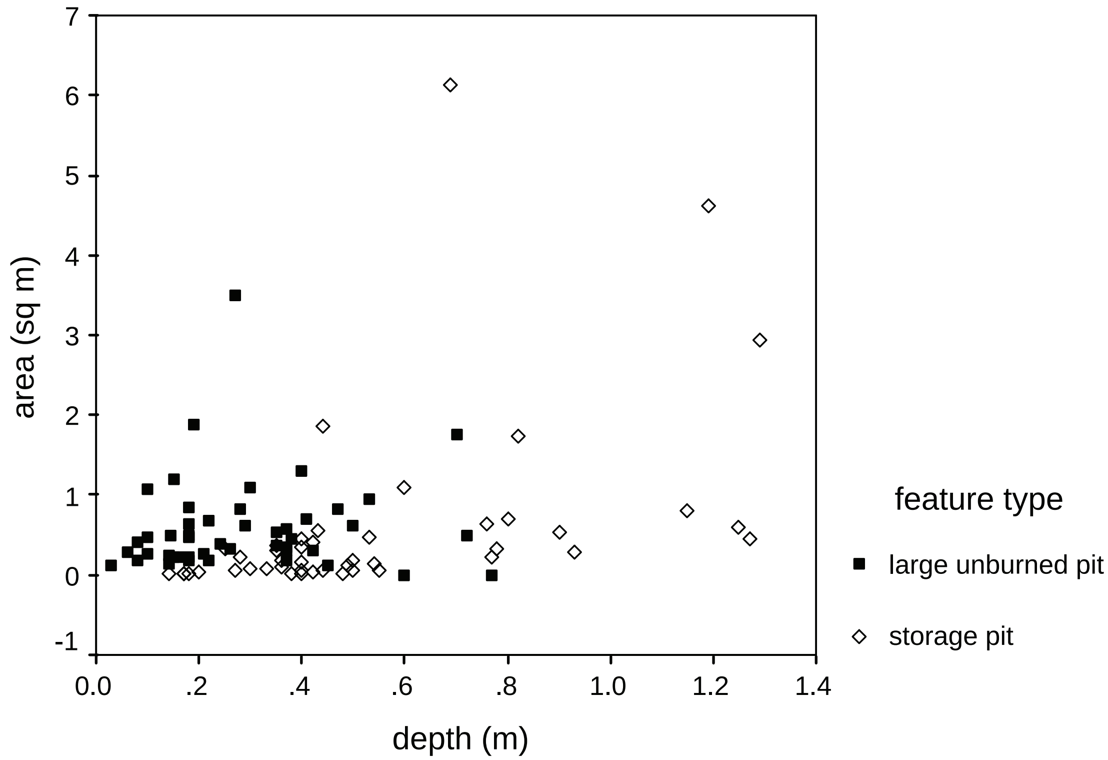

Figure 25.6. Large unburned pits by feature type, area, and depth.

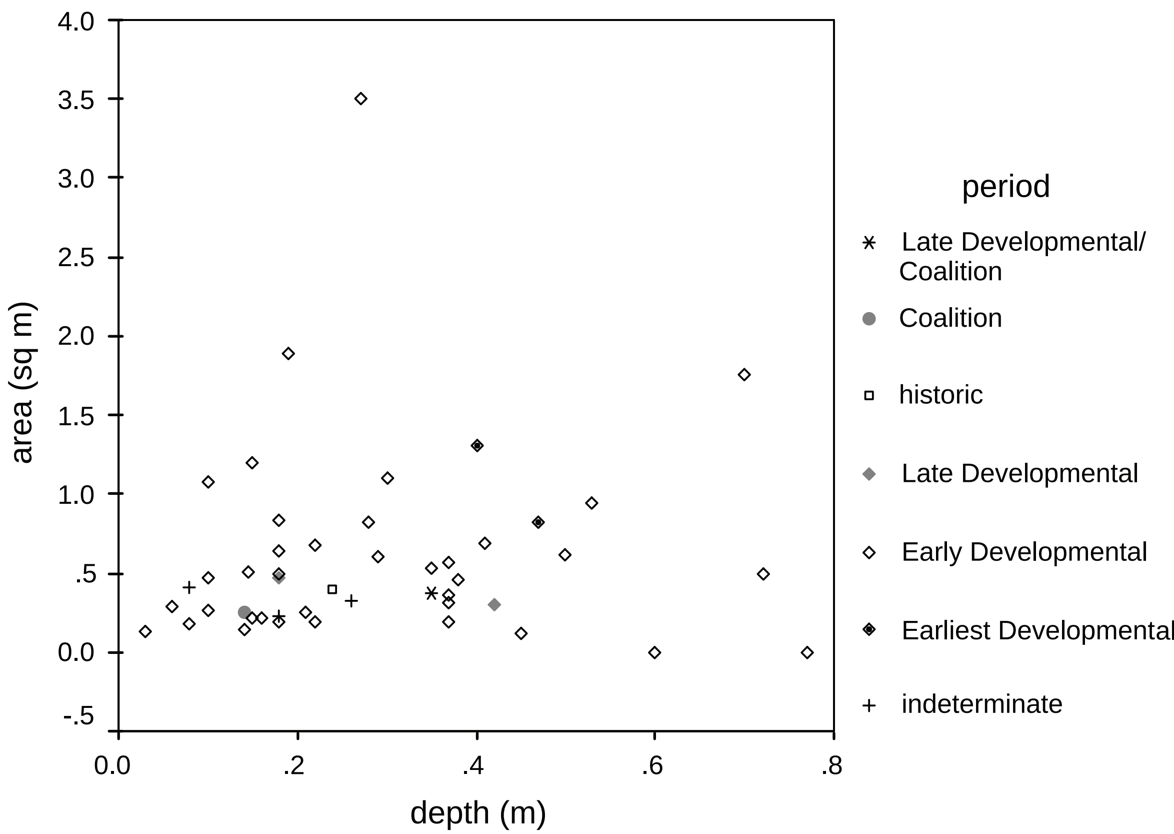

Figure 25.7. Large unburned pits by period, area, and depth.

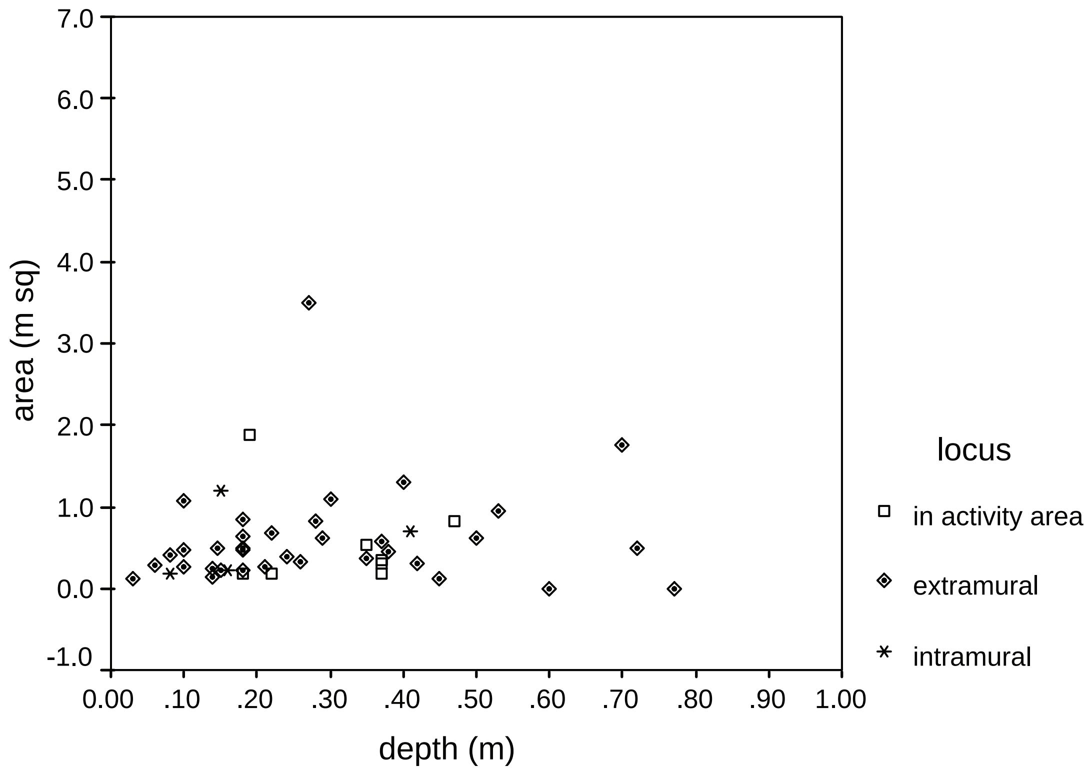

Figure 25.8. Large unburned pits by locus, area, and depth.

tle basins. Two Early Developmental pits were bell shaped and one was conical. The remainder (n = 10) were irregular (n = 7), indeterminate (n = 2) or deflated (n = 1). Most pits (n = 35) were extramural. Most extramural pits filled naturally but seven in an activity area were trash-filled. Like small unburned pits, trash-filled features (n = 11) were either extramural or located in activity areas. There were fewer intentionally filled large unburned pits (n = 3). The one pit with clean fill was in a structure and was capped. Pits with dirty fill were intramural (n = 1) and extramural (n = 1) and were left open.

There were more deep pits at LA 265 than at any other site. LA 265 had 29 large unburned pits, accounting for 78 percent of all Early Developmental large unburned pits, 11 percent of the site's features. Early Developmental components at other sites generally had from 2 to 5 percent large unburned pits. Although most (n = 19) were extramural, seven were located in an activity area. Three were in structures.

Overall, pits fell into two depth ranges: pits shallower than 0.25 m deep and pits deeper than 0.30 m. Extramural pits had the broadest depth distributions, ranging from 0.10 to 0.80 m deep. Pits in activity areas tended to be the most consistently sized. While still maintaining the depth ranges mentioned above, pits in activity areas were usually around 0.20 m deep or about 0.35 m deep. The majority tend to have areas of less than 0.50 sq m. Extramural features have a wider area range, the majority ranging from 0.11 sq m to about 1 sq m.

LA 6171 had six large unburned pits, five of which were extramural. Features with complete measurements ranged in depth from 0.08 to 0.70 m and in area from 0.12 to 3.51 sq m. Median area and depths were 1.0607 sq m and 0.35 m, respectively. The median volume was 0.2334 cu m, 40 percent larger than the overall median volume at LA 265, 0.0946 cu m. This large median volume is likely influenced by sample size. Remaining large unburned pits were located at LA 6169 (n = 2) and LA 6170 (n = 2). Pits at LA 6169 were intramural and extramural. Feature size fell within the middle range of size distributions. LA 6170 also had two large unburned pits, both of which were located within a structure. Feature sizes conformed to expectations. A total of four pits were associated with Late Developmental, Coalition, and Late Developmental/Coalition components; all were extramural (see Table 25.1).

Large unburned pits are as difficult to interpret as small unburned pits. They occurred primarily in earliest and Early Developmental components and are not typically reported in large numbers from Late Developmental and Coalition period sites in the Cochiti area (Lange 1968; Biella 1979). With increased size and depth, they, by definition, have greater capacity than small unburned pits. These pits could have been lined and served as temporary storage or holding pits for nonperishable foods or for foodstuffs that would soon be processed. Since most were open rather than bell-shaped, they were unlikely candidates for long-term storage because they would have been difficult to securely cover. Also, the majority of the pits were in extramural areas, including formal activity areas. Limited occurrence in structures reflects their open morphology. Large, open-mouthed pits rapidly exhaust available floor space. Pits with smaller openings can be easily covered and the spaced used for other purposes, such as sleeping. Given large pit capacity, it is interesting that they were not more systematically used for refuse disposal. Disposal of refuse in pits has the obvious advantage of removing sharp or bulky debris from high traffic areas. The repeated dispersal of refuse across sites or as a sheet deposit seems to be a common aspect of Early Developmental period residential patterns.

Storage Pits and Off-Chamber Cists

Storage pits and off-chamber cists (n = 45) were usually deeper than they were wide and were generally bell-shaped or cylindrical in profile. When in a structure, they opened from the floor and sometimes extend underneath walls. Large off-chamber cists at LA 6169 also contribute to total storage capacity but are removed from the following volumetric and size discussions because they are unique. Large oxidized pits at LA 6171 were not

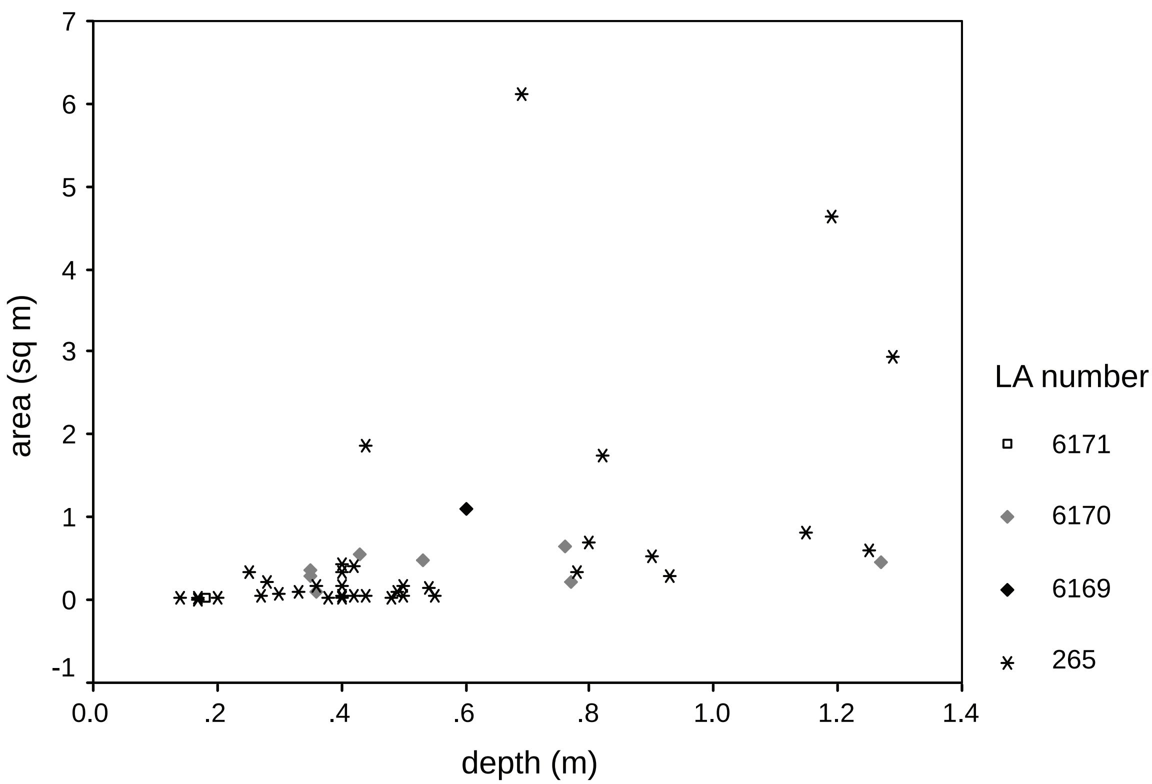

Figure 25.9. Storage pits and off-chamber cists, all time periods by site, area, and depth.

included in this data set because well baked, reddened side walls indicated possible use for roasting.

All but one storage pit of unknown time period at LA 265 were assigned to the Early Developmental period making up approximately 8 percent of all Early Developmental features. Storage pits from all time periods with complete measurements (n = 43) range in depth from 0.14 to 1.29 m and had surface areas that ranged from 0.01 to 6.12 sq m. Median measurements were 0.44 m deep, 0.29 sq m in area with a volume of 0.1134 cu m. As with small unburned pits, there is some interpretive overlap between large unburned pits and storage pit size, most notably at LA 265, where pits with large surface areas were designated as storage (Fig. 25.9). Otherwise, features belonged to two rough size groupings, those less than 0.70 m deep with surface area of less than 0.10 sq m and those deeper than 0.70 m with surface areas of less than 0.20 sq m.

Pit context was highly variable depending upon the site. Storage pits were most commonly located in a structure (n = 21). They were slightly less likely to be extramural (n=16, two of which were superimposed) followed by features located in an activity areas (n = 9). Extramural features and features located in activity areas were more frequently deep than were intramural features (Fig. 25.10). In general, intramural features were smaller than extramural features. Most features filled naturally (n = 13) or with a combination of roof fall and natural fill (n = 11). Trash-filled features (n = 8) were extramural or located in activity areas. Intentionally filled features (n = 11), with the exception of an extramural storage pit at LA 265 reused as a burial pit, were intramural and capped. Two features had undifferentiated fill.

Archaeobotanical samples were processed from 12 of the 21 intramural pits. Six have produced archaeobotanical remains. The only notable association with fill type is that four of the six pits with intentionally deposited cultural fill had no economic plant remains. Fill from only 2 of the 14 extramural pits was processed, not enough to provide a comparison with other intramural pits.

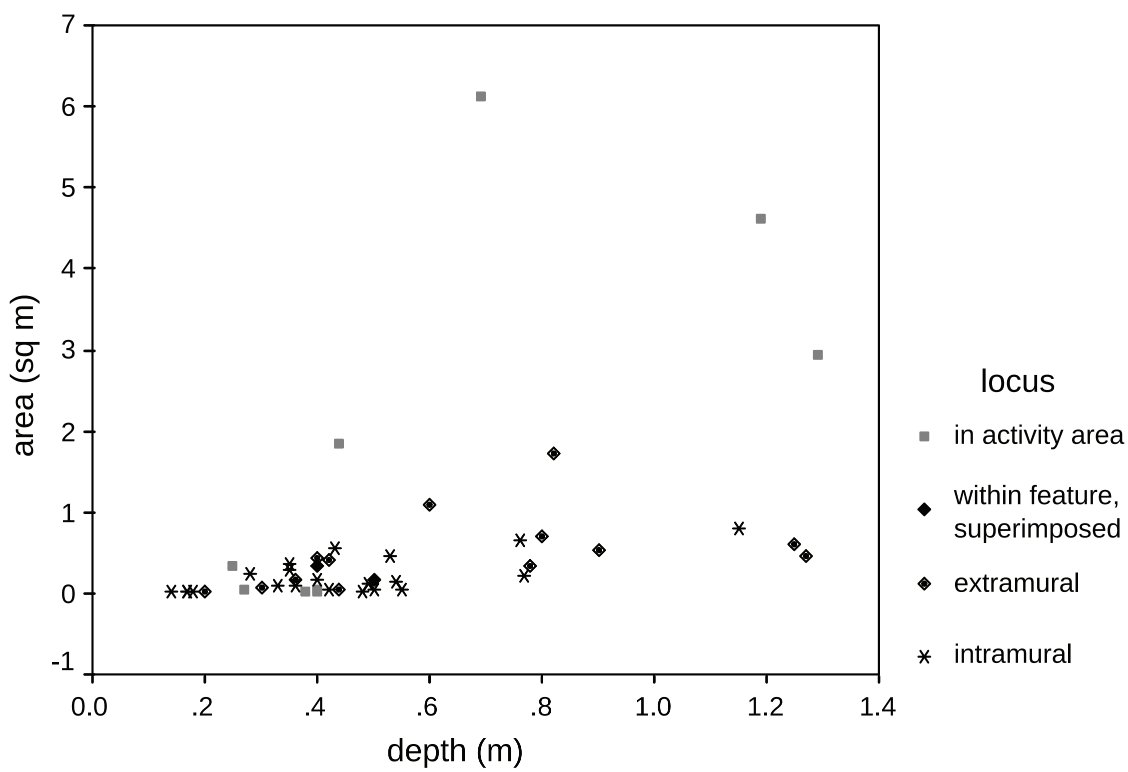

Figure 25.10. Early Developmental storage pits by locus, area, and depth.

None of the pits contained any charred corn.

Storage pits were most prevalent at LA 265 (n = 35) where they made up approximately 14 percent of the site's total feature count. As mentioned above, pits could be separated into two size groupings depending on feature depth. Features represented both size ranges but were more likely to be shallower than 0.70 m. Deep features were usually extramural. All of the storage pits with large surface areas were located at LA 265.

There were eight storage features at LA 6170, and all but one were intramural. The majority of features were shallower than 0.70 m. Although the count is small, the proportion of deep features to shallow is higher at LA 6170 than at LA 265. The only extramural pit was the deepest. All but one of the storage pits were located in Structure 50 and were capped during the use of the structure. The resulting interior storage capacity provided by storage pits was 1.2317 cu m . The one wall niche provided 0.0156 cu m resulting in 1.2473 cu m of capacity furnished by floor pits during the structure's first use.

LA 6169 had only one extramural storage pit, but had two massive interior storage features, or off-chamber cists. The storage pit had no temporal designation. Its volume was 0.4425 cu m. The two off-chamber cists were excavated into the wall of an Early Developmental structure and had storage capacities of 0.5634 and 0.8330 cu m resulting in 1.4964 cu m of combined interior storage space, only 17 percent more storage space than at LA 6170. LA 6171 had one intramural storage feature with a capacity of 0.0043 cu m . Sample size is too small to associate presence or absence of charred taxa with pit shape.

Bell-shaped storage features (n = 22) tended to fall into size ranges described above. The median depth and area ranges of the extramural features are significantly larger than those of intramural features (see Table 25.4) that tend to have a more restricted size range (see Fig. 25.11). Intramural storage pits were less likely to be belled than extramural pits and they were smaller and more consistently sized than their basin-shaped or steep-sided counterparts. A comparison of median volumes between intramural bell-shaped storage pits and basin-shaped storage pits indicates that basin-shaped or steep-sided

Table 25.4. NM 22, Storage Pits

Locus		Depth (m)	Area (sq m)	Volume (cu m)
Bell Shaped				
Intramural	N=7			
	Mean	0.43	0.07	0.0407
	Median	0.42	0.05	0.0418
	Std. Deviation	0.08	0.05	0.0256
	Minimum	0.33	0.02	0.0032
	Maximum	0.55	0.16	0.0874
	Variance	0.01	0	0.0007
Extramural	N=10			
	Mean	0.78	0.52	0.7501
	Median	0.81	0.45	0.6659
	Std. Deviation	0.35	0.48	0.6577
	Minimum	0.2	0.03	0.0069
	Maximum	1.27	1.73	2.2097
	Variance	0.12	0.23	0.4326
Within Feature,	N=2			
Superimposed	Mean	0.45	0.26	0.1617
	Median	0.45	0.26	0.1617
	Std. Deviation	0.07	0.12	0.0527
	Minimum	0.4	0.17	0.1245
	Maximum	0.5	0.34	0.1989
	Variance	0	0.01	0.0028
In Activity Area	N=2			
	Mean	0.39	0.02	0.0235
	Median	0.39	0.02	0.0235
	Std. Deviation	0.01	0	0.0094
	Minimum	0.38	0.02	0.0168
	Maximum	0.4	0.02	0.0301
	Variance	0	0	0.0001
Total	N=21			
	Mean	0.6	0.3	0.3884
	Median	0.48	0.16	0.0874
	Std. Deviation	0.3	0.39	0.5667
	Minimum	0.2	0.02	0.0032
	Maximum	1.27	1.73	2.2097
	Variance	0.09	0.15	0.3212
Not Bell Shaped				
Intramural	N=12			
	Mean	0.46	0.29	0.1827
	Median	0.39	0.26	0.0944
	Std. Deviation	0.31	0.28	0.2772
	Minimum	0.14	0.01	0.0016
	Maximum	1.15	0.81	0.9392
	Variance	0.09	0.08	0.0768
Extramural	N=3			
	Mean	0.46	0.56	0.4425
	Median	0.42	0.42	0.0381
	Std. Deviation	0.12	0.48	7
	Minimum	0.36	0.17	1.4873
	Maximum	0.6	1.1	0.5467
	Variance	0.02	0.23	1.7692
In Activity Area	N=7			
	Mean	0.65	2.28	4.4191
	Median	0.44	1.85	3.13
	Std. Deviation	0.43	2.4	22
	Minimum	0.25	0.06	0.6038
	Maximum	1.29	6.12	0.1087
	Variance	0.19	5.76	1.1489
Total	N=22			
	Mean	0.52	0.96	4.4191
	Median	0.43	0.35	1.32
	Std. Deviation	0.34	1.6	1.1489
	Minimum	0.14	0.01	0.0016
	Maximum	1.29	6.12	4.4191
	Variance	0.11	2.57	1.32

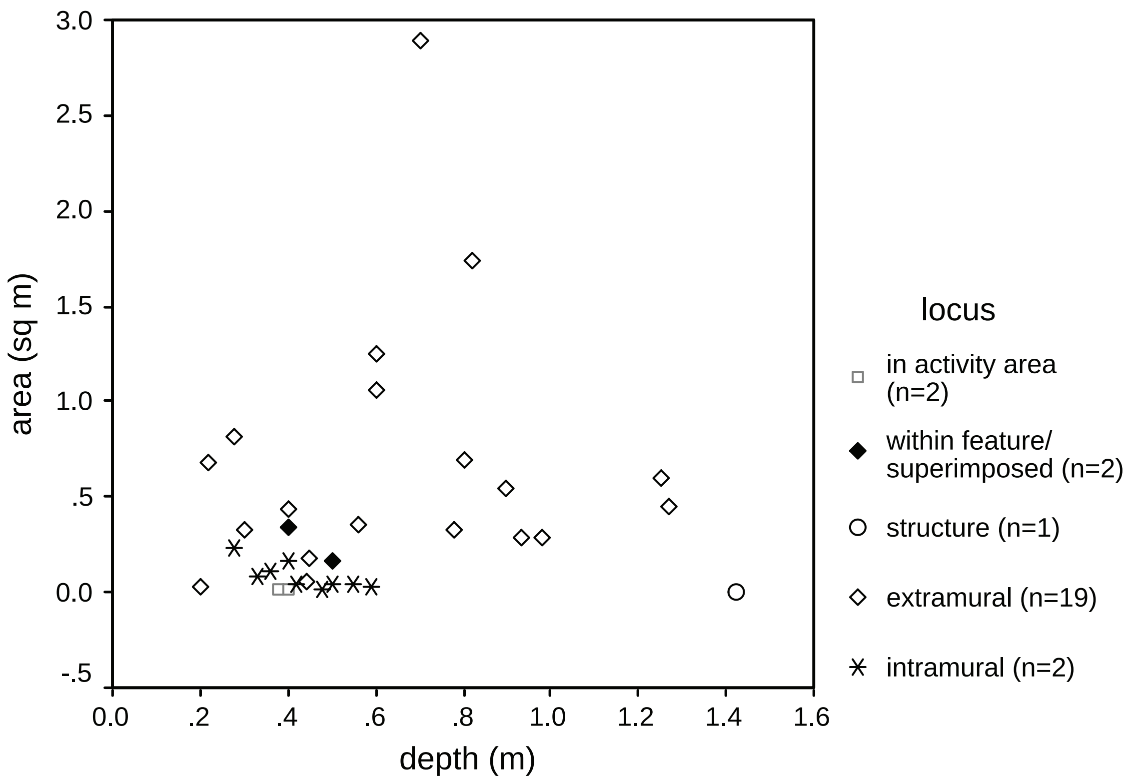

Figure 25.11. Bell-shaped pits by locus, area, and depth.

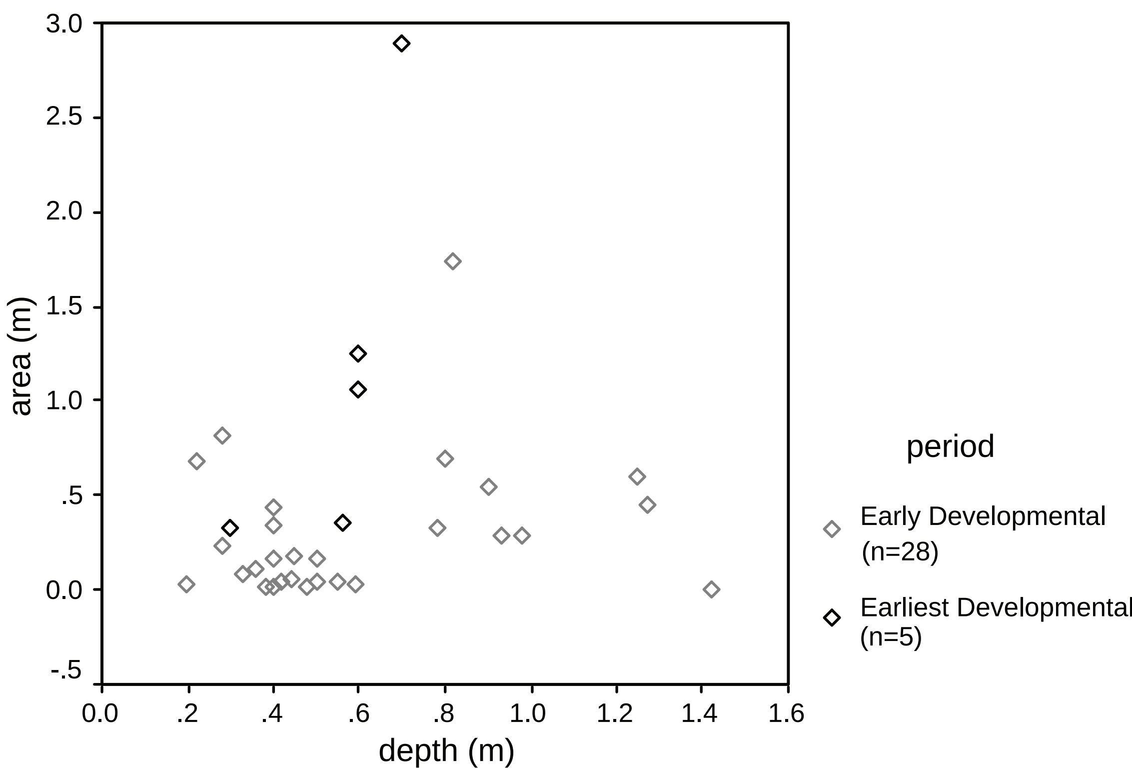

Figure 25.12. Bell-shaped pits by period, area, and depth.

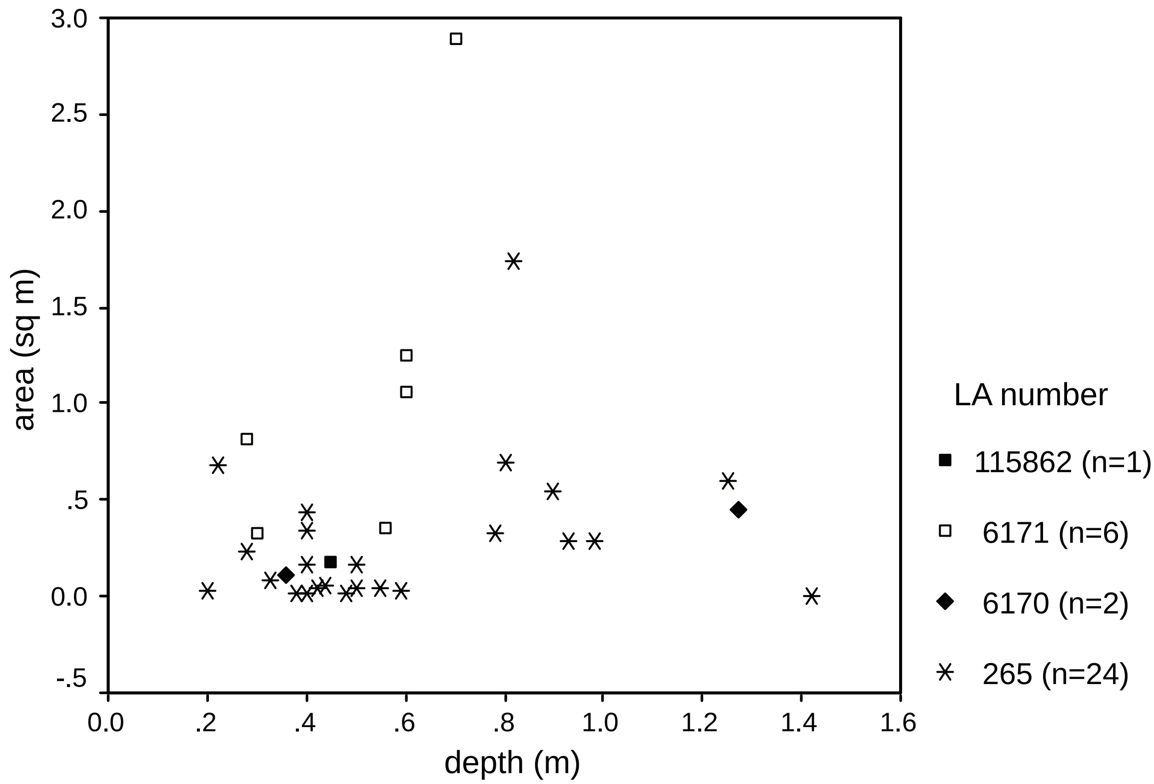

Figure 25.13. Bell-shaped pits by site, area, and depth.

pits tend to have larger volumes. When the same comparison is made between extramural bell-shaped pits and basin-shaped storage pits the relationship is reversed. Extramural bell-shaped pits have largest volumes.

All bell-shaped storage pits along NM 22 were Early Developmental (Fig. 25.12) features. Thirteen were extramural features, two were superimposed and two were located in activity areas. The remaining seven were intramural. The majority (n = 20) were located at LA 265. Other bell-shaped storage pits were from LA 6170 and included one intramural and one extramural feature. As mentioned above, bell-shaped pits at LA 6171 are discussed as storage/roasting pits (Fig. 25.13).

Storage and bell-shaped storage pits occur almost entirely on Early Developmental sites for NM 22. They exhibit a wide range of shapes and sizes, as well as location within each site. Just as morphology is variable, so is the placement of storage. Different storage and bell-shaped pit distributions between sites indicate a flexible subsistence organization and perhaps some difference in site occupation patterns. The most interesting pattern observed is the different location of storage pits for LA 265, LA 6169, and LA 6170, and the lack of identified large-scale storage facilities at LA 6171 and LA 115862.

LA 265, had mostly extramural storage pits of vertical-walled and bell-shaped varieties. At LA 265, bell-shaped pits were reused as burial pits for humans and dogs, while vertical-walled pits had large surface areas relative to their depth. Extramural locations for both pit types implies unrestricted access to stored goods as well as less secure storage, as if the site was only left unoccupied for short periods. Furthermore, large, open pits would have allowed regular access to goods, as if long-term storage was available, but there was rapid turnover in the stored food or resource. This more open or unrestricted storage can be contrasted with LA 6169 and LA 6170, where the majority of the large storage pits were intramural. These pits may reflect a focus on indoor food preparation or consumption. Restricted access or secure storage is implied by the intramural storage. Secure storage facilities may correspond with an occupation pattern that incorporates extended absences or absence of a majority of the population from the site. With extended absences, food and resources would need protection from pests and deterioration. The absence of substantial storage at LA 6171 and LA 115862 and the low frequency of large extramural storage pits at LA 6169 and LA 6170 could be interpreted as sampling error. However, the pattern applies to four sites indicating different organizational strategies. Combined with other site structure and subsistence and technology data, site storage patterns may be strong indicators of seasonality, mobility, and socio-economic interaction.

Wall Niches

Wall niches (n = 10) were features intentionally excavated into pit structure walls. They were the most variably shaped features typically with vertical or belling sides. Features were sometimes constructed to extend beneath structure floors, and were probably used for storage. In addition to storage, some niches (n = 2) contained caches (n = 1) and offerings (n = 1). Size ranges (most notably depth) of features with complete measurements (n = 9) ranged in size from 0.19 to 0.9 m (affected by two off-chamber cists at LA 6169, discussed above). Surface areas (defined by the opening at the wall) ranged from 0.02 to 0.22 sq m. The median volume was 0.024 cu m. All features were Early Developmental, were found in large pit structures and are loosely associated with the presence of ancillary hearths. Scatter plots (Figs. 25.14, 25.15) demonstrate that most of the features had surface areas of less than 0.20 sq m and were less than 0.10 m deep. Wall niches fall within size ranges of most Early Developmental storage pits. Three features were filled intentionally. One with sterile fill at LA 6170 was capped. Another capped feature at LA 265 was filled with cultural fill. At LA 6169, one uncapped feature was filled with dirty fill. All of the features (n = 4) for which archaeobotanical samples were processed had charred economic taxa. A wide range of wild plant pollen included cactus, cheno-am, and sage.

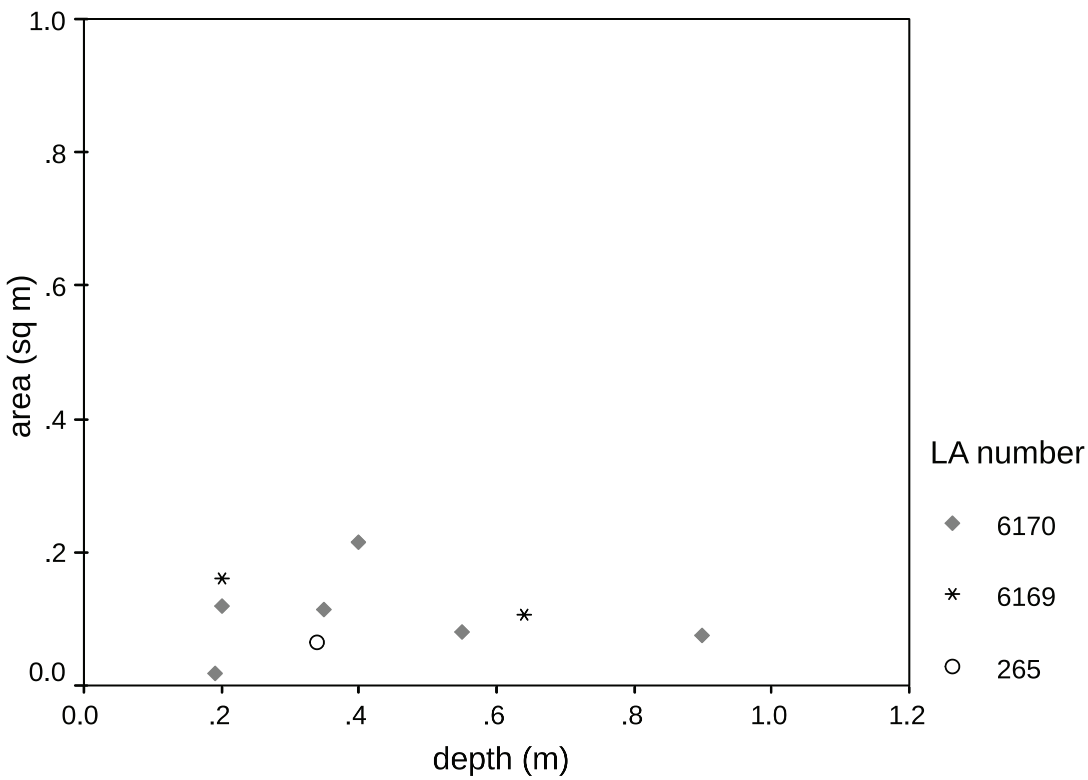

Figure 25.14. Wall niches by site, area, and depth.

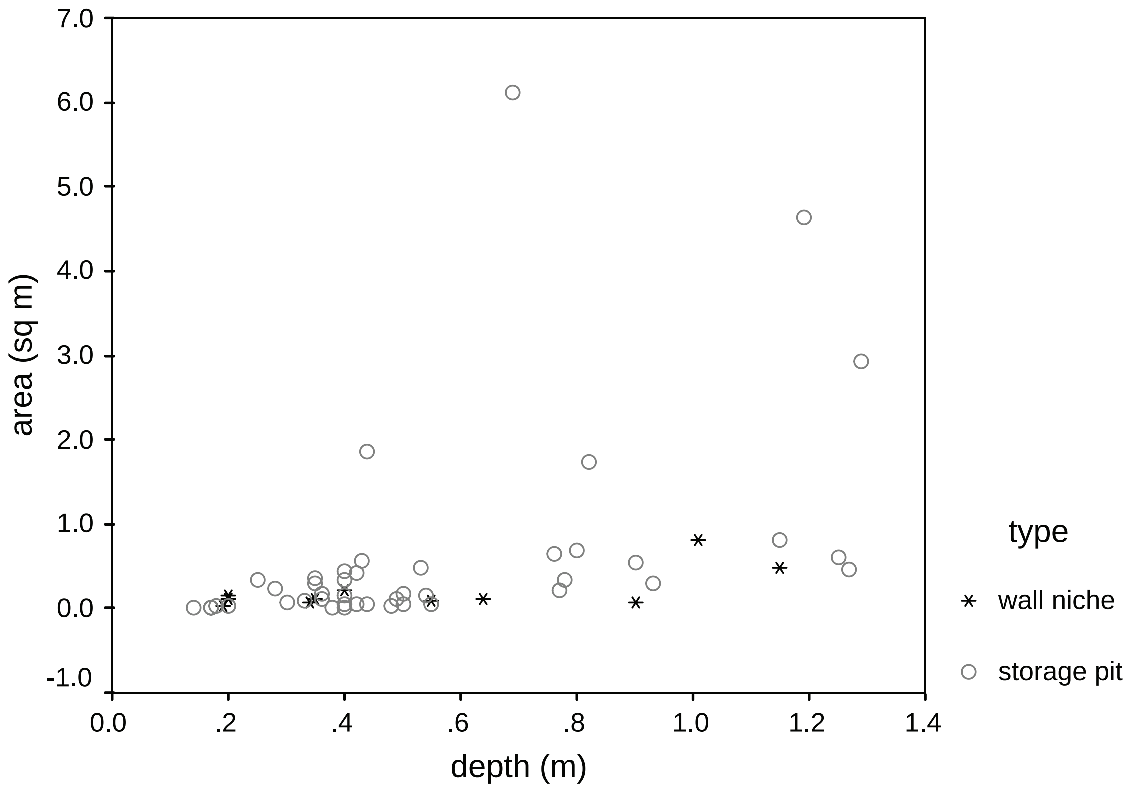

Figure 25.15. Early Developmental wall niches and storage pits by feature type, area, and depth.

Mealing Bins

Mealing bins were depressions or pits constructed to hold a metate and a meal receptacle. Pit dimensions ranged between 0.10 to 0.17 m in depth with areas ranging from 0.0949 to 0.3140 sq m in area. Although there were only five features, it is evident that mealing bin size varied by site and, possibly, by time period (Fig. 25.16). Two pits at LA 6170 were Late Developmental period features. Both were approximately 0.17 m deep with areas of about 0.3 sq m. Three Coalition mealing bins at LA 6169 had much smaller areas of about 0.1 sq m. Archaeobotanical samples from two features at LA 6170 were processed and contained charred economic taxa including corn and four-wing saltbush.

Postholes

Postholes (n = 155) were cylindrical or conical depressions located within a structure or in an extramural area. Evidence of a posthole function can be inferred from the location within a structure, the presence of a post mold, shims, or stone bases or wood particles in the hole. Remnant post wood or wood molds were rare along NM 22. Post molds were only present at LA 6170 and stone bases and shims were not found. In most cases, function was inferred from shape and location. Postholes were sometimes remodeled and the number per structure varied (see Structure 50). Structures with less than 10 sq m of floor space tended to have from two to three postholes. Predictably, larger structures with 10 sq m or more of floor space typically required more roof support and had from four to six main supports. Other attributes relating to structure construction are discussed later. Size ranges of complete features (n = 142) range from 0.03 to 0.90 m in depth, from 0.01 to 0.20 sq m in area with median measurements of 0.25 m deep, 0.03 sq m, and volume of 0.0076 cu m . Nine archaeobotanical samples were processed; four contained charred economic plants.

Postholes made up 20 percent of the total Early Developmental feature assemblage. Dimensions were the same as those for the group. A surprising number of Early

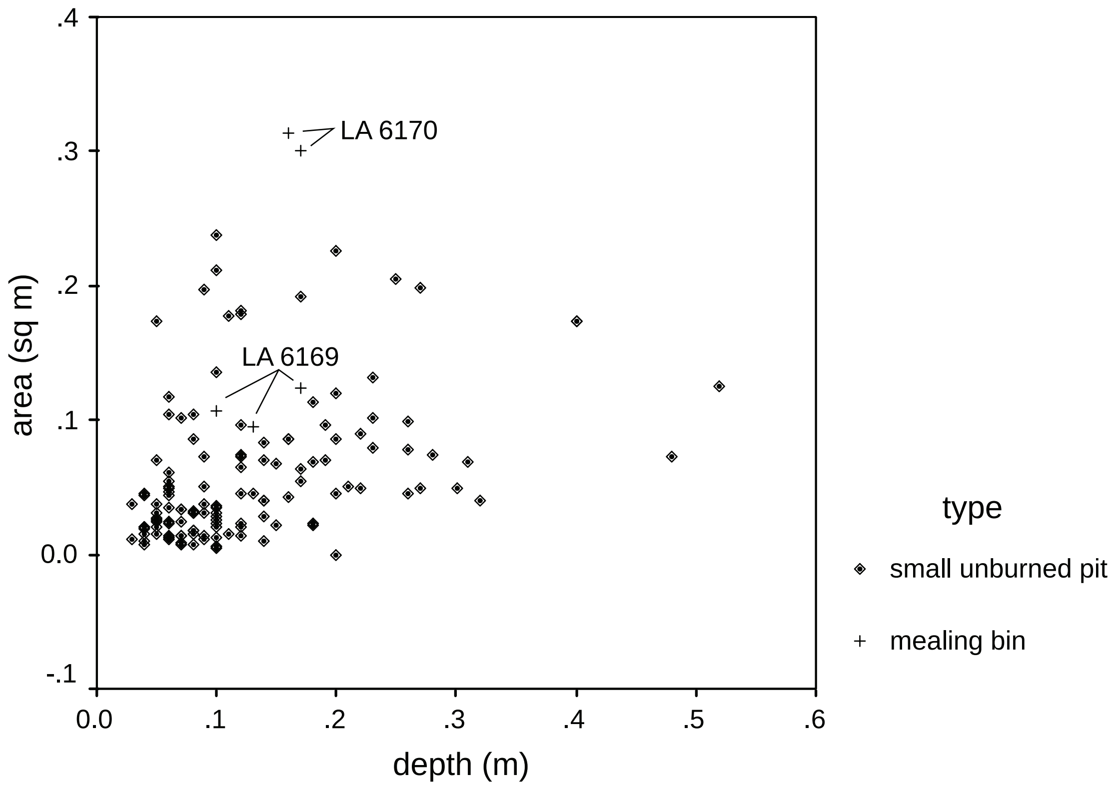

Figure 25.16. Mealing bins and small unburned pits by feature type, area, and depth.

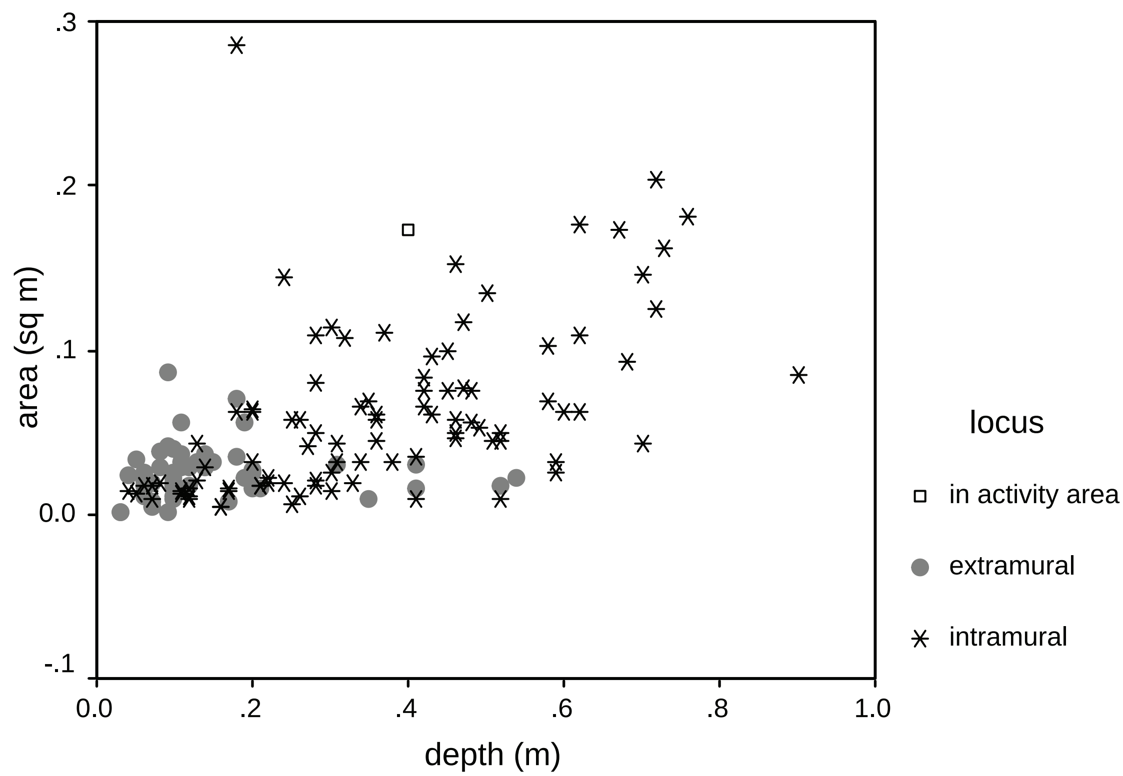

Figure 25.17. Early Developmental postholes by locus, area, and depth.

Developmental postholes were in extramural features. Scatterplots (Fig. 25.17) confirm that extramural postholes tend to be shallower with smaller surface areas than intramural postholes, which were larger and probably supported more weight. There does not appear to be any link between size range and site. LA 115862 has the highest ratio of postholes to other features (40 percent). All were intramural features in an Early Developmental structure. Postholes make up from 20 to 25 percent of the Early Developmental feature assemblage at LA 6170 and LA 265 and a 15 percent at both LA 6169 and LA 6171.

Structures containing Late Developmental (n = 1), Coalition (n = 7), and postholes of indeterminate period (n = 6) were located at LA 6169. They were all from intramural features. Size ranges did not differ significantly from Early Developmental features.

Pot Rests

Pot rests were shallow depressions used to support a ceramic vessel with a rounded base. They were usually found in a structure near a hearth or structure walls. As discussed above, features of comparable size were sometimes also reported as small unburned pits by site directors. All of the pot rests (n = 34) were found in Early Developmental contexts and ranged in depth from 0.02 to 0.09 m, areas were from 0.002 to 0.567 sq m and the median volume was 0.0012 cu m. They accounted for a little over 5 percent of the total Early Developmental feature assemblages. Percentage of features per site was slightly more variable, ranging from about 5 percent at LA 6170 to 8 percent at LA 6171. Most were located in structures, however two at LA 265 were found in an activity area. The majority of features were filled naturally or with material deposited by the collapsed structures (n = 27). Four were intentionally filled, three with sterile fill and one with cultural fill. There was also one trash-filled feature. An archaeobotanical sample containing charred plant remains was processed from LA 6171.

Divots and Divot Clusters

Divots were very small pits located in a structure floor. They occurred singly and in alignments and could have functioned as holders for paho sticks, drying racks, ladder sets, and looms. Some intramural divots contained clean sandy fill and may have been associated with ceremonial functions (Wilshusen 1998e; Lange 1968). Scatterplots (Fig. 25.18) show that some extramural postholes and divots share similar dimensions. This is likely a function of location. A divot is defined as in intramural feature. The distinction was more of location than of function. Small extramural postholes likely indicate the presence of drying racks or shade structures. Divots (n = 29) range is depth from 0.01 to 0.12 m and from 0.0003 to 0.011 sq m in area. There was no appreciable size patterning linked to time period or site.

Sipapu and Ladder Holes

Features originally recorded as small unburned pits, pot rests, and divots were reevaluated during the structural analysis. As a result, some features originally reported by authors as pot rests, divots, and small pits were reassigned as ladder holes and sipapus. Features were only reassigned when both feature location and fill agreed with widely accepted criteria for that feature type. All sipapu and ladder rests were located in Early Developmental structures. Sipapus were evident in five large Early Developmental pit structures with hearth complexes. Sipapus were associated with larger numbers of floor pits, ancillary hearths, and ladder rests. Ladder rests were also found in five large, Early Developmental structures but were not associated with sipapus.

Storage/Roasting and Small Pits

Storage/roasting pits (n = 6) were large oxidized extramural pits. They were usually bell-shaped and could have been used for roasting, storage, or both. Larger features could have been large enough to use for temporary shelter. These large bell-shaped pits contained from one to three smaller pits excavated into their bases along the floor-wall juncture. Unlike the pits into which they were excavated, all small pit walls were oxidized. These small pits without oxidized side walls could indicate remodeling of the larger storage/roasting pit but the association is

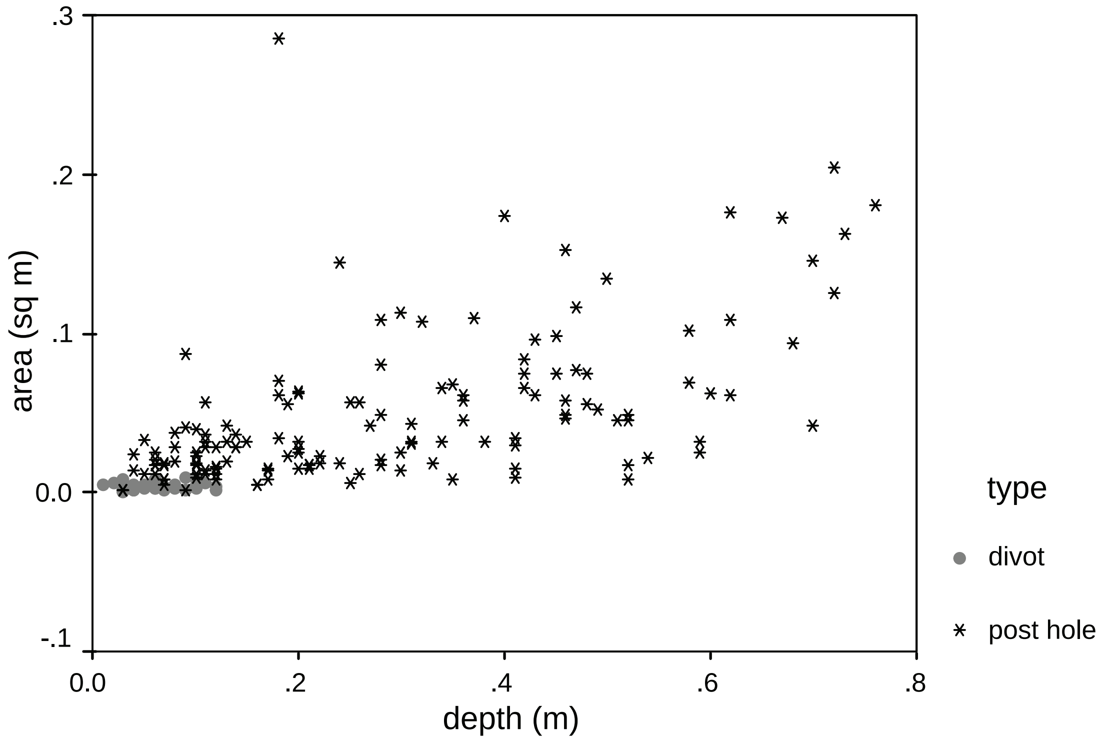

Figure 25.18. Early Developmental postholes and divots by feature type, area, and depth.

unclear. The combination of storage/roasting pits and small pits make up 60 percent of all earliest Developmental features. Pits at LA 6171 filled naturally while one Early Developmental pit at LA 265 was trash-filled. Archaeobotanical samples were processed from three pits. Two contained charred cultural plant material including corn, goosefoot, and pigweed.

Though there was one Early Developmental pit at LA 265, most storage/roasting pits were earliest Developmental (n = 5) at LA 6171 and all were extramural features. Stuart and Gauthier (1981) cite increased storage capacity in the form of large extramural features as a key indicator of transition to agriculture. Earliest Developmental pit depths ranged from 0.30 to 0.98 m. Areas were between 0.29 and 2.89 sq m. Volumes ranged from 0.0646 to 1.320 cu m . Median measurements were 0.65 m deep, 0.7837 sq m in area with a volume of 0.7732 cu meters. When com-

Table 25.5. NM 22, Storage/Roasting Pits, Total Volume

Feature Type		Feature No.	Feature volume
Storage/roasting		54	1.132
	small sub-pit	55	0.033
Total volume (cu m)			1.165
Storage/roasting		56	0.9702
	small sub-pit	57	0.0227
		58	0.0641
Total Volume (cu m)			1.0569
Storage/roasting		83	0.0646
	small sub-pit	104	0.005
Total volume (cu m)			0.0711

pared to the smallest structures excavated along NM 22, feature size ranges were smaller in area, but the largest pits were comparable to small structure volumes at LA 265. Structures 27 and 33 at LA 265 had 1.1297 and 1.8404 cu m volumes, respectively. When earliest Developmental feature storage/roasting pit volumes are added to associated small pit volumes (Table 25.5), total volume for the feature complex ranges from 0.0712 to 1.1650 cu m . The volume of the largest pit is comparable to that of the smallest pit structures at LA 265 and is larger than off-chamber cists recorded at LA 6169.

When compared to storage pits, scatterplots (Fig. 25.19) show that earliest Developmental storage/roasting pits areas and depths are in roughly the same range. But, because storage/roasting pits are bell-shaped, area and depth comparisons may be misleading. A comparison of median volumes (Table 25.2) indicates that bell-shaped storage/roasting pits had larger storage capacities than most other steep-walled or bell-shaped storage pits. Comparison of median volumes with Early Developmental bell-shaped pits (median volume 0.0808 cu m) indicates that most storage/roasting pits were larger than their unoxidized bell-shaped counterparts.

Comparison to large thermal features indicates that storage/roasting pits tended to be deeper than cobble-filled pits and if used for roasting may have been used for different types of food processing than other thermal features excavated along NM 22. Overall, the Earliest Developmental storage/roasting pit volumes exceed storage volumes at Early Developmental residences. This intriguing difference suggests substantial investment in food production and storage, but not habitation. This pattern is unusual and suggests there is much more about the early farming period yet to be determined.

Thermal Features

On a project level, thermal feature data may provide insight into residence duration and stability, household vs. community organization, and habitation season across sites. Ethnographic data indicate that small hearths can become wider as they are used, so that over a period of time a large feature is created. These small hearths are often expedient and

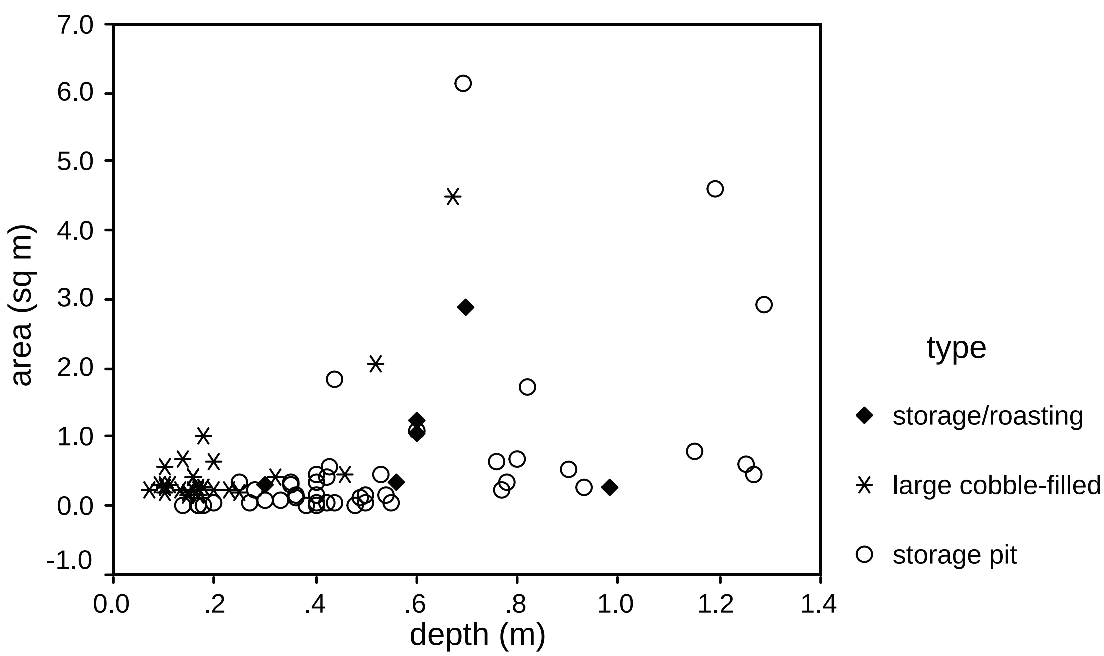

Figure 25.19. Storage/roasting, large cobble-filled and storage pits by feature type, area, and depth.

are changed according to need and wind direction. In contrast, large roasting pits were often located along site peripheries (Binford 1983). Groupings of large roasting facilities could indicate interhousehold use.

Wandsnider (1997) cited ethnographic accounts that indicate dried, starch-rich foods and lean meats were most often boiled, while foods most likely to be processed in a pit-hearth (like corn and large pieces of meat) needed to be cooked for a long time and were subjected to moderate to high heat to maximize their nutritional value. At NM 22 numerous small interior cooking features could be an indication of overwintering, when the population would have been rehydrating more foods, and the large numbers of roasting pits could indicate an emphasis on processing facilities, possibly indicating summer or fall occupations.

Hearths and other intramural features may provide evidence of formal or informal structure construction or remodeling that could also indicate seasonality. Logic dictates that hearths used for continuously heating a structure would necessarily be larger and more formalized than those only used for cooking during warm months. Formalized hearths with associated ash pits may indicate longer periods of overall site occupation as well as cold season habitation, while simple floor fires or burned areas may indicate a less intensive and possibly shorter term of use.

Small Burned Pits

Small burned pits (n = 23) were informal thermal features less than 0.50 m in diameter. They were located in both intramural and extramural contexts. All but three of the features were from Early Developmental components, which make up a little more than 3 percent of the total Early Developmental feature assemblage. Pits with complete measurements (n = 23) ranged in depth from 0.03 to 0.28 m and had areas ranging from 0.02 to 0.18 sq m. Median dimensions were 0.10 m deep, 0.0572 sq m in area, and a volume of 0.0055 cu m . Scatterplots (Fig. 25.20) demonstrate that small burned pits with comparable areas tended to be less deep than small unburned pits.

As a whole, small burned pits were slight-

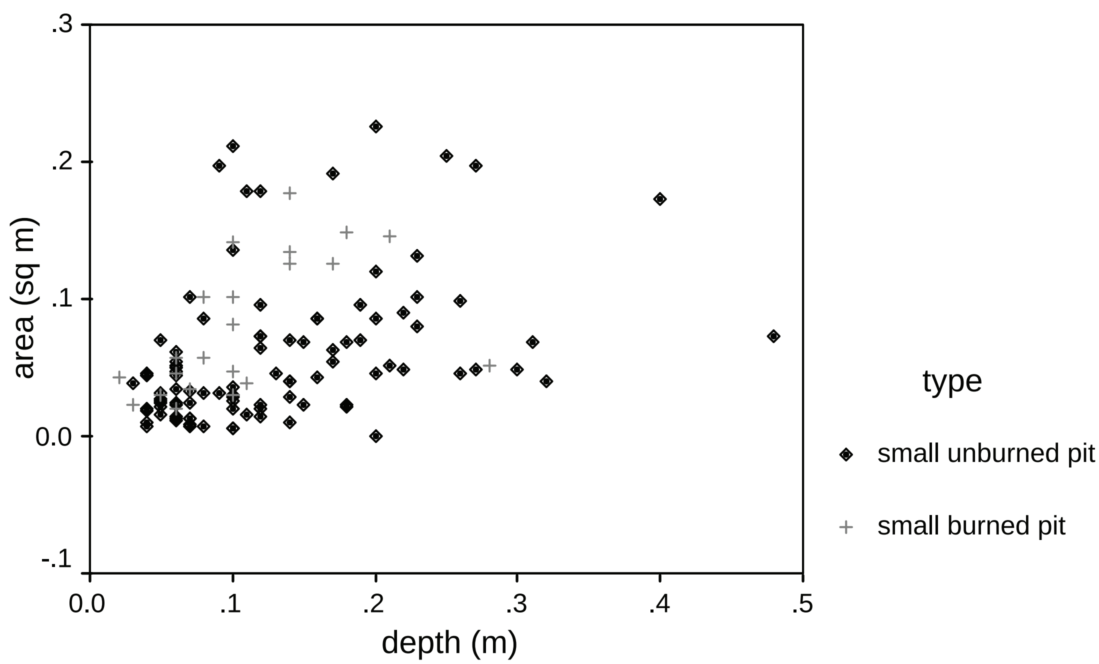

Figure 25.20. Early Developmental small burned and small unburned pits by feature type, area, and depth.

ly more likely to be extramural (n = 13) than intramural (n = 9). Intramural pits were found in Late Developmental (n = 1) and Coalition (n = 1) pit structures though they were predominantly located in Early Developmental pit structures (n = 7) with areas greater than 10 sq m. Scatter plots (Fig. 25.21) demonstrate that area to depth distributions fall into two rough size clusters. The smallest pits made up a group less than 0.10 sq m in area and less than about 0.12 m deep. A grouping of larger pits was made up of features more than 0.12 sq m with a wider depth distribution (0.10 m to about 0.20 m). Pits in the "small" group had equal ratios of intramural to extramural pits and tend to be more shallow than small unburned pits. Larger pits also had a nearly equal ratio. With the exception of LA 6171, each site with small thermal features had both large and small burned pits (Fig. 25.22). Distributions appear to be roughly even, but sample sizes for each site are not sufficient to demonstrate this as a pattern.

Extramural pits were more likely to have been left open than intramural features after their primary fill was removed, but sample sizes are too small to determine whether pits in either location were more likely to be cleaned out before abandonment. Six archaeobotanical samples were processed. The sample size is insufficient to correlate the presence of charred taxa with any other feature attribute.

One Late Developmental, and two pits of indeterminate period (Fig. 25.23) were also excavated at LA 6169. The Late Developmental pit was an intramural feature and was included in the smallest feature group. The two pits with no obvious temporal affiliation were extramural.

Large Burned Pits

Large burned pits (n = 27) are defined as informal thermal features with areas greater than 0.50 m. They may be either intramural or extramural. Pits with complete measurements (n = 19) ranged in depth from 0.07 to 0.50 m deep and had areas between 0.18 and 3.16 sq m. Median dimensions were 0.22 m deep, 0.04 sq m in area, with a 0.0712 cu m volume. Large burned pits and large unburned pits fall into

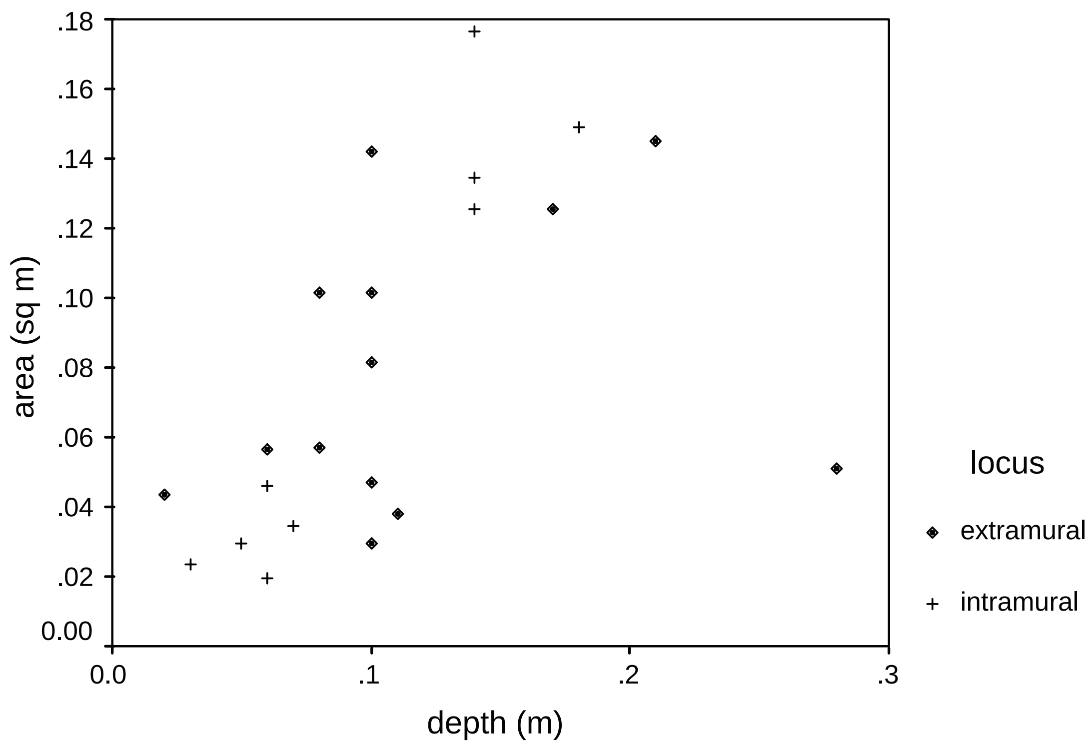

Figure 25.21. Small burned pits by locus, area, and depth.

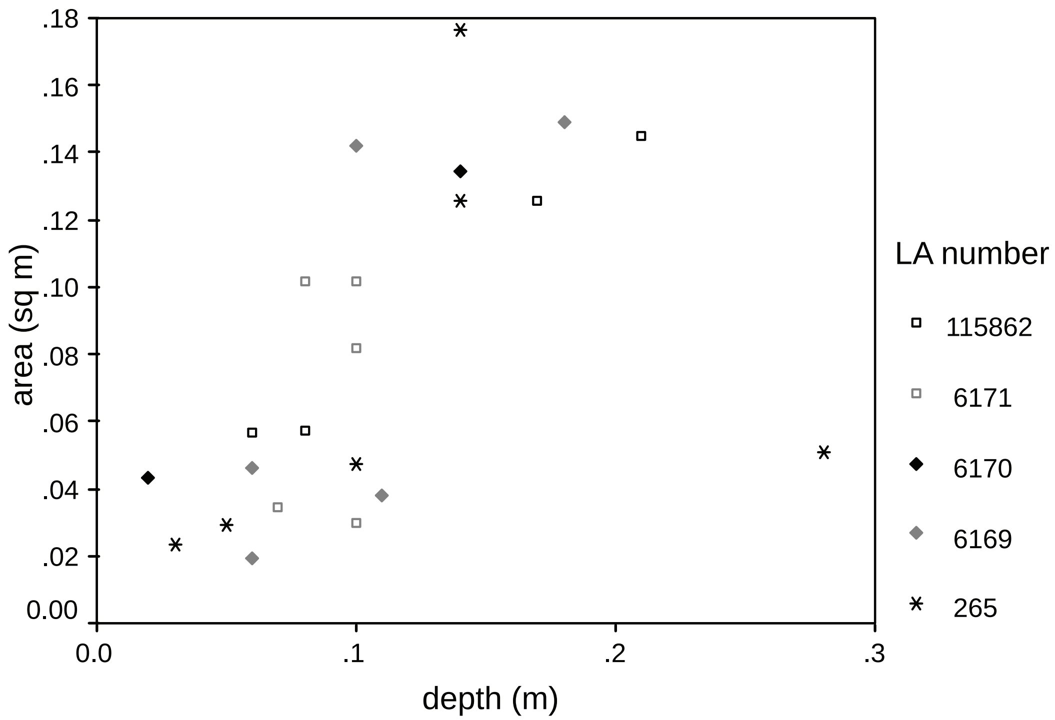

Figure 25.22. Small burned pits by site, area, and depth.

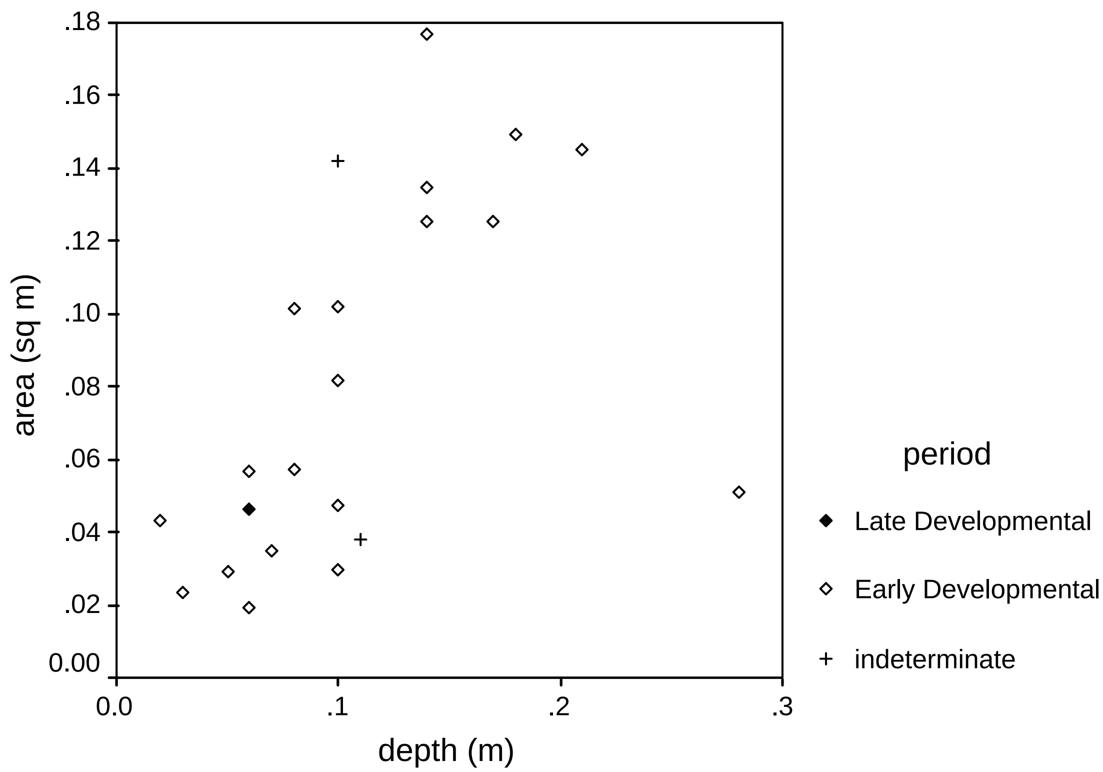

Figure 25.23. Small burned pits by period, area, and depth.

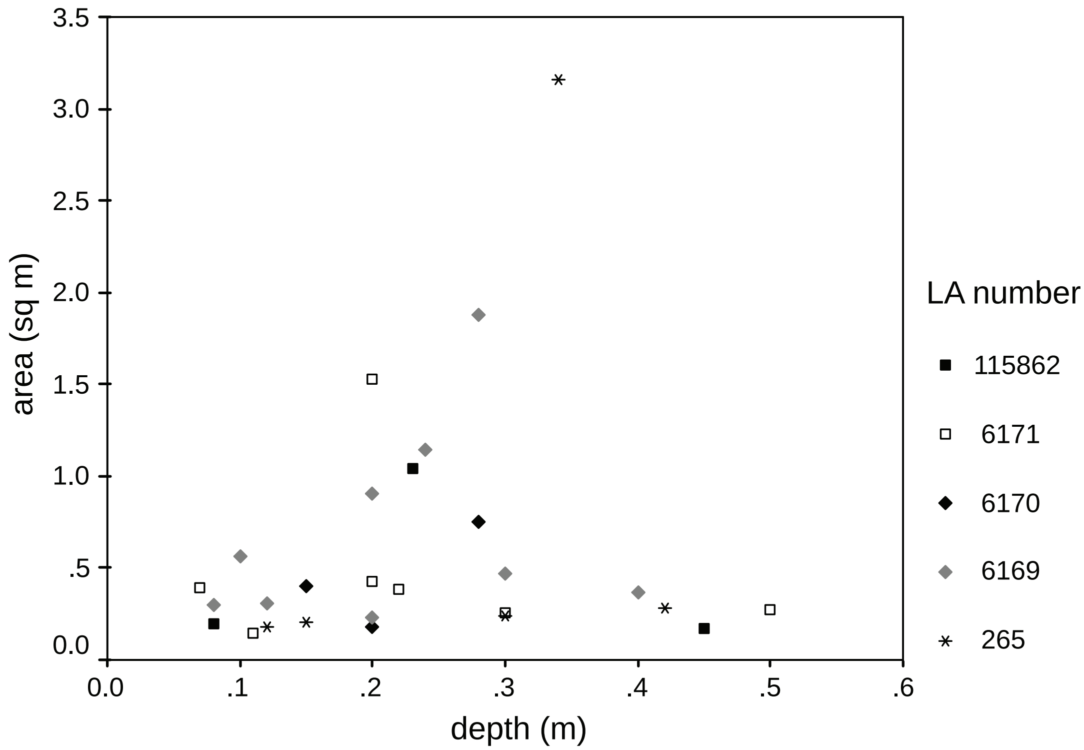

Figure 25.24. Large burned pits by site, area, and depth.

roughly the same size distribution (Figs. 25.24, 25.6). Scatterplots show that the majority of pits were less than 0.5 sq m in area and ranged widely in depth from less than 0.1 to about 0.45 m. Pits with areas larger than 1.0 sq m were either Early or Late Developmental features. Large burned pits were more likely to be extramural (n = 23) than intramural (n = 4) (Fig. 25.25). Intramural features at LA 6169, LA 6170, and LA 265 were all similar in size and were located in large Early Developmental structures. Three extramural features were superimposed upon other features, one in pit structure fill. Large burned pits were more widely distributed across time periods than a similar number of small burned pits or large unburned pits (see Fig. 25.6, 25.7, 25.23, 25.26). Archaeobotanical samples from 11 features were processed. Eight samples from extramural features (n = 8) with primary or trash/natural fill contained charred cultural taxa including corn. Figure 25.26 depicts large burned pits by temporal assignment.

Two earliest Developmental features were excavated at LA 6171. Both were extramural features and fall into the size and depth ranges mentioned above.

Project-wide, Early Developmental large burned pits (n = 19) make up 3 percent of all Early Developmental features. This is comparable to small burned pits. Features were more than twice as likely to be extramural as intramural. LA 265 had the largest number of large burned pits (n = 5) followed by LA 6169 (n = 4), LA 6171 (n = 4), and LA 6170 (n = 4). They make up from approximately 2 to 5 percent of Early Developmental features at each site. LA 115862 had three features, making up about 11 percent of the Early Developmental features, accounting for all extramural cooking facilities at the site. Archaeobotanical samples were sorted from 7 of the 19 features. Sample sizes were not sufficient to correlate the presence or absence of cultural taxa with any feature.

Three large, burned, Late Developmental pits were excavated at LA 6169. All were extramural; one was superimposed upon an Early Developmental structure. One extramural Coalition period feature was also excavated.

The temporal and physical distribution of large burned pits is interesting for a couple of reasons. First, distribution through time is con-

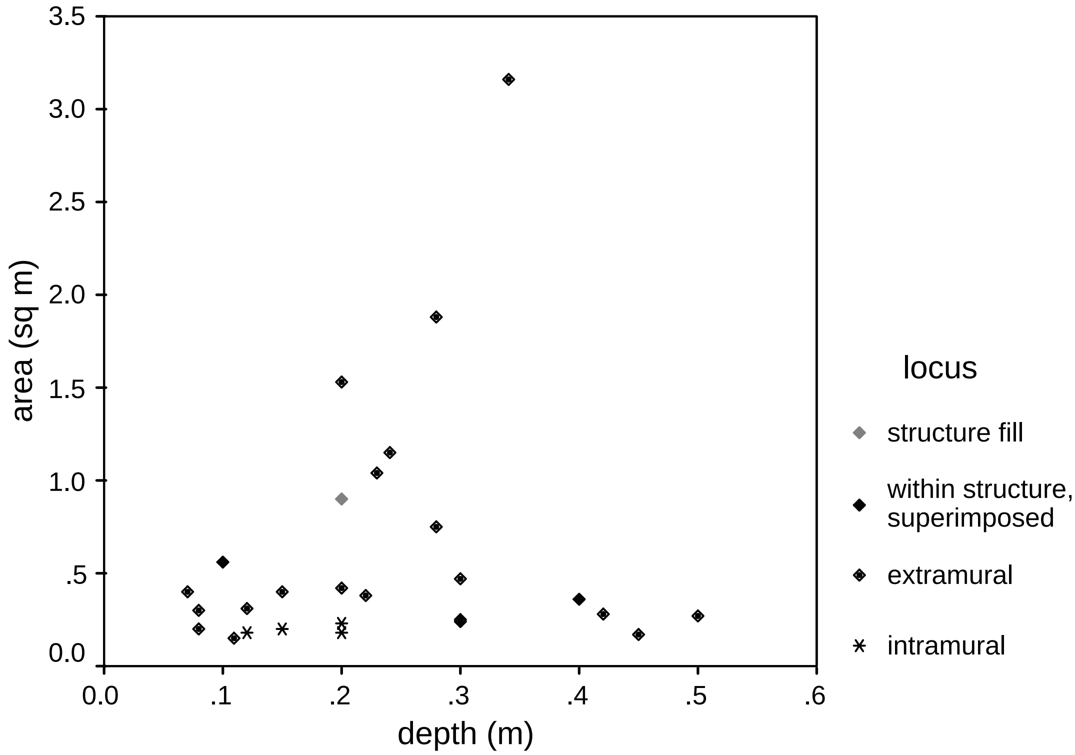

Figure 25.25. Large burned pits by locus, area, and depth.

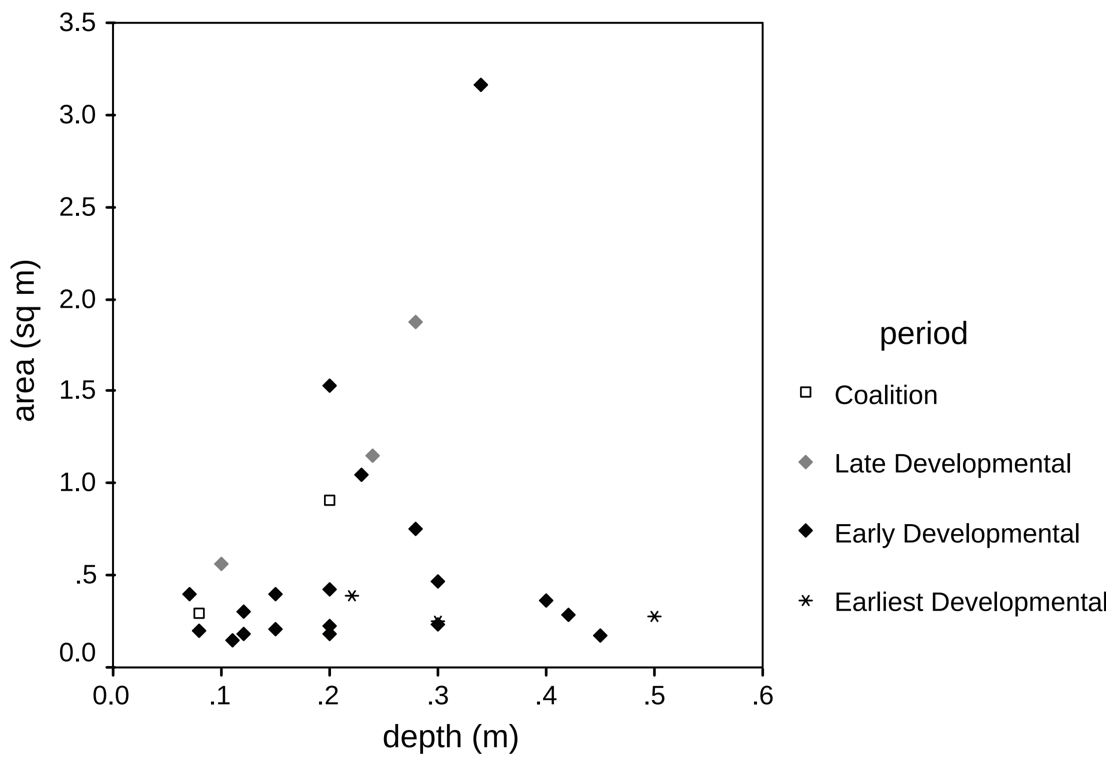

Figure 25.26. Large burned pits by period, area, and depth.

stant. Large burned pits occur in all temporal components. While there may be some size or volume variability within the large group, this pattern suggests that large burned pits were an important and persistent facility regardless of occupation duration, season, or group size. Large pits were more formal during the Early Developmental period, which may reflect the influence of occupation duration on facility construction. Second, large pits from the Early Developmental period occur on all sites. This consistent distribution may reflect construction and use of larger facilities by commensal groups or site residential units. A concentration of large burned pits at LA 265 might have suggested communal processing or cooking. Instead, the wider distribution suggests that all site residents had processing or cooking needs that required larger facilities and they were built and used at the household level. This pattern is one piece of evidence supporting the observation that the Early Developmental occupation pattern was similar across sites in terms of activities and facilities geared to daily subsistence needs.

Large Cobble-Filled Thermal Pits

Large cobble-filled thermal pits (also known as roasting pits) were features with diameters larger than 0.50 m. These features occurred in both intramural and extramural contexts. A total of 29 large cobble-filled pits were recorded at NM 22 sites. Pits with complete dimensions (n = 26) ranged in depth from 0.10 to 0.67 m and in area from 0.67 to 4.49 sq m. Median measurements were 0.17 m deep, 0.27 sq m in area, with a 0.0350 cu m volume. Over all, large cobble-filled thermal pits tended to be extramural (n=19), two were superimposed over other features within structures, and the rest (n = 9) were intramural (Fig. 25.27). Intramural pits are within the same size range as a majority of extramural features. Large, deep, cobble-filled pits with depths greater than 0.30 m were exclusively extramural. Regardless of fill type, large cobble-filled pits tended to have charred economic taxa; 14 of 16 had burned taxa including cheno-am, corn, and cholla.

Twenty-seven of the thirty large cobble-

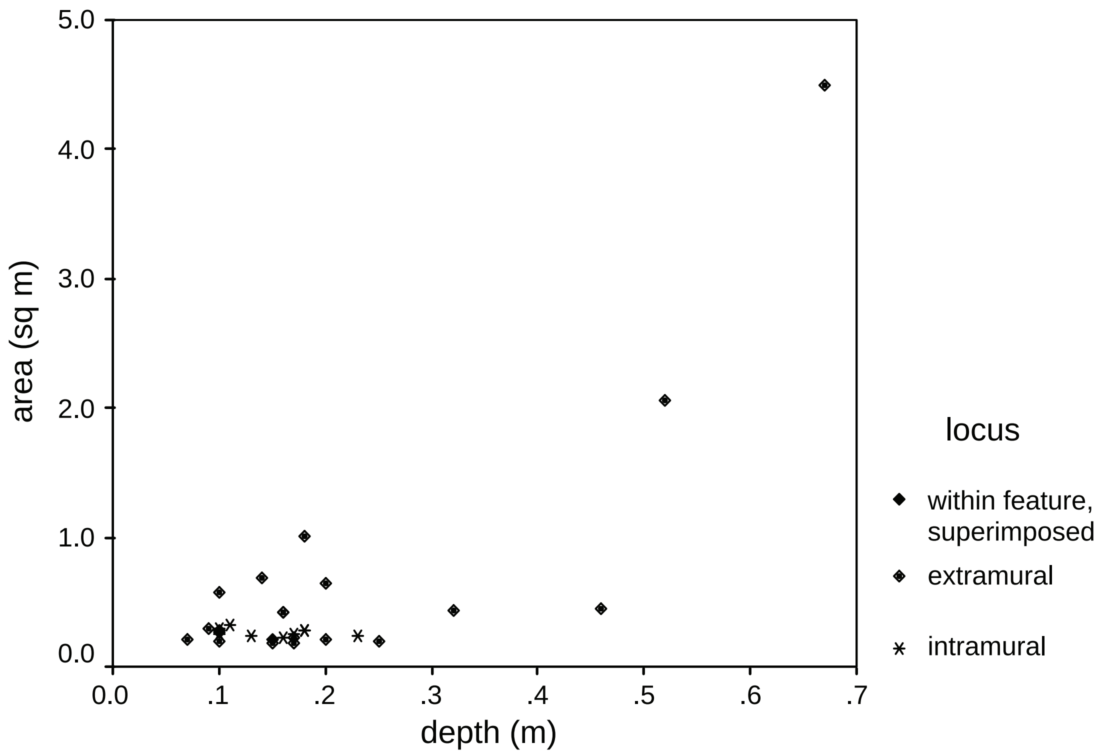

Figure 25.27. Large cobble-filled thermal pits by locus, area, and depth.

filled thermal pits accounted for approximately 5 percent of all Early Developmental features. Ninety percent of large cobble-filled thermal pits were from Early Developmental contexts (Fig. 25.28). Pit size ranges define the assemblage. Scatterplots show that intramural pits (n = 9) were somewhat standard in size. Depths ranged from 0.10 to 0.23 m, areas from 0.22 to 0.32 sq m. These intramural cobble-filled thermal pits, or ancillary hearths, were only found in structures with an area of more than 10 sq m and were loosely associated with the presence of storage pits. Extramural pits had more size variability. Most pits were filled with primary fill, but intramural pits were less likely to have been cleaned out. The single pit that had been cleaned out was intentionally filled. Extramural pits (n = 16) were more likely to have been cleaned out and filled naturally (n = 5). Two pits at LA 265 (Fig. 25.29) were superimposed over other features. The majority of Early Developmental cobble-filled pits were located at LA 265 (n = 15) making up about 6 percent of the Early Developmental features at the site. This percentage is similar for LA 6170 (approximately 5 percent). Large cobble-filled thermal pits make up 7 percent of the Early Developmental features at LA 115862 and about 2 percent at LA 6171. Both have very small sample sizes making the comparison tenuous. Scatterplots indicate that large cobble-filled thermal pits are generally smaller when compared to other large Early Developmental pit classes such as large unburned pits and large burned pits.

Of the 16 flotation samples mentioned above, 11 were processed from Early Developmental features; all but one contained charred botanical remains. Sample size is too small to determine whether presence of charred taxa is related to feature location, but the presence of charred taxa in all four extramural features suggests that feature location is not related to the presence of archaeobotanical remains in primary fill.

Late Developmental, Late Developmental/Coalition, and indeterminate pits were less numerous, collectively making up three features in the entire assemblage. They were all extramural features from LA 6169.

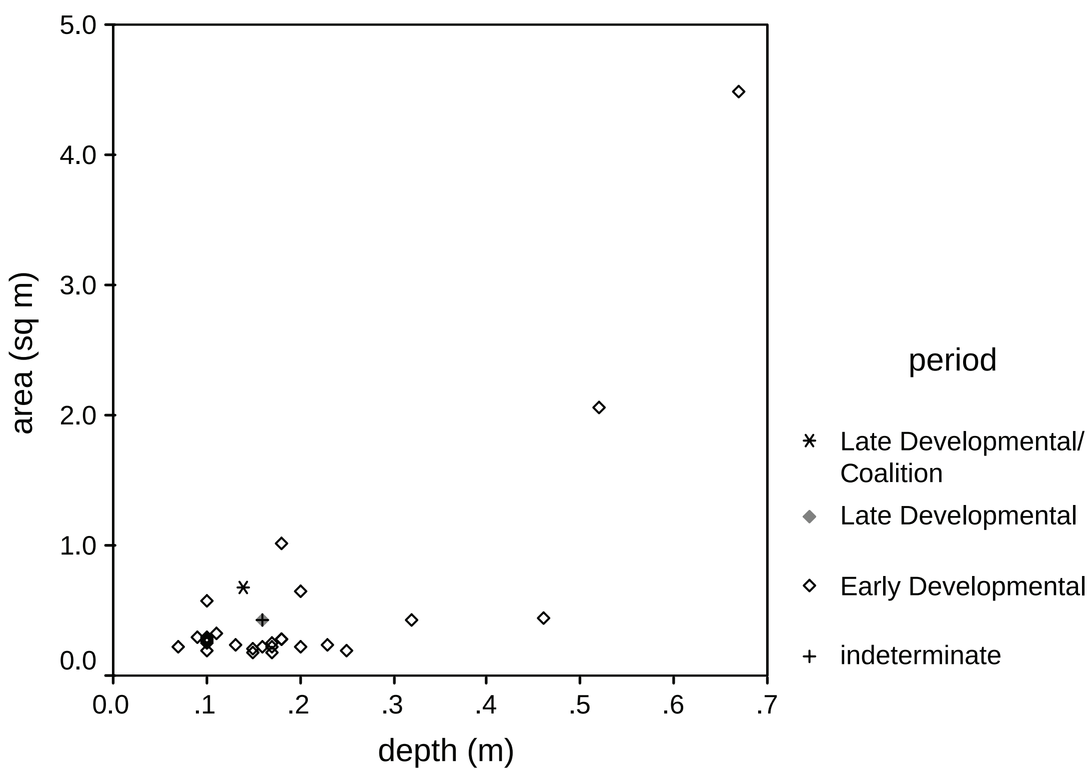

Figure 25.28. Large cobble-filled thermal pits by period, area, and depth.

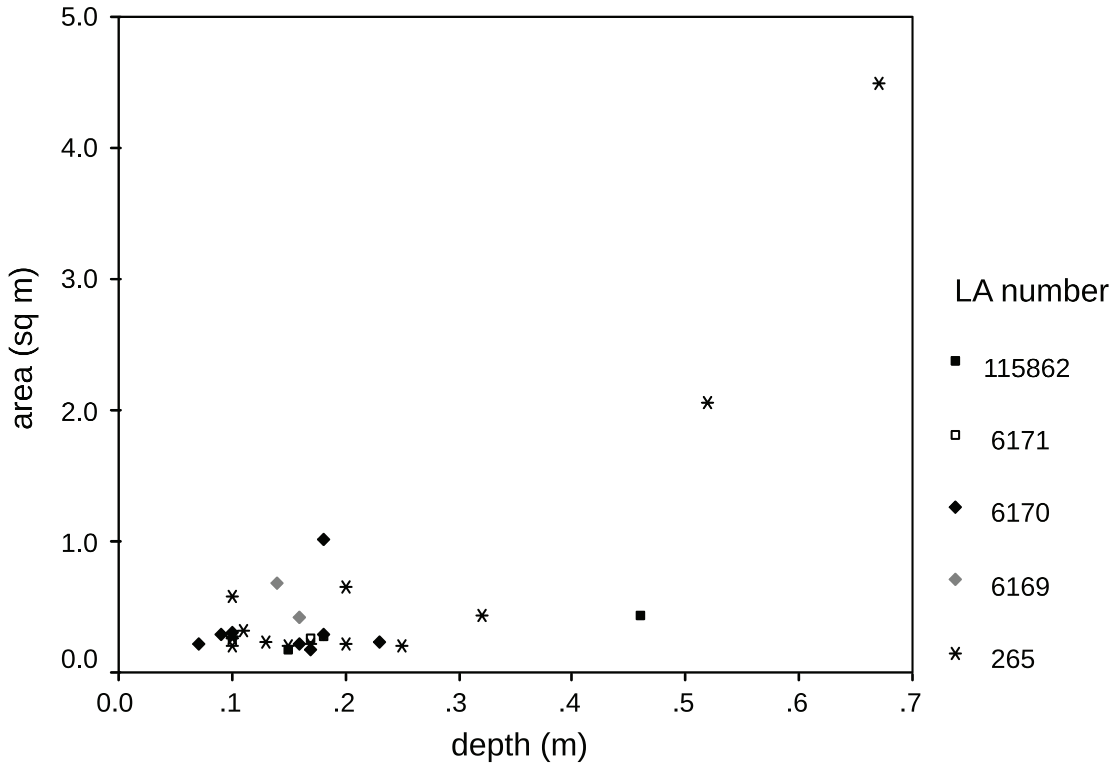

Figure 25.29. Large cobble-filled thermal pits by site, area, and depth.

Small Cobble-Filled Thermal Pits

Small cobble-filled thermal pits (n = 6) were not common. Pits were less than 0.50 m in diameter and were filled with rock. One was superimposed over a ventilator shaft at LA 265. The largest concentration of these features was at LA 265 (n = 3). They were also present at LA 265 and LA 6170. They ranged in depth from 0.10 to 0.35 m, had areas ranging from 0.04 to 0.37 sq m, and a median volume of 0.0276 cu m. Two archaeobotanical samples were processed; one had charred taxa.

Hearths

A hearth is the primary thermal feature within a structure located in or near its center. Hearths were often lined with raised adobe collars and were usually associated with ash pits and ventilator complexes. Twenty-one central hearths dating from Developmental and Coalition periods were excavated (Fig. 25.30). Ten were collared, eleven were not (Fig. 25.31). Fifteen were examined for archaeobotanical remains. The majority (n = 14) contained economic plant remains including corn. Presence or absence of a collar, depth, and location were not linked to the presence or absence of charred taxa or wood species, although collared hearths were slightly more likely to contain primary fill. Four of the features with primary fill had wood assemblages dominated by juniper, three had mixed wood species. Other wood types included greasewood/saltbush and cottonwood/willow.

Collared Hearths. Collared hearths ranged from 0.03 to 0.24 m in depth with areas from 0.1074 to 0.5407 sq m. Median measurements were 0.12 m deep, 0.19 sq m in area, with a volume of 0.0155 cu m. Early Developmental collared hearths were in the same general size range as features without collars, but as a group tended to be deeper (Figs. 25.30, 25.31). Most collared hearths (seven of ten, six with complete dimensions) were located in Early Developmental structures. Early Developmental collared hearths were found in structures at LA 265, LA 6169, LA 6170, and LA 6171. All were located in large pit structures: those with an area of more than 10 sq m. Hearths from Coalition (n = 2)

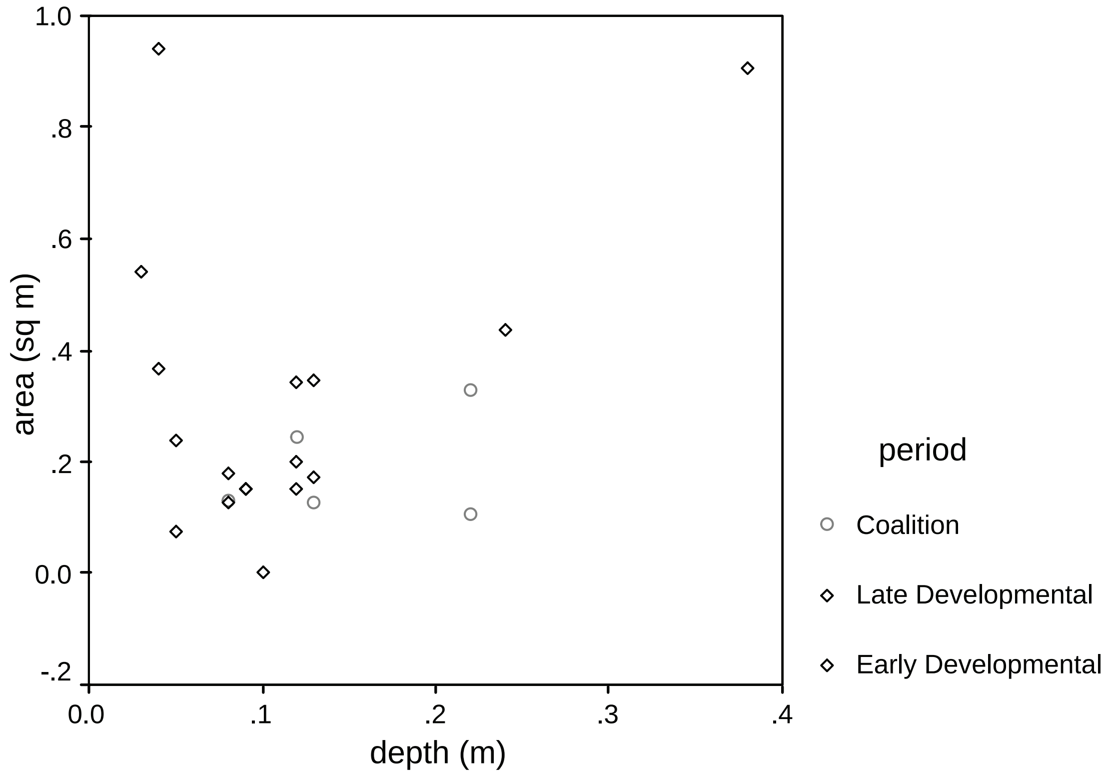

Figure 25.30. Hearths by period, area, and depth.

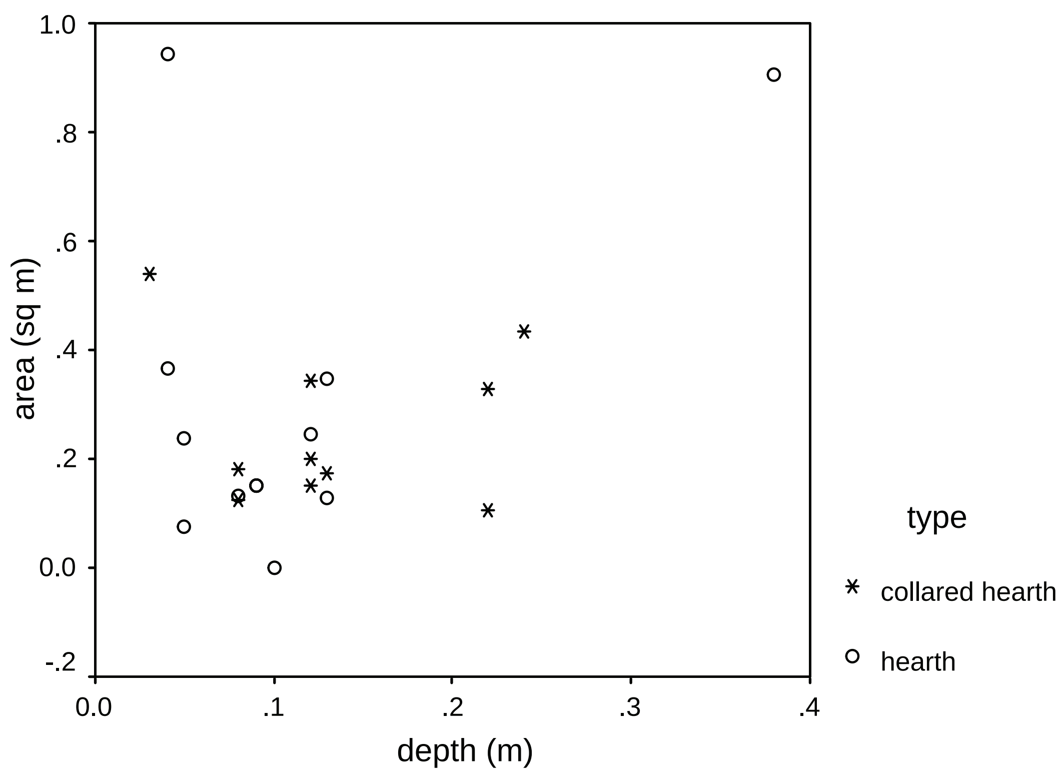

Figure 25.31. Hearths by type, area, and depth.

and Late Developmental (n = 1) structures were also excavated at LA 6169.

Central Hearths. These hearths do not have collars. Hearths without collars tended to be shallower than collared hearths, and depths ranged from 0.04 to 0.38 m. Complete feature areas (n = 11) ranged from 0.07 to 0.94 sq m. Median measurements were 0.09 m deep, 0.24 sq m in area, with a volume of 0.0098 cu m. Early Developmental central hearths (n = 7) accounted for more that half of the feature types. They were almost evenly distributed between large and small structures. Early Developmental features were located at LA 265, LA 6169, LA 6170, LA 6171, and LA 115862 (Fig. 25.32). Two Early Developmental hearths had large diameters ranging from 1.00 to 1.20 m. One was located at LA 265 (Structure 1) and was surrounded by floor vaults. The other was only 3 cm deep and was in a small structure at LA 6169. This hearth has an attached ash pit.

Ash Pits

Ash pits were pits or depressions adjacent to or near the central hearth that held ash, charcoal, and debris removed from the hearth. Ash pits are always intramural features and are part of the hearth complex that includes a central hearth and often a ventilator complex. Eleven ash pits were excavated. They ranged in depth from 0.08 to 0.28 m and in area from 0.03 to 0.21 sq m. Median measurements were 0.23 m deep, 0.0907 sq m in area, and had volumes of 0.0138 cu m.

Size ranges for Early Developmental pits (n = 9) ranged in depth from 0.11 to 0.28 m and in area from 0.03 to 0.21 cu m with a median volume of 0.0138 cu m. Relative dimensions are shown in Figure 25.33. Ash pits make up slightly more than 1 percent of the total number of Early Developmental features. Ash pit to hearth ratio ranged from 1:3 at LA 6169 to 1:1 at LA 265. Late Developmental pit structures lacked ash pits (Fig. 25.34). Coalition components at LA

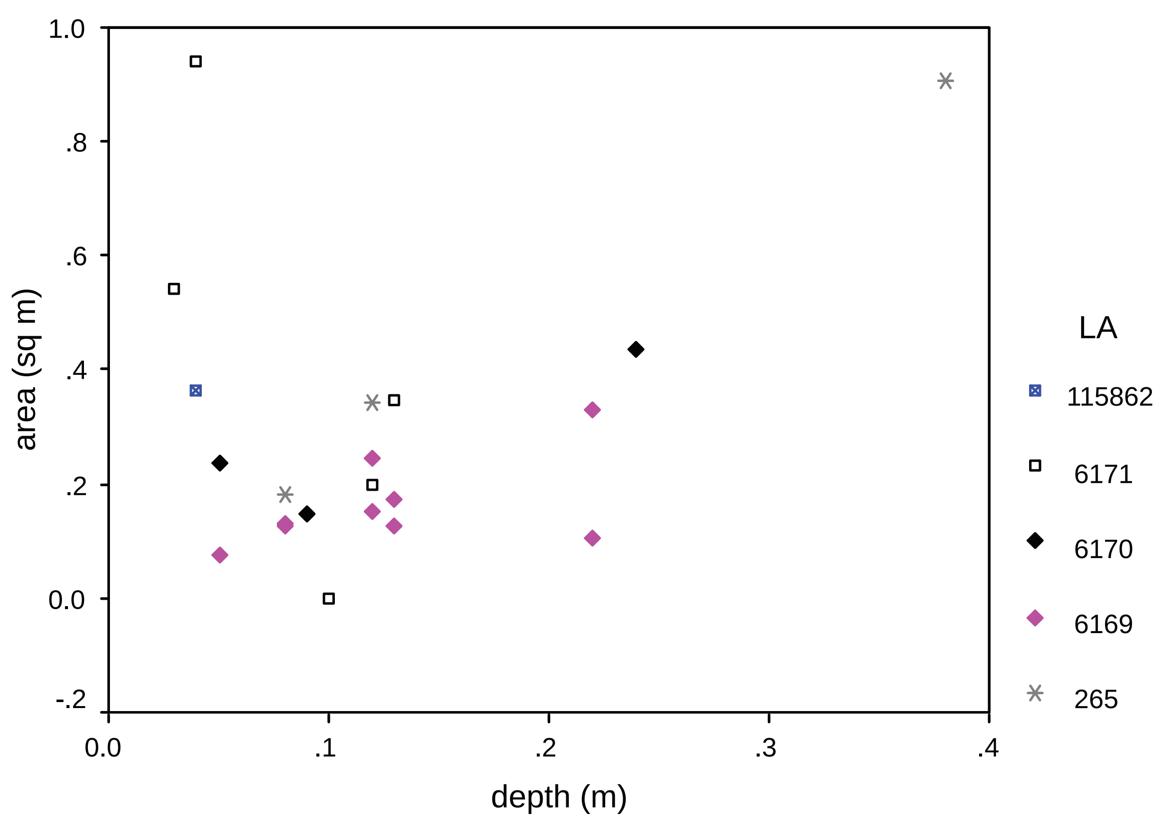

Figure 25.32. All hearths by site, depth, and area.

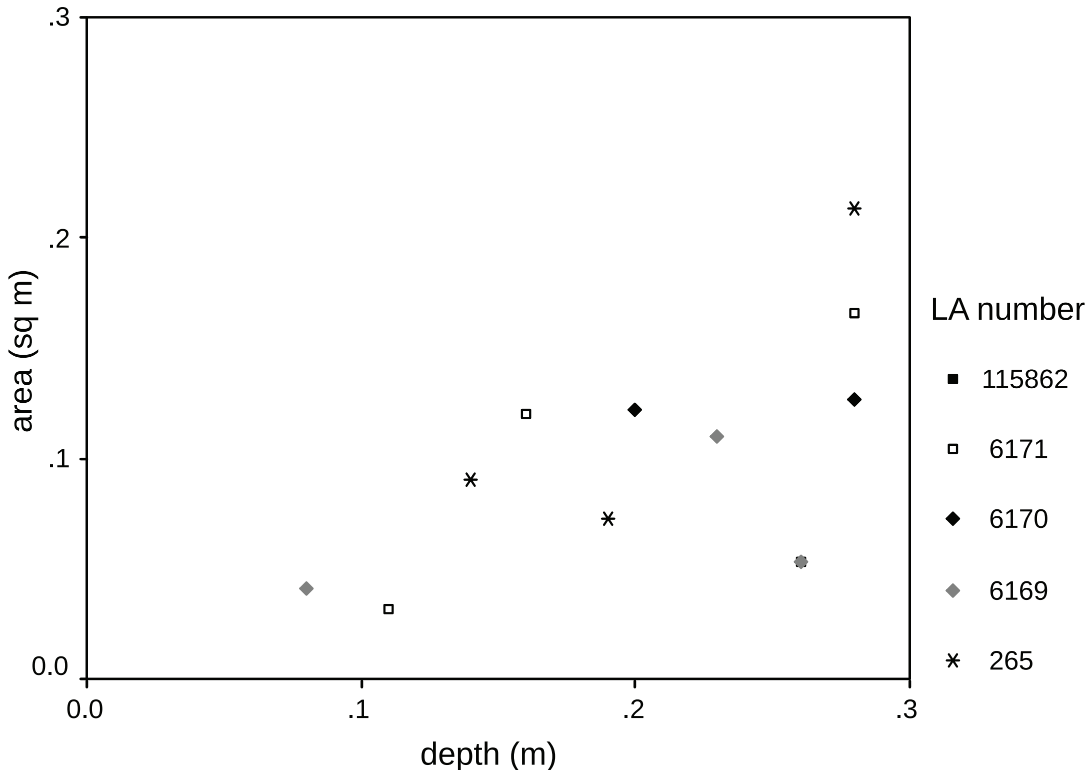

Figure 25.33. Ash pits by site, area, and depth.

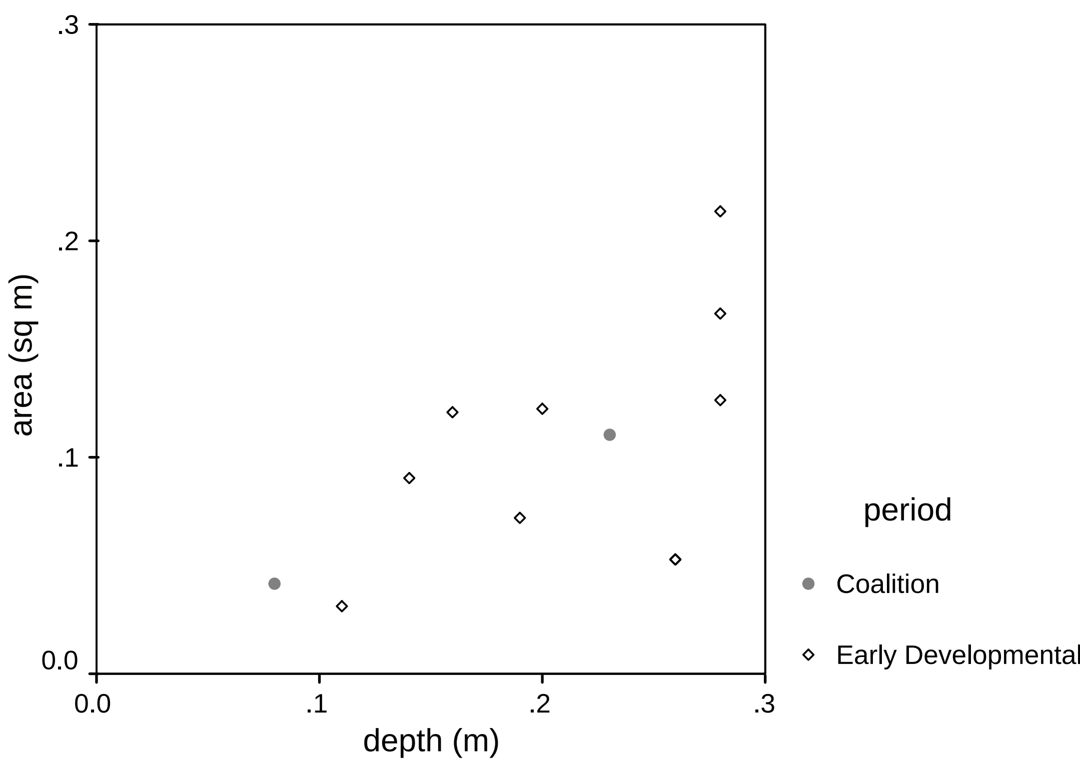

Figure 25.34. Ash pits by period, area, and depth.

6169 had an ash pit to hearth ratio of 2:1. With the exception of one feature at LA 115863, ash pits were oriented along the structure's hearth complex, placed between deflector supports and the vent shaft opening. Ten of the eleven ash pits contained primary fill, one had been cleaned out and filled naturally. Flotation samples were processed from seven of the pits. All but one pit with primary fill contained charred taxa.

Fire Pits

Fire pits were formally constructed (e.g., slab-lined), thermally altered pits found outside of a structure. There were only three. They ranged in depth from 0.08 to 0.12 m and in area from 0.0531 to 0.1590 sq m. Median volume was 0.0085 cu m. Size ranges were within the range of small burned pits.

Feature Summary

Site feature data are summarized below. The site summaries are followed by intersite and cross-temporal observations.

Earliest Developmental

LA 6171 was the only site with features dating before AD 600. Although the feature assemblage did include small and large unburned pits and an ash and rock cluster, the feature assemblage was dominated by large burned pits and storage/roasting pits (and the small subpits excavated into their bases). Large burned pits made up roughly the same feature ratio as they did in the Early Developmental component. The storage/roasting function, unique to this site and time period at NM22, dominated the feature assemblage.

Early Developmental

In terms of site structure, LA 115862 was unique. Unburned features at LA 115862 were almost exclusively intramural. The site had no small unburned pits, and all but one thermal pit were extramural features. Despite low feature frequencies and no evidence of extramural activity in the form of storage or undifferentiated pits, large cobble-filled pits and large burned pits are present at LA 115862 in higher proportion to other features than at other Early Developmental sites. These burned features were exclusively extramural.

LA 265 had by far the largest and most diverse feature assemblage. The site contained 70 percent of the Early Developmental large unburned pits found at all sites. Large unburned pits also tended to be deeper at LA 265 than at other Early Developmental sites. Small unburned pit frequencies as compared to other features fell into the mid range. LA 265 also had a large percentage of storage pits, second only to LA 6170. The six with large surface areas were the only ones of their type found at the Early Developmental sites. Despite the emphasis on large unburned pits and external storage pits, the percentage of large thermal features (cobble-filled and large burned pits) was consistent with the majority of other sites along NM 22, even those that lacked external storage facilities.

LA 6170 had the largest ratio of small unburned pits of any site. In contrast to LA 265, large unburned pits were predominantly intramural as were storage pits, many of which were deeper than those at LA 265. This Early Developmental component had the lowest percentage of large burned pits of any site, though large cobble-filled pits were found in similar frequencies to most other sites. LA 6170 was the only site other than LA 265 to have a small cobble-filled pit.

LA 6169 had only one storage pit. Storage facilities at this site were represented by two large off-chamber cists. Although lack of pit storage features could be partially attributed to sampling error, they may have been unnecessary because no other site had these large intramural storage facilities. Thermal processing facilities were represented in the same percentages in relationship to other site features as was observed at most of the NM 22 sites.

LA 6171 had one of the least diverse feature assemblages. The ratio of small unburned pits was comparable to LA 265, but LA 6171 had only one storage pit. Large unburned pits made up a small percentage of the site's overall feature assemblage. Large burned pits were present in frequencies similar to those observed at LA 6169 and LA 265, but large cobble-filled pits were less common than the norm for other Early Developmental sites.

Late Developmental, Coalition, Early Classic

Small unburned pits associated with Early Developmental components were larger than those belonging to later temporal components. Mealing bins were associated with Late Developmental (LA 6170) and Coalition (LA6169) habitations. With the exception of small unburned pits and mealing bins, features from later components occur in low frequencies and are not useful for comparison. They are summarized in Table 25.1.

Consideration of the feature assemblage on a project-wide level reveals some general trends across sites within the Early Developmental component. Overall, small unburned pits were represented in all periods. Pit openings were larger in the Early Developmental sample. Large unburned pits were disproportionately represented at LA 265, making up a larger percentage of the feature assemblage than at any other Early Developmental site. This higher ratio of large pits could indicate more community integration or possibly residential stability. Large Early Developmental pits have a broader depth range than any other time period. This may be the result of large sample size or could be that they served a wider variety of uses.

Storage pits were mostly identified with Early Developmental components and fell into two depth categories. Pits that were either less than 0.70 m deep or deeper than 0.70 m . Extramural features were more often deep and pits at LA 6170 were more likely to be deep. Storage location is represented as a continuum. At LA 6169, two large intramural off-chamber storage cists made up the majority of storage. Access to storage was also restricted at LA 6170, potentially indicating household level, or restricted community level control of resources. At LA 265, storage is primarily extramural, implying interhousehold access. LA 6171 and LA 115862 exhibited a lack of large Early Developmental storage facilities. Storage/roasting pits at LA 6171, though earlier than those at other sites, had gross storage capacity comparable to that of some pit structures, suggesting that they may have been multipurpose features.

Postholes were predictably shallower in extramural context. Structures with a footprint of less than 10 sq m at LA 265 and LA 6169 had high ratios of postholes to intramural features. This could be an indicator of structure maintenance or may indicate the presence of upright features such as looms or drying racks. Wall niches were found in large pit structures (those with larger than 10 sq m of potential floor area) and were loosely associated with the presence of ancillary hearths. Sipapus in Early Developmental structures were only found in large structures and were associated with a larger number of floor pits, ancillary hearths, and ladder rests.

Section II. Comparison of Early Developmental Feature Data: NM 22 and LA 109129 and LA 57024/57026

Comparative feature data are compiled from LA 109129 and LA 57024/57026, the Artificial Leg site. Data recovery at LA 109129 focused on a Basketmaker III component dating from AD 395 to AD 575. Although the date ranges were within those of the earliest Developmental site, LA 6171, site structure at LA 109129 is more similar to Early Developmental occupations from along NM 22. Located in the Jemez River Valley near the confluence of the Rio Grande, LA 109129 provided a comparative data set comprised of five structures and 254 features, 76 of which were extramural. (Walth's feature count was 155 with 57 extramural features, the reported increase is accounted for by the addition of postholes that were not originally assigned feature numbers and 19 extramural pits with complete measurements, although they were not all fully excavated [Walth 1999].)

The Artificial Leg site was an Early Developmental habitation located near Bernalillo with dates assigned from late AD 600 to late AD 700. LA 57024 and LA 57026 were originally excavated as one site by Frisbee in 1968. Two site numbers were assigned by Ward in 1986 (Schmader 1991). They are considered as one unit for this analysis. Schmader assigned structure dates based on a combination of architectural analogy, ceramic seriation, and chronometric dating. When considering these data in a regional context, it is interesting to note that the one-sigma range ^{14}C dates of AD 534–610 (Structure 4, Cist House), AD 252–406 (Structure 6, Coping House), AD 220–416 (Structure 9, Post House), were rejected by Schmader as influenced by old wood. This interpretation is bolstered by an AD 790 date obtained from reed matting from Structure 11 (Mural House) (Schmader 1991).This site was of particular interest for comparison because of an extensively remodeled pit structure, Structure 4 (Cist House), and because of a series of deep, extramural bell-shaped pits similar in morphology to those found at LA 6171. LA 57024/57026 had four pit structures and 194 features with complete and partial measurements that were included in the feature database. Features with no recorded measurements were not included. The assemblage included 156 intramural features, 24 extramural features (most of them large storage pits), and 9 features located within an activity area (Schmader 1991) consisting of a large burned pit similar to Feature 38 excavated at LA 6171.

Feature attributes and dimensions were entered into the NM 22 database using coding conventions previously discussed. During coding, it became evident that different criteria used for designating feature type between projects were not always interchangeable. In order to normalize data, Early Developmental features from the NM 22 data set were combined into two categories, unburned and burned features. Features with partial measurements were included in the database. Features from later temporal components were excluded.

Unburned features were nonarchitectural features. The set included small and large unburned pits, storage features, wall niches, and off-chamber cists. Because they have no relationship to storage capacity and because this small feature "type" was often variably interpreted at NM 22 , pot rests, postholes, and divots were not included. Excluding postholes significantly reduced the number of features reported at LA 57024/57026, Structure 9, because the structure had over 55 postholes. Ventilator shafts were also excluded from the analysis because they are part of pit structure architecture. All thermal features were included in the data set.

Scatter plots by area and depth, and by area and volume were generated in order to evaluate the new collapsed unburned feature assemblages by site. Volumetric histograms of unburned features were generated to examine volume distribution and to cross-check scatterplots. Independent t-tests were run for sites with apparent differences in histogram distribution. Because thermal feature size is primarily defined by area and not depth and because locational data were considered more important than volumetric data, histograms were not used to describe burned features.

Unburned Features

Because LA 265 had the largest feature assemblage, it provides a convenient baseline with which to compare other unburned features in the data set. Scatterplots by area and volume (Fig. 25.35) show unburned features in three clusters that appear to reflect location. Most unburned intramural features were restricted in size, with areas less than about 0.40 sq m and depths of less than 0.60 m. Features in all locations, intramural, extramural, and within an activity area, were included in this generic small pit cluster. Extramural features showed a broader distribution. A significant proportion had larger areas and volumes than intramural features, with median volume and area clustering at about 0.80 m. Features within activity areas tended to be small with the exception of five very large pits.

Area and depth plots (Fig. 25.36) indicated that extramural features were distributed in two diffuse clusters: features deeper than 0.60 m and those shallower. Intramural features tend to fall into the shallow group. Although the feature assemblage is smaller at LA 6171, pits show a similar size distribution to those at LA 265 (see Fig. 25.39).

In contrast to LA 265, intramural features at LA 6170 (Fig. 25.37) have larger openings and volumes than extramural features. At LA 6169 (Fig. 25.38), intramural pits were in the same size range as those at LA 265 but intramural features are deeper. Off-chamber cists from LA 6169 are outliers in the scatterplot. In contrast to an emphasis on extramural storage observed at LA 265 and LA 6171 (Fig. 25.39), the LA 6169 pattern reflects more restricted storage facilities, and could indicate a household instead of an intra-household storage strategy.

Histograms comparing intramural and extramural feature volumes by site support observations made using scatterplots. LA 265 and LA 6171 indicate an emphasis on small volume intramural features (Figs. 25.40, 25.42, 25.45). Extramural features (Figs. 25.41, 25.43, 25.44) show the same trend but with a wider distribution of large exterior features. At LA 6169 (Fig. 25.45), the low frequency intramural feature assemblage exhibits the largest median volume, and the widest volume distribution of any site. This is influenced by two off-chamber pits in Structure 47 and by sampling error introduced by structure superimposition. Extramural features had very small volumes. The results are likely the result of a small sample size.

Histograms of LA 6170 (Fig. 25.47) and LA 265 (Fig. 25.40) show that small intramural features have slightly larger volumes than those at LA 265 and LA 6171. The intramural feature assemblage is made up of features with more widely distributed volumes, indicating larger intramural features with a wider volume distribution. This indicates larger intramural storage capacity and possibly more feature diversity.

At LA 109129, scatter plots by area and vol-

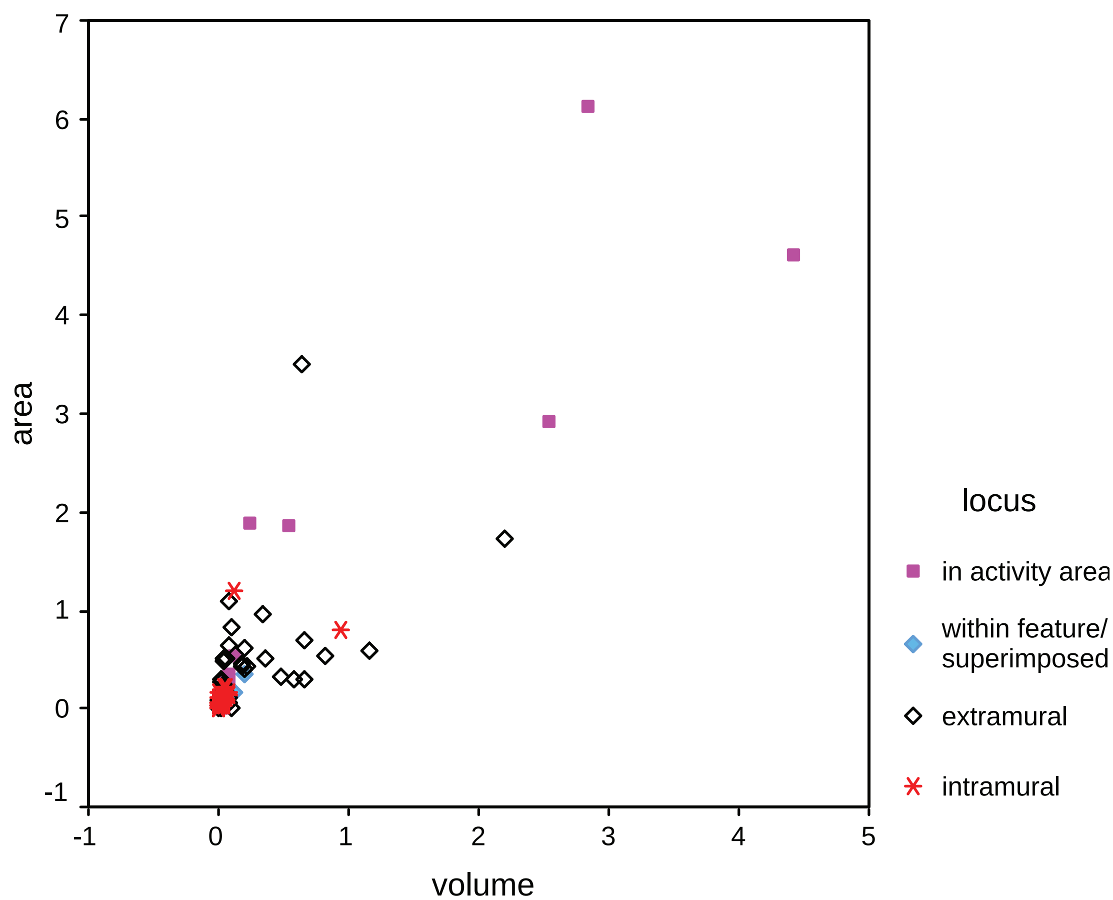

Figure 25.35. LA 265 unburned Early Developmental pits by locus, area (in square meters), and volume (in cubic meters).

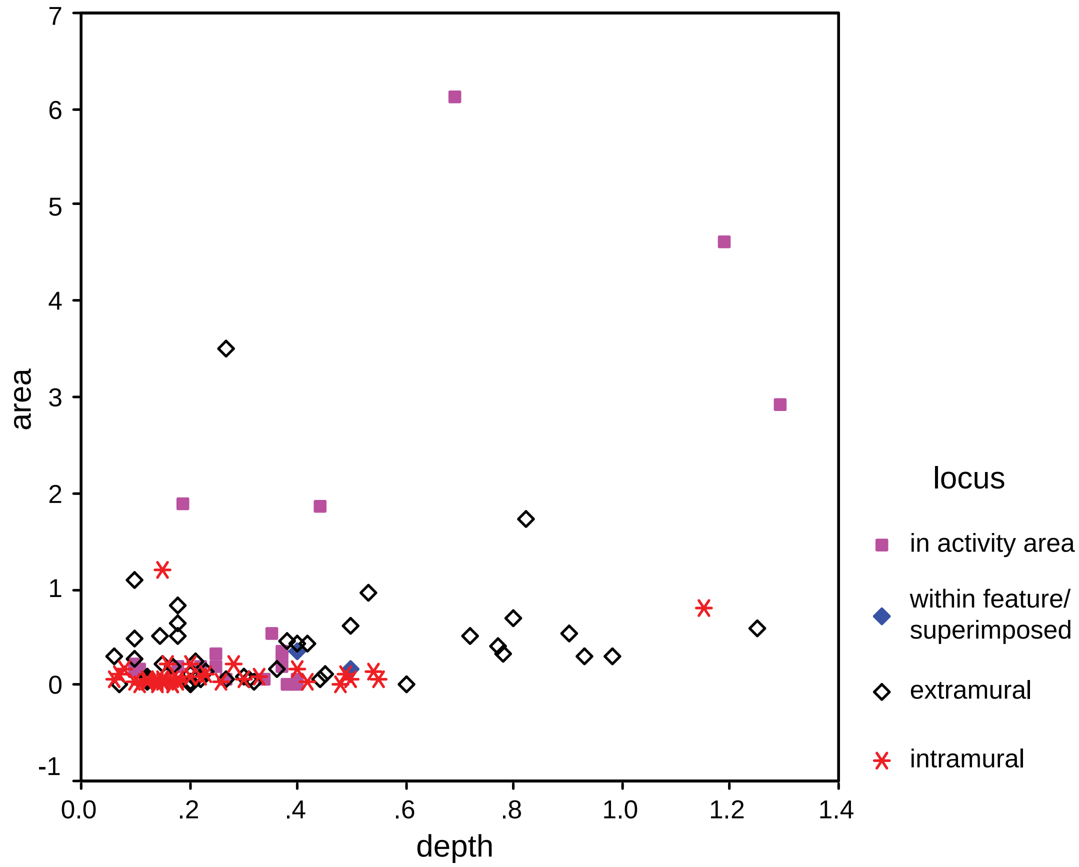

Figure 25.36. LA 265 unburned Early Developmental pits, locus by area (in square meters), and volume (in cubic meters).

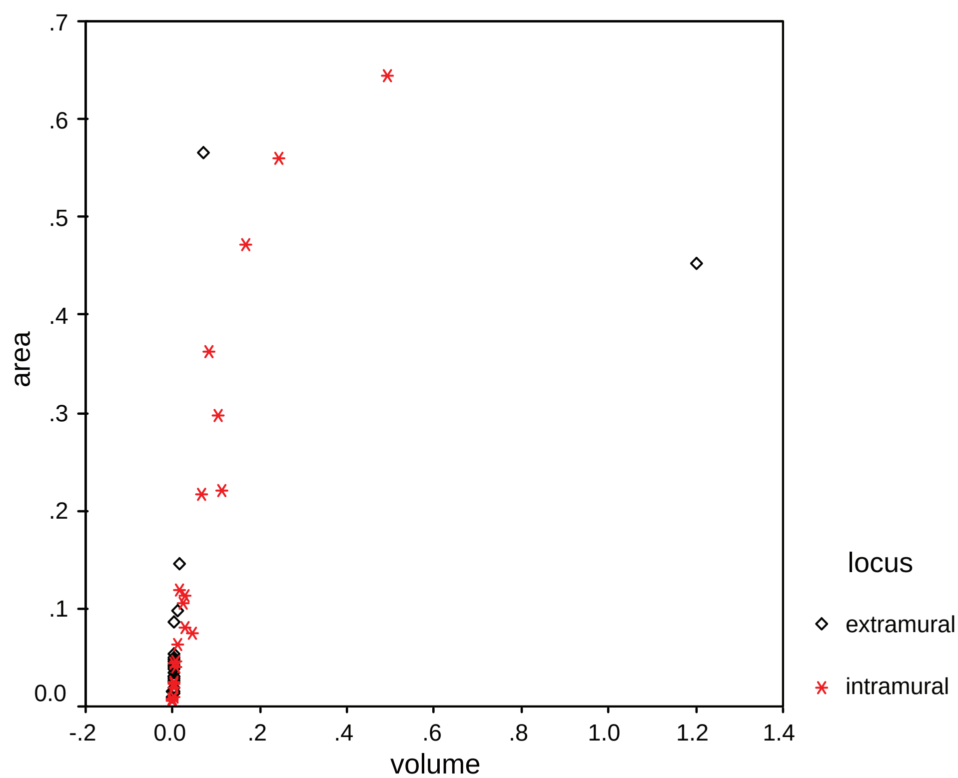

Figure 25.37. LA 6170 unburned Early Developmental pits by locus, area (in square meters), and volume (in cubic meters).

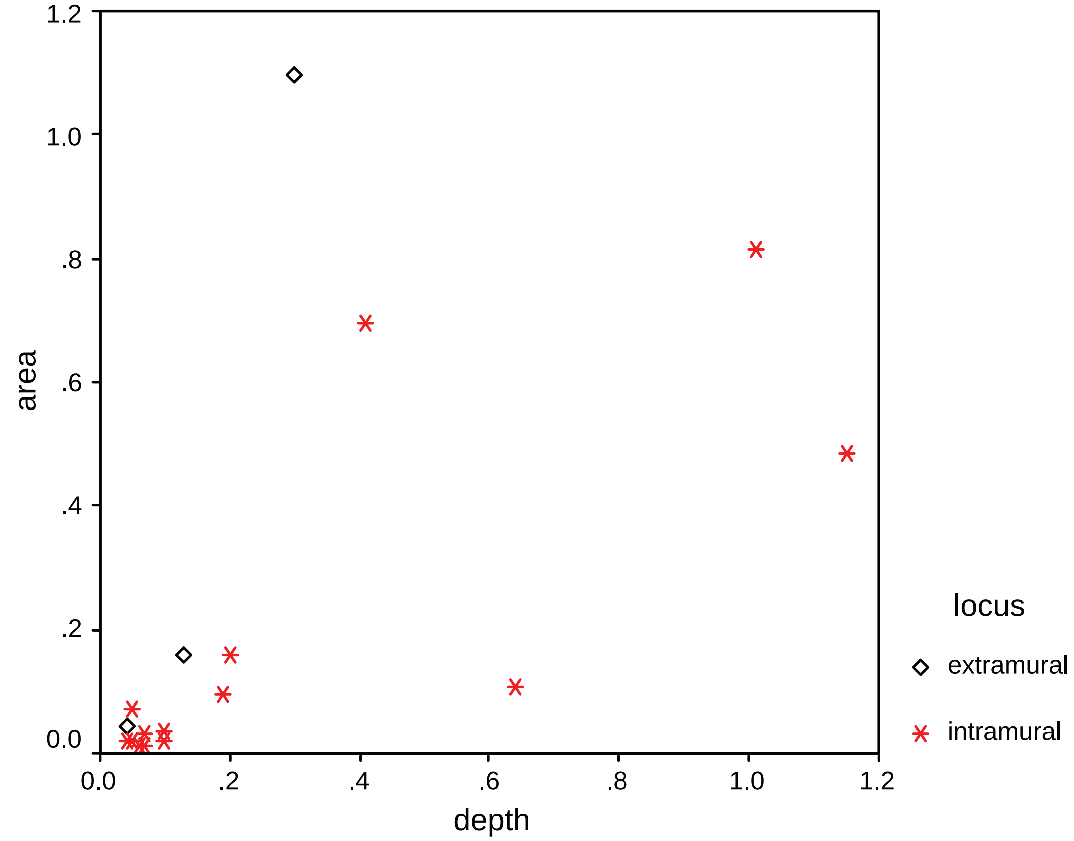

Figure 25.38. LA 6169 unburned Early Developmental pits by locus, area (in square meters), and volume (in cubic meters).

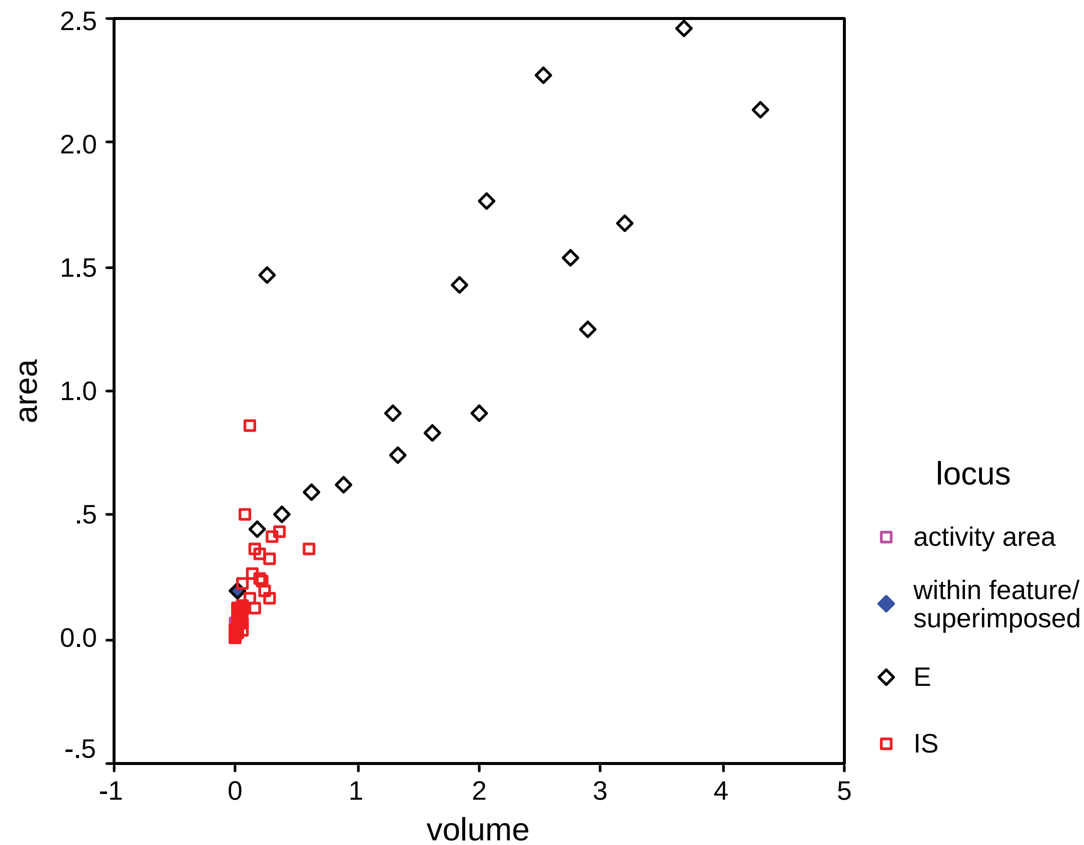

Figure 25.39. LA 6171 unburned Early Developmental pits by locus, area (in square meters), and volume (in cubic meters).

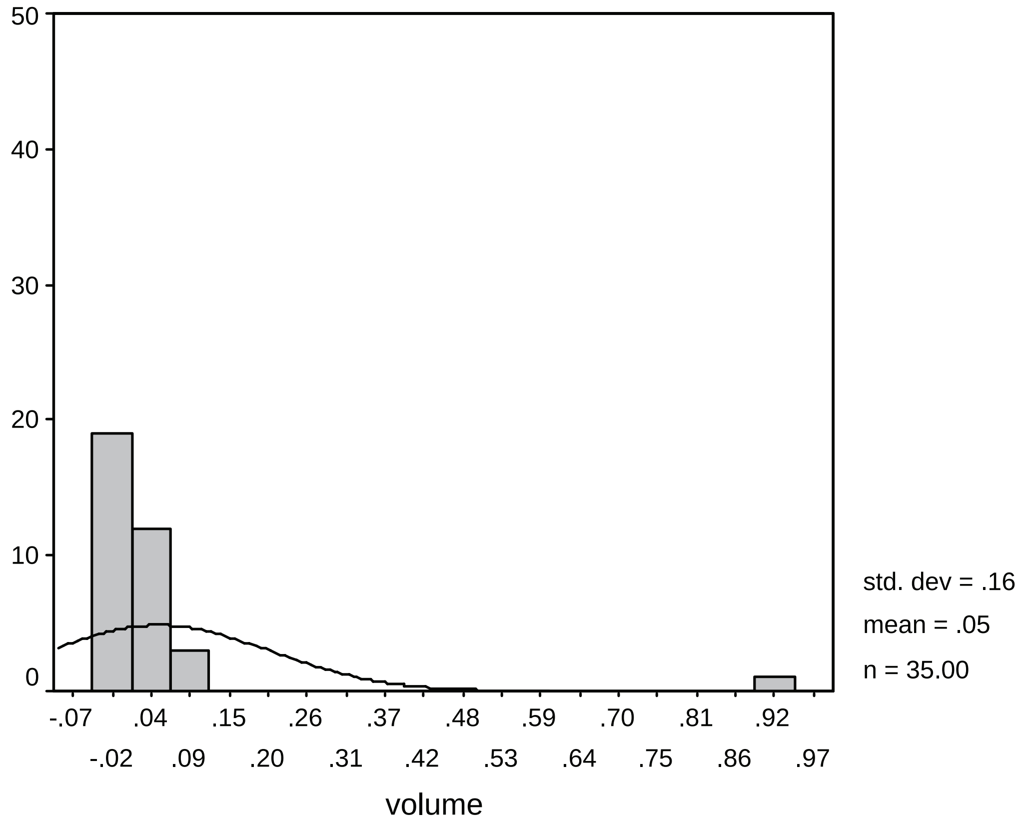

Figure 25.40. LA 265 intramural unburned Early Developmental pits, count by volume (in cubic meters).

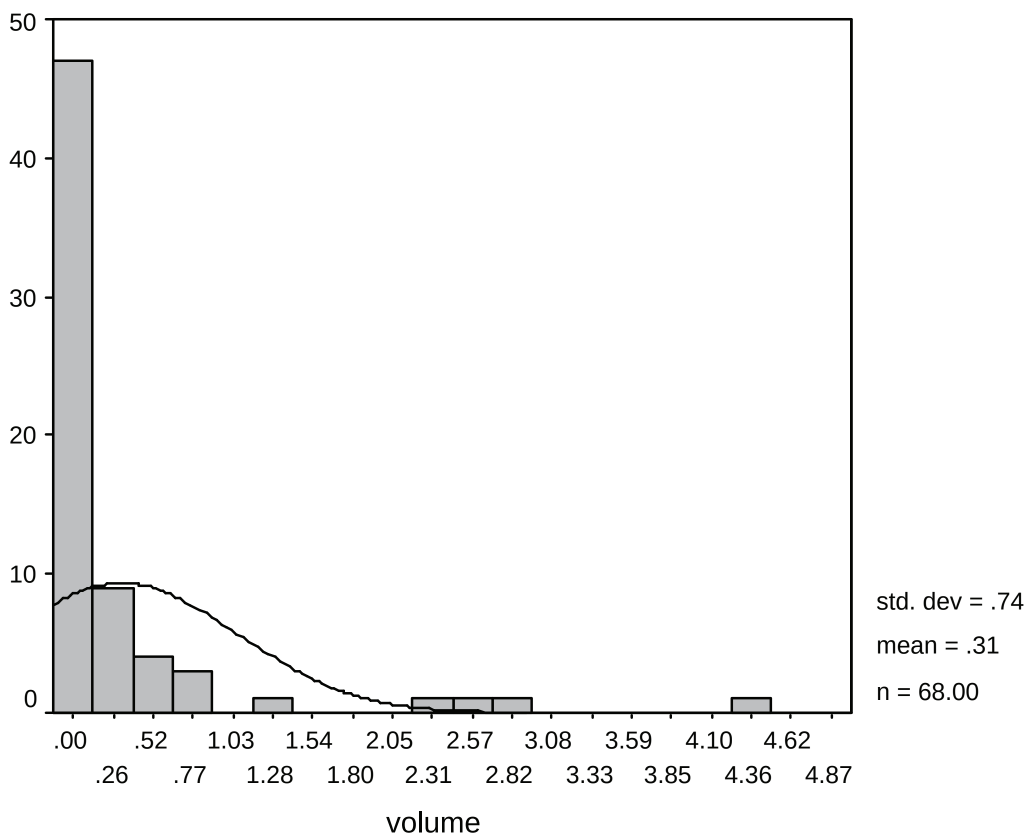

Figure 25.41. LA 265 extramural unburned Early Developmental pits, count by volume (in cubic meters).

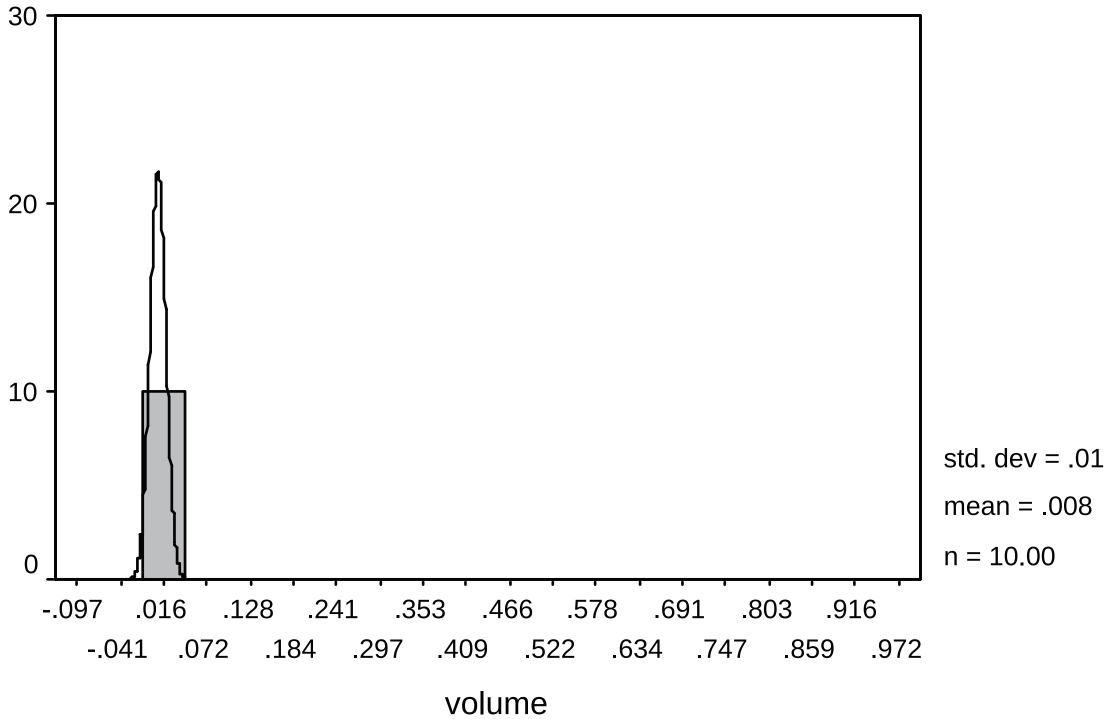

Figure 25.42. LA 6171, intramural unburned Early Developmental pits, count by volume (in cubic meters).

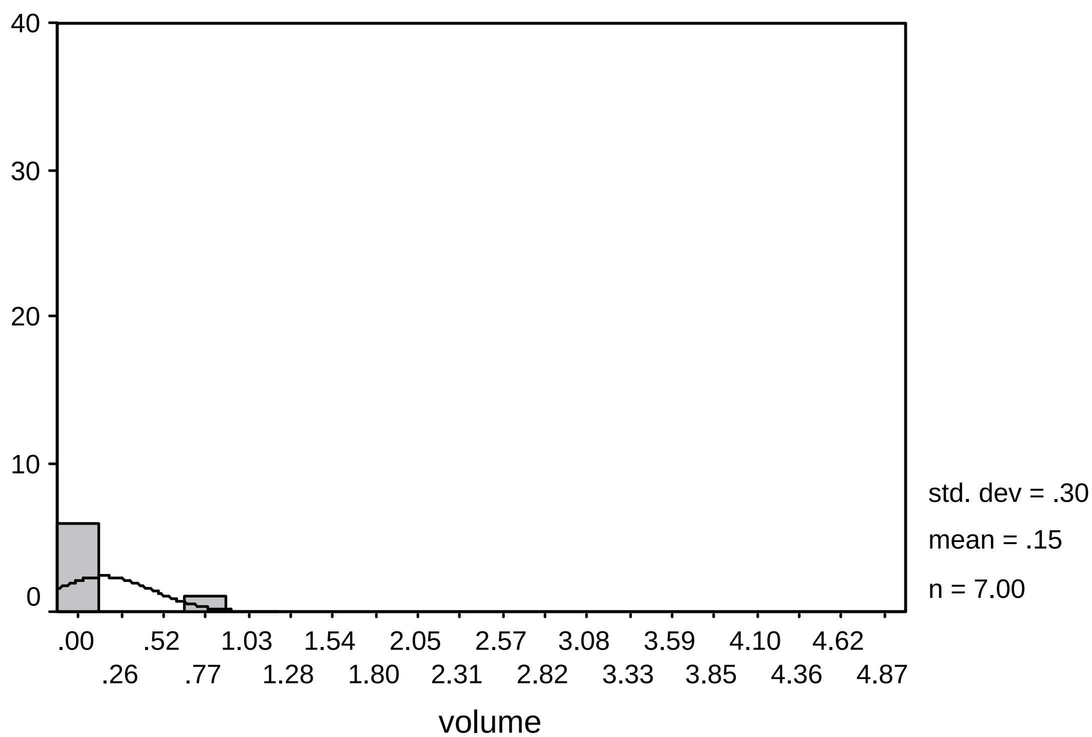

Figure 25.43. LA 6171 extramural unburned Early Developmental pits, count by volume (in cubic meters).

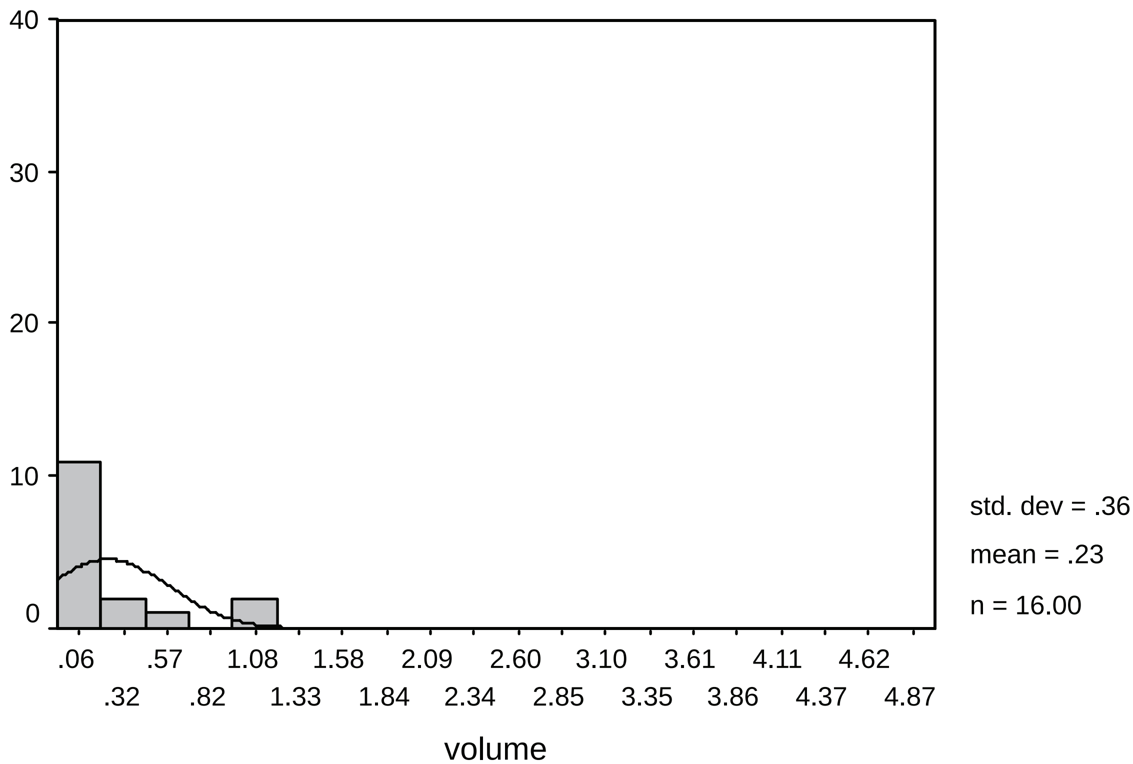

Figure 25.44. LA 6171 extramural unburned Earliest Developmental pits, count by volume (in cubic meters).

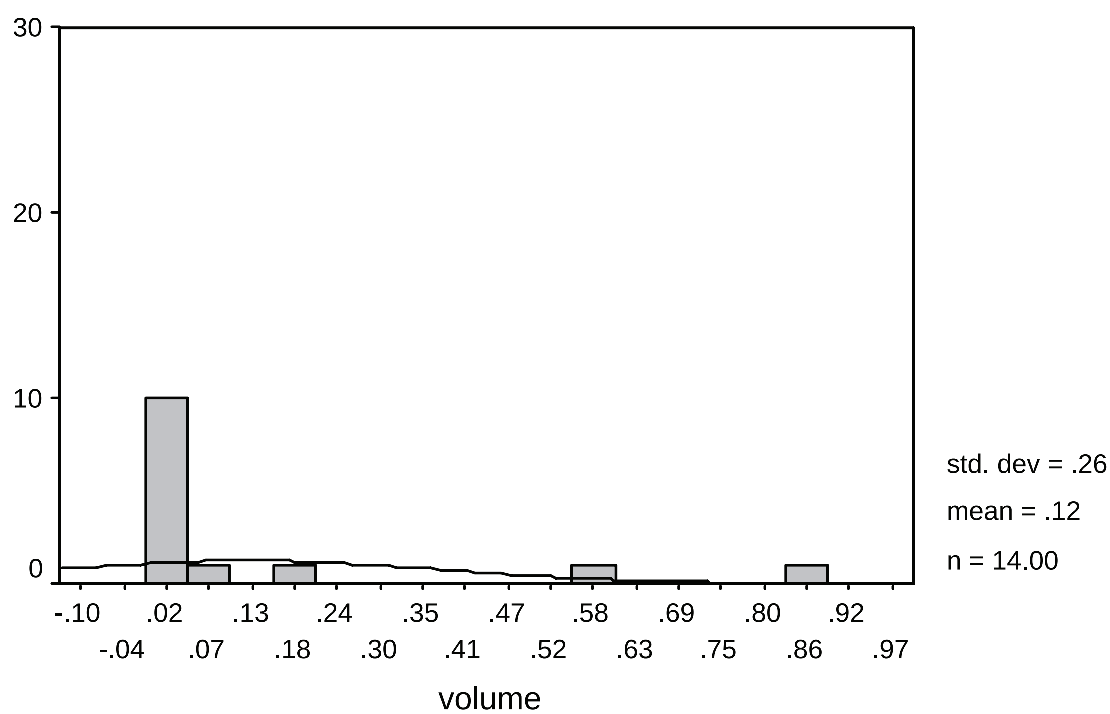

Figure 25.45. LA 6169 intramural unburned Early Developmental pits, count by volume (in cubic meters).

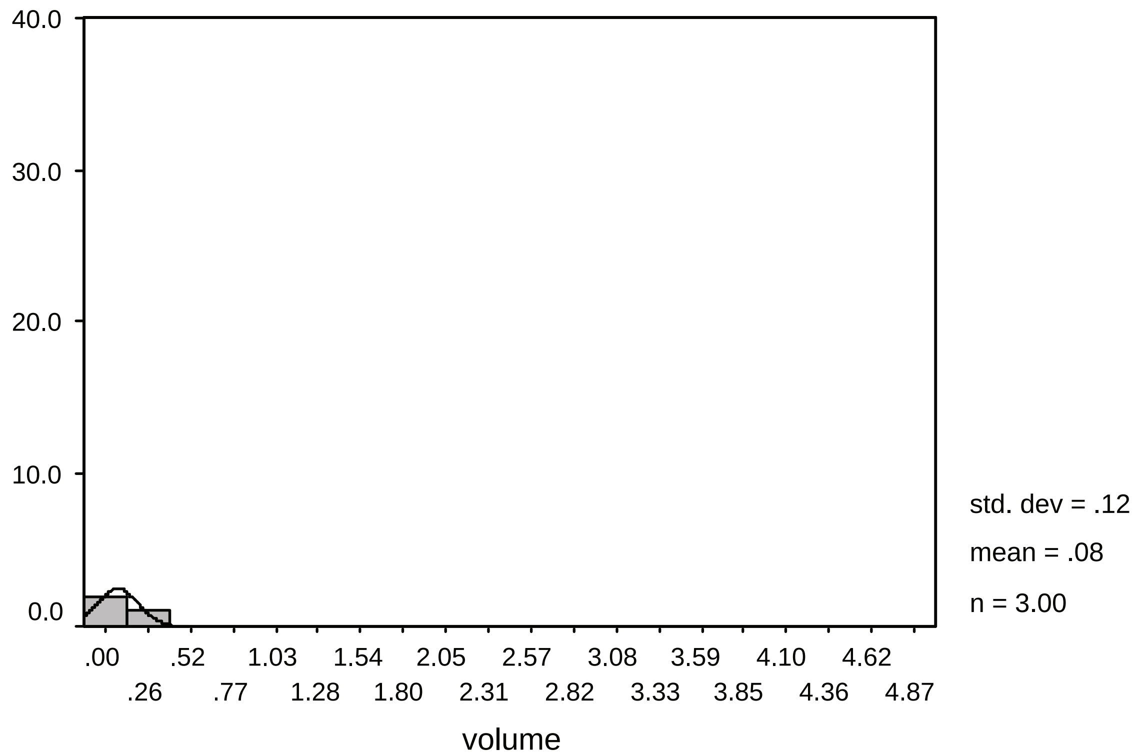

Figure 25.46. LA 6169 extramural unburned Early Developmental pits, count by volume (in cubic meters).

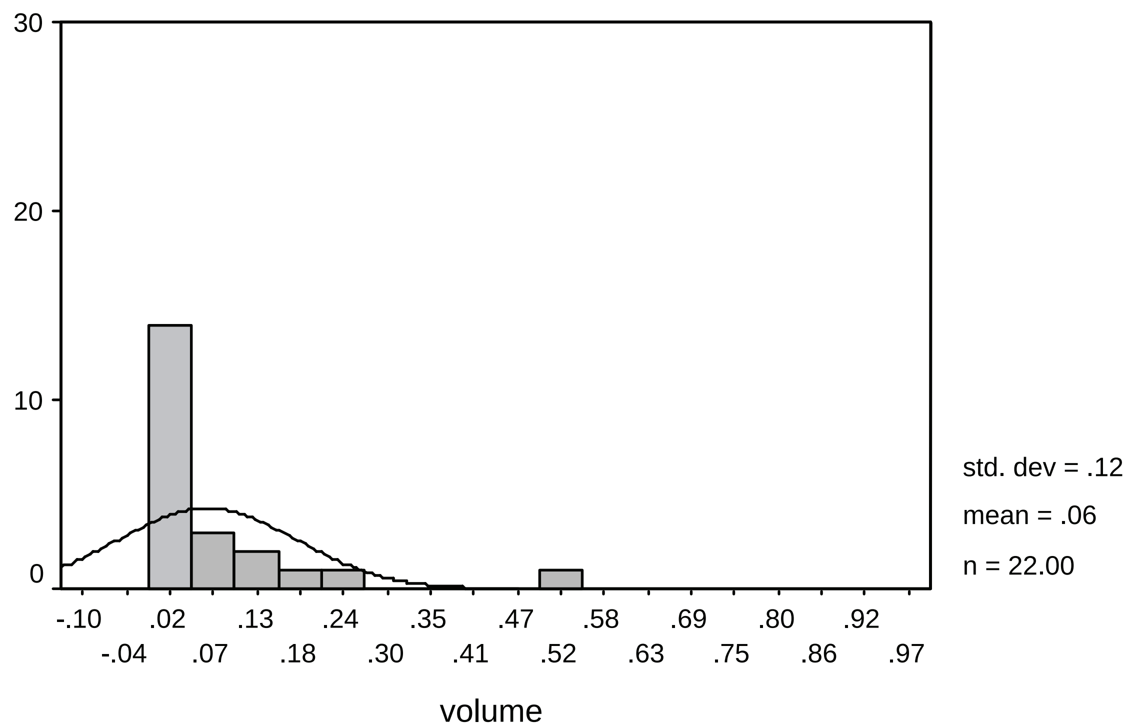

Figure 25.47. LA 6170 intramural unburned Early Developmental pits, count by volume (incubic meters).

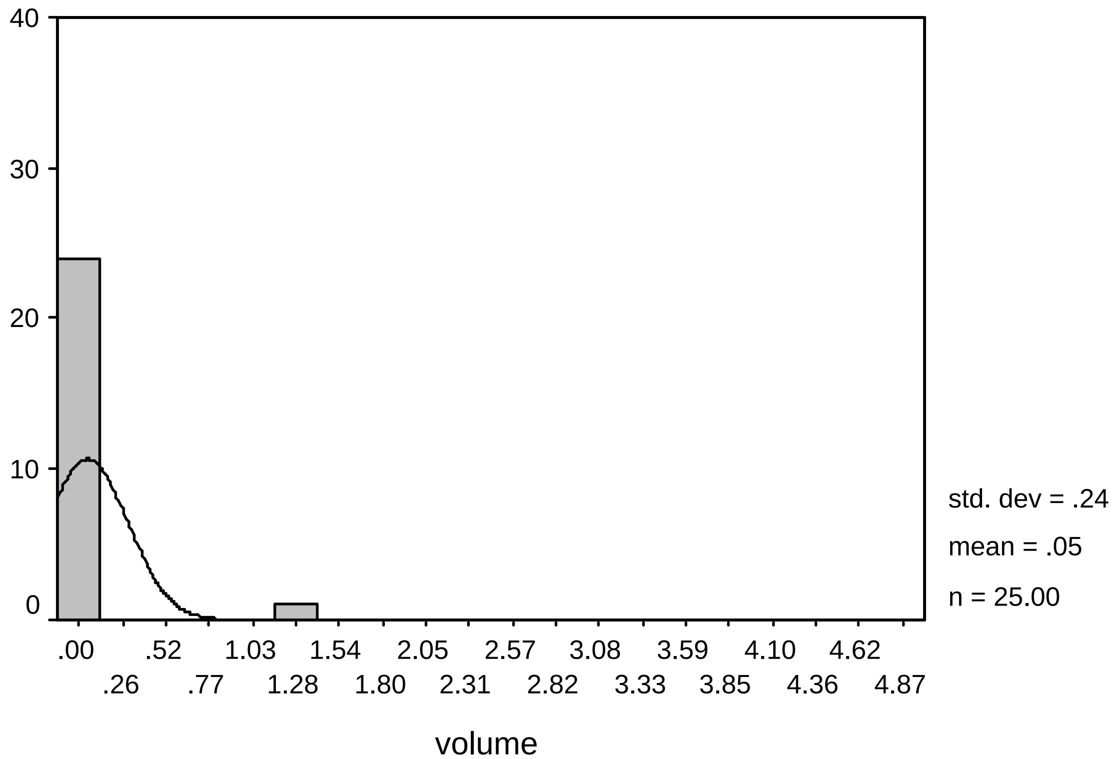

Figure 25.48. LA 6170 extramural unburned Early Developmental pits, count by volume (in cubic meters).

ume indicate that intramural pit distributions exhibited a size comparable to those at LA 265 with a similar pattern of intramural feature dimensions (Fig. 25.49). However, extramural feature apertures were larger in area, and the median areas were closer to 1 m at LA 109129 in contrast to 0.50 m at LA 265. These results are influenced by the presence of large roofed storage pits, which were exclusive to LA 109129. Extramural features were as deep as those at LA 265, but did not exhibit the clustering observed at LA 265. It is interesting to note that "accessory" pits associated with large roofed storage features were in the same size range as intramural pits, supporting the common sense supposition that space restrictions influenced intramural feature size and that activities that took place in bounded space may have been similar. This is consistent with Binford's contention that "site structure" (Binford 1983:144) reflects the residents' activities.

Histograms suggest a greater reliance on small interior features at LA 109129 (Fig. 25.50) than was observed at LA 265. Feature volumes were less evenly distributed than those at LA 265. LA 109129 had more than twice the number of smallest features with volumes of approximately 0.02 cu m . The opposite is evident for extramural features, showing an almost inverse distribution (Fig. 25.51). Extramural features make up a smaller percentage of the overall feature assemblage (46 percent as opposed to 66 percent at LA 265) and are more evenly distributed in volume range than extramural features at LA 265, with fewer very small or very large features. Large extramural features representing large storage pits at LA 109129 also tended to be smaller in capacity. This is an interesting result considering the presence of 11 storage features with postholes and16 storage pits. Roofed storage features are represented by volumes ranging from 0.18 to 2.00 cu m . In the company of feature volumes of 2 cu m, these numbers can be deceiving. A 0.24-cu-m volume could represent a feature with dimensions of 1.30-by-1.17-by-0.30 m, whereas a 0.70-cu-m volume could represent a bell-shaped feature measuring 1.21-by-1.21-by-0.45 m that flares to 1.60 m at the base.

Scatterplots indicate that pit size distribu-

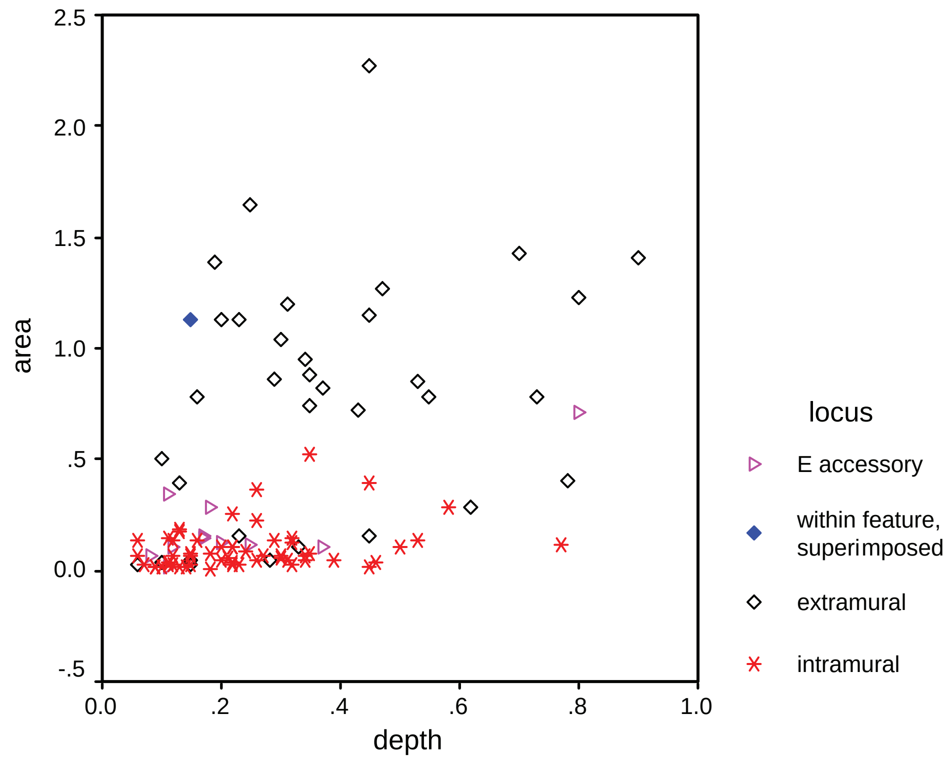

Figure 25.49. LA 109129 unburned Early Developmental pits by locus, area (in square meters), and depth (in cubic meters).

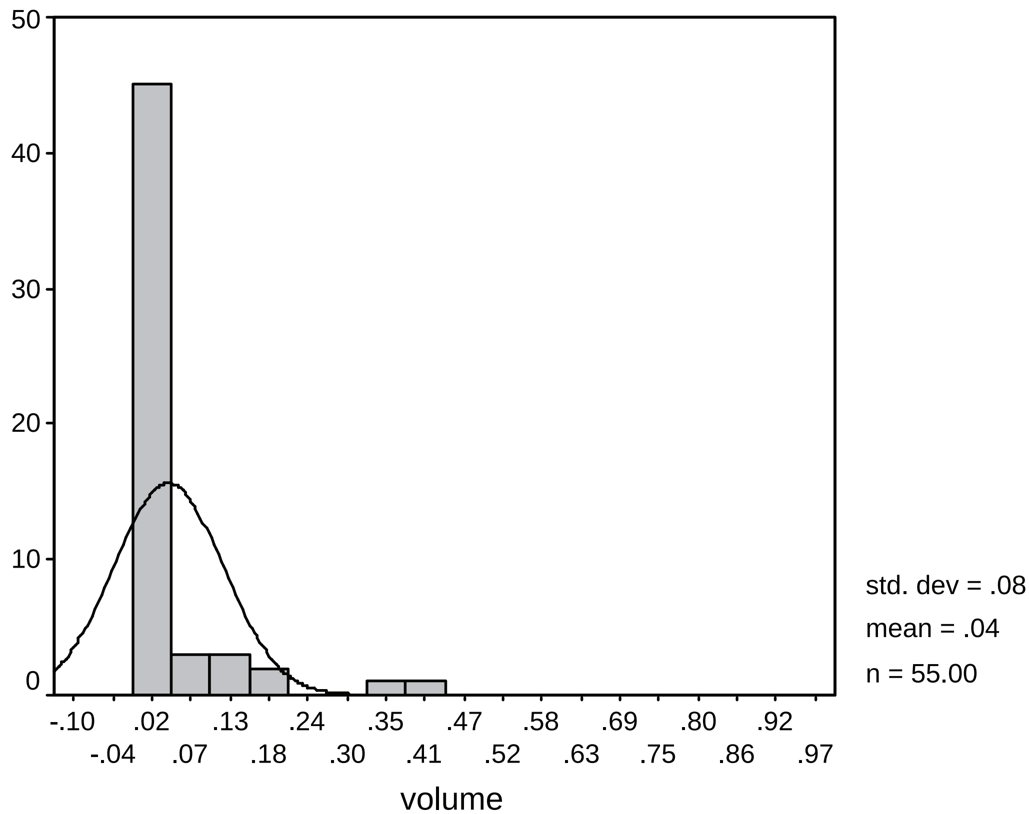

Figure 25.50. LA 109129 intramural unburned Early Developmental pits, count by volume (in cubic meters).

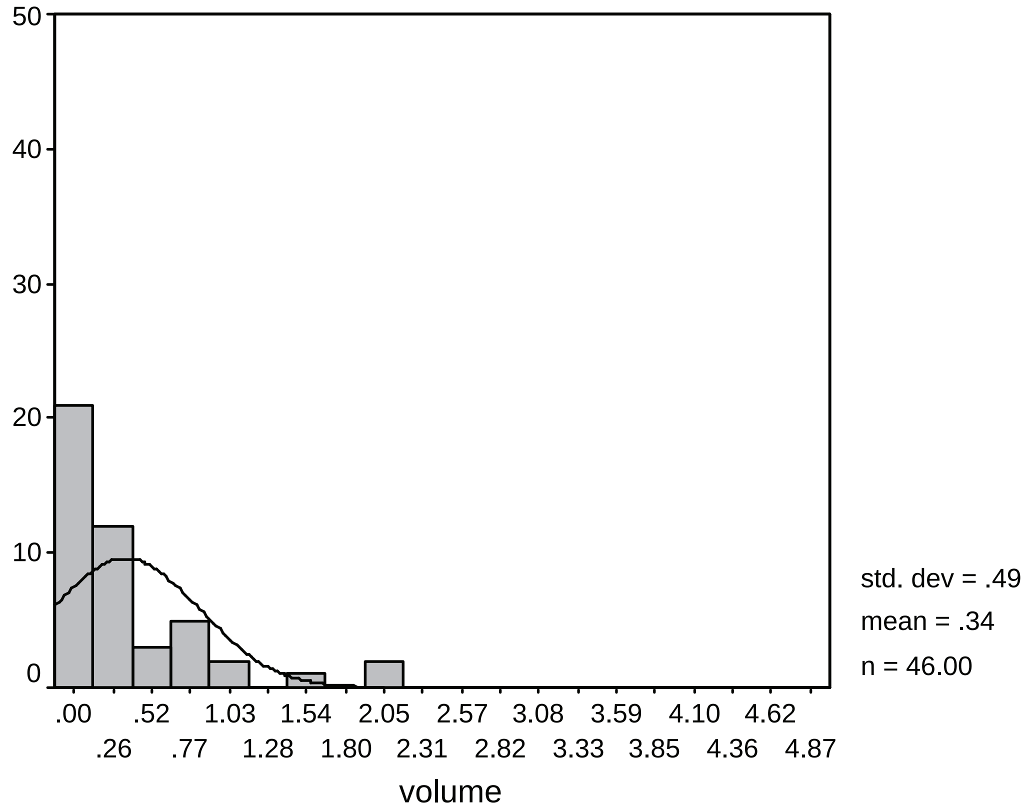

Figure 25.51. LA 109129 extramural unburned Early Developmental pits, count by volume (in cubic meters).

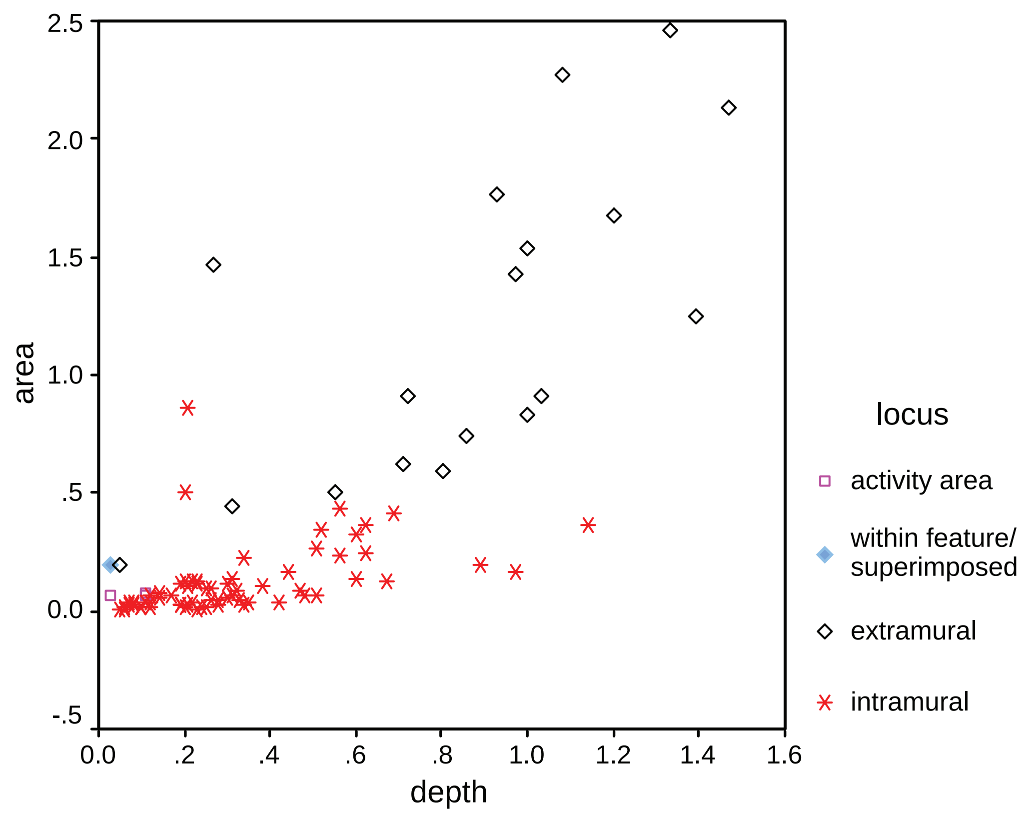

Figure 25.52. LA 57024/26 unburned Early Developmental pits by locus, area(in square meters), and depth (in meters).

tions were unique at LA 57024/57026 (Fig. 25.52).All other sites had a ubiquitous population of small pits that were both intramural and extramural, and a broader distribution of larger extramural pits. At LA 57024/57026, all but one extramural feature was larger than 0.50 m in area. All were deeper than 0.20 m, and the majority were deeper than 0.60 m. Although intramural and extramural pits were in the same size range, area by volume comparison indicated that the extramural pits assemblage at LA 57024/57026 consistently had larger volumes than those observed at all other sites. This may be because small extramural features were not excavated.

Large volumetric values on scatterplots (Fig. 25.52) represent bell-shaped storage cists. Unlike pits at LA 6171, bell-shaped pits at LA 57024/57026 were used for waste disposal, potentially an indication of a more stable and longer term occupation than that observed at LA 6171. A lack of smaller extramural features could indicate an emphasis on indoor activities, and on exterior storage, specifically storage accessible by an interhousehold group. This pronounced difference could also be an indication of sampling error.

Histograms support the observations made from scatterplots. Extramural pits represent the widest volume distribution with the largest median volume of any feature assemblage (Fig. 25.54) due to the lack of small extramural features. Intramural feature volume distributions (Fig. 25.53), similar to those of extramural features at LA 109129, and intramural features at LA 6170, exhibit both a wide volumetric range and higher median volume than intramural features at any other site.

Unburned Features Summary

A comparison of all unburned pit features from all sites indicates that depths and areas are constant for the group. Feature depths are distributed in two clusters with a break at 0.60 m observed at LA 265. Overall, feature area and depth are not dependent variables. Features with the largest surface areas were

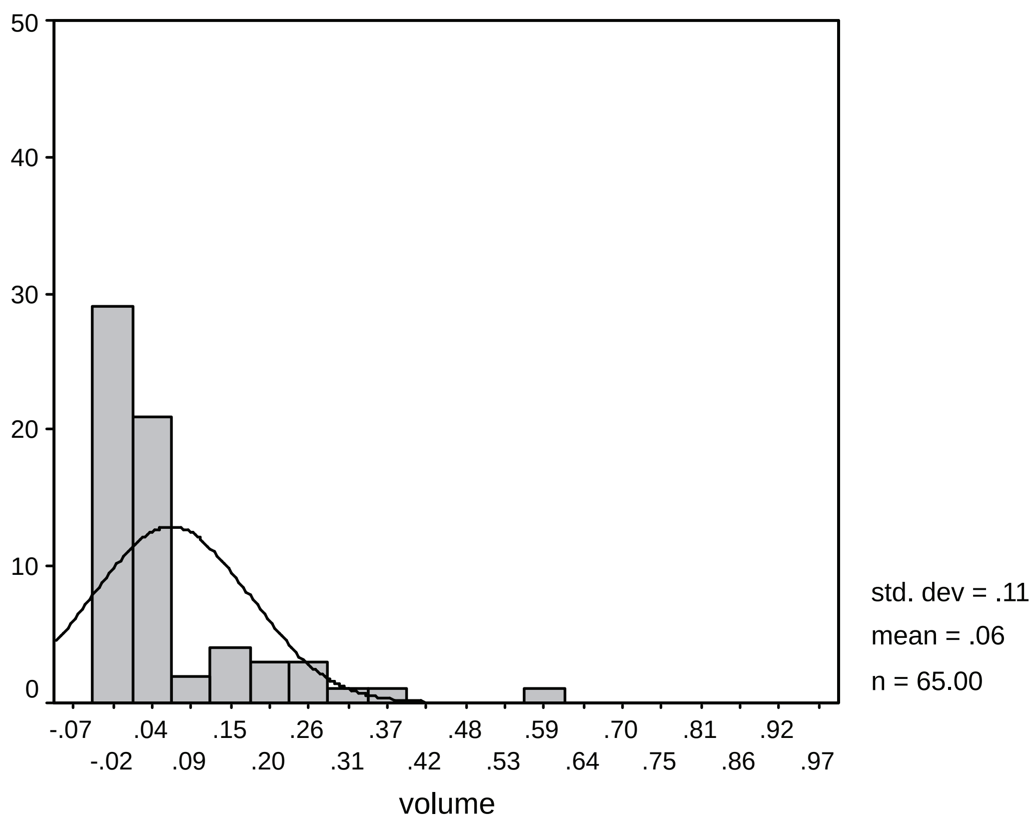

Figure 25.53. LA 57024/26 intramural Early Developmental unburned pits, count by volume (in cubic meters).

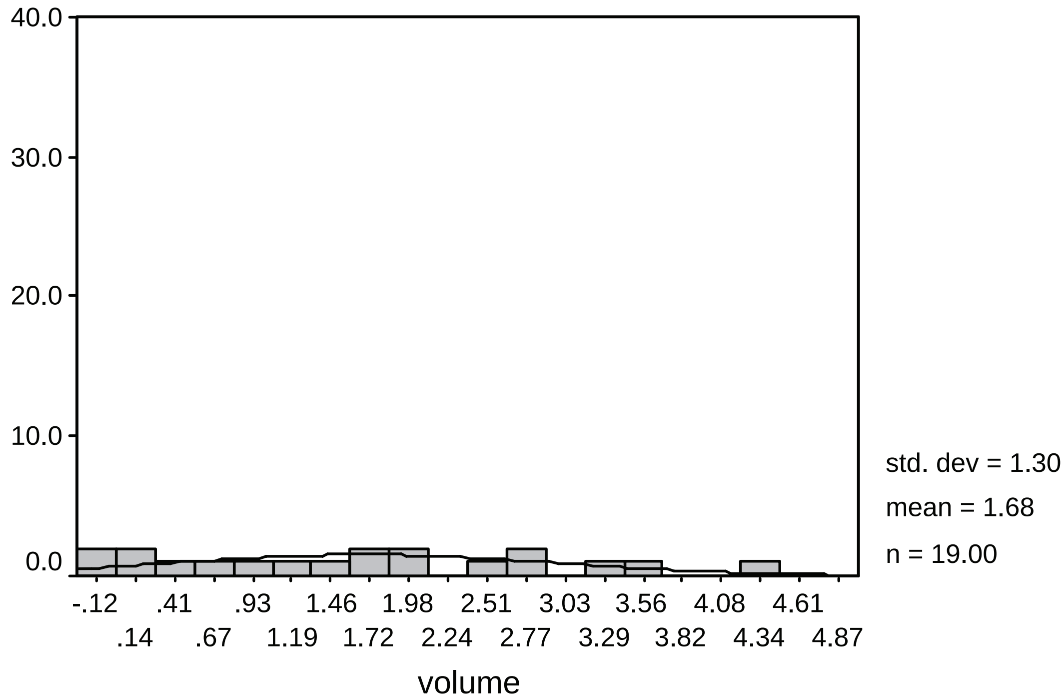

Figure 25.54. LA 57024/26 extramural Early Developmental unburned pits, count by volume (in cubic meters).

located at LA 109129, LA 617, and LA 6169. Features were consistently deepest at LA 57024/57026.

Histograms show that all sites had small, low volume features with varying proportions of larger volume features supplementing this basic assemblage. Volumetric distributions formed a continuum. LA 6171 was the most striking example with almost no features of large volume.

LA 265, LA 109129, and LA 57024/57026 all had numerous extramural pits with large volumes. Histograms of grouped intramural and extramural features from all three sites show a battleship-shaped feature distribution with large numbers of small volume features and decreasing numbers of features with larger and larger volumes. A comparison of intramural to extramural features indicates that this pattern is not derived from a distribution as simple as one of small volume features located in structures and features with large volumes of extramural pits.

Among extramural features, LA 265 had the most volumetrically varied assemblage: large numbers of small extramural pits and a few very large features. LA 109129 had fewer small extramural features and larger numbers of extramural medium-volume pits forming a greater continuum of pit volumes and a distribution with fewer small volume features. Average volumes for extramural features at both sites were similar, despite varying distributions. Independent t-tests confirm a lack of significant difference of mean volumes at the 0.05 level of significance between the extramural feature assemblage at LA 265 and LA 109129.

LA 57024/57026 represented the other end of the volumetric spectrum with an emphasis on pits with very large volumes. Independent t-tests confirm a significant difference between mean feature volumes at LA 265 and LA 57024/57026 at the 0.05 level significance with 21 degrees of freedom. Equal variances were not assumed. The same test between LA 57024/57026 and LA 109129 also confirms a significant difference between mean volumes with 20 degrees of freedom. This distribution probably reflects sampling error; small pits may not have been excavated at LA 57024/57026, leading to this very different distribution.

Intramural feature assemblages also formed a continuum. LA 109129 had larger numbers of small pits with fewer medium-sized features than LA 265. LA 265 had the smallest volume distribution and fewer small pits. LA 57024/57026 had more large and medium pits than LA 109129 and fewer small volume features. When compared by using a two-tailed t-test there was no significant difference at the 0.05 level of significance between intramural feature assemblages at LA 109129 and LA 265 or at LA 109129 and LA 57024/57026.

LA 6169 and LA 6170 exhibited a different pattern than other sites under consideration. Small intramural pits had larger volumes than at other sites and both sites had larger intramural features. Both sites had few large extramural features indicating a reliance on intramural activities and storage not observed at other sites. A two-tailed t-test for equality of means indicated that there was no significant difference between mean intramural feature volumes at LA 265 or at LA 6169 or LA 6170.

Bell-Shaped Pits

Although there may be some differences in criteria for designating storage features between projects, bell-shaped pits were consistently recorded. Because they are frequently associated with storage (Buskirk 1986; Wilson 1987; Guernsey and Kidder 1921), they provided a basis for comparing relative storage capacity on a regional level. Calculations of gross extramural storage capacity, however, are fraught with problems introduced by sampling error and may not accurately reflect the overall extramural storage capacity at any of the sites considered.

Volumetric measurements for 13 storage pits in Structures 3 and 4 were not provided in the LA 109129 report. At LA 57024/57026, 11 basal measurements were not included. Substitute base values for these features were derived by calculating the average ratio of top to base for pits with complete measurements at each site. At both LA 57024/57026 and LA 109129, the ratio derived from average top to base dimensions (base/average top) was 0.71. Volumes were derived by substituting the calculated base value (average top/ratio) into the frustum (see *Analytical Methods,* above) equation used to calculate bell-shaped pit volume.

Scatterplots of bell-shaped pits show a positive correlation between aperture area and volume (see Figs. 25.55, 25.56, 25.57). Distributions are similar to those observed at all sites, pits with small areas and volumes tend to be intramural while extramural pits were visibly larger. The break in depth at 0.70 m observed when evaluating storage pits by area and depth at NM 22 (see Storage Pits, this chapter) is evident in comparative data, but a relationship of depth to aperture area is not.

Pit structures at all sites contained storage features that were bell-shaped. Mean volumes for bell-shaped intramural pits were highest at LA 57024/57026 (0.1789 cu m). Followed by LA 109129 (0.1208 cu m), LA 265 (0.0464 cu m), and LA 6170 (0.0244 cu m). Bell-shaped pits do not provide an accurate evaluation of intramural storage because of the ubiquity of deep, steep-walled features not considered in this data set.

Storage/roasting pits at LA 6171, storage pits with postholes at LA 109129, and bell-shaped storage cists at LA 57024/57026 were evaluated as a group to compare large extramural storage capacity between sites (Fig. 25.55). Similar oxidized bell-shaped storage pits were excavated at LA 57024/57026 from an Early Developmental context. Contemporary large, roofed, extramural storage features, some with intramural thermal features, were also excavated at LA 109129. Some of these larger pits were similar to keyhole shaped pits excavated at LA 57024/57026 (Walth 1999). Features at both sites were associated with pit structures and their volume range was similar. As a group, bell-shaped pits with postholes at LA 109129 (n = 7) had larger surface areas and volumes than most storage/roasting pits at LA 6171 (n = 4). Scatterplots indicate that they were in the center of the overall volumetric distribution for bell-shaped pits at all sites. Other bell-shaped pits (n = 9), though more numerous, were

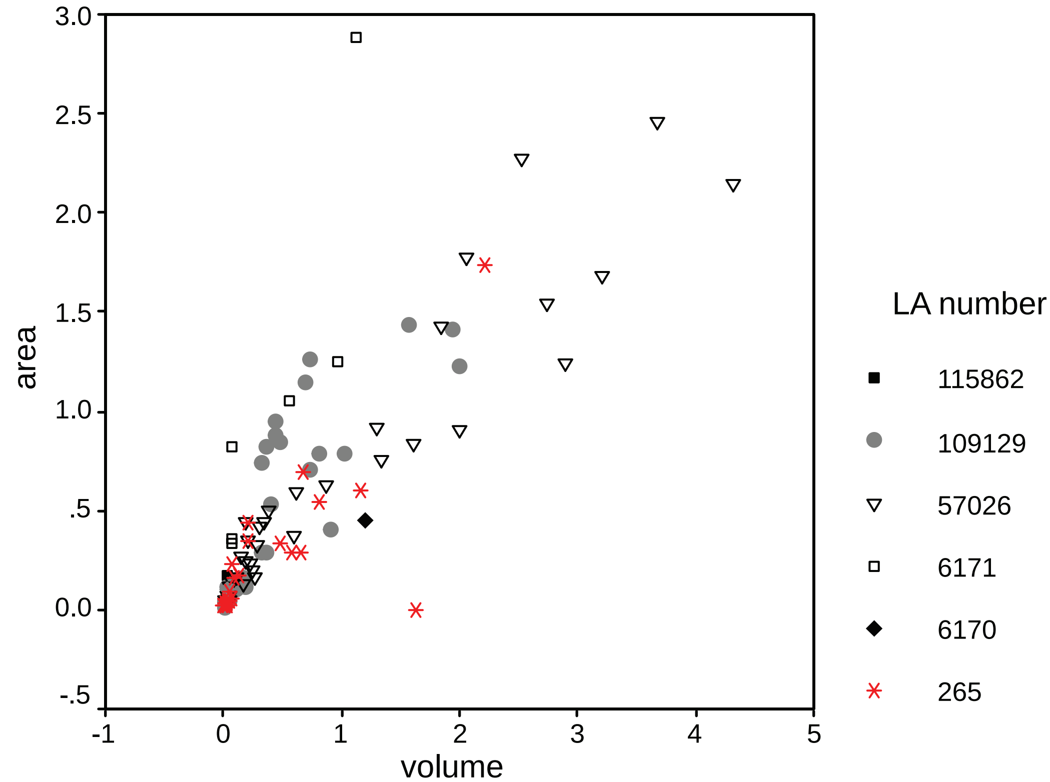

Figure 25.55. Early and Earliest Developmental bell-shaped pits, all sites by area (in square meters) and volume (in cubic meters).

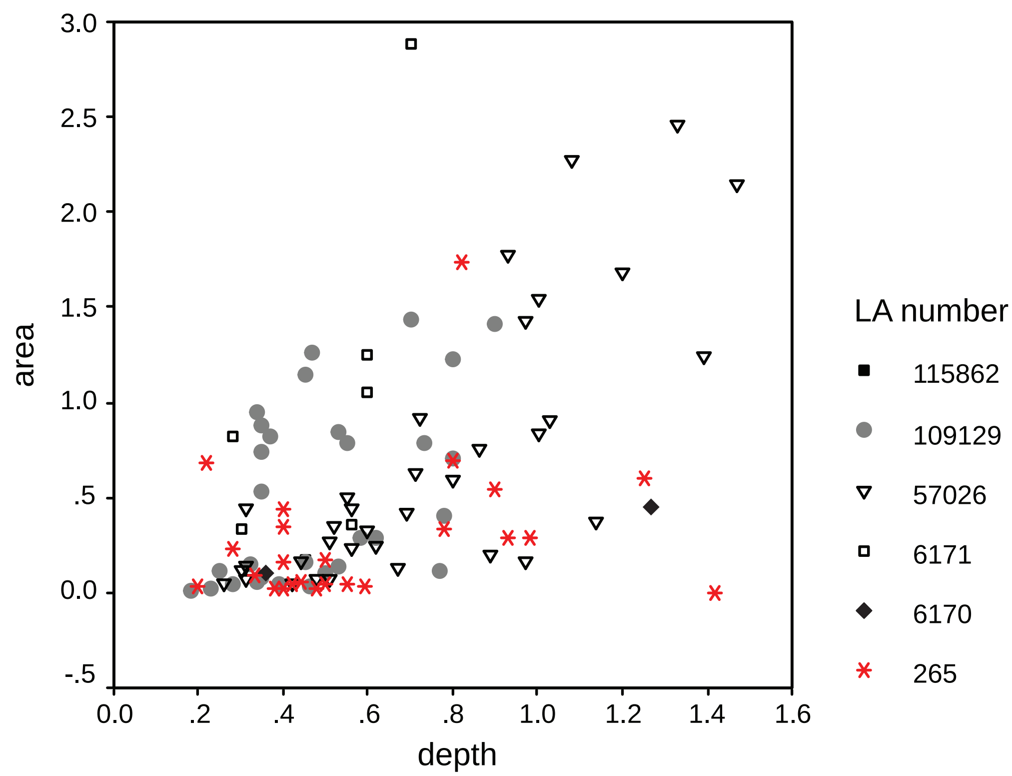

Figure 25.56. Early and Earliest Developmental bell-shaped pits, all sites by area (in square meters) and depth (in cubic meters) .

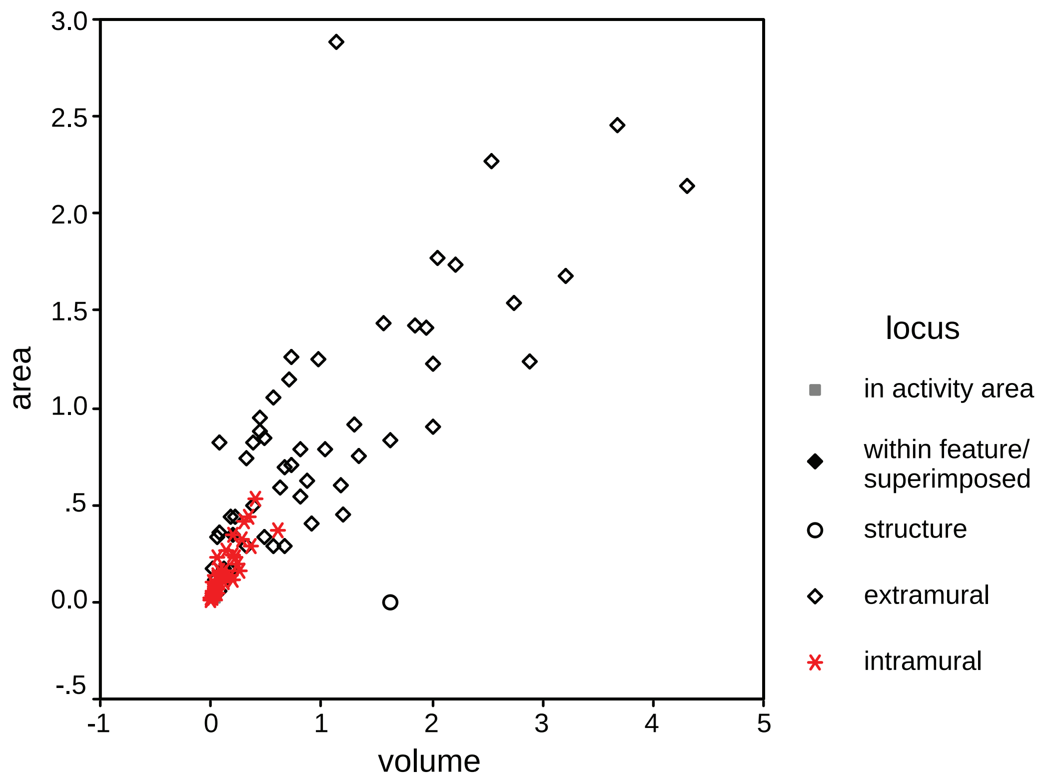

Figure 25.57. Early and Earliest Developmental bell-shaped pits, all sites by locus, area (in square meters), and volume (in cubic meters).

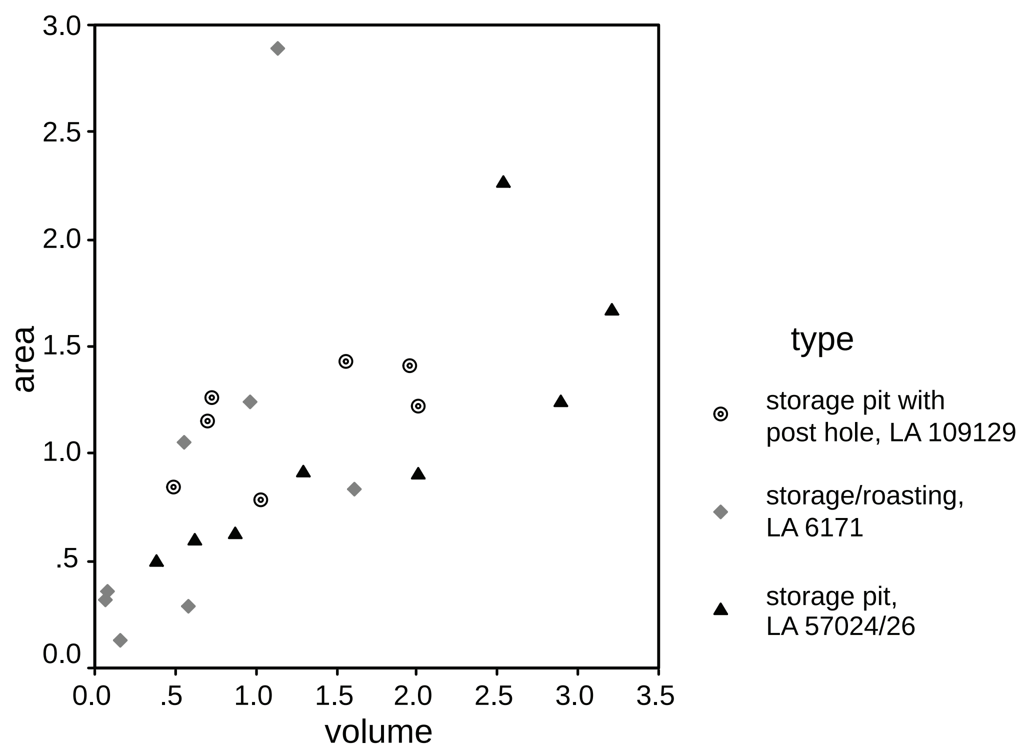

Figure 25.58. LA 6171, LA 57024, and LA 109129 large bell-shaped pits by type, area (in square meters), and volume (in cubic meters).

smaller than at other sites.

At LA 57024/57026, storage cists had a wider volumetric distribution than temporally earlier storage/roasting pits at LA 6171 or storage pits with postholes at LA 109129. Five pits with volumes larger than 2 cu m contributed to the largest capacity of any of the sites, with a median volume of 2.128 cu m. Pits at LA57024/57026 (n = 4) and at LA 265 (n = 3) were the only features that exhibited evidence of intensive trash deposits indicating that these features were utilized as trash receptacles after their first use for storage. LA 57024/57026 had the only pits that contained fecal mater. Ethnographic information indicates that less mobile populations exhibit less controlled patterns of waste disposal, creating diffuse trash scatters, while more sedentary, agriculturally dependent groups, have more controlled and maintained deposits (Schmader 1994). Refuse deposits at LA 57024/57026 may reflect a more controlled disposal strategy and may imply a higher degree of sedentism than observed at sites without trash-filled pits.

Table 25.6 summarizes bell-shaped pits containing human or dog burials. Human and dog burials were found at LA 109129, LA 57024/57026, and LA 265. Median volumes of bell-shaped pits that were ultimately used for interments reflect the overall volumes observed above.

The lack of a statistically significant difference between volume distributions among feature assemblages could be because given similar technology, social organization, and band size, increase or decrease in storage capacity is a product of storage feature number, not storage feature size. Another possibility is that a continuum of sedentism was practiced at each site and that small incremental change is not statistically evident.

Thermal Features

Scatterplots of burned features show a pattern similar to that of unburned features. Figures 25.59 through 25.62 indicate that the placement of intramural features was more limited, and volume distribution was more restricted than unburned features, clustering in nodes with areas of less than 0.40 sq m and volumes of less than 0.5 cu m.

All sites had large extramural thermal pits (see Table 25.7). This may reflect construction of planned facilities necessary for domestic use. LA 109129 and LA 57024/57026 had proportionally fewer large extramural thermal facilities than most sites along NM 22. Thermal features at LA 109129 and at LA 57024/57026 made up 2 percent or less of the site's total feature assemblage. Burned extramural features comprised 6 to 23 percent of the total feature assemblage at all sites except for LA 6169 (extramural thermal facilities were 3.0 percent of the assemblage). As a mixed component site, this made feature dating difficult.

Thermal feature location at LA 6169, LA 57026, and LA115862 suggests an emphasis on intramural use, potentially reflecting less diverse or intensive extramural processing. All three of the sites had low ratios of extramural thermal features to total features and had a

Table 25.6. Bell-Shaped Pits with Human and Dog Burials, Feature Count by Site

	Fill Type	LA 265	LA 57026	LA109129
Human Burial	Trash filled	-	2	-
	Intentional (clean)	-	1	-
	Intentional (dirty)	2	-	-
	Indeterminate	-	-	2
Dog Burial	Natural fill	-	1	-
	Trash filled	2	-	-
	Indeterminate	-	-	1
Total feature number		4	4	3
Mean volume (cu m)		0.8055	2.1515	0.4887

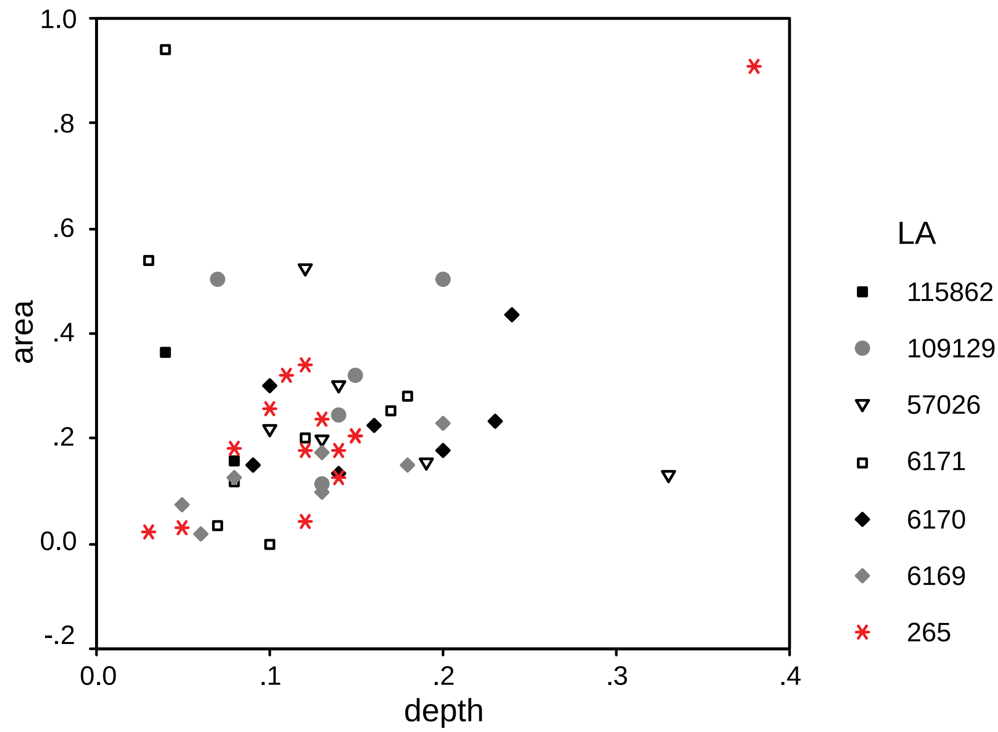

Figure 25.59. Early Developmental intramural thermal features, all sites by area (in square meters) and depth (in cubic meters).

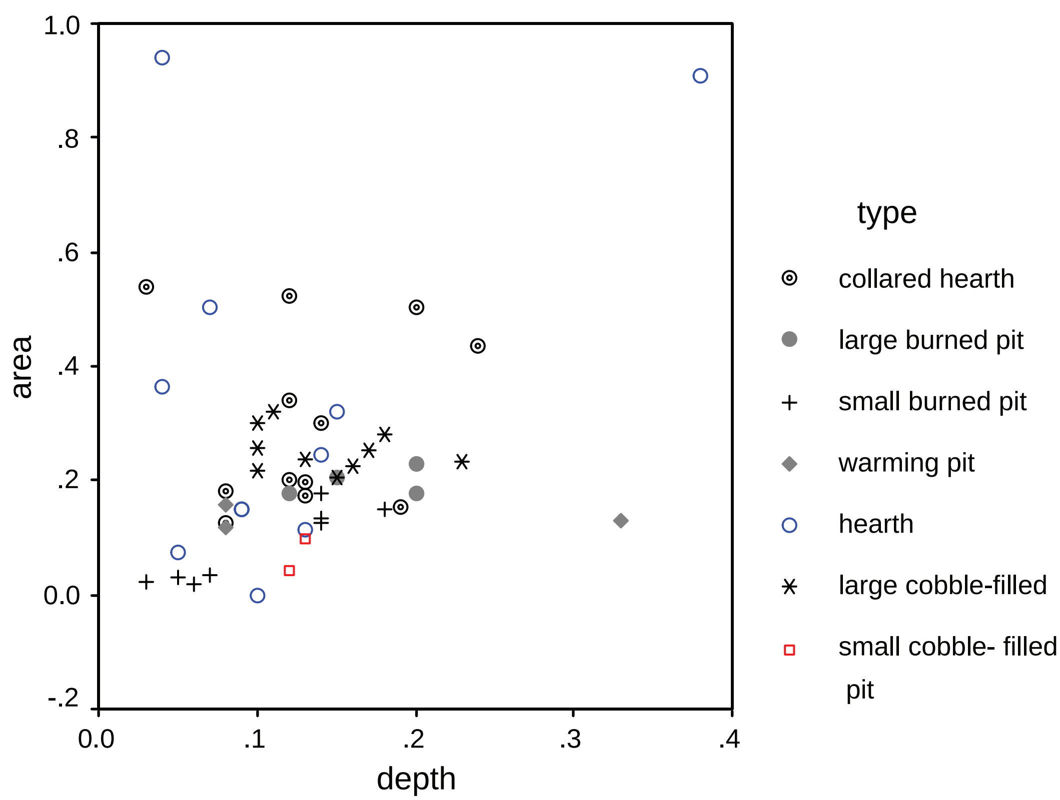

Figure 25.60. Early Developmental intramural thermal features, all sites by type, area (in square meters), and depth (in cubic meters).

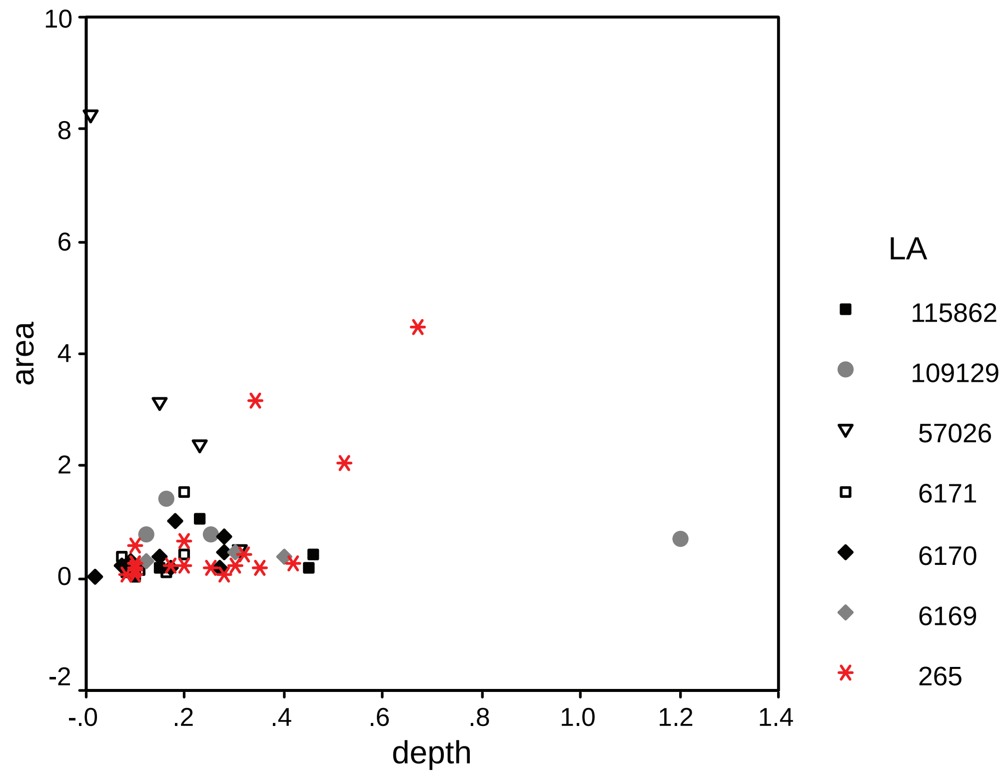

Figure 25.61. Early Developmental extramural thermal features, all sites by area (in square meters) and depth (in cubic meters).

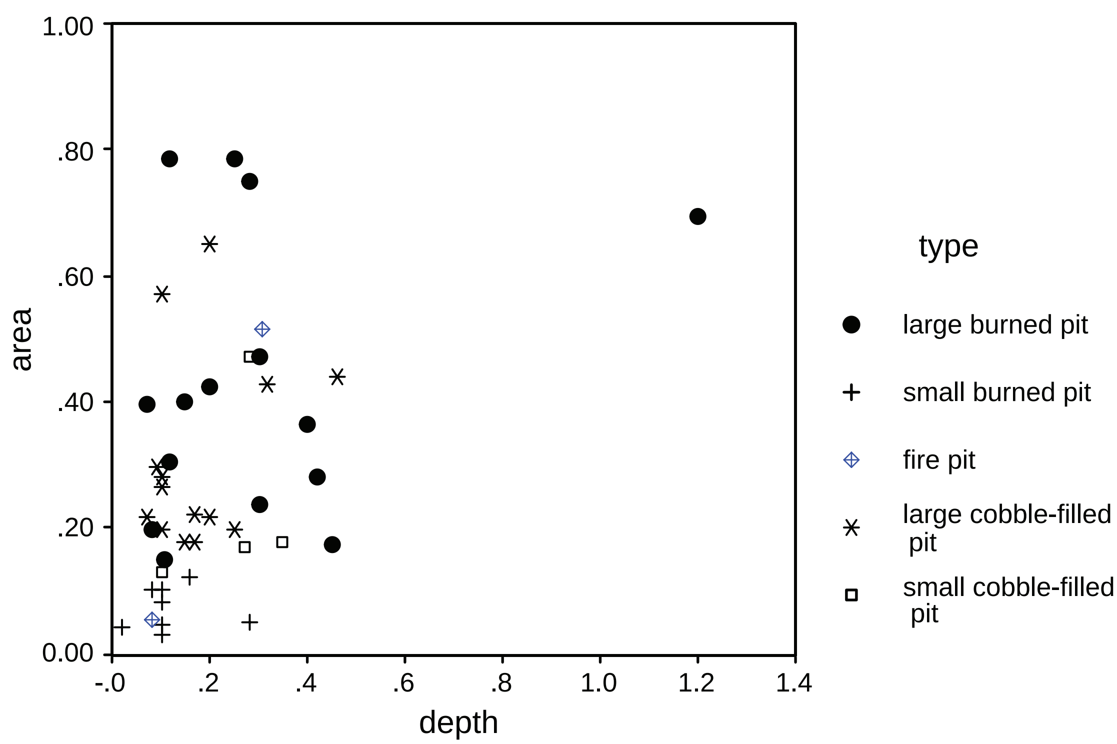

Figure 25.62. Early Developmental extramural thermal features, all sites by type, area (in square meters), and depth (in cubic meters).

Table 25.7. Early Developmental Thermal Features by Site

Site	LA 265	LA 6169	LA 6170	LA 6171	LA 57026	LA 109129	LA 115862
Intramural features							
Total	115	52	87	45	156	162	14
Thermal features:	n = 14	n = 7	n = 8	n = 8	n = 6	n = 5	n = 2
Percentage of all features	4.0%	6.6%	5.6%	8.9%	4.7%	2.1%	9.0%
Large cobble filled pits and large burned pits	5	1	4	2	1	–	–
Extramural features							
Total (includes superimposed features and those in activity areas)	122	19	54	28	42	62	8
Thermal features:	n = 19	n = 3	n = 9	n = 9	n = 4	n = 4	n = 5
Percentage of all features	8.0%	3.0%	6.3%	11.4%	2.0%	1.6%	22.7%
Large cobble filled pits and large burned pits	14	3	2	4	3	1	5
Thermal features total	249	71	141	73	198	224	22

greater number of intramural features. At these sites, intramural thermal features made up about twice the overall ratio (but not twice the number) of intramural features to the overall feature count as their extramural counterparts. At LA 6170, a site identified along with LA 6169 for its larger intramural storage facilities, the ratio to the entire feature assemblage was about equal.

With the exception of two hearths that were almost 1 m in diameter, most intramural features were 0.60 sq m or less in area. Features ranging in area from 0.4 to 0.6 sq m tended to be collared hearths. At NM 22 collared hearths were only located in structures with areas larger than 10 sq m. This was not true of LA 57026 and LA 109129. Collared hearths were built in one smaller structure at each site (LA 57026, Structure 7; and LA 109129, Structure 5).

Large extramural features, larger than 2 sq m, were found at only two sites, LA 265 and LA 57026 (see Figs. 25.61, 25.62). One pit at LA 57026 was shallow but had an area of 8.25 sq m. Other large processing pits ranged from 2 to 4 sq m in area. Very large shallow thermal features may represent roasting pits that were expanded through repeated use (Binford 1983). Deeper pits may have been constructed for a specific use. Large thermal features were presumably used for preparation of large quantities of food. Numerous big processing pits at one locale could be an indication of interhousehold cooperation and might indicate a more formalized strategy of food distribution within the group. A more even distribution may indicate processing for a household. Many small thermal features may indicate a wider variety of processing activities and could also provide evidence of seasonality. Warm season camps may have more small-scale exterior processing features, indicating varied outside activities. At LA 57024/57026, large thermal features are present instead of smaller processing features. This is the same pattern observed for unburned facilities. The possibility of sampling error has been discussed above and may also apply to thermal features. At LA 265, large thermal features were complemented by a plethora of smaller thermal pits of various sizes. This pattern may indicate a more varied strategy that may reflect a larger warm season population at LA 265.

Section III. Analysis of Structures from NM 22 and the Northern Rio Grande

Structures excavated at Peña Blanca provide examples of some of the earliest architecture in the Santo Domingo Basin (Post, Chapter 26). Architecture has been the subject of predictive models concerning seasonality, sedentism, food procurement strategies, social organization, and population density (Gilman 1987; Schmader 1994;Wilshusen 1988a, 1988b). This section will present descriptive structure data for Early Developmental, Developmental, Coalition, and Historic periods on the NM 22 project and regionally. A comparison of structures and associated feature morphology within each time period will be made when numbers allow, and regional comparisons will be made when possible. Syntheses of these data will lead to more detailed inferences about cultural history and change, settlement and subsistence, and social organization.

A total of 25 structures at five sites were excavated during data recovery at Peña Blanca, 23 of which were completely excavated and intact. The majority were subterranean pit structures or pit rooms. Of these, 60 percent (n = 15) were Early Developmental, followed by Coalition (20 percent, n = 5), Late Developmental (8 percent, n = 2), and Late Developmental/Coalition (n = 1) components. Two surface rooms were also excavated, one historic structure and one Coalition surface structure remnant.

Table 25.8. NM 22, All Structures, Time Period by Date, Site and Feature

Time Period	Date Range	LA No.	Structure No.
Early Developmental	A.D. 650-750	265	13
	A.D. 700-800	6170	5
			50
	A.D. 750-850	265	1
			4
			27
			33
		6169	4
			47
		6171	9
			60
		115862	1
	A.D. 800-900	6170	2
	A.D. 850-950	6171	26
	A.D. 900-1000	6171	18
Late Developmental	A.D. 1050-1150	6170	5
	A.D. 1150-1250	6169	76
Coalition	A.D. 1200-1300	6169	15
			16
			70
		6169	10
		6171	1
Late Developmental/ Early Coalition	A.D. 1150-1250	249	6
Historic	Historic	6170	1
Unknown	--	6169	12

Table 25.9. Northern Rio Grande Database, Time Period by Date Range, Site, and Structure Number

Time Period	Date Range	Site No.	Area-Study Unit/Structure No.
Early Developmental	AD 600-700	LA 3128	1
			2
			3
			4
		LA 57019	4
	AD 650-750	LA 3122	9
	AD 700-800	LA 57022	1
	AD 750-850	LA 3122	6
		LA 3290	1
			3
		LA 5891	1
		LA 9070	1
			2
		LA 57020	2
			3
			4
	AD 800-900	LA 2942	1
		LA 57019	1
		LA 57020	1
	AD 850-950	LA 3122	2
			3
			5
		LA 3289	2
		LA 3290	5
		LA 3291	1
		LA 5685	1
			2
			3
		LA 5891	2
		LA 25852	1
		LA 25860	1
			2
			3
Late Developmental	AD 900-1000	LA 2939	1
		LA 3637	1
			2
		LA 3638	1
			2
	AD 950-1050	LA 835	99
		LA 3122	4
			7
			8
			10
		LA 3616	1
			2
	AD 1000-1100	LA 388	1
			2
		LA 746	1
		LA 835	2
			3
			6
			11
			1
			2
			1
			1
			2
			2

Table 25.9. Continued.

Time Period	Date Range	Site No.	Area-Study Unit/Structure No.
Late Developmental	AD 1000-1100	LA 6462	1
			1
		LA 6579	3
	AD 1050-1150	LA 260	2
		LA 742	4
		LA 835	3
		LA 6461	1
			2
		LA 6462	2
			1
	AD 1100-1200	TA 10**	1
		TA 18**	1
			2
			3
			4
		TA 20**	1
			2
		TA 26**	1
		TA 47**	1
			2
		BL 83*	1
		BL 103*	1
		TA 112**	1
		LA 260	1
		BL 268*	1
		LA 742	2
			3
		LA 2742	1
		LA 3294	1
			2
			5
		LA 3570	1
		LA 6462	1
			3
			1
			1
		LA 6579	2
		LA 9200	1
		LA 9201	1
			5
		LA 9203	1
		LA 9204	1
		LA 9206	1
		LA 9207	1
		LA 51889	1
		LA 51893	1
		LA 53678	1
		LA 53683	1
		LA 65678	1

Table 25.9. Continued.

Time Period	Date Range	Site No.	Area-Study Unit/Structure No.
Late Developmental	AD 1100-1200	LA 70577	1
		LA 100419	2
		LA 102304	1
	AD 1150-1250	LA 9201	2
			4
		LA 51856	1
		LA 51879	1
		LA 51880	1
		LA 51883	1
		LA 100419	1
	AD 1200-1300	LA 51883	27

* Blumenshein

** Taos Archaeological Society?

The following structure analysis is dependent upon two data sets. NM 22 structure database was compiled from feature summaries, tables, thumbnail sketches, and maps provided in site reports included in this volume. The comparative data set for Northern Rio Grande pit structures was compiled by Steven Lakatos (Lakatos 2006). Site numbers and time periods for each data set are summarized in Tables 25.8 and 25.9 and a list of sources from which the Northern Rio Grande database was compiled is provided in Table 25.10. Information concerning locational data, temporal information, construction materials, size, shape, orientation and ventilator complex, roof supports, storage, remodeling or maintenance, and deconsecration and abandonment processes were recorded using a total of 56 variables. Coding conventions are discussed in Appendix 7.

Early Developmental

A summary of Early Developmental structures and related intramural features excavated at Peña Blanca is presented below. The summary is followed by a comparison of structure morphology derived from the Northern Rio Grande structure database. This information should provide a base line to address research questions about cultural change, seasonality, mobility, and social hierarchy. Morphological and structural data reflect conceptual planning prior to construction and knowledge of con-

Table 25.10. Northern Rio Grande Database

Region	State	Site number type	Site number	Structure number	Reference
Rio Grande	New Mexico	Blumenshein	83	1	Blumenshein 1956, 1958
			103	1	
Rio Grande	New Mexico	Blumenshein	268	1	Blumenshein 1963
Rio Grande	New Mexico	Laboratory of Anthropology	260	2.01	Wetherington 1968
				2.02	
Rio Grande	New Mexico	Laboratory of Anthropology	265	1	This volume
				4	
				13	
Rio Grande	New Mexico	Laboratory of Anthropology	388	1	Lakatos 2001
				2	
Rio Grande	New Mexico	Laboratory of Anthropology	742	2	Allen 1972
				4	
Rio Grande	New Mexico	Laboratory of Anthropology	746	1	Ahlstrom 1985, ARMS site files
Rio Grande	New Mexico	Laboratory of Anthropology	835 (Area.STR #)	1.02	Stubbs 1954; Wiseman 1996;
				1.03	Boyer and Lakatos 1997
				1.06	ARMS site files
				1.11	
				2.01	
				2.02	
				3.01	
				5.01	
				5.02	
				5.03	
				6.01	
Rio Grande	New Mexico	Laboratory of Anthropology	2742	1	Boyer 1994
Rio Grande	New Mexico	Laboratory of Anthropology	2939	1	Wendorf 1954
Rio Grande	New Mexico	Laboratory of Anthropology	2942	1	Peckham 1954
Rio Grande	New Mexico	Laboratory of Anthropology	3119	1	Lakatos n.d. manuscript on file Office of Archaeological Studies
Rio Grande	New Mexico	Laboratory of Anthropology	3122	2	Skinner 1965
				3	
				4	
				5	
				6	
				7	
				8	
				9	
				10	
Rio Grande	New Mexico	Laboratory of Anthropology	3128	1	Frisbie 1967; Schmader 1991, 1994
				2	
				3	
				4	
Rio Grande	New Mexico	Laboratory of Anthropology	3289	2	Peckham 1957
			3290	1	
				3	
				5	
			3291	1	
Rio Grande	New Mexico	Laboratory of Anthropology	3294	1	McNutt 1969
				2	
				5	

Table 25.10. Continued.

Region	State	Site number type	Site number	Structure number	Reference
Rio Grande	New Mexico	Laboratory of Anthropology	3570	1	Boyer 1994
Rio Grande	New Mexico	Laboratory of Anthropology	3616 (49993)	1	Vivian and Clendenen 1965
				2	
Rio Grande	New Mexico	Laboratory of Anthropology	3637	1	Peckham 1958
				2	
			3638	1	
				2	
Rio Grande	New Mexico	Laboratory of Anthropology	5685	1	Condie1987; 1996
				2	
				3	
Rio Grande	New Mexico	Laboratory of Anthropology	5891	1	Vytlacil and Brody 1958
				2	
Rio Grande	New Mexico	Laboratory of Anthropology	6169	4	This volume
				47	
				70	
				76	
Rio Grande	New Mexico	Laboratory of Anthropology	6170	5	This volume
				50	
Rio Grande	New Mexico	Laboratory of Anthropology	6171	9	This volume
				26	
				60	
Rio Grande	New Mexico	Laboratory of Anthropology	6461	1	Bussey 1968
				2	
Rio Grande	New Mexico	Laboratory of Anthropology	6462 (Unit.STR#)	2.03	Bussey 1968
				3.01	
				4.01	
				5.01	
				5.02	
				6.01	
				7.01	
Rio Grande	New Mexico	Laboratory of Anthropology	6579	2	Boyer and Lakatos 1997
				3	
Rio Grande	New Mexico	Laboratory of Anthropology	9070	1	Allen and McNut 1955
				2	
Rio Grande	New Mexico	Laboratory of Anthropology	9200	1	Wolfman and Dick 1965
Rio Grande	New Mexico	Laboratory of Anthropology	9201	1	Loose 1974
				4	
				5	
			9203	1	
			9204	1	
			9206	1	
			9207	1	
Rio Grande	New Mexico	Laboratory of Anthropology	25852	1	Hammack, et al. 1983
			25860	1	
				2	
				3	

Table 25.10. Continued.

Region	State	Site number type	Site number	Structure number	Reference
Rio Grande	New Mexico	Laboratory of Anthropology	51856	1	Skinner et al. 1980
			51879	1	
			51880	1	
			51883	1	
			51889	1	
			51893	1	
Rio Grande	New Mexico	Laboratory of Anthropology	53678	1	Bullock 1999
Rio Grande	New Mexico	Laboratory of Anthropology	53683	1	Blueberry Hill Rd. Manuscript on
Rio Grande	New Mexico	Laboratory of Anthropology	57019	1	Schmader 1991, 1994
				4	
			57020	1	
				2	
				3	
				4	
			57022	1	
			57025	2	
				4	
			57026	5	
				6	
Rio Grande	New Mexico	Laboratory of Anthropology	70577	1	Boyer 1994
Rio Grande	New Mexico	Laboratory of Anthropology	100419	2	Acklen 1995
Rio Grande	New Mexico	Laboratory of Anthropology	102304	1	Manuscript on file Office of Archaeological Studies
Rio Grande	New Mexico	Laboratory of Anthropology	115862	1	This volume
Rio Grande	New Mexico	TA	10	1	Green 1976
			18	1	
				2	
				3	
				4	
			20	1	
				2	
			112	1	
Rio Grande	New Mexico	TA	26	1	Vickery 1969
Rio Grande	New Mexico	TA	47	2	Green 1976
San Juan	Utah	Brew(Site-Kiva #)	1	1	Brew 1946
			11	1	
			13	1	
				1.01	
			7	1	
			9	1	
San Juan	New Mexico	Laboratory of Anthropology	4169	5	Eddy 1966

Table 25.10. Continued.

Region	State	Site number type	Site number	Structure number	Reference
San Juan	New Mexico	Laboratory of Anthropology	61954	2	Damp 1999
				4	
			61955	1	
				2	
				3	
				4	
				5	
			61956	1	
				2	
				3	
				5	
			61958	1	
				3	
			61959	1	
				2	
				3	
				4	
				6	
San Juan	New Mexico	Laboratory of Anthropology	80407	1	Loieb 1998
			80410	1	
				2	
San Juan	Colorado	Mesa Verde	499	1	Lister 1964
				2	
San Juan	Colorado	Mesa Verde	866	1	Lister 1966
				2	
				99.00 protokiva	
San Juan	Colorado	Mesa Verde	875	1	Lister 1965
				2	
San Juan	Arizona	Northern Arizona University	AZ-I-25-47	1	P. Reed et al. 1999
			AZ-I-26-3	2	
				4	
				5	
				600	
				7	
				9	
				10	
San Juan	New Mexico	Northern Arizona University	NM-H-47-102	1	P. Reed 1994
San Juan	New Mexico	Smithsonian	299	1	McKenna 1984; McKenna and Truell 1986
				2	
				4	
			627	3	
				5	
			628	1	
				3	
				4	
			629	3	
			721	1	
			724	1	
			750	1	
			1360	1	
				2	
San Juan	Colorado	Smithsonian	4475	1	Brisbin et al. 1988
				2	
				4	
				5	
				7	
San Juan	Colorado	Smithsonian	5108	1	Kuckelman 1988
				2	

Adapted from Lakatos 2003.

struction materials and methods (Lakatos 2003:49). This may reflect similarities in cultural knowledge, adaptive behavior, seasonality, and social organization (Post, Chapter 26).

Structures at Peña Blanca

Fifteen Early Developmental pit structures from six sites were excavated at Peña Blanca and are summarized in Table 25.11. One was only partially excavated and is not included in the tabulations. The following discussion refers to Tables 25.12 and 25.13. More than half of the structures (n = 8) were round to subrectangular, two were keyhole-shaped, and two were somewhat D-shaped to subrectangular. One structure was not completely excavated, but may have been subrectangular. It should be noted here that the definition of D-shaped and keyhole-shaped structures in the NM 22 database is one strictly of structure outline. "D-shaped" refers to a structure with one flat side, not a structure with a ventilator aperture located in the arched wall, opposite the flat wall segment and associated with room block construction, as in Kidder (1958). Likewise, keyhole-shaped structures in this data set do not refer to Pueblo III Mesa Verde keyhole-shaped kivas (Cordell 1984:103–104), but to small structures with no formal ventilator and an entryway. Lakatos would have defined these structures as round with a stepped entry (pers. comm.). Other minor differences in definitions are outlined in Appendix 7.

Maximum diameters for all structures ranged from 2.76 to 6.9 m with floor areas of 3.06 to 33.31 sq m. Mean floor area was 19.29 sq m, with a standard deviation of 11.68 sq m. Structure depths ranged from 0.35 to 2.0 m with a mean of 1.01 m and a standard deviation of 0.57 m. All structures were of earth construction without evidence of significant masonry elements. Of the round structures, all but one had a central hearth and ventilator complex as did both of the D-shaped structures (Fig. 25.63).

Structures at NM 22 can be separated into size groups: structures with areas over 10 sq m of floor space and structures with smaller floor areas (see Fig. 25.64). Structures with floor areas of 10 sq m and over with formalized hearth complexes (n = 10) were typically supported by four to six main posts, sometimes augmented by smaller support posts along the walls or within the body of the structure. The exception was one large pit structure (LA 6171, Structure 9) that had no evidence of post and beam construction. Figure 25.63 also illustrates a tendency of structures deeper than 0.5 m to have between seven and ten roof supports. Although numbers of roof supports vary, the number of main support posts ranged from four to six. Smaller structures with floor areas of less than 10 sq m (n = 4) were often shallower. These structures had two or three postholes. Both keyhole-shaped structures had two roof supports, though one structure had postholes that were extramural. Another small, round structure had three posts. Although the structure had a thermal pit, there was no central hearth or evidence of a ventilator. The two remaining small structures had indeterminate numbers of roof supports. One structure at LA 6171 was only partially excavated during data recovery, and the other at LA 6170 was abandoned before its construction was completed and is not illustrated in Figure 25.64.

Mean structure orientation (Fig. 25.65) was calculated using large structures that had measurable hearth/ventilator complexes and therefore orientations. The mean was 141.00 degrees east of true north with a standard deviation of 31.25 degrees. Eight structures had axes ranging from 109 to 145 degrees. Two structures excavated at LA 6170 had axes oriented south/south measuring 191 and 200 degrees east of true north, respectively. Even with these two structures removed from consideration, mean orientation was 127.40 degrees with a standard deviation of 12.6 degrees, demonstrating that Early Developmental structures at Peña Blanca had a mean structure orientation that was more southerly than Early Developmental pit structures throughout the Northern Rio Grande (mean 109 degrees). A thorough comparison of south-facing structures to other Early Developmental structure attributes was conducted. Orientation did not

Table 25.11. NM 22 Structure Summary

Site/Structure	Dimensions	Floor Features (not including post holes)	Comments
LA265/Structure 1	6.90 m x 6.15 m x 1.3 m deep; 33.31sq m floor area	Hearth, ashpit (formal, remodeled), deflector supports, 2 ancillary hearths (one large, capped and one small), 3-4 (one added during remodeling) large floor cists, 13 undifferentiated floor pits, 2 divot clusters, 3 foot drums.	8-roof supports, four main posts with supporting posts along interior structure perimeter. East orientation, ventilator tunnel opening at floor with separate vent shaft. Sub-floor burial; Adult burial in fill; infant in fill above vent tunnel; 2 dog burials in the fill.
LA265/Structure 4	5.46 m x 4.4 m x 1.44 m deep; 25.52 sq m floor area	Both floors– Collared hearth, ashpit, deflector supports.	9 to 13- roof supports, four main posts; East orientation with ventilator tunnel opening at floor, separate vent shaft--one vent shaft was abandoned and redug.
		Floor 1– 6 ancillary hearths (two cobble filled), 4 floor cists, 2 off chamber cists, 7 undifferentiated pits. Floor 2 (remodel): remodeled hearth, 2 ancillary hearths, 2 off chamber cists,1 large floor cist, 10 undifferentiated pits. 38 divots and pot rests were located in the floor, association is indeterminate.	Remodeled structure with two floors and numerous capped features. One burial in upper structure fill.
LA265/Structure 13	4 m x 4.5 m x 1.50 m deep; 13.50 sq m floor area	Collared hearth, ash pit, 2 cobble filled ancillary hearths, wall niche, 4 undifferentiated floor pits, 3 large floor cists (one containing a human burial)	8-post construction posts placed around the structure interior perimeter. East orientation ventilator tunnel opening at floor with ventilator shaft
			Three dog burials in lower fill fill; one human sub-floor burial, abandoned and dismantled, with sealed ventilator shaft with animal and artifact offerings, no evidence of burning.
LA265/Structure 27	2.76 m x 1.82 x 0.46 m deep; 3.94 sq m floor area	9-- No hearth, 3 storage pits, 4 undifferentiated pits	2 post holes along wall/ floor juncture, key-hole shaped structure with a stepped entrance; insubstantial construction.
LA265/Structure 33	2.60 m x 1.50 x 0.48 m deep; 3.06 sq m floor area	3–1 hearth, 2 small pits	Shallow, key-hole shaped structure with a stepped entrance; 2 exterior post holes oriented with stepped entry, insubstantial construction.
LA 115862/Structure 1	6.05 m x 5.50 m x 2.0 m deep, 28.06 sq m floor area	5-- hearth, ashpit, ventilator supports, capped ancillary hearth	6-posts, (one capped) and one small post near wall; East orientation; Excavated into gravel, trench-type ventilator supported with 8 posts. No evidence of burning but the vent shaft was sealed.
LA 6169/Structure 4	4.82 m x 4.55 m x 0.90; 17.22 sq m floor area	14-- collared central hearth (remodeled), ash pit, 2 ancillary hearths , possible ladder rest, wall niche, possible sipapu, 6 undifferentiated pits, 1 divot	4 post; East orientation; ventilator opening at floor, vent shaft unknown no remodeling, except for the hearth; dismantled at abandonment.
			Two dogs near floor, human skull on the floor; child burials in fill and ventilator shaft; orniments, animal offerings and formal tools placed along hearth complex axis.

Table 25.11. Continued.

Site/Structure	Dimensions	Floor Features (not including post holes)	Comments
LA 6169/Structure 47	6.07 x 5.60 m x 1.17 m; 26.68 sq m floor area	17-- central collared hearth, ash pit, 2 ancillary hearths, 2 large off chamber cists, wall niche, 7 undifferentiated pits, 3 divots	8 posts holes- 2 remodeled, 1 small supporting post; East orientation; ventilator opening at floor with separate remodeled shaft. Burned; wall cists are unusual; ash area packed with artifacts. Two human burials in upper fill. Sealed vent shaft.
LA 6170/Structure 2	3.07 m x 2.73 m x .90m ; 6.58 sq m floor area	None	Floor burn; no features of ventilator; possibly unfinished.
LA 6170/Structure 5	5.03 m x 4.14 m x 1.04 m; 16.35 sq m floor area	Hearth, ash pit, deflector posts, sipapu, 2 capped ancillary hearths, 3 wall niche, 4 undifferentiated pits, 8 divots	6 with 4 main posts. Ventilator complex oriented south, above floor ventilator opening with separate ventilator shaft. Dismantled and burned; sealed pits and remodeled ash pit. Four dogs as offerings left in front of vent opening.
LA 6170/Structure 50	7.8 m x 6.9 m x 0.80 m; 42.25 sq m floor area	Both floors– collared central hearth with, ash pit (Floor 2 remodeled), sipapu, grinding bin, wall niche and ladder depressions. Floor 1-- 2 ancillary hearths, 7 floor cists, 5 undifferentiated pits. 12 pits were sealed. Floor 2– 1 ancillary hearth, 9 undifferentiated pits, 7 divots	6-post holes 4 main supports; ventilator complex oriented South; roofed trench ventilator with above floor opening. Depressions worked into central hearth collar. Dismantled and burned. Heavy remodeling at least two floors, interesting dichotomy between pit types for each floor, offerings at vent opening.
LA 6171/Structure 9	5.70 m x 5.65 m x .70 m; 25.28 sq m floor area	6-- Collared central hearth (remodeled) , ash pit, 2 ancillary hearth, 2 undifferentiated pits	Dismantled and burned; remodeled central hearth, no superstructure postholes. Above floor vent opening with continuous shaft.
LA 6171/Structure 26	4.71 diameter (estimated) x 0.52 m; 17.2 sq m floor area (estimated)	6-- rock-filled ancillary hearth, 2 undifferentiated pits, 3 divots	1-post; Pit structure superimposed with Feature 1 pit structure; only half visible in r-o-w. No vent opening excavated. No central hearth excavated
LA 6171/Structure 18	3.74 m diameter x 0.35 m; 10.98 sq m floor area	5-- central hearth (not excavated), 1 ancillary hearth, 3 undifferentiated pits	2 to 3-post– one post remodeled into undifferentiated pit. No ventilator complex found. Superimposed Structure 26.
LA 6171/Structure 60	5.4 m diameter x 4.3;18.23 sq m floor area	17-- central surface hearth, ash pit, ancillary hearth, ladder rests, 2 sipapu, 2 floor vaults, 6 undifferentiated pits, 2 divots	4-post; Dismantled at abandonment; limited floor refuse; few large intramural features. Above floor ventilator opening.
LA 6171/Feature 38	2.60 x 2.50 x 0.39; 5.2 sq m floor area	1 large unburned pit, 2 ash and rock redeposits in undifferentiated pits	1- post hole; Irregular-shaped shallow structure outline; structure was partly filled with fire-cracked rock and charcoal-infused soil; insubstantial construction.

** In order to adapt the feature database to the Northern Rio Grande structure data base feature designations for intramural features were lumped.

Table 25.12. NM 22 Quantitative Structure Attributes

Period		Structure Axis (degrees of True North)	Roof Supports	Sipapu	Floor Vaults	Divots	Undiffer-entiated Small Pits	Ancillary Hearths	Wall Niche	Large Floor Cists	Off-Chamber Cists	Grinding Bins	Floor Area (sq m)	North-South Floor Diameter (m)	East-West Floor Diameter (m)	No. of Floors	Human Burials
Early Developmental	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	n	10	12	6	1	7	12	8	5	3	2	1	14	14	14	14	5
	Mean	141.2	6	1	3	9	5	2	1	2	2	1	19.29	4.99	4.65	2	2
	Percent of N	71	86	43	7	50	86	57	36	21	14	7	100	100	100	100	36
	Standard Dev.	31.25	3	0.41	.	13	3	0	1	1	0	.	11.65	1.42	1.8	1	1
	Minimum	109	2	1	3	1	1	1	1	1	2	1	3.37	2.76	1.5	1	1
	Maximum	200	10	2	3	37	12	2	3	3	2	1	42.25	7	7.8	3	4
	Median	133.5	6	1	-	5	4	2	1	3	-	.	17.72	5.43	4.93	2	1
Late Developmental	N	2	2	-	-	2	2	-	-	-	-	2	2	2	2	2	2
	n	1	1			1	1	-	-			1	2	2	2	2	1
	Mean	133	1	1	-	1	7	-	-	-	-	1	8.74	3.35	2.92	1	3
	Percent of N	50	50	-	-	50	50	-	-	-	-	50	50	50	50	50	50
	Standard Dev.	-	-	-	-	-	-	-	-	-	-	-	5.12	1.63	0.83	0	-
	Minimum	133	1	-	-	1	7	-	-	-	-	1	5.13	2.2	2.33	1	3
	Maximum	133	1	-	-	1	7	-	-		-	1	12.36	4.5	3.5	1	3
	Median	-	-	-	-	-	-	-	-	-	-	-	8.74	3.35	2.92	-	-
Coalition	N	5	5	-	-	5	5	5	-	-	-	-	5	5	5	5	5
	n	3	1	-	-	2	2	1	-	-	-	-	5	5	5	5	1
	Mean	136	7	-	-	2	3	1	-	-	-	-	6.04	2.75	2.29	1	1
	Percent of N	60	20	-	-	40	40	20	-	-	-	-	100	100	100	100	20
	Standard Dev.	52.2	-	-	-	1	2	-	-	-	-	-	1.3	0.28	0.33	0	-1
	Minimum	101	7	-	-	1	1	1	-	-	-	-	5.1	2.5	2	1	1
	Maximum	196	7	-	-	3	4	1	-	-	-	-	8.25	3.1	2.75	2	1
	Median	111	-	-	-	2	3	-	-		-	-	5.61	2.58	2.2	1	-
Late Developmental/ Coalition	N	-	-	-	-	-	1	1	-	-	-	-	1	1	1	1	
	Mean	-	-	-	-	-	5	-	-	-	-	-	6.53	2.6	3.2	1	-
	Standard Dev.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Minimum	-	-	-	-	-	5	0	-	-	-	-	6.53	2.6	3.2	1	-
	Maximum	-	-	-	-	-	5	0	-	-	-	-	6.53	2.6	3.2	1	-
	Median	-	-	-	-	-	-	-	-	-	-	-	-	-	.-	-	-
Historic	N	-	-	-	-	-	1	-	-	-	-	-	1	1	1	1	-
	Mean	-	-	-	-	-	1	0	-	-	-	-	30.15	4.5	8.7	1	-
	Standard Dev.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Minimum	-	-	-	-	-	1	0	-	-	-	-	30.15	4.5	8.7	1	-
	Maximum	-	-	-	-	-	1	0	-	-	-	-	30.15	4.5	8.7	1	-
	Median	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 25.13.Early Developmental Structures at Peña Blanca Compared with Regional Data, Attribute Frequencies

	Early Developmental Structures				Northern Rio Grande Structures	
	All		Ventilator		All	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
LA 265	5	35.7	3	30	-	-
LA 6169	2	14.3	2	20	-	-
LA 6170	3	21.4	2	20	-	-
LA 6171	3	21.4	2	20	-	-
LA 115862	1	7.1	1	10	-	-
Total	14	100	10	100	-	-
Room shape						
Round	8	57.1	7	70	19	57.6
D-shaped*	2	14.3	2	20	-	-
Sub-rectangular	2	14.3	1	10	-	-
Rectangular	-	-	-	-	13	39.4
Irregular	-	-	-	-	1	3
Key hole*	2	14.3	-	-	-	-
Total	14	100	10	100	33	100
Structure depth range (below present ground surface)						
.1-.5	3	21.4	1	10	7	21.2
.5-1.5	8	57.2	8	80	18	54.5
1.5-2.0	1	7.2	1	10	6	18.2
Unknown	2	14.2	-	-	2	6.1
Total	14	100	10	100	33	100
Construction						
No. of roof supports						
0	1	7.1	1	10	-	-
2	2	14.3	-	-	2	6.1
3	1	7.1	-	-	6	18.2
4	2	14.3	2	20	22	66.7
5	-	-	-	-	2	6.1
6	2	14.3	2	20	1	3
7	1	7.1	1	10	-	-
8	2	14.3	2	20	-	-
9	1	7.1	1	10	-	-
10	1	7.1	1	10	-	-
Unknown	1	7.1	-	-	-	-
Total	14	100	10	100	33	100
Ventilator shaft						
Unobservable	4	28.6	-	-	1	3.4
Separate shaft	5	35.7	5	50	24	82.8
Contiguous shaft	1	7.1	1	10	-	-
Roofed trench	2	14.3	2	20	1	3.4
Wall opening	-	-	-	-	1	3.4
Entry	-	-	-	-	2	6.9
Unknown	2	14.3	2	20	-	-
Total	14	100	10	100	29	100
Ventilator tunnel						
None	4	28.6	-	-	-	-

Table 25.13. Continue.

	Early Developmental Structures				Northern Rio Grande Structures	
	All		Ventilator		All	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Above floor sill	-	-	-	-	6	20.7
Above floor protruding sill	-	-	-	-	12	41.4
At floor	7	50	7	70	-	-
At floor sill	-	-	-	-	8	27.6
At floor with horizontal stone divider	1	7.1	1	10	-	-
Unknown	-	-	-	-	3	10.3
Total	14	100	10	100	29	100
Hearth type						
Absent	3	21.4	-	-	-	-
Plaster	1	7.1	1	10	-	-
Cobble lined	-	-	-	-	1	3
Adobe collar	5	35.7	5	50	19	57.6
Adobe collar with depressions	1	7.1	1	10	6	18.2
Unlined	3	21.4	3	30	7	21.2
Indeterminate	1	7.1	-	-	-	-
Total	14	100	10	100	33	100
Hearth shape						
Absent	3	21.4	-	-	-	-
Basin	10	71.4	10	100	22	66.7
D-shaped	-	-	-	-	8	24.2
Rectangular	-	-	-	-	2	6.1
Tear drop	-	-	-	-	1	3
Indeterminate	1	7.1	-	-	-	-
Total	14	100	10	100	33	100
Ash pit						
Absent	4	28.6	-	-	15	45.5
Formal plaster lined	1	7.1	1	10	3	9.1
Informal unlined	9	64.3	9	90	15	45.5
Total	14	100	10	100	33	100
Deflector location						
None	7	50	3	30	15	51.7
Ash pit/vent	6	42.9	6	60	4	13.8
Hearth/vent	-	-	-	-	3	10.3
Hearth/ash pit, vent	-	-	-	-	1	3.4
Vent opening	-	-	-	-	6	20.7
Unknown	1	7.1	1	10	-	-
Total	14	100	10	100	29	100
Deflector						
None	6	42.9	2	20	15	51.7
Post and adobe	6	42.9	6	60	5	17.2
Unshaped stone/ post & adobe	1	7.1	1	10	-	-
Damper	-	-	-	-	7	24.1
Puddled adobe	-	-	-	-	1	3.4

Table 25.13. Continue.

	Early Developmental Structures				Northern Rio Grande Structures	
	All		Ventilator		All	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Above floor sill	-	-	-	-	6	20.7
Unknown	1	7.1	1	10	-	-
Total	14	100	10	100	29	100
Sipapu type						
Absent	8	57.1	-	-	24	72.7
Unlined	6	42.9	-	-	9	27.3
Total	14	100	-	-	33	100
Sipapu Shape						
0	8	57.1	-	-	-	-
Cylindrical	3	21.4	-	-	-	-
Hemispherical	1	7.1	-	-	-	-
Basin	2	14.3	-	-	-	-
Total	14	100	-	-	-	-
Sipapu number						
0	-	-	4	40	-	-
1	-	-	5	50	-	-
2	-	-	1	10	-	-
Total	-	-	10	100	-	-
Ladder holes						
None	-	-	5	50	-	-
Depressions	-	-	5	50	-	-
Total	-	-	10	100	-	-
Floor vaults						
0	13	92.9	9	90	30	90.9
1	-	-	-	-	2	6.1
2	-	-	-	-	1	3
3	1	7.1	1	10	-	-
Total	14	100	10	100	33	100
Floor features						
Number of divots						
0	7	50	-	-	-	-
1	1	7.1	-	-	-	-
2	1	7.1	-	-	-	-
3	1	7.1	-	-	-	-
5	1	7.1	-	-	-	-
6	1	7.1	-	-	-	-
7	1	7.1	-	-	-	-
37	1	7.1	-	-	-	-
Total	14	100	-	-	-	-
Plain floor pits						
Small undifferentiated pit						
0	2	14.3	-	-	8	24.2
1	1	7.1	-	-	5	15.2
2	1	7.1	-	-	5	15.2
3	2	14.3	-	-	4	12.1

Table 25.13. Continue.

	Early Developmental Structures				Northern Rio Grande Structures	
	All		Ventilator		All	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
5	-	-	-	-	1	3
6	1	7.1	-	-	2	6.1
7	2	14.3	-	-	-	-
9	1	7.1	-	-	-	-
10	-	-	-	-	1	3
11	-	-	-	-	2	6.1
12	1	7.1	-	-	-	-
22	-	-	-	-	1	3
Total	14	100	-	-	33	100
Ancillary hearths			-	-	-	-
0	6	42.9	-	-	-	-
1	2	14.3	-	-	-	-
2	6	42.9	-	-	-	-
Total	14	100	-	-	-	-
Wall niche						
0	9	64.3	-	-	28	84.8
1	4	28.6	-	-	2	6.1
2	-	-	-	-	3	9.1
3	1	7.1	-	-	-	-
Total	14	100	-	-	33	100
Large floor cists						
0	11	78.6	7	70	20	60.6
1	1	7.1	1	10	6	18.2
2	-	-	-	-	1	3
3	2	14.3	2	20	5	15.2
6	-	-	-	-	1	3
Total	14	100	10	100	33	100
Off-chamber cists						
0	12	85.7	-	-	31	93.9
1	-	-	-	-	2	6.1
2	2	14.3	-	-	-	-
Total	14	100	-	-	33	100
Abandonment						
Deconsecrating						
None evident	4	28.6	1	10	-	-
Animals in vent	1	7.1	1	10	-	-
Animals on floor	1	7.1	-	-	1	3
Animals/ornaments/ formal tools/ aligned on axis	3	21.4	3	30	-	-
Formal tools/ ornaments between hearth and vent	-	-	-	-	1	3
Vent sealed	1	7.1	1	10	-	-
Partial human, animals/ ornaments/ formal tools	1	7.1	1	10	-	-
Sealed vent w/ animals,	1	7.1	1	10	-	-

Table 25.13. Continue.

	Early Developmental Structures				Northern Rio Grande Structures	
	All		Ventilator		All	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Animals in vent, on floor	1	7.1	1	10	-	-
Ceramic vessels, principle	-	-	-	-	1	3
Insufficient reporting	-	-	-	-	30	90.9
Total	14	100	10	100	33	100
Abandonment status						
Intact	-	-	-	-	1	3
Dismantled	7	50	4	40	13	39.4
Unfinished	1	7.1	-	-	-	-
Burned *	-	-	-	-	10	30.3
Dismantled and burned	2	14.3	2	20	6	18.2
Dismantled and trash filled	1	7.1	1	10	-	-
Dismantled, burned, superimposed	1	7.1	1	10	-	-
Dismantled, superimposed	1	7.1	1	10	-	-
Burned, superimposed	1	7.1	1	10	-	-
Insufficient reporting	-	-	-	-	3	9.1
Total	14	100	10	100	33	100
No. human burials						
0	9	64.3	5	50	26	78.8
1	3	21.4	3	30	4	12.1
2	-	-	-	-	2	6.1
3	1	7.1	1	10	1	3
4	1	7.1	1	10	-	-
Total	14	100	10	100	33	100
Human burial location						
0	3	21.4	-	-	26	78.8
None	6	42.9	-	-	-	-
Upper fill	2	14.3	-	-	1	3
Floor feature	1	7.1	-	-	-	-
On floor	-	-	-	-	1	3
Sub-floor	-	-	-	-	1	3
Wall	-	-	-	-	1	3
Wall and floor	-	-	-	-	1	3
Vent	-	-	-	-	2	6.1
Vent shaft and upper fill	1	7.1	-	-	-	-
Vent shaft/upper and lower fill	1	7.1	-	-	-	-
Total	14	100	-	-	33	100

*see Appendix 2 for differences in definition between NM 22 and Northern Rio Grande

Table 25.14. NM 22, Early Developmental Structures, Ventilator Shaft Opening and Deflector Type

Vent Opening	Vent Shaft Deflector	None	Post and adobe	Unshaped stone/post & adobe	Unknown
Unobservable		5	-	-	-
Above floor	Contiguous shaft	1	-	-	-
	Roofed trench	-	1	-	-
At floor	Separate shaft	1	3	-	-
	Roofed trench	-	-	1	-
	Unknown	-	1	-	1
At floor with horizontal stone divider	Separate shaft	-	1	-	-

appear to be consistently linked with any other structural attribute except for extensive remodeling as discussed below.

Most (n = 8) ventilators opened at floor level, one of which had a horizontal stone divider suspended in the opening. Two opened above floor level. Two at LA 6170 protruded from the structure wall. Half of the structures had ventilator shafts that attached separately to the ventilator tunnel. Other configurations included two roofed trenches, one continuous shaft, and two ventilator shafts about which information was not available (Table 25.14). Early Developmental structures throughout the Northern Rio Grande tended to have ventilator openings placed above the floor and had a protruding sill (Lakatos 2003).

Large structure hearths were all unlined basins ranging in depth from 0.04–0.38 m. Six were collared, one had depressions on each side worked into the collar. There was one hearth lined with mud plaster and three were unlined. Information about central hearths in smaller structures is less reliable than data from larger features. One of the five structures was not completely excavated and may have had a central hearth and associated ventilator. Another was bisected by a backhoe. Although there may have been an ancillary thermal feature in these structures, information about the central hearth is inconclusive. Hearths in contemporary structures in the Northern Rio Grande were usually central and basin shaped with an adobe collar (Lakatos 2003).

Ventilator shaft morphology in larger structures did not appear to be linked with hearth attributes. With the exception of one plaster-lined ash pit at LA 115862, ash pits were informal (n = 9). Deflector supports were adjacent to ash pits between the ash pit and the ventilator opening. They were not interpreted as ladder rests because of the proximity of the supports to the ash pit. Although one deflector was an unshaped stone, no evidence of deflector construction other than support posts remains for the majority of Early Developmental features (n = 6). Two of the remaining structures with hearth complexes did not have evidence of a deflector. One (LA 6169, Structure 4) had a later structure superimposed over the space where a deflector and ventilator opening would have been located. Stone slabs in front of vent openings were most commonly used as deflectors in Early Developmental structures in the Northern Rio Grande (Lakatos 2006).

Half of the structures with hearth complexes (n = 5) had at least one sipapu (Structure 60, LA 6171, had two). Sipapus were often cylindrical or basin-shaped, filled with clean sand, and placed opposite the hearth along the structure's central axis. One structure (Feature 1, LA 265) had three floor vaults arranged around the hearth adjacent to the hearth and opposite the ash pits. Large Early Developmental structures with a sipapu had a larger mean number of floor pits, burials, and ancillary hearths associated with the structure (Table 25.15), but the presence of a sipapu was not linked to any specific hearth type (Fig. 25.66). Sipapus were present in 27 percent of structures in the comparative regional data set (Lakatos 2003). Structures with ventilator complexes at Peña Blanca were more likely to have a sipapu.

Possible ladder depressions were present in five of the fifteen structures. They were only

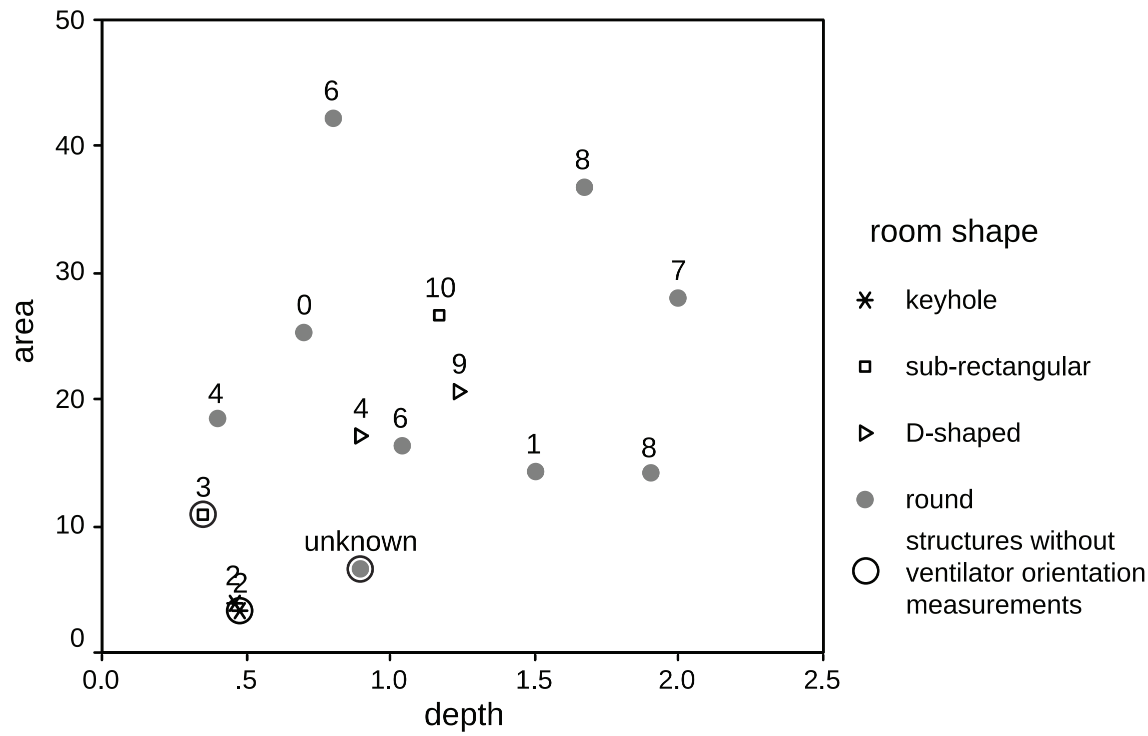

Figure 25.63. Early Developmental pit structures, number of roof supports and structure shape by area and depth.

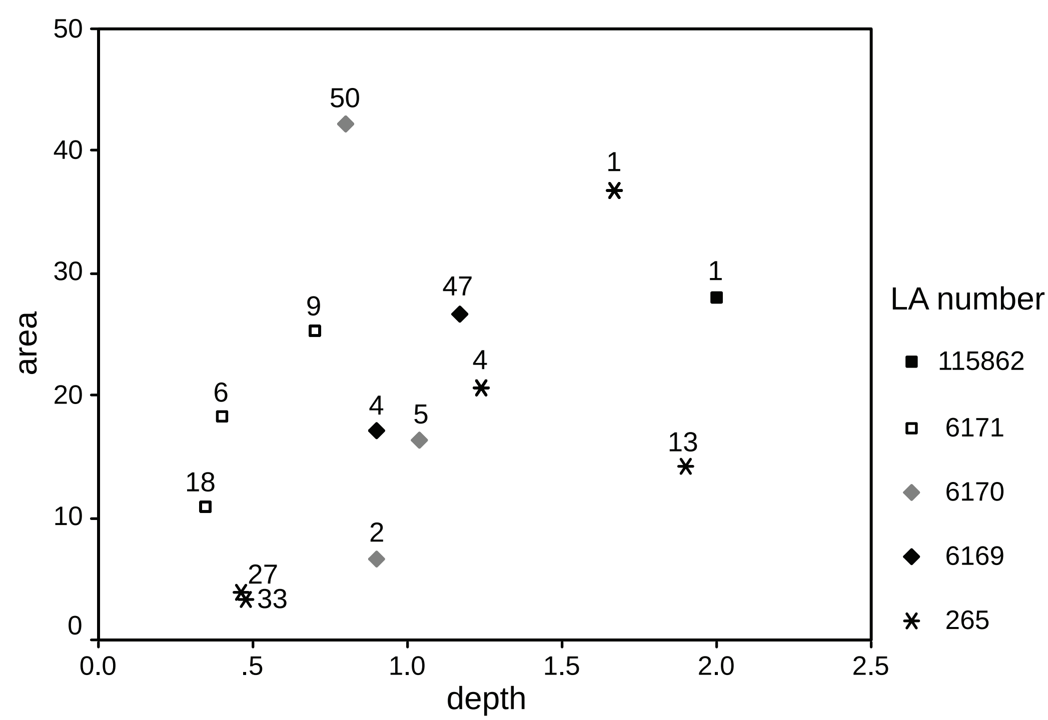

Figure 25.64. Early Developmental structures, site and structure number by area and depth.

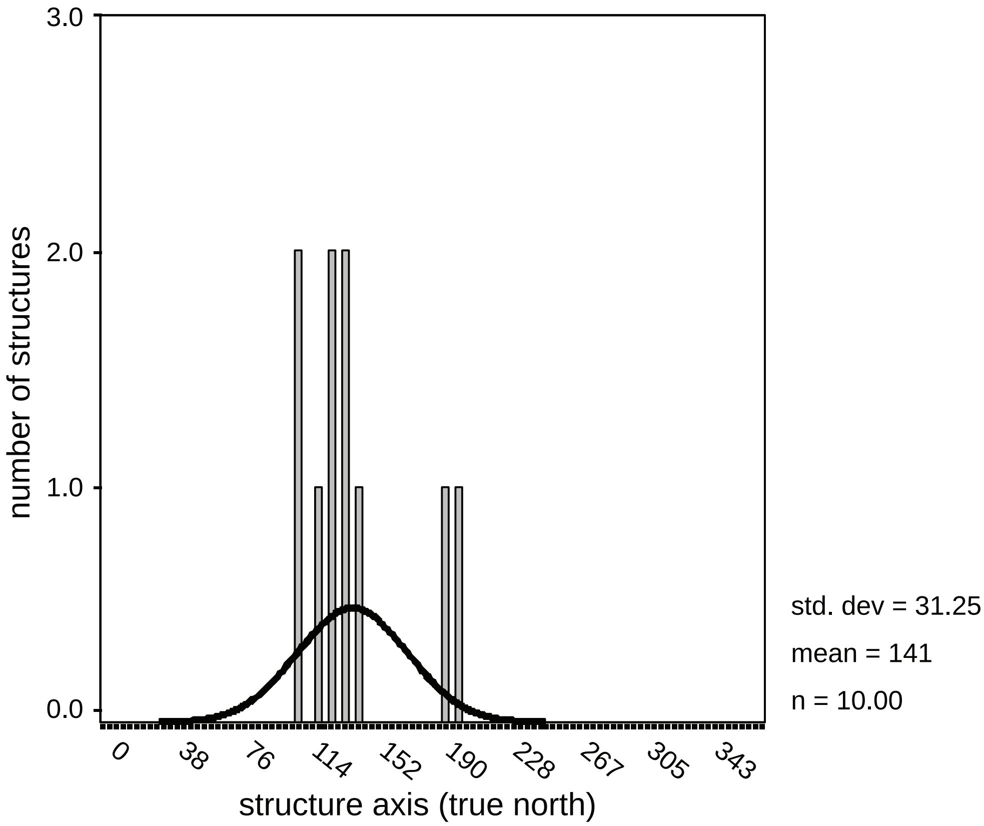

Figure 25.65. Early Developmental structures, orientation.

identified in the larger structures and were placed east of the hearth in four of the five structures. Ladder depression position did not appear to be associated with structure axis. Ladder rests in Structure 5 and Structure 50 at LA 6170 were not in line with ventilator openings, which were oriented at 191 and 200 degrees east of true north, respectively. Ladder rests were found in 36 percent of Early Developmental structures (Lakatos 2003).

Floor Features. Floor features included ancillary hearths, large floor cists, off-chamber cists, metate supports, and up to 12 undifferentiated floor pits and as many as 37 divots, sometimes arranged in clusters, and a grinding area. Floor features are summarized with extramural features in Tables 25.9 and 25.12.

Overall, the most common floor features were undifferentiated pits, which were present in 13 of 15 structures. Frequencies ranged from one to twelve, but structures most commonly had from two to seven pits. Ancillary hearths were also common and were present in nine of fifteen structures (60 percent). Thermal features located in small structures that were either partially excavated or deflated were coded as ancillary hearths. Numbers ranged from one to two and large structures most commonly had two. Five structures had wall niches. Most structures had one wall niche although one had three. Three structures had large storage cists and two had very large (0.0687 to 0.8329 cu m volume) off-chamber cists (cists that were excavated into the wall outside the confines of the structure interior).

In large structures (more than 10 sq m), the presence of ancillary hearths appears to be loosely associated with the presence of specialized storage facilities (Fig. 25.67). All large structures with additional thermal features also have some combination of storage pits, off-chamber cists, or wall niches. Only one feature with storage cists (Structure 5 at LA 6170) had storage facilities not associated with ancillary thermal features at the time of abandon-

Table 25.15. NM 22, Large Early Developmental Structures with Sipapu, Number of Associated Features, and Burials

No. of Sipapu		Large Floor Cists	Plain Floor Pits	Ancillary Hearths	No. of Human Burials
0	Mean	1	3	2	1
	N=4				
	Std. Deviation	2	3	1	1
	Maximum	3	7	2	1
	Minimum	0	0	0	0
	Median	0	2	2	1
	Mode	0	n/a	2	0
1	Mean	1	8	1	2
	N=5				
	Std. Deviation	1	3	1	2
	Maximum	3	12	2	4
	Minimum	0	4	0	0
	Median	0	7	2	1
	Mode	0	n/a	2	(0,1)
2	Mean	0	4	0	0
	N=1				
	Std. Deviation	.	.	.	.
	Maximum	0	4	0	0
	Minimum	0	4	0	0
	Median	.	.	.	.

ment (although two cobble-filled pits in the structure floor had been plugged earlier).

A change in storage pit/ancillary hearth association is demonstrated by Structure 50 at LA 6170. The structure was extensively remodeled leaving a series of pits that were capped. Consequently, two easily distinguishable sets of floor features were evident, one in use when the structure was abandoned and another that was decommissioned earlier. The first use had two ancillary hearths in association with seven large floor cists, one wall niche, nine undifferentiated pits, a possible mealing area, and no divots. The final floor had one ancillary hearth, with no associated floor cists, one wall niche, a mealing area, five undifferentiated pits, and seven divots (Table 25.16). The remodeling episode removed a large amount of storage capacity (0.8843 cu m) and two thermal features in favor of more floor area. It is also interesting to note that the number of divots increased from none to seven with the increase in floor space. This is atypical of structures along NM 22. Usually, features with more than four undifferentiated floor pits also had divots, although number of divots was not tied to number of floor pits and was not demonstrably associated with the presence of any other feature type. The association is also problematic because of definitional differences for divots and small unburned pits, discussed in the Features section of this report.

Although remodeling in Structure 50 is the most obvious case, two other structures were remodeled, Structure 1 at LA 115862, and Structure 18 at LA 6171. Seven structures had evidence of maintenance, defined as a change to the structure without a change in shape or function. Maintained and remodeled structures were assessed statistically to determine whether they had anything in common. Data for remodeled structures was inconclusive but

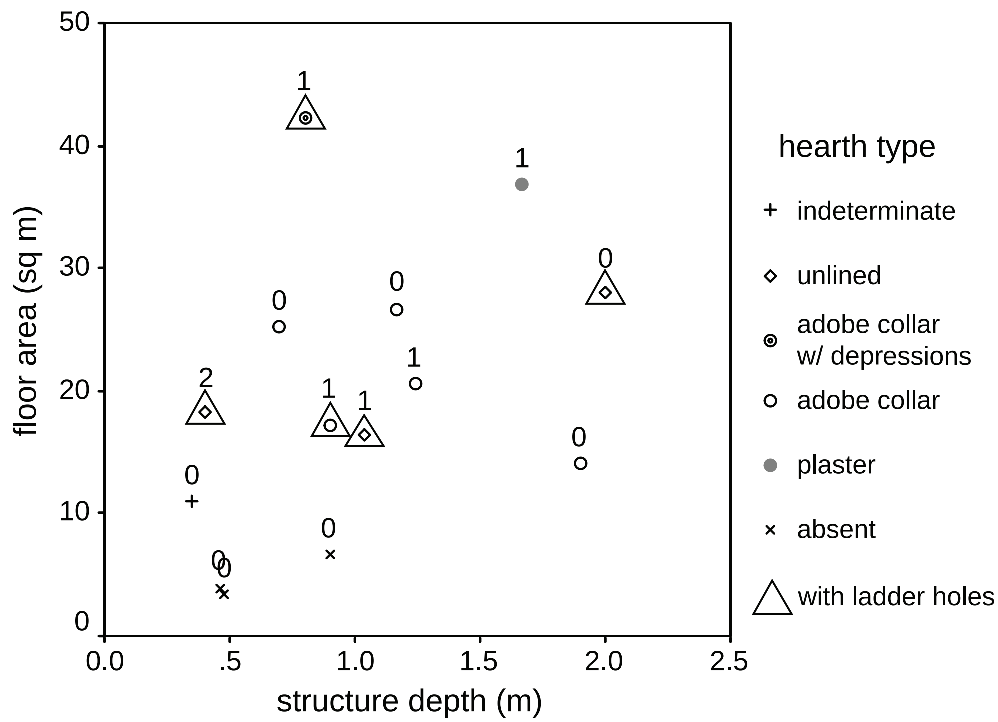

Figure 25.66. Early Developmental pit structures, hearth type and ladder holes by area and depth.

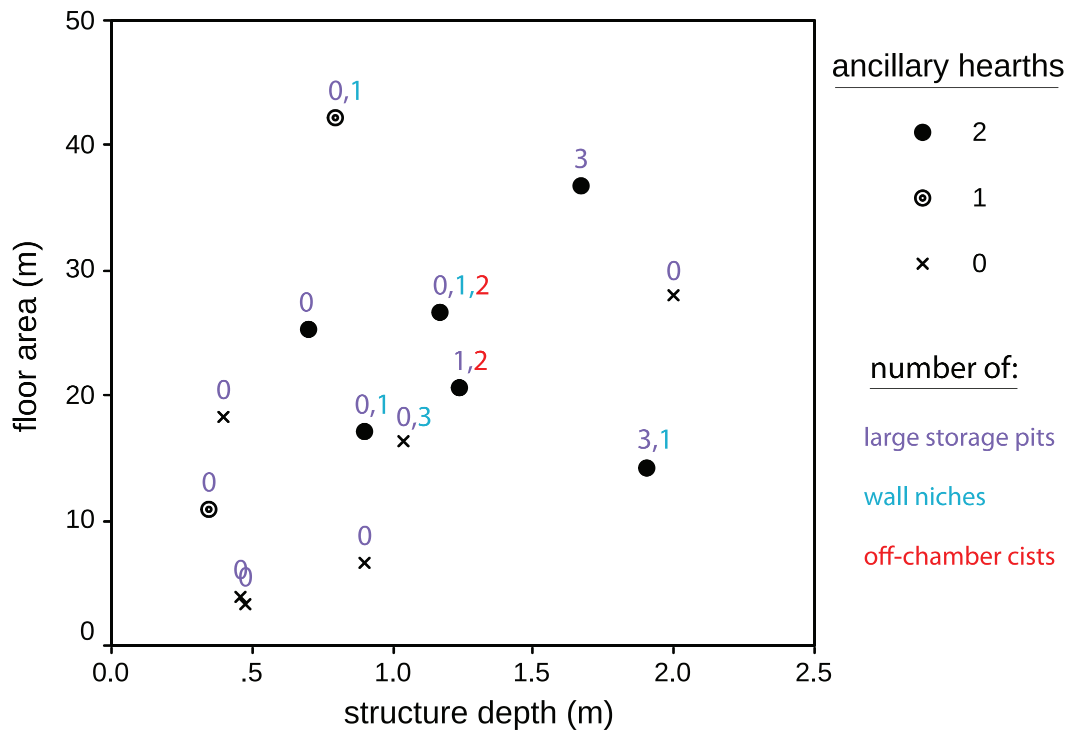

Figure 25.67. Early Developmental pit structures, ancillary hearths, and storage features, by area and depth.

Table 25.16. NM 22, MAPCO, and River's Edge, Comparative Intramural Feature Volumes

	Ancillary Hearths	Floor Cists	Undiffer-entiated Pits	Divots	Wall Niches	Cists, Pits, Divots: Volume (cu m)	Structure Area (sq m)
NM 22, LA 6170, Structure 50							42.24
Open floor features	1	0	9	7	1	0.011	
Capped features	2	7	6	1	1	1.252	
River's Edge, LA 57024/26 Structure 4 (Cyst House)							18.86
Open features	2	7	14	0	1	0.66	
Possibly reused	2	4	2 (no volume) *	0	0	1.042	
Capped features	1	3	9 (no volume for 4)*	0	1	0.83	
MAPCO, LA 109129, Structure 4							15.9
Upper floor	0	10	1	0	1	1.217	
Lower floor	0	5	10	0	0	0.203	

*The draft report at ARMS is missing a page. Dimensions for five "post holes or associated small cysts" (Schmader 16-15) were missing. Volumes are calculated without considering these six features. One additional pit had no depth.

Table 25.17. Maintained Early Developmental Structures, Storage and Ancillary Hearths

	Off-chamber Cists	Small Undiffer-entiated pits	Wall Niches	Ancillary Hearths	No. of Divots	Large Floor Cists
Floor at abandonment						
Mean	2	6	2	2	10	2
N=6						
n	2	6	3	5	5	2
Percent N	33	100	50	83	83	33
Std. Deviation	0	4	1	0	15	1
Maximum	2	12	3	2	37	3
Minimum	2	1	1	2	1	1
Median	.	7	1	.	5	2
Floor before maintenance						
Mean	Same	7	Same	3	Same	4
N=6		6		6		2
n		100		100		33
Std. Deviation	4		2		1	
Maximum		12		6		4
Minimum		2		2		3
Median		7		2		4

maintained structures (Table 25.17) did appear to show a weak trend toward the decrease through time of undifferentiated pits, ancillary hearths, and storage cists. All maintained structures had storage pits, most, five of six, had ancillary hearths. Large storage cists were located in two of the structures and large, off-chamber cists were located in one structure.

Gilman uses ethnographic analogy to equate pit structure use with seasonal sedentism (usually cold weather) and food storage but not necessarily the presence of agriculture (Gilman 1987:546). Schmader evaluates seasonality and structure function by using a ratio of intramural feature area to total structure area and volume. Because there was no linear relationship between large feature area and large floor area, he concluded that his data set contained two different types of structures. He also demonstrated an inverse proportion between structure volume and percentage of floor area. Structures with small volumes (less than 5 cu m) had a higher percentage of floor space taken up by features (mean 15 percent) and larger structures had progressively less floor space taken up by floor features (Schmader 1994:329).

Figure 25.68 demonstrates that this is not the case with structures at Peña Blanca. Most structures have from 4 to 10 percent of floor space taken up by features regardless of structure volume. This could be conditioned by the presence of bell-shaped pits and off-chamber cists, which would provide more storage space in proportion to surface area. They provide for a decreased amount of floor space and necessary volume for intramural storage. Even so, Schmader's identification of sleeping versus cooking structures does not seem to be borne out at Peña Blanca. Figure 25.68 also illustrates a trend away from interior storage associated with remodeling episodes in Structures 5 and 50 at LA 6170.

Why would the architects of a large structure give up its storage capacity (cubic meters) and ancillary hearths to gain more floor space? Capped storage features suggest that the structure housed more nondomestic activities and that it could have been a community structure. Construction costs would necessitate a larger labor force (Glennie 1983) possibly an inter-household group as defined by Wilshusen (1988b:642). They are arguably not expanding the structure to gain more sleeping space, and it appears that the group is sacrificing control over foodstuffs and possibly food distribution in favor of more floor space, possibly signaling a change in social organization or seasonal occupation of the structure.

Another possible community structure excavated at NM 22 was Structure 1 at LA 265. Like Structure 50 at LA 6170, its large size (over 30 sq m in area), and the presence of floor vaults placed around the central hearth, suggest community involvement in construction and possible later ritual use as discussed above (Wilshusen 1998b, 1998d; Glennie 1983). Structure 1 also lacked intramural storage pits.

Abandonment. Eleven of the fourteen structures had evidence of deconsecration. Three

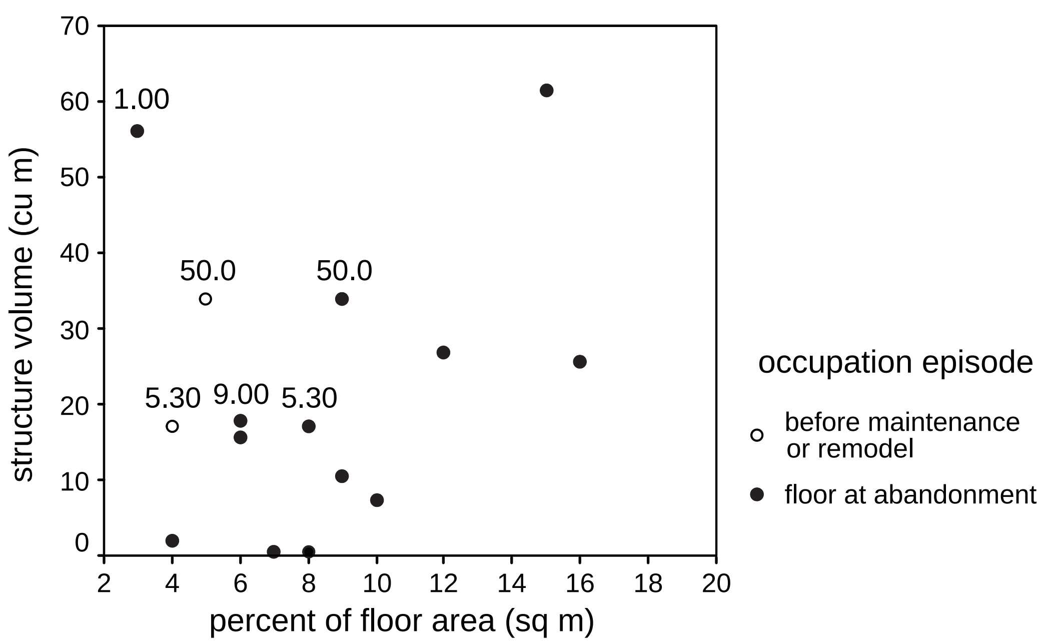

Figure 25.68. Early Developmental structures, structure volume and percentage of total intramural feature area by occupation episode.

structures had animal bones, ornaments, and formal tools present in areas along the structure axis. Three had sealed vents. Structure 4, LA 6169, exhibited a human cranial case on the floor of the pit structure in possible association with a bear jaw. The most consistent placement of items was in ventilator shafts. Animal elements were found in vent shafts of ten of the structures that exhibited evidence of deconsecration, and were located exclusively on the floor of two small structures indicating planned ritual abandonment and possibly, in one case, ritual firing as defined by Wilshusen (1998c:680).

Except for one structure that was unfinished (Structure 2, LA 6170), all Early Developmental structures along NM 22 were dismantled. Three structures were superimposed by other structures obscuring fill sequences. Two of the three were burned, roof supports were removed suggesting that they were dismantled. Of the remaining structures that were not superimposed, two were dismantled and burned and one was dismantled and trash-filled. Wilshusen describes unburned structures intentionally dismantled to salvage timbers, as those lacking substantial roof fall. Burned structures with no posts probably had their remaining timbers scavenged. Structures abandoned in these ways are usually "cleaned out" (Wilshusen 1998c:679). "Cleaned out" structures are those in which "few of the portable high cost tools remain." This floor assemblage is likely associated with seasonal, short-distance relocations of approximately 5 km (Wilshusen 1998b:679). This pattern is typical of most abandonment sequences at NM 22. Lack of reconstructible vessels, intact interior activity areas, or large frequencies of specialized tools characterize floor assemblages at NM 22, probably indicating seasonal, short-term relocation.

Five of the structures had human interments. They are summarized in Human Skeletal Remains (Akins, Chapter 22).The use of structures for human interment suggests the area or site was not abandoned. Interment of the dead suggests monitored or ritualized used of abandoned structures.

Section IV. Comparison with Regional Data

Regional data on Early Developmental pit structures in the Northern Rio Grande complements the descriptions presented above. Basketmaker III pithouses in the Albuquerque area are characterized by Cordell (1979) as round with central hearths, which are sometimes collared, and having east-oriented ventilator shafts. They are differentiated from Mogollon structures by lacking central post roof supports, gabled roofs, or long lateral entrances. Architecture in the Northern Rio Grande also lacks attributes typical of the early Anasazi architecture: subsquare or D-shaped pit structures with attached or detached antechambers, benches, and partitioning features—clay radials and slab-lined wing walls (Cordell 1979:42; Reed and Wilcox 2000). Cordell also notes a low frequency of adobe or stone deflectors in Northern Rio Grande pit structures (Cordell 1979:42).

Data from Early Developmental structures in the Northern Rio Grande compiled by Lakatos (2003) provide a useful database against which structures along NM 22 can be compared. Data were derived from selected sites in Bernalillo and Sandoval Counties. Site numbers and locations are summarized in Table 25.10. When comparing these data it should be noted that the Northern Rio Grande database was restricted to structures with a measurable structure orientation (structures with a central hearth and ventilator complex). Very small informal structures were not included (Lakatos, pers. comm.), so the following discussion concentrates on the earliest floor of large structures unless otherwise specified. The following discussion is derived from Tables 25.13 and 25.18.

Morphology

Morphological and structural data reflect conceptual planning prior to construction and knowledge of construction materials and methods and may reflect similarities in cultural knowledge, adaptive behavior, seasonality, and social organization (Lakatos 2003:49). Structure depth along with number and type of intramural features has been associated with seasonality and activity type by Schmader (1994). Gilman associates pit structure use with periodic sedentism conditioned by dependency on stored food and (primarily) cold season residences (Gilman 1987:543). Glennie's experiments indicate that pit structure thermal efficiency was a result of the massive heat sink provided by the earth, potentially making a deep pit structure a good choice for summer occupation as well as winter habitation (Glennie 1983:115). An experimental construction of deep pit structures by Dolores Archaeological Project demonstrated a "functional relationship between pit structures and surface structure at the site level" (Wilshusen 1988d:705), which illustrate possible changes in population size and subsistence pattern (Gilman 1987).

Fifty-eight percent of Early Developmental structures included in the Northern Rio Grande database were round, 38 percent were rectangular. A significant portion of structures along NM 22 (70 percent) were round but none were rectangular. There was only one subrectangular feature. By the same token, no Early Developmental D-shaped structures were recorded in the Northern Rio Grande database. The presence of D-shaped, or somewhat D-shaped structures at NM 22 is due to the definition of D-shaped. NM 22 structures were coded as D-shaped to match the descriptions of excavators, whereas Lakatos may have described the same structure as round or subrectangular. Definitional differences also apply to keyhole-shaped structures discussed above and in Appendix 8.

NM 22 structures with ventilator complexes tended to have larger floor areas than comparable Northern Rio Grande structures. Diameters range from 4.14 to 7.80 m, an average floor dimension is 24.56 sq m, and a standard deviation of 9.23 sq m as compared with Northern Rio Grande structures that ranged in diameter from 2.2 m to 7.6 m with an average area of 17.92 sq m and a standard deviation of 9.94 sq m. When all structures (meaning those without ventilator complexes) are included, the average floor size is more in line with other Early Developmental structures along the Northern Rio Grande, 19.32 sq m. Large structures at NM 22 (Table 25.15) tended to be between about 0.5 and 1.5 m deep. Eighty percent of large NM 22 structures fell into the same category as compared to Northern Rio Grande structures, 54 percent of which were of the same depth range. If all NM 22 structures are considered, 60 percent fall within the group. Northern Rio Grande structures tended to be deeper, 18 percent are deeper than 1.5 m. Only one (7 percent) of the NM 22 structures was as deep.

Construction. Northern Rio Grande structures consistently had four roof supports (78 percent). Structures at NM 22 had from zero to ten supporting posts, any number of which were no more frequent than 20 percent. Structures at Peña Blanca with measurable axes (n = 10) had a mean orientation of 141 degrees, more southerly than other Early Developmental structures found throughout the Northern Rio Grande (mean orientation of 109 degrees). Most structures had axes at 124 degrees east of true north (Fig. 25.65).Ventilator openings were also different. Ventilator tunnel openings at Peña Blanca had no sills and tended to be at floor level, two protruded from the structure wall. The majority of vent tunnels in the Northern Rio Grande opened above the structure's floor, and had a sill (71 percent); 41 percent of the sills were protruding. Structures with a ventilator opening on the floor also had a protruding sill (27 percent).Ventilator tunnel construction was more variable along NM 22 than among other structures in the Northern Rio Grande. Although a significant number of structures from both groups had ventilator tunnels with a separate shaft, the percentage among structures recorded in the Northern Rio Grande database (83 percent) was much higher than among structures along NM 22 (50 percent). Both groups also had structures with

Table 25.18. Northern Rio Grande Quantitave Structure Attributes

	Structure Axis (degrees true north)	Roof Supports	Sipapus	Floor Vaults	Undifferen-tiated small pits	Wall Niche	Large Storage Pits	Off-Chamber Cists	Grinding Bins	Floor Area (sq m)	North-South Floor Diameter (m)	East-West Floor Diameter (m)	No. of Floors	Human Burials
Early Developmental														
Mean	109	4	1	1	5	2	2	1	2	17.92	4.47	4.25	1	2
N=33														
n	29	33	9	3	25	5	13	2	2	33	33	33	33	7
Percent of N	88	100	27	9	76	15	40	6	6	100	100	100	100	21
Std. Deviation	29.56	0.77	0.67	0.58	4.69	0.55	1.48	0	0.71	9.94	1.15	1.18	0.24	1
Minimum	4	2	1	1	1	1	1	1	1	3.52	2	2.2	1	1
Maximum	196	6	3	2	22	2	6	1	2	51.68	7.6	6.8	2	3
Median	110	4	1	1	3	2	2	--	2	15.58	4.5	4.2	1	1
										15.48				
Late Developmental														
Mean	121	3	1	1	3	2	1	1	1	19.89	4.65	4.44	1.22	2
N =85														
n	82	85	32	5	43	15	5	3	7	85	85	85	85	18
Percent of N	96	100	38	6	51	18	6	4	8	100	100	100	100	21
Std. Deviation	23	2	1	1	3	2	--	--	--	22.09	1.68	1.65	1	2
Minimum	68	0	1	1	1	1	1	1	1	2.4	1.6	1.5	1	1
Maximum	187	8	3	3	13	8	2	1	2	202.25	15.9	15.9	3	7
Median	121.5	4	1	1	2	2	1	.	1	15.48	4.4	4.3	1	2

roofed trench shafts, although they were more frequent at Peña Blanca. Variations in ventilator construction not found at Peña Blanca, but located in the region, include entryway and wall openings.

Hearth types at NM 22 were similar to those of other Northern Rio Grande sites in that they were mostly unlined or exhibited adobe collars or and adobe collars with depressions. Northern Rio Grande structures were more likely to have an adobe collar and were twice as likely to exhibit an adobe collar with depressions than hearths excavated at NM 22 (see Table 25.13). Hearth shapes were more diverse among other Northern Rio Grande pit structures. At NM 22, all hearths were basin-shaped. Although this was the dominant shape among other Early Developmental structures (66 percent), D-shaped, rectangular, and tear-drop shapes were also recorded.

Deflector location was more variable among other Northern Rio Grande structures although the percentage of structures with deflectors was smaller. Eighty percent of structures along NM 22 had evidence of a deflector-compared with 48 percent for Northern Rio Grande structures. At NM 22, most deflectors were located at the ventilator opening (21 percent), but other locations included between the ash pit and ventilator (14 percent), and between the hearth ash pit and ventilator opening (3 percent).

Sipapus were more common at NM 22 than regionally. Half of the structures at Peña Blanca with ventilator complexes had one sipapu and one room had two, bringing the total to 60 percent. Regionally, 27 percent of structures had one or more sipapu. Regionally, sipapu shape is inconclusive. When recorded (9 times out of 33) it tended to be cylindrical. Although there was a correlation with increased number of floor pits and a chance of the structure containing a burial at NM 22, this did not hold for regional structures.

Ladder depressions were slightly more common in large structures (50 percent) at NM 22 than in the regional sample, in which a majority (59 percent) did not exhibit evidence of a ladder.

Floor Features. Intramural features can provide information about food storage and control of foodstuffs (Wilshusen 1998a). Interior features contribute to the differentiation of structure use, which Schmader observes may play an increasingly important role in site organization as groups become more sedentary. He also notes a correlation between floor to feature area ratio and functionality (Schmader 1994).

Between data sets, interior features were coded differently with regard to the presence of features not included in the ventilator suite or structure axis. The Northern Rio Grande database does not include a category for divots or ancillary hearths, resulting in a potential inclusion of features of this type as "plain floor pits." Although this category had the greatest potential to be skewed, it is interesting to note that structures at NM 22 were more likely to consistently have undifferentiated pits than the regional average. The mean feature count for structures at Peña Blanca is five with a standard deviation of four, as compared to other Northern Rio Grande structures with a mean of three and a standard deviation of four. As previously mentioned, potential for error between coding differences and sample size is probable.

The most reliable data is that provided by the null set, that is, 24 percent of other Northern Rio Grande structures had no floor pits as compared with 10 percent of large structures excavated at NM 22.

Wall niches were more common at NM 22 than in other structures in the Northern Rio Grande. They are present in half of the structures at Peña Blanca and only about 15 percent of structures in the Northern Rio Grande database. Storage facilities were made up of large floor cists and off-chamber cists (defined in the previous section). Structures at Peña Blanca had slightly fewer incidences of large floor cists, 30 percent, versus 40 percent regionally. Numbers per structure were also lower: one to three features versus one to six regionally. Three storage cists per structure seemed to be the most common in both data sets. This tally is made without considering seven capped floor features located in Feature 50, Floor 2, LA 6170. (Because they were not in use during the time of abandonment, they were not included.) When this early use of Feature 50 is included in the NM 22 data set, regional and NM 22 feature frequencies and incidence in structures are comparable. Off-chamber cists were uncommon in Early Developmental structures both at NM 22 and in the rest of the Northern Rio Grande. Incidence of these features was statistically greater at NM 22 located in 20 percent of the features as opposed to 6 percent regionally.

One could interpret a slightly higher incidence of large intramural storage features represented by off-chamber cists at Peña Blanca to reflect a greater reliance on stored foodstuffs. However, extramural feature information from the sites considered in the regional structure data was not available to test this observation.

Feature data compiled from NM 22, LA 57024/57026, and LA 109129 indicate that extramural features played a significant role in storage. Intramural storage was augmented at both LA 57024/57026 and LA 109129 by large extramural storage facilities with storage capacities comparable to, or larger than those at LA 265 (see Figs. 25.55–25.56). Storage capacity of these individual features was not larger than off-chamber cists at LA 6169, the largest of which had a volume of 0.8330 cu m, roughly 25 percent larger than the largest bell-shaped storage pit at LA 57024/57026. This suggests that a range of storage strategies was employed at Peña Blanca. At LA 265, storage behaviors were similar to that seen at the other two sites in the region, while storage at LA 6169 was intramural, implying restricted access.

Because the regional structure database does not provide information pertaining to feature volume or to detailed aspects of remodeling, the comparative feature data was compiled from NM 22, River's Edge, LA 57024/57026, MAPCO, and LA 109129. Structure 50 was compared to two similar structures excavated along the upper Middle Rio Grande. All structures were larger than 10 sq m. All had formal hearth complexes and had been remodeled with adobe-plugged pits that indicated the features were no longer in use at the time of abandonment. At LA 57024/57026, potential roof fall was found in two capped features and at the base of one of the remodeled open features. This may indicate that remodeling or roof maintenance was performed before the structure's final use.

Table 25.16 compares the number of storage features (floor cists), undifferentiated pits, divots, wall niches, and ancillary hearths. As previously discussed, when Structure 50 was remodeled, inhabitants removed storage and hearth space, possibly to gain floor area, drastically reducing potential storage capacity. Although the number of small pits increased overall, total storage volume decreased by 1.24 cu m.

Data for Structure 4 at LA 109129 were incomplete (recording for six undifferentiated pits was not available). Even so, total volumes were calculated with this error in mind. A group of "possibly reused" features with large total volumes were also a component not present at the two other structures. If we assume that "possibly reused" features were used before and after remodeling and count that volume as a constant, we see that large capacity storage was never abandoned at Structure 4. Even so, total volumes calculated for capped features were larger than for the next occupation, which had a larger number of smaller features and more thermal features. At LA 109129, pit structure remodeling contrasts with LA 6170, Structure 50 with an increase in potential storage volume and a decrease in the number of small pits.

Conclusions are tentative. It appears that smaller pits are more common in structures with less storage capacity. This is not necessarily linked with available floor area. At LA 109129, numerous postholes and "possible postholes" (Walth 1999:88) took up a great deal of combined floor space (0.6050 sq m). If even half were used simultaneously, they probably would have restricted movement and available sleeping space. If possible postholes were used as small pits, seven additional features would be added to the undifferentiated pit count, weakening the case for a correlation. The observation also exposes contradictory relationships between feature types. At NM 22, ancillary hearths are associated with specialized storage. At the same time there are numerous floor pits and sipapus. The association—if there is one—between increased number of small pits and reduced storage is a contradiction that is beyond the scope of this chapter to resolve. What is evident is that in these structures, remodeling reflects a planned change in activity focus. Whether this is evidence of diurnal habitation pattern, a reflection of the structure's changing use conditioned by the availability of other facilities, or both is unclear. Structure 50's large area and storage implies that it may have been used by an interhousehold group for part of its use life.

Abandonment. Barring catastrophic events, abandonment, like construction, can be a planned event (Wilshusen 1998c). To paraphrase Adler, ritual performance is acceptable and effective in domestic settings and relies on social context for its existence, deriving its sacredness from the ritual act and participation of those in the community (Adler 1993:322). Evidence of ritual abandonment could provide information about cross cutting religious practices, possibly providing evidence of group relationships or ethnicity. Other information such as indications of seasonality can also be gleaned from offerings such as deer crania placed on the floor of structures at LA 265, LA 6169, and LA 6170, potentially indicating late winter to spring abandonments at LA 265 and LA 6170 and spring to early winter abandonment at LA 6169 (Akins et al. 1996).

Unfortunately, site reports use to compile regional data did not provide sufficient information to characterize deconsecration. General observations indicate that placement of animal remains and tools along the structure axis were practiced both regionally and at Peña Blanca. Three of the ventilator shafts at Peña Blanca were sealed and animal offerings were left in the ventilator shafts of two of the structures. Although this is not in the regional data, it may not have been reported.

Abandonment status for structures at Peña Blanca was similar to other structures along the Northern Rio Grande (see Table 25.13). The majority were dismantled or dismantled and burned. Unique to structures along NM 22 is the common incidence of superimposition of a structure upon another previously burned or superimposed structure, suggesting a persistent pattern of reoccupation.

Activity Areas

Assigning associated activity areas to any one pit structure at NM 22 is impossible. All sites were excavated in long strips as part of a right-of-way and all sites likely have more structures and features in the immediate vicinity of the exposed component. Pit structures were also located near each other and associated features were not necessarily nearer to one than another. Furthermore, an assumption that all extramural features were used at the same time or even within a few years of one another would be a faulty one, given that trash and burials fill some of the larger storage pits at LA 265. The best model of pit to pit structure association is at LA 115862, containing five thermal features. This is probably not representative.

Summary

Early Developmental structures excavated at Peña Blanca were similar to those found in the Northern Rio Grande. Differences included southern structure orientation, ventilator apertures without a sill, larger floor area, larger number of floor pits, and higher incidence of structural reuse and remodeling. They also lacked construction details commonly associated with Anasazi or Mogollon structures such as lacking benches, wing walls, antechamber, or central post construction.

Unlike pit structures recorded at LA 272 (Snow 1971), there was no surface room association with any Early Developmental structures excavated along NM 22, possibly indicating that the surface structures tentatively dated AD 850–950 (Snow 1971) may have been built later or that the room block component was not contemporary with the pit structures, or that the site dates post-950.

Varying feature type assignments and lack of volumetric data limited comparison of intramural storage or remodeling between the Northern Rio Grande and NM 22 data sets. Pit structures at Peña Blanca were more likely to have intramural features. Comparison of specific feature types, specifically large floor cists, to regional data indicated that incidences of these facilities were comparable to regional data. The addition of off-chamber cists at Peña Blanca, a feature type rarely reported in the Northern Rio Grande databeae, suggests greater emphasis on intramural storage at LA 6169 than is regionally common. Data from extramural storage facilities derived from LA 57024/57026 and LA 109129 indicate that extramural storage capacity at these sites is comparable to and exceeds that at LA 265, sugesting similar storage behavior.

Structures at Peña Blanca exhibited signs of remodeling with a trend towards decreased interior storage and hearth use, a pattern that contrasts with similar structures excavated at LA 57024/57026 and LA 109129. This pattern potentially indicates a shift in social organization or access and distribution of resources. Most structures exhibit signs of multiple use episodes and planned ritual abandonment. Sparse floor assemblages further support planned abandonment.

SYNTHESIS

The first evidence of habitation at Peña Blanca is earliest Developmental oxidized storage/roasting pits probably used for caching foodstuffs. Lack of other structures indicates low intensity area use probably by mobile groups that returned to the area periodically over 200 years. This initial low intensity occupation indicated by pit facilities may have anchored later, more permanent, occupation. Gilman's (1987) three part criteria for pit structure use is comprised of biseasonal residence, residence during cold months, and dependence on stored foodstuffs. The earliest Developmental features represent one component of the tripartite scheme.

Comparison of regional specialized extramural storage indicates overlapping morphology between sites. Both comparative data sets indicate that large early pit features were used to the south, slightly before or at around the same time they were used near Cochiti. Context of this use may have been different. Pits in the regional comparison were located at more intensively used, possibly longer term sites.

Gilman points out that pit structure use is dependant on food storage, and the group's reliance on these foodstuff when there is no plant production (Gilman 1987). Lack of early pit structures, even shallow ones, associated with earliest Developmental features at LA 6171 may indicate that the third criterion, biseasonal residence, was not yet in place. Small, shallow structures may also have been obliterated by later pit structure construction or could have been located in the NM 22 road cut.

Architectural, feature form and frequency, and distribution variability at Early Developmental sites along NM 22 represented a full spectrum of occupation duration, intensity, and organization. Short-term residential occupations are often inferred from relatively small pit structures and limited extramural feature assemblages. More permanent and substantial occupations are inferred from larger, deeper pit structuers and from a diverse and overlapping accumulation and distribution of corporate and individual household features and activity spaces. Lightfoot (1984) defined residential stability as the amount of time spent at a residence during a year, and use duration as the total or accumulated amount of time a site was inhabited. By juxtaposing the two variables, he was able to describe sites according to yearly and cyclical long-term patterns. Sites with low residential stability and low use duration describe a seasonally inhabited location with a single use. Sites with high residential stability and high use duration describes a year-round occupation that has been periodically reinhabited. Gallivan uses accumulations theory to argue a positive correlation between diverse feature assemblages, plentiful material culture, and residential stability and identifies use duration by feature and artifact density (Gallivan 2002).

Ethnographic data indicate that "anticipated mobility" (Kent 1991:4), the amount of time a group plans to stay at a locale, is one of the most influential factors affecting facility construction and site structure. Kent found it to be a more important factor than actual occupation length, seasonality, mode of subsistence, or population size. Among hunter-gatherers, formal storage areas were only constructed if residents anticipated staying in a location for longer than 3 to 5.9 months. If an anticipated stay lengthened, storage facilities were not constructed. Habitation structures were also constructed with anticipated use in mind, more substantial structures were constructed only when a long stay was planned. If the group moved unexpectedly, the substantial structures would be abandoned (Kent 1991).

Three feature types, storage facilities, small unburned pits, and large thermal features, stand out as barometers of facility planning and repeated site use along NM 22. Large or cobble-filled thermal pits, ubiquitous among all NM 22 sites as well as at LA 57024/57026 and at LA 109129 (though in smaller feature to site assemblage ratios than at NM 22) may be basic site facilities, and some of the first features constructed. Some may have expanded with use through time as Binford (1983) described. Storage facilities may indicate intended and actual occupations (Gilman 1987; Kent 1991; Damp and Kotyk 2000). Small unburned pits were also ubiquitous, but because of their nature, may be more likely to accrue on a site, indicating intensive site use, whether seasonal or year-round.

At Peña Blanca, short-term, potentially seasonal residential use is indicated by small overall feature assemblage, restricted variation in the assemblage, and less storage capacity of fewer unburned pits. These results conform to general expectations regarding residential stability discussed by Gallivan (2002). Two sites, LA 6171 and LA115862, reflect these conditions. Both sites lacked significant amounts of intramural or extramural storage and had low feature density with relatively few to no extramural pits.

Site structure at LA 6171 reflects low residential stability and short use duration. There was one pit structure larger than 10 m in area with a formal hearth and ventilator complex, but structures were generally small and shallow. The feature assemblage is small and mirrors that of LA 265, but with less diversity, density, and storage. This may be an indication that had LA 6171 been inhabited by a larger population or continuously, for a longer amount of time, the resulting assemblage may have been more like that of LA 265.

LA 115862 was comprised of one large pit structure and had a unique feature assemblage that included only thermal features, no small unburned intermural or extramural pits, and no storage features. One interpretation of this unusual assemblage could be that LA 115862 was a winter habitation affiliated with LA 265 to the north and dependent on their stored supplies. On the other hand, the assemblage could reflect high planned residential stability, but low use duration. The site was probably not originally constructed as a seasonal camp. A huge effort was required to build the structure, as it was dug into a ridge covered by loose gravel 2 m deep (Bargmann, Chapter 9). Anticipated occupation may have been longer than the actual stay. Two women, one carrying a near-term fetus, and an infant were buried near the pit structure. Their deaths may have been reason to move. As a result, storage features were never constructed and the accumulation of small undifferentiated pits seen at all other sites were not created.

Regardless if the differences between the two sites are attributed to planning, small feature assemblages and the relative lack of diversity in the feature assemblage at both locales indicates that the basic feature count needed for a household to function is relatively low. The presence of high feature density is likely a function of more intensive or lengthy site occupation than group size or community organization.

In contrast to seasonal occupations, long-term, potentially year-round, residences had large, varied feature assemblages, formal, large volume storage facilities, numerous undifferentiated unburned pits, and superimposed and trash-filled features. Human and dog burials were found in both structure and pit fill. Large, usually deep pit structures with formal hearth complexes were also present at these sites, often in tandem with smaller structures and large features that could have been used as storage or potentially as temporary shelter. Damp and Kotyk (2000) argue that horticultural Basketmaker III habitations represent year-round residence based on the presence of large structures, large amounts of storage, presence of a communal structure and the presence of diverse macrobotanical remains. Gilman finds a positive correlation between "cold season sedentism" and pit structure use in seasonal populations, as well as length of overwintering and available surplus (Gilman 1987).

At NM 22, LA 265 was the clearest example of a potentially year-round and periodically repeated site occupation. Further to the south, LA 109129 and LA 57024/57026 had comparable structure and feature assemblages. Although features with small volumes were more typically intramural at LA 109129, all occupations relied on numerous large storage pits, some of which were filled with trash and sometimes human and dog burials. Small undifferentiated pits were also common at all sites, the emphasis on small intramural facilities coupled with plentiful extramural storage at LA 109129 could be an indicator of a greater amount of indoor activity. This could be indicative of longer winter residence or possibly of a cumulative population larger than that at LA 265, overwintering at LA 109129. This pattern is also reflected at LA 57024/57026 where archaeobotanical and pollen samples produced corn, cactus seeds, and high-spine aster pollen, among other species. All are evidence of late summer to fall subsistence processing.

Evidence of community structure and social organization that is archaeologically visible is that of household and interhousehold interaction. Wilshusen defines the household as the basic social unit inhabiting a dwelling that accomplishes basic tasks necessary for the group's survival. The best archaeological evidence of this most basic social unit is manifested by shared residence and domestic activities. Generalized or "pooled" distribution within or between several households indicates economic alliances within a community implying shared resources, and should be archaeologically visible as shared access to food storage or processing facilities. Construction of separate facilities with restricted access suggests the power of a social unit to control distribution and may indicate "exchange" or more formalized resource distribution (Wilshusen 1988b:639). The interhousehold unit is one that cooperates in domestic, subsistence, or ritual activities and is characterized archaeologically by shared domestic, storage, or ritual facilities (Wilshusen 1988b).

Both LA 6170 and LA 6169 had a pit structure with large intramural storage capacity provided by storage pits or off-chamber cists. Both sites lacked significant extramural storage facilities like the facilities recorded at LA 265, LA 109129, and LA 57024/57026. At LA 6169, large storage was installed in a mid size pit structure and may be interpreted as a restriction on household-level goods or supplies. Because this habitation may have been seasonal with the residential group absent for one to two months at a time (Post, Chapter 26) internal storage may have been as much a function of a very small group of people guarding foodstuffs from marauding animals while most household members were away.

Conversely, LA 6170 may provide evidence of a large, more continuously inhabited residential unit or the beginnings of an interhousehold organization. Structure 50 was a massive structure. In subsistence economies, an individual's wealth is often expressed as the power to control another individual's labor (Wilshusen 1988b). This type of influence—the ability to mobilize suprahousehold labor and resources—could be manifest in Structure 50 construction. Restricted storage and thermal facilities would have served to restrict access from others. In this light, the most interesting aspect of the construction is that the group gave up this restricted storage capacity. Remodeling at Structure 50 indicates a change in use that may reflect a shift in priorities from control of foodstuffs to community integration. Structure remodeling could also reflect a change in seasonal activities requiring different facilities. Schmader characterized large deep structures with large floor surfaces as winter sleeping structures (Schmader 1994).

Given the sheer amount of space gained and grinding facilities that presumably survived the remodel, this seems unlikely. Instead, the structure appears to have functioned as a full-service residence with diminished status relative to interhousehold activities.

Trends observed across sites included the presence of ancillary hearths loosely associated with specialized storage facilities, possibly indicating a cool season habitation or maybe food processing in preparation for overwintering. Structures with a sipapu had more floor pits, burials, and ancillary hearths, possibly indicating more intensive use.

Regionally, evidence of remodeling is provided by structures with capped features. The sample size is too small to generalize about a pattern of change from more to less storage, or vice-versa. But variability, along with plentiful extramural storage, and potential community structures at each site does imply that access to resources, while generally shared by the interhousehold, was fluid throughout time, and may have been influenced by fluctuating population and resource availability.

LA 265 is the best example of site structure reflecting interhousehold organization. Evidence of community integration was provided by a large, deep, community/residential structure with a formal hearth, pit, sipapu, and foot drums adjacent to the central hearth. Numerous extramural storage facilities, and a large reused thermal feature at the site periphery, further indicate shared facilities.

Most structures at Peña Blanca appear to have functioned as household residences because there is little evidence of sustained specialized or ceremonial use such as might be consistent with community integration. Although some structures may have served a dual function as a habitation and a meeting place, any integrative function beyond interhousehold cooperation is not obviously manifested in structure architecture.

Large structures that were generally of the same basic construction type were similar to regionally observed norms. Structures were predominantly constructed with four to six primary support posts and had plastered interior walls. Hearths were central and more than half of them were collared. Variations included ventilator complexes oriented farther to the southeast (most notably two structures at LA 6170 with south-oriented ventilator complexes).Ventilator apertures tended to open at the floor as opposed to above the floor on a protruding sill. There was a higher percentage of structures with sipapus and ladder rests. As with all regionally observed Early Developmental pit structures, those at Peña Blanca lacked benches, wing walls, and antechambers.

Earliest Developmental sites show an emphasis on extramural storage. Storage feature morphology though likely conditioned by use constraints, is comparable throughout the period and between sites, as is pit structure morphology. Site facilities reflect variable degrees of sedentism and reoccupation, but also imply early cold season residence along the upper Middle Rio Grande and a mixture of seasonal and year-round camps established and periodically occupied during the Early Developmental period.

Chapter 26

Fifteen Hundred Years of Human Occupation in the Northern Santo Domingo Basin: Overview and Conclusions

Stephen S. Post

The excavations along NM 22 provided new data and information on identity, subsistence, and community at varying scales for almost 1,500 years of human occupation. The site occupation histories span the introduction of agriculture to the Northern Santo Domingo Basin in the AD 400s, the establishment and demise of arguably the first ancestral Puebloan agriculture-based community in the Northern Santo Domingo Basin and the upper Northern Rio Grande Valley. Adding to this is the relatively abundant subsistence and settlement data for the period from AD 1190 to 1450, and ending with late historic period use of the terraces as seasonal residences by Cochiti Pueblo farmers. The information for the early periods is seminal for this region and the later data urge us to periodically question the received wisdom from those works that have preceded our own efforts.

As outlined in Volume 1, the research design focuses on synchronic and diachronic perspectives on the important issues of cultural affiliation, subsistence technology through artifacts and the dietary or food remains, residential patterns through site structure analysis of features and architecture, and settlement patterns from the perspective of community formation and dynamics. Volume 1 provides the environmental context and cultural-historical background and excavation results for LA 249 (a multicomponent site with Late Developmental and Classic components), LA 115862 (a multicomponent site with Early Developmental and historic components), and LA 115863 (unknown temporal component site).

Volume 2 presents excavation results from LA 265 (primarily an Early Developmental site) and LA 6169 (a multicomponent site with Early Developmental, Late Developmental, Coalition, and historic components). Volume 3 presents excavation results from LA 6170 (a multicomponent site with Early Developmental, Late Developmental, and historic components) and LA 6171 (a multicomponent site with earliest Developmental, Early Developmental, and Coalition components). Volumes 4, 5, and 6 contain the synthetic chapters from the various material culture and subsistence analyses including ceramics, lithic, and ground stone artifacts, fauna, flora, and site structure. These chapters examine the data in terms of intersite and cross-temporal comparisons relative to the research design questions. The following section is a project synthesis, which broadly summarizes the excavation and analytical results in terms of the broader research design themes and questions. It draws on data, patterns, interpretations, and conclusions presented in the site descriptions and analytical chapters. It is organized chronologically from earliest to latest.

Earliest and Early Developmental Period

Cultural Affiliation—Anasazi or Mogollon or Both or Neither?

Before excavation of the Early Developmental components from LA 265, LA 6169, LA 6170, LA 6171, and LA 115862, there were no data on the establishment, occupation, and eventual disbanding of early agriculturally focused

Pueblo populations in the Northern Santo Domingo Basin prior to AD 900. For this reason, characterizations of Early Developmental cultural affinity or identity as expressed through archaeological cultures of Anasazi and Mogollon, subsistence and settlement patterns and behaviors, and exogenous and endogenous relations and interactions were based on interpretations drawn from excavated sites located from Isleta Pueblo to Zia Pueblo to San Felipe Pueblo along the Rio Grande and its tributaries. For the most part, cultural affinity, as inferred from material culture and architectural trait lists and suites, was predominantly reported as indicative of an Anasazi cultural tradition with less substantial Mogollon cultural tradition influence. Even with a general agreement by most authors, there remain unresolved issues that are in part driven by an academic desire to relate and explain the cultural history, developments, and change in the Middle Rio Grande in terms of influences from the more focal areas of the Anasazi and Mogollon culture areas.

As indicated in the Research Design (Volume 1), archaeologists throughout the twentieth century have framed the cultural sequence in the Middle Rio Grande Valley in reference to developments in the Anasazi and Mogollon cultural cores. This outward focus promoted a received view of cultural development and change that occurred along unilineal evolutionary or transactional lines. When changes in Middle Rio Grande site material culture and architecture and their inferred implications for social and economic organization did not occur at the same time, rate, extent, or take the same form as in the Anasazi or Mogollon cores, the Rio Grande populations were characterized as lagging behind, less developed, weak patterned, or practicing a more hunter-gatherer based adaptation to riverine, piedmont, and montane environments. Apparently it was easier to characterize and interpret Middle Rio Grande material culture differences relative to the other culture areas than to acknowledge them as evidence for a distinct Rio Grande adaptation with similar origins and developmental trajectory, but probably a product of a different set of historical contingencies than might be ascribed to Anasazi or Mogollon culture areas.

When viewed from a macroregional perspective, the Rio Puerco of the East, the Mogollon Highlands, and the western Colorado Plateau, the number of excavated Middle Rio Grande sites from the Early Developmental period is low and even with the Peña Blanca sites included, the area of interest encompasses only 1,140 sq km or roughly a 60 km north-south by 20 km east-west corridor within a much larger Middle and Northern Rio Grande region as defined by Mera (1939), Wendorf and Reed (1955), and Cordell (1979, 1989). Given this fact, it becomes interesting to ask: Where did these populations come from? Did they interact with extant hunter-gatherer groups that may have inhabited a much larger portion of the region and, if so, how did they interact? Since there is such minimal evidence for interaction with any of the major cultural traditions, is it possible that they self-identified as a separate population that may have had similar customs and language, but were adapting to different cultural and natural landscapes?

Earliest Developmental Period: Continuity or Replacement?

An unexpected result of the excavation was the complex of deep, oxidized storage/roasting pits and activity area uncovered at LA 6171 that dated AD 435 to AD 665. This feature complex was intermingled with the later, more formal and residential Early Developmental component. Because this feature complex predated the Early Developmental occupations at all sites and because it exhibited distinctly seasonal and small-scale characteristics (no residential architecture, low artifact frequency and diversity, and limited extent within the site), it is interpreted as reflecting a transition from hunting and gathering to agriculture or the first pulse of agriculturally based populations into the Northern Santo Domingo Basin. While the feature types and function appear similar to those found at other Middle Rio Grande Valley sites, their low frequency and limited variability suggest groups came to the Peña Blanca area periodically to test the area for its agricultural potential and capacity to support a larger, more permanent population. The feature and artifact assemblage similarities support the interpretation that this population was looking to move into the Peña Blanca area, rather than an existing population adopting a new socio-economic adaptation. In other words, these people were experienced farmers looking for new lands for settlement expansion.

Based on current knowledge of the geographical distribution of early agricultural populations in the Middle Rio Grande Valley, these people may have come from contemporaneous sites in the Jemez River-Corrales area (VanPool and VanPool 2003; Schmader 1994). In this report, this component is called the earliest Developmental period. The term is not meant as a formal addition to the accepted Rio Grande Sequence outlined by Wendorf and Reed (1955). Instead, it acknowledges that the component is not latest Archaic, as suggested for some Basketmaker II-like components described by Reinhart (1967) and contextualized by Matson (1991), but not distinctly Early Developmental, as defined by Wendorf and Reed (1955).

Two observations can be made about this earliest Developmental component; one archaeological and the other environmental. First, the LA 6171 component is unique within a site distribution that is distinctly Late Archaic, but lacking in well-defined, relatively large volume pit features that may have served processing or storage functions. These pits are similar to Basketmaker II pits described for the Durango area and found in other Colorado Plateau settings (Bellorado 2003; Kakos 2003). The Late Archaic occupation in the Cochiti area focused on the terraces above the Rio Grande and upstream into White Rock Canyon (Chapman 1979, 1980). Seasonal foraging camps were dominated by local raw material used for expedient core reduction, fire-cracked rock concentrations, and deflated thermal features in clusters and in isolation. No structures were identified and thermal features yielded poorly preserved ethnobotanical remains degraded by exposure in deflated topographic settings, and no evidence of cultivation or consumption of maize. Based on the Cochiti data, Chapman proposed a mobility pattern focused on vertical elevation movement between the Rio Grande and the upper elevations of the Pajarito Plateau and Jemez Mountains combined with movement up and down the Rio Grande.

This scenario begs the question, were hunter-gatherer populations in the Northern Rio Grande concurrent with the early agricultural pulse? In previous presentations, I have suggested that there was a well-established latest Archaic tradition in the Northern Rio Grande that would have co-occurred with the earliest Developmental population in evidence at LA 6171 (Post 2002). In my view, agricultural-based populations did not move into the Northern Rio Grande until after AD 850. The few examples of consumption and probable cultivation may also represent early pulses from the south or they may represent intermarriage between agricultural and hunter-gatherer populations, which facilitated the small-scale, but not widespread techno-economic transfer of maize cultivation (Skinner et al. 1980; Vierra 1998). Admittedly, the Peña Blanca data are scant, but it is my interpretation that the LA 6171 earliest Developmental component represents new people moving into the area and that these early groups were the first agriculturalists that may be ancestral to later Pueblo populations and form part of modern Pueblo people. These were the first people that were Anasazi and Mogollon, before becoming Rio Grande people.

The second observation is that the initial pulse into the Northern Santo Domingo Basin occurred at a time of average to above average precipitation and of better than average predictability (Dello Russo 1999:53–54). According to the El Malpais Long Chronology [count] reconstructed by Henry Grissino-Mayer (1995) indicates potentially favorable conditions for maize cultivation between AD 490 and 660 existed. There were more average or better than average years during this stretch, suggesting that the movement into more northern settings may have occurred at a time of possible prosperity for populations living in the Jemez River-Corrales areas, rather than during stressful times. In other words, settlements were looking to expand rather than move to ameliorate the effects of deteriorating or unfavorable climate on maize production.

In light of the "refugium hypothesis" for the late adoption of maize cultivation and the attendant suite of social and economic traits and behaviors, it would appear that the early pulse in the Northern Santo Domingo Basin was small-scale population movement rather than resident populations incorporating an agricultural lifestyle into a well-established hunter-gatherer economy. This does not mean that hunter-gatherers did not incorporate domesticates into a seasonal economy, only that it may have been at a very small-scale and it probably entailed the interaction with populations moving up the Rio Grande. Based on the Malpais Long Count sequence, it is also possible that the very dry interval from AD 258 to 520 caused a geographic shift (to the north?) of hunter-gatherer group annual territories, leaving the Peña Blanca area open to settlement pulses from the south.

Early Developmental Period: When They Came to Stay

By AD 750, the Peña Blanca area was settled by fully residential, agriculturally dependent households that probably formed a village or small community. The households occupied round, roof-entried, subterranean pit structures with four or multipost roof supports, collar-lined or unlined central hearths with aligned ash pits and ventilators, and a variable array of floor and wall features. Extramural spaces supported storage, processing, and productive activities as inferred from a wide variety of pits and feature types. The scale, distribution, and frequency of features suggest accumulations through sequential occupations rather than contemporaneous interhousehold occupations of individual terrace locations. Culinary activities focused primarily on cooking cultivated plants and garden-hunted animals with less evidence for processing and consumption of large game and gathered plant foods. Plain gray pottery vessels were the most common with a relatively diverse assemblage of forms, although most forms were probably open bowls and open to moderately restricted opening jars used for cooking and storage. Decorated pottery followed the widespread San Marcial/White Mound Black-on-white tradition with non-local pottery more commonly from southern sources or mimicking western sources (red-on-white wares). Burial practices employed inhumation in pit structure fill and in extramural burial pits with burial offerings including jewelry and pottery. While there is some variability in all material culture and architectural classes, as would be expected, the overall pattern is highly consistent with Early Developmental/Basketmaker III sites reported throughout the Middle Rio Grande Valley.

In considering cultural affiliation, the most recent compilations of site structure and material culture data from Early Developmental/Basketmaker III sites (Gerow 1999; Schmader 1994) agree that the weight of evidence favors aligning these sites with the Anasazi Cultural Tradition. This is also voiced by C. Dean Wilson for the Peña Blanca ceramic analysis (Chapter 16).

However, it is important to note that by AD 700 or 750 there were changes in the architecture and material culture at sites on the eastern Colorado Plateau without similar changes at Middle Rio Grande Valley sites. Differences in this Basketmaker III to Pueblo I transition and Pueblo I pattern is evident in pottery, architecture, and site structure. They signal a developmental and structural split between Middle Rio Grande and Anasazi historical trajectories. Until the middle 900s the Middle Rio Grande Valley populations maintained a highly conservative, but flexible and open suite of customs, traditions, and exogenous interaction.

By AD 700 Anasazi culture area architecture and material culture shows signs of formality indicative of differentiation, exclusion, and control (Lakatos 2007; Lakatos and Post

2005). This formality was well embedded within and expressed over a wide geographic area, somewhat analogous to the Chaco world. The empirical observation that the Middle Rio Grande Valley and early settlements in the Northern Rio Grande Valley into the AD 900s looked similar to AD 700 sites in the Anasazi core led to characterizations of cultural lag or backwater and marginality. This was and is the perceived view of Middle Rio Grande culture history.

The alternative view is that the Middle Rio Grande populations developed a robust and conservative economic strategy and social organization. Social and economic organization was consistent with the requirements and needs of a dispersed and low population group living within a seasonally diverse and abundant environment. Middle Rio Grande Valley groups also interacted with and were bordered by groups that had higher populations and stricter social organization and other groups that were more mobile, less densely populated and more fluid in their social organization (plains and montane hunter-gatherers) (Lakatos and Post 2005; Post 2002, 2009).

Earliest and Early Developmental Settlement and Subsistence: Eden, Refugium, or Just Good Timing

As proposed in the Research Design in Volume 1, the Early Developmental settlement pattern can be characterized as pulsing, low density, and relatively low frequency for most of the period. Site clusters in the Corrales and Rio Rancho areas suggest that some settings were conducive to longer, and perhaps, more concentrated settlement into interhouseholds and interhousehold clusters. As an alternative to the unilinear evolutionary model explanations for the Early Developmental settlement pattern, Cordell (1979) suggested that adaptation to a richer, more diverse environment precluded maize specialization, an increased need for year-round sedentism, and a sudden increase in population requiring more intensive subsistence strategies and social mechanisms for organizing and guiding intra- and intergroup interactions. The expectations was that Middle Rio Grande Early Developmental populations would be more seasonally mobile, practice a fluid and flexible social organization, and were stained by mixed subsistence practices with greater reliance on wild foods than their eastern Colorado Plateau counterparts.

The earliest Developmental component from LA 6171 suggests that there was a seasonally mobile element to the AD 500 to 700 settlement pattern and subsistence strategy. A household or household segment or segment of an interhousehold moved into the Peña Blanca area at a time when precipitation patterns were favorable. Charred maize recovered from inside some of the large, deep pits suggested that maize cultivation was practiced, at least on a small-scale with harvested maize on cobs stored for an unknown length of time. The charred maize strongly suggests some consumption and more weakly supports an interpretation of cultivation. The few ceramic and chipped stone artifacts recovered from the pit features did not provide conclusive evidence that a hunting and gathering strategy was emphasized more than consumption of domesticates. If, as we surmise, these people traveled to the Peña Blanca area from the Santa Ana, Corrales, Rio Rancho area to the south, then they appear to have focused on the Santa Fe River and Rio Grande confluence. While it is possible that structures and other features from the earliest Developmental period may have remained outside the right-of-way or were destroyed by earlier road construction, the empirical evidence from excavation suggests they were primarily implementing a subset of traditional subsistence practices relying on foraging, hunting forays, and consumption of domesticates.

Early Developmental settlement of LA 265 may have occurred in stages with a shallow pit structure built and occupied in the middle to late 600s and some of the surrounding pits used for storage, processing, and daily site activities. The initial occupation may have been seasonal and an elaboration on the earliest Developmental settlement strategy with claims to productive lands reinforced by construction of structures and outdoor work areas. By the early to middle 700s, LA 6170 and LA 265 were occupied with deep pit structures built and an array of extramural features for storage and processing accumulating at LA 265. In the late 700s or early 800s, all the sites were occupied with deep pit structures, intramural storage more common at LA 6169 and LA 6170. Extramural storage was most common at LA 265 and LA 6171 and LA 115862 lacked substantial storage features. By the late 800s, site activities within the excavated site areas were curtailed. There is some evidence for partial refuse filling of pit structures at LA 265 and LA 6170, suggesting residential occupations continued to the end of the 800s or early 900s, but no structures associated with this terminal component were excavated by the project.

What were the subsistence strategies employed by the Peña Blanca site residents? Did these strategies change through time? Were there differences in technologies and strategies employed across sites? Does the evidence for Peña Blanca subsistence practices and organization differ from other contemporary sites to the south? Were these groups more hunter-gatherer oriented than their southern contemporaries? These basic questions guided the analysis of ceramics, lithics, fauna, macrobotanical and palynological specimens, human remains, paleoenvironment, and site structure.

The ceramic analysis focused on characterizing assemblages in terms of daily and anticipated use. All site assemblages were dominated (more than 90 percent) by plain pottery with coarse temper and low, light-colored firing clays that were locally available in the Northern Santo Domingo Basin. Peña Blanca potters used local materials to produce expedient cooking and storage jars that were resistant to thermal shock, resilient for daily handling, and were more easy to replace than decorated wares. A wide range of plain vessel forms were identified within the project-wide assemblage attesting to the utility of this manufacture technique. According to Wilson (Chapter 16), plain pottery reflected an emphasis on expedient or maintainable technology consistent with more mobile settlement patterns.

There were no significant differences between site assemblages or through time from the middle 600s to the late 800s that would suggest a change in subsistence strategy or residential patterns. Minor differences may be attributed to length of occupation, recovery methods, and individual household idiosyncrasies. The focus on a maintainable ceramic technology allowed for procurement of materials from nearby, access to readily replaced tools that were multipurpose and functioned equally as storage, cooking, and serving and consumption wares. Household size and composition was unlikely to affect the availability of ceramics for daily activities or longer duration intramural storage.

Chipped stone analysis focused on how raw material selection, core reduction trajectory, and tool manufacture use and discard might be organized within a mixed subsistence strategy that supported sedentary and mobile segments of the households, interhouseholds, and village. Early Developmental period subsistence has been characterized as mixed with seasonal reliance on domesticated and wild foods. The relative contribution of different food sources to a group's diet and the investment in acquisition or production and processing made by groups may be reflected in the chipped stone assemblage as core reduction and tool manufacturing debris, used, broken, and discarded tools and proportion and distribution of debris, informal and formal tools within and between different activity and residential areas of a site and sites.

Analysis of raw material selection for core reduction and production of informal and formal tools showed that core reduction relied on a wide variety of fine- and medium-grained locally available chert, chalcedony, basalt, and obsidian. Locally available chert, chalcedony, and basalt core reduction debris dominated all assemblages reflecting their presence in the local gravel deposits in greater proportion than obsidian. This high frequency of cryptocrystalline and basalt debris corresponded with their predominance in informal tools at all sites, except for LA 6169, where obsidian and other materials were used in similar ways. Daily subsistence and productive activities were supported by the reduction of locally available materials and the production and use of informal tools.

More specialized or formal tools, mainly projectile points and bifaces, were most commonly made from obsidian. According to VanPool's performance characteristics study of projectile points (Chapter 18), obsidian was a superior raw material. Use of obsidian fulfilled a critical technological requirement more consistently and completely than other raw materials. Chert, chalcedony, and basalt were made into projectile points, but they were in the minority for all sites. Reliability, predictability, and replicability all were optimized by the use of obsidian.

The large number of projectile points (n = 175) strongly emphasizes the importance of hunting to Peña Blanca residents' subsistence. The predominantly corner-notched triangular points were suited to small and large game and were easy to produce and maintain (VanPool, Chapter 18). The small projectile points exhibited performance traits optimal for a generalized hunting strategy.

A quandary presented by all site assemblages is the low frequency of biface manufacture to maintenance debris. Schutt's analysis of breakage and discard patterns (Chapter 17) indicates that projectile points were made on the site based on the presence of manufacturing breaks, but in low frequencies. The most frequent breakage could be attributed to use suggesting that projectile points that were broken during hunting were often removed from their shafts on site. Some reworking and reuse of points based on metric distributions at the low end of expected dimensions is demonstrated in VanPool's study (Chapter 18). Some projectile point tips that were reworked during hunting trips were ultimately discarded at the residential sites. Whole points recovered from structure floor and fill contexts may reflect small-scale caching or storing of finished arrows that were left in place when structures were left unoccupied.

These different lines of evidence point to a mixed hunting strategy that may have exploited local and distant game. The fact that the corner-notched points were effective for killing prey of all sizes allowed opportunistic daily hunting in and on the margins of fields and riparian environments and logistical hunting in montane and plains environments for sheep, antelope, deer, and elk. Schutt's observation that "The virtual lack of used and broken bifaces and unifaces, yet large number of manufacturing failures indicates that manufacturing occurred on the sites. Clearly tools were used and discarded at other locations. This would suggest that tool fragments and used-up tools were discarded at special activity sites away from the NM 22 sites." This strongly reinforces an interpretation that hunting and initial meat processing and rendering occurred off site. Therefore, even though bone from large mammal meat packages made up a small proportion of the identifiable animal bone recovered from Peña Blanca sites, the tool assemblages suggest that long-distance hunting may have been an integral part of the annual subsistence organization.

Early Developmental period ground stone tools reflect a low to moderate emphasis on processing wild and cultivated plant products. Low frequencies of complete tools and ground stone fragments seem to indicate that tools were not regularly exhausted or broken and therefore, replacement tools were produced infrequently. The low frequency of ground stone is unlikely due to recovery methods or area because a wide range of intramural and extramural domestic contexts and activity areas. Typically, the one and two-hand manos and trough, basin, slab, and mortar metates were recovered. While it can be argued that these millstones were made from highly durable materials, their frequency is low for occupations that may have spanned 50 to 100 years, except for LA 115862, which was occupied for less than a generation. The relatively diverse range of grinding implements would have supported a mixed foraging/farming plant food dietary component. Overall diversity in each site assemblage seems to be a reflection of occupation longevity. The largest number of tool types are present at the longest occupied sites, where tools would most probably be used to the point of discard. Assemblages from LA 265 and LA 6170 probably represent a range of processing activities that occurred at all sites, rather than a locus of specialized activities.

Food remains are potentially the most direct evidence for subsistence practices, strategies, and organization. Animal bones were the most common and ubiquitous food remains recovered by the Peña Blanca excavations. All things being equal, game procurement, processing, consumption, and discard behaviors should be represented by the proportions of species, elements, butchering, and thermal alteration. As Nancy Akins (Chapter 20) made very clear, all things are rarely equal in faunal assemblages, which may be substantially affected by recovery methods and biases, and post-depositional and taphonomic processes. These formation processes combined with variable and dynamic exploitation, butchering, consumption, and discard behaviors can make it difficult to assess the relative contribution that different species mixes might have made to Early Developmental Peña Blanca diets. The relative proportions of different game species may also be an important indicator of hunting strategies and occupation behaviors. If the Northern and Middle Rio Grande were gateways to rich and diverse ecosystems, is there evidence to support the supposition that Peña Blanca populations were organized in ways that would allow them to more intensively and successfully exploit such abundance and diversity? Were they more mobile than their counterparts? Was logistical hunting a major strategy for procuring protein and fat stored in large game mammals?

Akins (Chapter 20) concludes that "This study finds little if any support for a hunter-gatherer refugium model (as described by Ware 1997:47)." The primary evidence for this conclusion is the heavy reliance on cottontail rabbit and other field-hunted species suggesting that the bulk of the daily protein may have been obtained from nearby sources. The presence of large game mammals in all assemblages does indicate a mixed hunting strategy with montane and grassland species represented at all sites. Akins also suggests that large mammal skulls found in closing and abandonment contexts may correspond with hunting-related rituals or beliefs.

Observations from the faunal analysis indicate that meat procurement and consumption was primarily managed at the household level. The low incidence of roasted bones suggested cooking methods consistent with female-directed cooking and food preparation. A concentration of cottontail rabbit carcasses (LA 6169, Feature 33) with roasting discoloration suggested episodic group hunting efforts, perhaps associated with seasonal changes in group size and composition.

Akins does not discount the possibility that healthy and able segments of the households may have left the Peña Blanca residences to exploit more distant food sources during non-critical periods during the growing season. Hunting groups, potentially composed of men and women, may have traveled into the Jemez and Sangre de Cristo mountains to hunt and gather, placing less stress on local biotic resources, leaving garden-hunting to less mobile or fit household members, and returning to the residences with highly processed and portable food packages and utilitarian animal musculo-skeletal animal parts. A biseasonal subsistence pattern would have relieved social pressures, maintained household world knowledge base, allowed for interaction with nonagricultural groups moving through similar hunting and gathering territories, and divided ritual responsibilities between different household or interhousehold members.

Archaeobotanical studies of macrobotanical and pollen remains were based on samples submitted from a wide variety of feature and stratigraphic contexts that were expected to be the most informative. Evidence for a broad-based, heavily wild-food dependent, part-time agricultural subsistence organization was the most represented for any period, and ended with many of the same conclusions reached by the faunal analysis. The most used thermal features from all sites yielded no evidence that wild plants were intensively processed during their terminal uses, so that agricultural stress did not lead to consumption of more wild plant foods. Midden deposits were sampled to ascertain if bulk domestic refuse would show evidence of wild plant consumption, but the typical wild grass seeds were the most common. There were low frequencies of fruits and seeds from cactus, yucca, piñon, and juniper, but rarely in significant concentration, which probably indicates regular, but not excessive use of wild species that might populate the village and field margins. Minimal exploitation of riparian resources for food is evidenced by cattails. Reeds were a common constituent of roofing at all sites.

Pollen analysis confirmed the ubiquity of maize with a consistent presence of wild plants that flower at different seasons. Cacti and cheno-am were the most common pollen from edible wild plants. Storage features from all sites consistently had evidence of cactus pollen suggesting storage of fruits. Cactus pollen was in human interments along with other flowering plants suggesting their use as offerings (Holloway, Chapter 23). Higher altitude exploitation of plant resources is indicated by ponderosa pine, spruce, and Douglas fir pollen. Boughs from these conifer species may have been used as covers for burials, intramural storage pits, and in house blessings, since these pollens did occur in pit structure postholes. Overall, pollen evidence suggests a balanced and wide-ranging exploitation of seasonally available plants and elevation-specific conifer species. However, there was no evidence that wild species were acquired and exploited at the expense of maize cultivation. The majority of the exploited wild plants could have been obtained within easy walking distance of the Peña Blanca residences.

Human skeletal remains provided some of the strongest evidence that the Peña Blanca residents were mobile for part of the year for a significant portion of their adult lives. The gender composition of the Peña Blanca burial population is also very interesting because it was predominantly women and children. The women were of all ages, with three women from LA 265 exhibiting a similar genetic anomaly, indicating they were related and represented at least two generations of female residents. Where were the men? Were they missed by excavation coverage or were they subject to different burial customs or were they interred in a different location?

Akins (Chapter 22) determined from femoral measurements that Peña Blanca women were more robust than observed for later populations within the Peña Blanca/Cochiti area, across the Northern Rio Grande region, and for agricultural populations of the La Plata Valley in northwest New Mexico. The low frequency of male burials and the osteological evidence of highly mobile women suggests that Peña Blanca populations were mobile for a good portion of the year. Periodic mobility conferred a number of benefits to a population that could practice a balanced or diverse subsistence strategy. Seasonal forays may have taken family-based task groups up the Santa Fe River into the lower Tewa Basin, perhaps bringing them in contact with intermontane hunter-gatherers with whom they could exchange information and food or made items. By leaving the village in the spring, their absence would have stretched precious stored foods that would have supported the family members who could not leave the village. Movement across large areas would have helped establish and maintain new territorial claims or reinforce existing ancestral land-use patterns. Population pressure on land and resources from farming populations was low at this time. However, extensive land use and resource acquisition strategies may have been negotiated with northern or montane hunter-gatherer groups. While a seasonal mobility pattern does not explain the missing male population in the burial assemblage, it may account for a dispersed, or uneven distribution of burial locations for Peña Blanca households.

When all the material culture and subsistence data are taken into account and compared with similar data from excavated sites in Corrales/Rio Rancho, the lower Jemez River, and NM 550, there are few obvious differences. Ceramic, faunal, lithic, and ethnobotanical assemblages show similar patterns of utilization (K. Brown 1999; Schmader 1994a; VanPool and VanPool 2003). A lack of riparian mammal exploitation is evident from all sites with an emphasis on garden-hunting and limited large mammal exploitation. Maize is ubiquitous with instances of heavy reliance indicated by presence of burned stores (Schmader 1994). Ceramics are dominated by plain wares, and southern and western intrusive decorated types are most common. A wide range of vessel forms is present. Plain storage/cooking jars are the most common, reflecting the wide distribution of maintainable technologies consistent with populations that are mobile and may need to regularly refurbish their supply of utility wares. The few occurrences of human skeletal remains at regional sites did not reinforce or refute the apparent pattern of female robusticity observed in the Peña Blanca population. At present we cannot conclusively state that Peña Blanca women participated in a more mobile lifestyle than their southern counterparts. We will have to wait for demographic data from future excavations.

Early Developmental Household and Social Organization

In the research design and based on the large body of data available on Early Developmental or Basketmaker III–Pueblo I populations that lived on the Colorado Plateau and along the Rio Grande, we expected that the Peña Blanca sites would reflect household and, perhaps, interhousehold organization. A one-to-one relationship between household and primary habitation, the pit structure, is commonly used to estimate population numbers and the level of complexity of social and economic interaction among households, villages, and communities. At the Peña Blanca sites, the site structure patterns conform with the larger-scale temporal and spatial pattern. Examination of occupation sequence (Badner, Chapter 25) indicated that each Peña Blanca site only supported a single household at any given time, even when multiple pit structures were present. The exception is LA 115862, which reflects occupation longevity, rather than intensity. At LA 265 and LA 6171, multiple pit structures are accompanied by dense clustering of storage and processing features, and at LA 265 heavy re-use of specific site locations. LA 6169 and LA 6170 had less evidence of occupation intensity as manifested by extramural feature abundance and density, but had more intense intramural use and occupation patterns suggesting a slightly different organizational approach to daily activities than that displayed by LA 265 and LA 6171.

The Peña Blanca population, which did not exceed 40 or 50 individuals, was organized so that households fulfilled most social and economic needs. Spacing of residences on terraces with access to dry-farming and floodplain agricultural land should have provided each household with sufficient arable land, access to water for daily use and irrigation, and some diversity in field locations. Proximity of residences to fields facilitated field tending and guarding by less mobile or robust members of the household during the growing season. Continued low population would have promoted settlement stability, as there was no pressure to produce more from the same amount of land retarding effects of soil depletion through time. Human osteological evidence indicated that the Peña Blanca population was not nutritionally stressed and the presence of old-aged individuals supports the observation that the population was relatively healthy.

The close proximity of Peña Blanca households (five distributed along a 2.1 km stretch) allow for the possibility that they were organized into a village or a network of interhouseholds. Evidence of communal activities, if they occurred, was at LA 265, where the largest diameter structure had the fewest floor features, the largest hearth, possible floor drum vaults, and clusters of divots along the wall. Structure 1 may have functioned as a communal and domestic structure. Furthermore, LA 265 has the greatest concentration of large extramural processing and storage features. While the majority of the extramural features could be explained by accumulation through sequential occupation, it is possible that some of the features supported communal activities. Lacking from the artifact assemblage from LA 265 is evidence of exotic vessel forms or types or unusually large forms that might suggest group activities or use and discard of specialized forms, as was posited for the Dolores project sites (Blinman 1988).

Household-level ritual is suggested by the presence of sipapu or sipapu-like narrow-diameter cylindrical profile pits within pit structures. These pits, while not unequivocally related to ethnographically documented ritual features, may be prototypes or early expressions of a practice that became more formal later in time. Other possible ritual activities are inferred from the placement of animal skulls or horns in ventilator tunnels or in cardinal directional locations on pit structure floors. Placement of these items in conjunction with structure abandonment may represent a cultural custom with specific behaviors determined by individual choice rather than strictly defined mores or rules.

As expected from regional data, the main social organization unit in the Peña Blanca community and along the Rio Grande, at this time, was the household. Some evidence for differentiation of pit structure size and feature configuration occurs in all hypothesized communities along the Rio Grande. For example, the Artificial Leg/River's Edge community had one pit structure (LA 59616, PS 3) that was 50 percent larger than the next largest and at least twice the size of the remaining 35 pit structures. Low population and assumed low pressure on subsistence resources would have reduced the need for community integration for all economic reasons, suggesting that occasional activities related to social integration occurred in these structures. Such activities may have accompanied exogamous marriage patterns and bilateral residential patterns within an early tribe or group that had biologically, linguistically, and culturally related people scattered over a large area.

Late Developmental Period: Continuity and Accommodation

Between AD 900 and 1050 or 1100, there is no concrete occupation evidence at the Peña Blanca sites. As described in Volume 1, LA 272 represents one of the few confirmed AD 950 to 1050 residential sites in the Peña Blanca/ Cochiti area. This period coincides with the establishment and expansion of settlement in the Tewa Basin by what are assumed to be ancestors of modern Pueblo Indians or ancestral Puebloans as defined by direct historical and geographical association. While it is likely that these people were descended from or are biologically or culturally related to Early Developmental populations, it is not a certainty. A small percentage of plain ware pottery from Peña Blanca sites and LA 272 are tempered with granitic materials that may sourced to the Sangre de Cristo Mountains and its drainages. Granitic-tempered utility ware is very common in the Peña Blanca Late Developmental period assemblages. Architecture includes a combination of pit structures and above-ground puddled adobe rooms. Conservative pottery traditions incorporate Red Mesa Black-on-white design styles and neck-banded, zoned, and indented corrugated utility with plain wares. Red Mesa style pottery was combined with southern design traditions creating a regionally distinct Kwahe'e Black-on-white by the middle 1000s or early 1100s.

Settlement returns to the Peña Blanca area by the late 1000s or early 1100s. The ground stone cache and possible mealing room at LA 6170 and the pit structure at LA 249 are the earliest components. The LA 6170 component suggests seasonal and specialized activities that may have coincided with tending, guarding, and harvesting crops. LA 249 is a more substantial residence, but only sufficient in size for a single household. The later component at LA 6169 (Structure 76) is formal and well constructed, although it has a limited number and variety of intramural features. Its occupation type could be seasonal or year-round. The interment of three burials within the structure limits suggests that there was a fairly substantial residential occupation of LA 6169 during the Late Developmental period. Unfortunately, no architecture from a later occupation was identified.

It is the similarities in architecture, social organization, occupation scale, and adherence to a conservative pottery tradition that suggests the Late Developmental populations were part of a distinct cultural group indigenous to the Middle and Northern Rio Grande Valley. Similarities with groups living as far north as Taos, south to Belen, and west to Laguna or the eastern part of the Acoma Province suggest the Peña Blanca populations were participating in a widespread social and economic system. Just as their probable forerunners could be characterized as Anasazi, so could these Late Developmental groups, except they seem to have a separate and distinct cultural identity that is geographically centered along the Rio Grande Valley with related groups along the Rio San Jose, and, perhaps, along the northern margins of the Salinas and northern Jornada Mogollon. Undoubtedly, these Rio Grande people had knowledge of and may have maintained limited relations with people living in the eastern Colorado Plateau, but their influence appears to be negligible, as judged from the percentages of nonlocal pottery.

Making a Living along the Rio Grande, AD 1100 to 1200

By the AD 1100s, farming households returned to the Peña Blanca area. Based on excavation of Structure 76, LA 6169, and partial excavation of Structure 8, LA 249, it is evident that a mixed subsistence economy sustained the Peña Blanca residents. The pit structures are somewhat smaller than their Early Developmental counterparts. Interestingly, Structure 76 was built into Structure 47 with a retaining wall, instead of using the complete circumference of the earlier structure. Intramural floor features were simple, and at LA 6169 there was an array of extramural features that were small in size suggesting they supported household activities. No storage features were encountered at either site, which would be expected if the residents did not plan to overwinter.

Direct evidence that the Late Developmental period residents were seasonal is lacking, although the absence of storage suggests they were part-time residents. Plant remains are conclusive regarding seasonality. Toll , McBride, and Badner (Chapter 23) suggest that Late Developmental occupation at Peña Blanca was seasonal because of the low contribution of weedy annuals. The increase in maize ubiquity suggests a spring to fall occupation with some plant gathering and consumption occurring during the early fall in conjunction with harvesting. Faunal remains provided mixed messages when compared to the ethnobotanical data. With an increased reliance or focus on agriculture, garden-hunting and attendant species would be expected to increase or be equal to the Early Developmental pattern. Instead, the cottontail rabbit proportion decreased and the deer contribution increased, suggesting a change in hunting focus or strategy. Akins (Chapter 20) suggests that as populations became less mobile, species taken by garden-hunting may have changed with deer taken closer to home resulting in more elements discarded at the site, rather than at a distant meat processing location.

Decreased mobility is indicated by the small burial population for which robusticity indices are more in line with sedentary populations. Seasonal movement may have been tied to residential mobility between summer and winter homes, while Early Developmental mobility was farther ranging and included movement within and between territories and not movement of the household between residences. Ceramic assemblages display an increase in decorated pottery and a decrease in utility pottery, although utility pottery is still dominant. The increase in decorated pottery is interpreted by Wilson (Chapter 16) as production of more reliable forms, a characteristic of less mobility and more residentially stability. This pattern holds true throughout the area defined by the "Kwahe'e system" according to Wilson. Similarities in temper and paste in the utility wares suggest northern connections for Peña Blanca residents, although southern influences were also suggested by the continued occurrence of plain surfaces and the presence of Socorro and Chupadero Black-on-whites.

So it appears that Late Developmental populations in the Peña Blanca area were agriculturally dependent and more reliant on garden-hunting than Early Developmental residents. Biseasonal residential mobility may have replaced tethered seasonal mobility. Strong affiliation with the north indicates that these groups may have wintered in the southern Tewa Basin, although evidence is circumstantial.

Social Organization

Late Developmental period residents appear to have participated in a loosely knit local community defined by the distribution of sites along NM 22 and the components at the Red Snake Hill and North Bank sites. These few structures display consistent site structure, material culture, and subsistence patterns, as well as relatively close contemporaneity. To date, it appears that most interactions occurred between households that operated within a larger social network, which Wilson (Chapter 16) calls, "the Kwahe'e system." Local or daily activities of food acquisition and production and basic social customs or rituals were likely performed with limited external input or interaction. Population, at least in the Northern Santo Domingo Basin, remained relatively low and would have exerted minimal pressure on local resources. Identity, kinship, corporate ritual or social responsibility, and maintenance of long-distance relationships probably operated at intercommunity levels that may have functioned within the regional limits of the Kwahe'e system, but did not involve interaction with all geographical or corporate groups. These interactions would have facilitated marriages, movement of households between differentially productive areas in response to erratic climate, and maintenance of ties as buffers against multiple bad years, when moving between areas was not an option. In all, the Late Developmental social structure may not have been fundamentally different from Early Developmental patterns. Difference in mobility and residential patterns may have evoked behaviors that were different, but left similar material traces.

Coalition Period: New Kids on the Block or Just New Neighbors?

The Coalition period is characterized as a time of population increase, settlement expansion into previously unoccupied or sparsely populated areas, change in pottery manufacture to a carbon-paint decorated pottery, and the founding of and interaction between communities with the early formation of tribal identities a possibility (Habicht-Mauche 1993). Many investigators suggest this as a time of shifting population and a change in social relationships and economic activities including increased sedentism and reduced access to former territories. Affinal relationships between Late Developmental and Coalition residents of the Peña Blanca area is possible and still should be questioned. At LA 6462, Coalition period surface room blocks and kivas were built in proximity to Late Developmental pit structures seemingly indicating an unbroken occupation sequence. However, settlement locations may have been favored for access to water and well-drained arable lands by both populations, regardless of descendant relationships and land tenure.

Coalition period components were encountered at LA 6169 and LA 6171. LA 6169 and LA 6171 apparently had surface structure remains, but they were outside the project right-of-way, were destroyed by previous road construction, or the surface architecture was poorly preserved. The two possible puddled-adobe surface room remnants at LA 6169 yielded no information on the identity or affiliation of the occupants. The same is true of LA 6171, where the small room block was outside the project right-of-way. Instead, most of the Coalition period information was derived from the excavation of four pit rooms at LA 6169 and a house pit from LA 6171. These structures represent seasonal, probably warm-weather or growing season residential occupations by one or two members of a household or interhousehold. Structure 70 at LA 6169 contained a mature-aged adult male interment.

The most obvious local relationship or affiliation of these site residents would have been with the residents of the North Bank site (LA 6462), a village consisting of a cluster of room blocks, kivas, and pit rooms, which was occupied during the middle to late 1200s (Bussey 1968b). Biella (1979:121) suggests that there were three levels of social unit represented by Cochiti Reservoir and southern Pajarito Plateau architectural data: single rooms, which may have supported a single household, three- to eight-room structures, which housed three to five commensal groups and large sites of 15 or more surface rooms, which housed two of the three to five commensal group social units or up to ten commensal units. In Peña Blanca project social organization typology, the first unit would be a household or commensal unit. The second unit would be an interhousehold, and the third unit would also be classified as an interhousehold residential unit. The clustering of small, medium, and large structures at the North Bank site might be classified as a village depending on room block contemporaneity.

One of the main lines of evidence available for examining possible social or economic relationships and by association, identity or affiliation, is pottery. Utility pottery recovered from Late Developmental and Coalition period components exhibited a shift in inferred manufacture source as suggested by the most likely geological source of the temper. Late Developmental utility ware pottery was tempered with granitic crushed rock or sand. As discussed by Wilson (Chapter 16), granitic temper is commonly sourced to the foothills of the Sangre de Cristo Mountains and the southern Tewa Basin. Acquisition of utility ware pottery from non-local production centers suggests that the Peña Blanca Late Developmental residents were economically linked and, perhaps, socially tied to groups living along the Santa Fe or Tesuque Rivers. Faunal and ethnobotanical evidence from Structure 76, LA 6169, and Feature 6, LA 249 suggests seasonal occupations during the maize growing season. This evidence is not strong or conclusive, but allows for the possibility that household groups or a segment of a household group was living in the Peña Blanca area during spring, summer, and early fall and returning to a Tewa Basin village during the fall and winter. Similar granitic pottery was recovered from North Bank and Red Snake Hill components suggesting that an interhousehold was seasonally moving to the Peña Blanca area.

However, within a relatively short span (less than 20 years), pit structure residences were replaced by surface room blocks, kivas, and pit rooms in the Peña Blanca area. Pottery recovered from these components is very similar to anthill sand found in utility pottery on sites of the southern Pajarito Plateau. Did the Late Developmental households in the Peña Blanca area simply change their pottery providers and make a wholesale change in their residential pattern as inferred from architecture or are these different people?

The most parsimonious explanation is that the Peña Blanca and Cochiti Dam site residents were members of a community that had close ties to villages on the Pajarito Plateau. The shift from Tewa Basin to Pajarito Plateau affiliation may have occurred through retraction of territory caused by short-term drought, a reapportionment of family land or shift in tenure patterns due to intermarriage or death, a redistribution of population in response to intrinsic population growth and immigrating populations onto the Pajarito Plateau or a combination of factors. There was definitely a new residential pattern, a probable retraction in territory, institution of fieldhouses (pit rooms) for seasonal occupation, and the construction and use of specialized rooms and facilities within and external to villages and interhousehold clusters.

Seasonal Structures and Specialized Subsistence Activities

Coalition period components that inform on subsistence organization were limited to LA 6169 and LA 6171 for architecture and LA 6169 for material culture and ethnobotanical and faunal data. The small portion of Structure 12 present within the project limits at LA 6169 did not yield data from contexts useful for interpretation. The same holds true for a small room block at LA 6171, and a probable room block that was completely outside the project area at LA 6170.

These small room blocks indicate that the terraces were targeted for residential occupation during the 1200s or early 1300s by interhousehold-scale commensal groups. Actual number of people occupying the terraces above the Rio Grande may have been higher than anytime previously. While land tenure may have been determined by lineage or kinship, management of any change in tenure or land holdings may have occurred through corporate leadership or participation. Changes in farming strategies may be indicated by the establishment of pit rooms as seasonal residences and as specialized work rooms. Commensal group seasonal occupation, short-duration, but repeated seasonal occupation by one or two individuals, and the establishment of specialized mealing rooms suggest that farming strategies changed and how land tenure was determined and maintained, also changed. From full-time seasonal residency to part-time seasonal residency to daily occupations, the scale and intensity of occupation changed and presumably the daily on-site subsistence needs changed, while shifting to activities that supported the interhousehold needs at a different location.

Coalition period subsistence displayed a decided decrease in the occurrence of wild plants and large mammals, the reintroduction of the turkey, heavy reliance on maize, and the use of maintainable ceramic technologies that were undoubtedly brought to the seasonal residences rather than produced at the seasonal locations. This basic fieldhouse pattern indicated that during the growing season, residents relied on a limited range of locally available food resources. Application of ceramic and lithic technologies were limited and the presence of mealing bins in Structure 16, LA 6169, indicates that productive activities supported site occupation in a small way, but were really intended to support the larger residential sites located up the Rio Grande or maybe on the slopes of the Pajarito Plateau.

Powers and Orcutt (1999:555) suggest that unpredictable climate and associated variability in agricultural productivity from AD 1200 to 1250 favored dispersed, low population settlements, farming in a variety of topographic settings, and a wider range of farming strategies to maintain population levels during years when surplus accumulation was unlikely or uneven. The Peña Blanca pit rooms fit this scenario well. The pit rooms located adjacent to farm land required limited investment and maintenance, but increased access to farm lands. Flexibility and adaptability may have increased productive capacity, without requiring the major shifts in social and economic organization that accompanied aggregation in the 1300s.

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Appendix 1
Petrographic Analysis Report

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A sample of 90 sherds from the NM 22 Project was submitted for petrographic analysis, including samples from Early Developmental, Late Developmental, and Coalition period components. As discussed in more detail below, the temper and clay mineralogy for these samples are varied. Fourteen distinct temper types (I through XIV) were identified along with six clay types (A through F). Although a field sourcing study phase was not undertaken, the mineralogy of the sherd samples are compared with geologic data available for the NM 22 project area and other known clay/temper resource areas. The resulting interpretations include potential production locales within the NM 22 project area for ceramics from each temporal period and likely sources for ceramic vessels produced outside of the immediate area.

Test Procedure

All 90 sherds from LA 265, LA 6169, LA 6170, LA 6171, and LA 115862 were petrographically examined using the Glagolev-Chayes point-counting method. The intersection of the cross-hairs was taken as the point and the grain beneath it was identified, and one count was recorded for that particular grain type. When possible, a minimum of 500 points was recorded for each thin section. For this study, the point-counting stage was set to cover the horizontal and the vertical transects in increments of 1.0-mm. Sand-sized grains were divided into monomineralic and lithic fragments. The monomineralic fragments were counted as the mineral phase to which they belong (e.g., quartz, biotite), whereas the lithic fragments were classified based on composition and texture (e.g., andesite, granite). Sherd temper was recorded as grains with discrete boundaries, different paste color, and often different inclusions than the surrounding clay paste. Sand-sized grains were measured as very coarse (VC = > 1.0 mm), coarse (C = 0.5-1.0 mm), medium (M = 0.25-0.5 mm), fine (F = 0.125-0.25 mm), and very fine (VF = 0.06-0.125 mm) using a micrometer fitted to the eyepiece of the petrographic microscope. A fineness modulus (FM = S cumulative percentage of VF, F, M, C, and VC sized grains/100), or coarseness value, was computed for each sample. Values range from 0 (finest) to 5 (coarsest). The amount of a particular grain type was determined by dividing the number of that grain type by the total number of sand-sized grains counted and then multiplying by 100 to obtain a percentage. Grains were quantified as very abundant (> 60 percent), abundant (40-60 percent), common (20-40 percent), present (5-20 percent), rare to absent (0-5 percent).

Petrographic Results

Because the NM 22 specimens were grouped into temporal periods upon submission for analysis, the following discussion of analytical results are presented by temporal period. First, the 51 sherds representing the Early Developmental period are discussed. Second, petrographic data for the 14 Late Developmental period samples are presented and discussed. Finally, the 25 sherds representing the Coalition period are discussed.

Early Developmental Period Sherds

The Early Developmental ceramic assemblage consists of 51 sherds. It includes 27 plain wares (MRG Plain, MRG Plain Gray, MRG Plain with Fugitive Red Slip, MRG Slipped Fugitive Red,

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and Plain Gray) and 22 San Marcial Black-on-white wares. Two Mogollon sherds, a Mogollon Red-on-brown and a San Francisco Red, comprise the remainder of the assemblage.

Based upon the petrographic data, it is likely that there were at least two production locations for the manufacture of Early Developmental plain ware vessels—LA 265 and the LA 6169/6170/6171 area. Because the San Marcial Black-on-white sherds from each site tend to fall within distinct temper groups, each site may have been producing its own decorated wares. A low silt clay was used for the production of 92 percent of the plain ware vessels, whereas a moderately silty clay was used for the production of 90 percent of the San Marcial Black-on-white vessels. Only 10 percent of the sherds (all San Marcial Black-on-white) were made using high silt clays. Present to common natural inclusions of shale were found in 88 percent of the San Marcial Black-on-white sherds from LA 6169, LA 6170, and LA 6171, and in only 20 percent of the San Marcial Black-on-white sherds from LA 265. All of the sites had vessels with similar coarseness and amounts of temper, depending on the ceramic type. Given the above, it seems likely that although there were multiple pottery making communities in the Early Developmental period, each site shared a similar ceramic tradition that incorporated the use of local sand tempers with low or moderately silty clays.

Temper Types.

I. Quartz-Plagioclase-Potassium Feldspar-Granitic (Sand)
II. Quartz-Plagioclase-Potassium Feldspar-Granitic-Mixed Volcanics (Sand)
III. Devitrified Tuff (Crushed Rock)

Temper Type I (Quartz-Plagioclase-Potassium Feldspar-Granitic): 14 Plain Sherds and 10 San Marcial Black-on-white Sherds.

Temper type I is differentiated from Temper type II by its lack of volcanics. It contains sand-sized grains of abundant to very abundant quartz (Qz) (monocrystalline and polycrystalline grains, quartzite), absent to present plagioclase (Pl), rare to present potassium feldspar (Kfd) (microcline), absent to present granitic fragments (Gr) (granite/gneiss), and absent to rare volcanic fragments (Vol) (andesite/basalt, rhyolite, tuff). Type I is subdivided into four groups—IA, IB IC, and ID—based upon differences in the proportions of major grain types. Group ID contains similar types of grains as groups IA, IB, and IC but is distinct in that it also contains calcareous sandstone grains as well. Eighty-five percent of the sherds in group IB and 44-percent of the sherds in group IA are tempered with medium-sized sand grains. Consequently, group IB may be a refined, size-sorted, version of group IA. Table 1 lists the sherds that belong to each group.

Table 1 shows that temper type I is primarily composed of plain wares from LA 265 (eleven of the thirteen plain ware sherds). Three of the five San Marcial Black-on-white sherds from LA 265 and four of the six San Marcial Black-on-white sherds from LA 6170 are also tempered with type I sands. Of the nine plain ware sherds from LA 6170, however, only three are tempered with type I sands. Since most of the sherds from sites LA 6169 and LA 6171 are contained within Temper type II, it is likely that vessels 6169 and 6171-12 were imported from other sites (e.g., LA 265 or LA 6170).

Given that most sherds from LA 265 are tempered with type I sands, it is likely that LA 265 was a production location for Early Developmental plain wares and possibly San Marcial Black-on-white wares. Many of the San Marcial Black-on white sherds from LA 6170 are also tempered with type I sands. Since both sites had access to similar geological deposits, it is unclear whether these sites were connected by trade or whether they used similar tempering materials. Possible local sources of type I sands reported by Smith and Kuhle (1998a) include:

- Older alluvium of the Rio Grande (Qoa): Alluvial sand, gravel and silt underlying a low-relief surface about 3-m above the active channel of the Rio Grande.
- Alluvium deposited by tributaries to the Rio Grande (Qal): Poorly sorted gravelly sand and sandy gravel deposited in chan-

Table 1. Early Developmental Sherd Samples Tempered with Type I Sands

Ceramic Type	IA Sand	IB Sand	IC Sand	ID Sand
	Abundant Qz; present Pl, Kfd, Gr; absent to rare Vol	Abundant to very abundant Qz; absent to rare Pl; present Kfd; absent to rare Gr, Vol	Present to common Qz; present Pl, Kfd, Gr; absent Vol	Common Qz; rare Pl; present Kfd; absent Vol; common Gr and calcareous sandstone
Plain Wares	265-1	265-3	---	265-25
	265-64	265-26	---	---
	265-65	265-61	---	---
	265-67	265-63	---	---
	265-68	265-23	---	---
	6170-83	6170-70	---	---
	6170-84	---	---	---
	---	---	---	---
San Marcial B/w	265-62	265-4	115862-28	---
	6169-17	265-24	---	---
	---	6170-6	---	---
	---	6170-19	---	---
	---	6170-72	---	---
	---	6170-85	---	---
	---	6171-12	---	---

nels and minor flood plain areas of tributary streams. Likely interbedded with Qoa.

- Piedmont sand, undifferentiated (Qpu): Poorly sorted sand and minor, lenticular gravel. Texture and rarely preserved sedimentary structures suggest Qpu is a combination of sheetwash, gullywash, and eolian sediment derived from the erosion of the upper highland surface and backslope above the Qta terrace gravels. Mapped as Ancha Formation by Kelley (1978).

Temper Type II (Quartz-Plagioclase-Potassium Feldspar-Granitic-Mixed Volcanics): 13 Plain Sherds and 12 San Marcial Black-on-white Sherds

Temper type II is differentiated from temper type I by the presence of volcanics. It contains sand-sized grains of present to abundant quartz (monocrystalline and polycrystalline grains, quartzite), rare to abundant plagioclase, absent to present potassium feldspar (microcline), absent to common granitic fragments (granite/gneiss), and present to abundant volcanic fragments (andesite/basalt, rhyolite, tuff). Temper type II is divided into five groups—IIA, IIB, IIC, IID, and IIE—based upon differences in the proportions of major grain types. Table 2 lists the sherds that belong to each group.

Temper type II consists primarily of San Marcial Black-on-white sherds from LA 6169 and plain ware sherds from LA 6170. Eight of the nine sherds from LA 6169 (six San Marcial Black-on-white sherds and both plain sherds) and six of the nine plain ware sherds from LA 6170 are tempered with type II sands. Four of the five sherds from LA 6171, two plain ware sherds from LA 265, and one plain ware sherd from LA 115862 also are tempered with type II sands.

Sherds in Temper type II likely represent a distinct production area for the manufacture of plain wares and San Marcial Black-on-white wares. The petrographic data suggest that there were at least two production areas for the manufacture of Early Developmental plain wares—LA 265 and the LA 6169/6170/6171 area. The majority of plain wares from LA 265 are tempered with type I sands, whereas the majority of plain wares from LA 6169, LA 6170, and LA 6171 are tempered with type II sands. The petrographic data also suggest that each site may have been producing its own decorated wares. The temper groups for San Marcial Black-on-white sherds tend to be distinct for each site. LA 6169 was likely using the same sand source to make both San Marcial Black-on-white wares and plain wares, whereas LA 6170 was likely using two distinct sand sources. Possible local sources of type II sands reported by Smith and Kuhle (1998a) include:

Table 2. Early Developmental Sherd Samples Tempered with Type II Sands

Ceramic Type	IIA Sand	IIB Sand	IIC Sand	IID Sand	IIE Sand
	Common to abundant Qz; rare to present Pl and Kfd; present to common Gr; present Vol	Common to abundant Qz; present Pl; rare to present Kfd; rare to present Gr, present to common Vol	Present Qz; common to abundant Pl; rare to present Kfd; rare Gr; present to common Vol	Common Qz; present Pl and Kfd; absent Gr; common to abundant Vol	Common Qz and Pl; absent Kfd; absent Gr, common Vol
Plain Wares	265-2	6170-7	--	--	--
	265-66	6170-71	--	--	--
	6169-21	6170-86	--	--	--
	6169-22	--	--	--	--
	6170-8	--	--	--	--
	6170-10	--	--	--	--
	6170-69	--	--	--	--
	6171-13	--	--	--	--
	6171-14	--	--	--	--
	115862-29	--	--	--	--
San Marcial Black/white	6169-16	6170-30	265-60	6169-15	6170--5
	6169-18	--	265-89	6169-79	--
	6169-31	--	6171-11	--	--
	6169-90	--	6171-20	--	--

- Terrace gravel (Qta3,4 and Qtp4): Fill-terrace gravel formed along the Rio Grande and tributaries that contain quartz, quartzite, granitic and mixed volcanic rocks. Mapped as Tesuque Formation by Kelley (1978) and as Santa Fe Formation by Kelley (1977).
- Gravel deposited by ancestral Rio Grande (QTslg): Contains primarily quartz, quartzite, and granitic rocks with some mixed volcanics.

Temper Type III (Devitrified Tuff): Both Mogollon Sherds

The two Mogollon sherds (6170-9 and 265-27) are tempered with the same type of crushed rock—a devitrified tuff with axiolitic texture. This tuff is different from other tuff grains observed in the Late Developmental Kwahe'e Black-on-white sherds, the Santa Fe Black-on-white sherds, and the corrugated varieties of the Coalition period. Consequently, it is possible that these are imported vessels from the Mogollon region. Both sherds contain rare quartz, rare biotite, and rare hornblende, but differ in their amounts of feldspar and silt. Specimen 6170-9, the Mogollon Red-on-brown, contains 14-percent silt and significantly more plagioclase and potassium feldspar than 265-27, but the San Francisco Red only contains 5 percent silt. Given the differences in silt content, it is likely that these two vessels were made using different clay sources.

Clay Types.

A. 1 to 4 percent silt (low silt clay)
B. 5 to 9 percent silt (moderately silty clay)
D. 17 to 26 percent silt (high silt clay)

Clay Type A (Low Silt Clay). Twenty-six of the 51 Early Developmental sherds were made with a low silt clay. Of those 26 sherds, 24 are plain wares and two are San Marcial Black-on-white wares.

Clay Type B (Moderately Silty Clay). Nineteen of the 51 sherds were made with a moderately silty clay. Of those 19 sherds, 15 are San Marcial Black-on-white wares, three are plain wares, and one is a San Francisco Red ware.

Clay Type D (High Silt Clay). Six of the 51 sherds were made with a high silt clay. Of those six sherds, five are San Marcial Black-on-white wares and one is a Mogollon Red-on-brown.

Vessel Coarseness. Vessel coarseness was measured by fineness modulus (FM = S cumulative percentage of VF, F, M, C, and VC sized grains/100). Vessels were qualified as fine (FM = 1 to 2), medium (2 to 3), coarse (3 to 4), and very coarse (4 to 5). Table 3 shows that plain sherds tend to be tempered with coarse sand. LA 265 is the only site that contains plain sherds tempered with medium sand. The sole exception is 6170-70. Table 4 shows that decorated wares tend to be tempered with medium sand. Eight of the San Marcial Black-on-white sherds, however, are tempered with coarse sand. The amounts of sand temper added to the plain sherds and San Marcial Black-on-white sherds vary between 12 and 31 percent (mean = 20 percent) and 10 to 27 percent (mean = 15 percent), respectively. All five sites were tempered with similar proportions of sand, based on ceramic type.

Late Developmental Period Sherds

The Late Developmental assemblage consists of 14 sherds from LA 6169. It includes 7 corrugated wares (NRG Indented Corrugated, NRG Smeared Corrugated, Indented Corrugated), 1 NRG Plain Striated ware, 5 Kwahe'e Black-on-white wares, and 1 Socorro Black-on-white ware.

Eighty-eight percent of the utility sherds are tempered with a residual clay derived from a muscovite-bearing granite/gneiss from the Sangre de Cristo Mountains. More variety is observed among the Kwahe'e Black-on-white sherds, however. Sixty percent of these sherds contain relatively low, naturally included sand contents (< 5 percent), whereas the remaining 40 percent are tempered with 14 to 19 percent type I or type II sands. The moderately high silt clays used to make the Kwahe'e Black-on-white vessels, as well as the Indented Corrugated vessel (6169-80), appear to be almost identical, with some variation in the amounts of the ferromagnesian silt particles. These clays are compositionally different from the clays used to make the San Marcial Black-on-white sherds in the Early Developmental assemblage. They lack shale and ash flow tuff, but contain more silt. It is possible, however, that these vessels were made locally since type I and type II sands are available in the area.

Temper Types.

I. Quartz-Plagioclase-Potassium Feldspar-Granitic (Sand)
II. Quartz-Plagioclase-Potassium Feldspar-Granitic-Mixed Volcanics (Sand)
IV. Muscovite Granitic (Residual Clay)
V. Less than 5 Percent Sand: Quartz-Plagioclase-

Table 3. Courseness of Plain Ware Sherds from the Early Developmental Assemblage (expressed as number of sherds)

Site/Type	Fine	Medium	Coarse	Very Coarse
LA 265/plain ware	--	5	8	--
LA 6169/plain ware	--	--	2	--
LA 6170/plain ware	--	1	6	2
LA 6171/plain ware	--	--	2	--
LA 115862/plain ware	--	--	--	1

Table 4. Coarseness of San Marcial Black-on-white and Mogollon Sherds from the Early Developmental Assemblage (expressed as number of sherds)

Site/Type	Fine	Medium	Coarse	Very Coarse
LA 265/San Marcial B/w	--	5	--	--
LA 6169/San Marcial B/w	--	2	5	--
LA 6170/San Marcial B/w	--	5	1	--
LA 6171/San Marcial B/w	--	1	2	--
LA 115862/San Marcial B/w	--	1	--	--
LA 265/San Francisco Red	--	1	--	--
LA 6170/Mogollon R/b	--	1	--	--

Potassium Feldspar-Granitic-Ash Flow Tuff (Natural Inclusions (?))

VI. Sherd

Temper Type IV (Residual Clay-Muscovite Granitic): 6 Corrugated Sherds and 1 NRG Plain Striated Sherd (Samples: 6169-36, 6169-37, 6169-38, 6169-39, 6169-81, 61619-82)

Six of the seven corrugated sherds and the NRG Plain Striated sherd (6169-40) are self-tempered with a residual clay composed of granitic fragments derived from a muscovite-bearing granite/gneiss. The remaining indented corrugated sherd (6169-80) is tempered with a type I sand. Muscovite is rarely present in the granitic lithic fragments, but is present in varying amounts in the clay matrix as silt-sized microlites with some sand-sized microlaths. Temper type IV primarily contains sand-sized grains of common quartz, present to common plagioclase, present potassium feldspar (microcline), common to abundant granitic fragments, rare to present calcite, and rare muscovite laths. The silt and sand content of these sherds varies between 11 to 17 percent and 24 to 30 percent, respectively. The values of fineness modulus (FM) are extremely uniform. Most sherds have FM values between 2.53 and 2.68, all medium-grained vessels. Sherd 6169-39, however, is slightly coarser with an FM value of 3.19.

Many of the Rio Grande Gray Ware sherds, specifically Tesuque Gray, from Arroyo Hondo also are reported to contain a residual clay with granite/gneiss and muscovite (Habicht-Mauche 1993). The only source for this clay is the Sangre de Cristo Mountains, since the Sandia Mountains lack muscovite-bearing granitic rocks. Habicht-Mauche (1993) reports that the foothills of the Sangre de Cristo Mountains contain residual clays derived from the erosion of pink granite and gneiss. Consequently, it is likely that these corrugated and striated vessels were made at sites located along the western and southern edge of the Sangre de Cristo Mountains and were imported into LA 6169.

Temper Type V (Less Than 5 Percent Sand: Quartz-Plagioclase-Potassium Feldspar-Granitic-Ash Flow Tuff): 3 Kwahe'e Black-on-white Sherds (Samples: 6169-34, 6169-35, 6169-88)

Three of the five Kwahe'e Black-on-white sherds have sand contents between 2 and 5 percent composed of a few grains of quartz (monocrystalline and polycrystalline), plagioclase, potassium feldspar (microcline), and granitic fragments. Sherds 6169-34 and 6169-88 contain a few grains of opaque-flow banded tuff with minute phenocrysts of quartz. It is unclear whether the sand-sized grains are natural inclusions, or whether they were added as temper. Moderately-high and high silt clays of similar origin were used to make these sherds. The silt-sized fraction is composed primarily of abundant quartz, present to abundant altered biotite microlites, common opaque (magnetite), present plagioclase, and rare to present hornblende. The abundance of ferromagnesian minerals in the clay (e.g., biotite, magnetite, and hornblende) and the presence of the ash flow tuff grains suggest that the clay(s) used to make these vessels were volcanic, specifically, tuff-derived. The coarseness of these sherds varies between fine and medium. Both 6169-35 and 6169-88 have preferentially aligned altered biotite microlites suggesting that "pukis," or turnpots may have been used during the production process.

Habicht-Mauche (1993) petrographically examined one Kwahe'e Black-on-white sherd from nearby Arroyo Hondo. The sherd was characterized by a dark gray, fine-textured clay with medium quartz, plagioclase, potassium feldspar (microcline), micrographic quartz-feldspar (granitic likely), argillaceous sandstone, and pellets of unprocessed clay. Both this sherd and the three sherds in Temper type V have similar grain types. Both have quartz, plagioclase, potassium feldspar, and granitic fragments. The sherds from LA 6169, however, contain ash flow tuff and lack argillaceous sandstone and unprocessed clay pellets.

Temper Type I (Quartz-Plagioclase-Potassium Feldspar-Granitic): 1 Kwahe'e Black-on-white Sherd and 1 Indented Corrugated Sherd (Samples: 6169-32, 6169-80)

One Kwahe'e Black-on-white sherd (6169-32) and one Indented Corrugated sherd (6169-

80) are tempered with type I sands, IA and IB respectively. The indented corrugated sherd also contains a few grains of the opaque-flow banded tuff observed in 6169-34 and 6169-88. Consequently, it is likely that this grain type represents a natural inclusion in the clay. The amount and mineralogy of the silt-sized fraction of these sherds is similar to the Kwahe'e Black-on-white sherds in temper type V. The indented corrugated sherd is tempered with 17 percent fine sand, whereas the Kwahe'e Black-on-white sherd is tempered with 19 percent medium sand.

Temper Type II (Quartz-Plagioclase-Potassium Feldspar-Granitic-Mixed Volcanics): 1 Kwahe'e Black-on-white Sherd (Sample: 6169-33)

One Kwahe'e Black-on-white sherd, 6169-33, is tempered with a medium-grained type IIB sand. The amount and mineralogy of the silt-sized fraction is similar to the other Kwahe'e Black-on-white sherds.

Temper Type VI (Sherd): 1 Socorro Black-on-white Sherd (Sample: 6169-87)

The Socorro Black-on-white sherd, 6169-87, contains only 6 percent sand composed primarily of coarse-grained quartz, siltstone, and crushed sherd. A moderately silty clay (11 percent silt) was used to make this vessel. This sherd lacked the schist-tempered sherd grains observed in Socorro Black-on-white sherds from Arroyo Hondo (Habicht-Mauche 1993).

Clay Types.

C. 11 to 18 percent silt (moderately-high silt clay)
D. 23 percent silt (high silt clay)

Clay Type C (Moderately-High Silt Clay). Four of the five Kwahe'e Black-on-white sherds were made with a moderately high silt clay. The residual clay used to make most of the corrugated varieties also contains a moderately high silt content.

Clay Type D (High Silt Clay). One Kwahe'e Black-on-white sherd (6169-35) and one Indented Corrugated sherd (6169-80) were made with a high silt clay. Although the silt content is different, it is likely that the clay used to make these vessels was of a similar origin as the clay used to make the other Kwahe'e Black-on-white sherds.

Vessel Coarseness. The Kwahe'e Black-on-white sherds tend to vary between fine and medium, whereas the corrugated varieties tend to be medium.

Coalition Period Sherds

The Coalition assemblage consists of 25 sherds from LA 6169 and LA 6171. It includes 12 corrugated varieties (NRG Smeared Corrugated, MRG Smeared Corrugated, Smeared Corrugated, MRG Indented Corrugated, and Corrugated) and 13 Santa Fe Black-on-white sherds.

Eighty-three percent of the Coalition utility wares are tempered with pumice or tuff derived sands with some related basalt. The remaining 17 percent are tempered with the same muscovite granitic residual clay that the type IV Late Developmental utility wares are tempered with. Five different types of tuff/pumice derived sands were used as tempering material. Many of the sherds, however, were made using similar clays, a moderately silty to moderately-high silt clay with naturally included particles of devitrified glass (?). Since tuff and pumice are scattered throughout the region as both large volcanic deposits and as thin lenses in sedimentary deposits (e.g., Ancha Formation [Kelley 1978]), it is difficult to determine, without thorough sourcing studies, whether these ceramics were made locally. Possible local sources for pumice/tuff sand with basalt reported by Smith and Kuhle (1998a) include:

- Volcanic substrate to Cochiti Dam: Outcrops of hydromagmatic tuff and basalt lava at the base of Cochiti Dam.
- Terrace gravel (Qta4 and Qtp4): Fill-terrace gravel. Photographs in USACE foundation reports for the building of Cochiti Dam illustrate a several-meter thick accumulation of pumice (El Cajete) on the upper sur-

face of this terrace and banked against the backslope.
- Sand, mud, and gravel deposited by eastern-piedmont streams (QTslp): Pumiceous alluvium in the Galisteo Creek drainage, 1.5 miles east of Domingo.
- Gravel deposited by ancestral Rio Grande (QTslg): Tephra reworked from the Bandelier Tuff is present 20-m below the top of the Sierra Ladrones Formation in the Santa Fe River Valley immediately upstream of Cochiti Dam.
- Cochiti Formation (QTc): Volcanic sand and gravel in poorly sorted, tabular beds. In the Cochiti Dam quadrangle, the upper Cochiti Formation contains primary and reworked tephra-fall beds.
- Olivine Basalt (Tb): Olivine-basalt lavas near Cochiti Dam overlie and are separated by hydromagmatic tuff (Tbt).
- Basaltic Tuff (Tbt): Bedded, hydromagmatic tuffs forming tuff rings.

Sixty-two percent of the Santa Fe Black-on-white sherds are tempered with vitric ash, whereas 23 percent are likely untempered and contain only natural inclusions. The remaining sherds, 6169-56 and 6169-48 are tempered with rhyolitic tuff and a type IA sand, respectively. Three of the four sherds that lack vitric ash were made using a low silt clay. Most of the other Santa Fe Black-on-white sherds were made using a moderately high to very high silt clay. Regardless of the amount of silt, the composition of the silt-sized fraction appears similar in most sherds. The clays used to make the Santa Fe Black-on-white vessels are similar to the clays in the Kwahe'e Black-on-white vessels but contain less altered biotite microlites and are often more silty, irrespective of silt-sized ash. A pale-gray vitric ash (Qta1) is reported in the Santo Domingo Pueblo SW Quadrangle two to three miles southwest of the project area (Smith and Kuhle 1998b). However, vitric ash is ubiquitous throughout the region as pumiceous deposits and as thin layers in sedimentary formations (e.g., Ancha Formation [Kelley 1978]). Consequently, it would be very difficult to pinpoint a source for the manufacture of these vessels.

Temper Types—Corrugated Sherds.

IV. Muscovite Granitic (Residual Clay)
VII. Quartz-Potassium Feldspar (sanidine)-Plagioclase (spongy cellular)-Mixed Volcanics-Air Fall Tuff (Sand)
VIII. Quartz-Potassium Feldspar-Ash Flow/Air Fall Tuff-Granitic (Sand) IX. Quartz-Potassium Feldspar (sanidine)-Plagioclase (spongy cellular)-Pumice-Mixed Volcanics (Sand)
X. Quartz-Potassium Feldspar (sanidine)-Pumice (Sand)
XI. Tuff/Pumice Derived: Quartz-Potassium Feldspar (sanidine) (Sand)

Temper Type VII (Quartz-Potassium Feldspar (sanidine)-Plagioclase (spongy cellular)-Mixed Volcanics-Air Fall Tuff): 5 Corrugated Sherds (Samples: 6169-49, 6169-50, 6169-54, 6169-55, 6171-76)

Five of the 12 corrugated sherds are tempered with a well-sorted type VII sand that contains common to abundant subhedral sanidine, common quartz (often embayed), rare to present spongy cellular plagioclase, present air fall tuff, absent to present mixed volcanic fragments (cryptocrystalline and intergranular basalt varieties), and absent to rare granitic fragments (granite/gneiss). The air fall tuff is characterized by poorly consolidated glass shards with few rodded cellular pumice fragments and coarse- to very coarse-grained phenocrysts of subhedral sanidine, quartz, and minor plagioclase and minute augite. It is similar to pumice but lacks a cellular structure. The monocrystalline grains of quartz and sanidine are derived from the air fall tuff. Temper type VII is divided into two groups—VIIA and VIIB—based upon differences in the proportions of volcanics. Group VIIB sherds 6169-54 and 6171-76 contain present mixed volcanics, whereas the group VIIA sherds (6169-49, 6169-50, and 6169-55) contain absent to rare volcanics.

The group VIIA sherds were manufactured using the same clay, type F1 (described below). Silt-sized, isotropic comb-like particles that show characteristics of glass devitrification are observed in the paste as natural inclusions. Consequently, this clay may derive from a very old volcanic clay. A moderately-high silt clay was used to make the group VIIB sherds. The paste color of this group is too dark to determine whether the comb-like particles are present. Consequently, it is possible that these sherds were made using either clay type C or F2 (described below). The group VIIA sherds are coarser (FM = 3.99 to 4.27) than the group VIIB sherds (FM = 3.59 to 3.64). Similar amounts of temper (18 to 33 percent), however, were added to all five vessels.

Temper Type VIII (Quartz-Potassium Feldspar-Ash Flow/Air Fall Tuff-Granitic): 2 Corrugated Sherds (Samples: 6169-53, 6169-59)

An NRG Smeared Corrugated (6169-53) and a Smeared Corrugated sherd (6169-59) are tempered with a type VIII sand that contains common to abundant quartz, common opaque-flow banded tuff and air fall tuff, present potassium feldspar (microcline), present granitic fragments (granite/gneiss), rare plagioclase, and rare mixed volcanics (cryptocrystalline and intergranular basalt varieties). The ash flow tuff is the same tuff that is observed in the Kwahe'e Black-on-white sherds in Temper type V and the Indented Corrugated sherd (6169-80) in Temper type I. Both sherds contain low silt contents (1 to 2 percent) and 20 to 21 percent coarse-grained sand temper.

Temper Type XI (Quartz-Potassium Feldspar (Sanidine)-Plagioclase (Spongy Cellular)-Pumice-Mixed Volcanics): 1 Corrugated Sherd (Sample: 6169-51)

One MRG Indented Corrugated sherd, 6169-51, is tempered with a coarse-grained type XI sand that contains common quartz (often embayed), present to common subhedral sanidine, present spongy cellular plagioclase, present rounded cellular pumice, and present mixed volcanics (intergranular basalt and cryptocrystalline and pilotaxitic andesite/basalt). The pumice is characterized by phenocrysts of coarse-grained subhedral sanidine and quartz with some plagioclase and minute augite. This vessel appears to have been made with the same clay (type C or F2) as the type VIIB sherds, 6169-54 and 6171-76, and is tempered with a similar proportion of sand (22 percent).

Temper Type X (Quartz-Potassium Feldspar (Sanidine)-Pumice): 1 Corrugated Sherd (Sample: 6171-77)

One corrugated sherd, 6171-77, is tempered with a coarse-grained type X sand that contains abundant quartz (often embayed), common subhedral sanidine, present rounded to rodded pumice, rare spongy cellular plagioclase, rare volcanics (rhyolite), and rare air fall tuff. The pumice is characterized by phenocrysts of plagioclase, hornblende, and clinopyroxene. The subhedral sanidine and quartz are also volcanically derived grains, possibly air fall tuff. This sherd was made using clay F2, a moderately high silt clay with naturally included particles of devitrified glass (?) and was tempered with 14-percent sand.

Temper Type XI (Quartz-Potassium Feldspar (Sanidine): Tuff/Pumice Derived): 1 Corrugated Sherd (Sample: 6171-78)

One corrugated sherd, 6171-78, is tempered with a coarse-grained type XI sand that contains abundant quartz (often embayed), abundant subhedral sanidine, rare volcanics (cryptocrystalline), rare air fall tuff, and rare glass shards and pumice. The monocrystalline grains of quartz and sanidine are derived volcanically from either pumice or air fall tuff. This sherd was made using the same clay (F1) as the type VIIA sherds, but contains less sand temper (12 percent).

Temper Type IV (Residual Clay-Muscovite Granitic): 2 Corrugated Sherds (Samples: 6169-52, 6169-58)

An MRG Indented Corrugated sherd (6169-52) and a Smeared Corrugated Sherd (6169-58) are both tempered with type IV temper, a residual clay derived from a muscovite bearing granitic rock from the Sangre de Cristo Mountains area.

Clay Types-Corrugated Sherds.

A. 1 to 4 percent silt (low silt clay)

C. 12 to 15 percent silt (moderately-high silt clay)
F1. A moderately silty clay with naturally included particles of devitrified glass (?)
F2. A moderately-high silt clay with naturally included particles of devitrified glass (?)

Clay Type A (Low Silt Clay). Four of the twelve corrugated sherds were made with a low silt clay. These include three Smeared Corrugated sherds and one Indented Corrugated sherd.

Clay Type C (Moderately-High Silt Clay). Group VIIB sherds, 6169-54 and 6171-76, and the type XI sherd, 6169-51, were either made with a type F2 clay or a type C clay. The paste is too dark to determine whether the devitrified glass particles (?) are present as they are in the group VIIA sherds.

Clay Types F1 and F2 (Moderately Silty to Moderately-High Silt Clay with Devitrified Glass Particles [?]). Five of the twelve corrugated sherds were made with a moderately silty to moderately-high silt clay that contains devitrified glass particles (?).

Vessel Coarseness-Corrugated Sherds. Nine of the twelve corrugated sherds are coarse. Two are very coarse and one is medium.

Temper Types-Santa Fe Black-on-White Sherds.

I. Quartz-Plagioclase-Potassium Feldspar-Granitic (Sand)
XII. Less Than 5 Percent Sand: Quartz-potassium Feldspar (microcline)—Plagioclase-Opaque-Altered Biotite-Mixed Volcanics (Natural Inclusions (?))
XIII. Less than 10 Percent Sand: Vitric Ash-Quartz-Potassium Feldspar (microcline)-Plagioclase-Mixed Volcanics
XIV. Less Than 10 Percent Sand: Rhyolitic Tuff-Quartz-Potassium Feldspar-Plagioclase-Opaque-Calcareous Sandstone-Calcite (Crushed Rock)

Temper Type XII (< 5 Percent Sand: Quartz-Potassium Feldspar (microcline)—Plagioclase-Opaque-Altered Biotite-Mixed Volcanics): 3 Santa Fe Black-on-White Sherds (Samples: 6169-43, 6169-46, 6169-47)

Three Santa Fe Black-on-white sherds are tempered with less than 5 percent fine sand composed of quartz and minor potassium feldspar, plagioclase, opaque, altered biotite, and mixed volcanic fragments. Specimens 6169-43 and 6169-46 contain 31 to 32 percent silt, whereas specimen 6169-47 contains only 18 percent silt. The silt-sized fractions of all the sherds, nevertheless, contain similar types of minerals, including abundant quartz, rare to abundant altered biotite microlites and blebs, and rare to present hornblende microlites and crystals.

Temper Type XIII (< 10 Percent Sand: Vitric Ash-Quartz-Potassium Feldspar (microcline)-Plagioclase-Mixed Volcanics): 8 Santa Fe Black-on-white Sherds (Samples: 6171-41, 6169-42, 6169-44, 6169-45, 6169-57, 6171-73, 6171-74, 6171-75)

Eight Santa Fe Black-on-White sherds are tempered with fine- to medium sand-sized grains composed of rodded cellular pumice, unconsolidated glass shards, quartz, and some potassium feldspar, plagioclase and mixed volcanic fragments. The pumice and the glass, or vitric ash, were likely added to the clay. The other minerals (e.g., quartz) may be natural inclusions. All the sherds contain less than ten-percent sand. The sole exception is 6169-42, which is tempered with 14 percent sand and contains minor granitic fragments. The silt content of these sherds varies. Specimen 6171-74 contains 6 percent silt (moderately silty clay); specimens 6169-57, 6171-42, and 6171-73 contain 15 to 17 percent silt (moderately-high silt clay); and specimens 6169-41, 6169-44, 6169-45, and 6171-75 contain 22 to 28 percent silt (high to very high silt clay). With the exception of 6171-74, the silt-sized fraction includes abundant quartz, common to abundant vitric ash, rare to abundant altered biotite microlites and blebs, and rare to present hornblende microlites and crystals. Specimens 6169-45 and 6171-73 have preferentially aligned altered biotite microlites suggesting that "pukis," or turnpots may have been used during the production process.

Temper Type XIV (< 10 Percent Sand:

Rhyolitic Tuff-Quartz-Potassium Feldspar-Plagioclase- Opaque-Calcareous Sandstone-Calcite) I Santa Fe Black-on-white Sherd (Sample: 6169-56)

Specimen 6169-56 is tempered with seven-percent medium-sized sand composed of crushed rhyolitic tuff, quartz, potassium feldspar, plagioclase, opaque (magnetite), calcareous sandstone, calcite, and rare hornblende and granitic and volcanic fragments. The rhyolitic tuff is characterized by a cryptocrystalline to glassy groundmass with phenocrysts of quartz and potassium feldspar with minor plagioclase and pyroxene/altered biotite and muscovite microlites. It contains 8 percent silt composed of quartz, opaque (magnetite), potassium feldspar, and minor muscovite microlites and calcite. Santa Fe Black-on-white sherds from Arroyo Hondo are also reported to contain calcareous sedimentary rock fragments (calcite-cemented sandstone) (Habicht-Mauche 1993).

Temper Type I (Quartz-Plagioclase-Potassium Feldspar-Granitic): 1 Santa Fe Black-on-white Sherd (Sample: 6169-48)

Specimen 6169-48 is tempered with eleven-percent of a medium-sized group IA sand composed of abundant quartz, present potassium feldspar, present plagioclase, and present granitic fragments. It has 21-percent silt with a composition similar to the type XII and type XIII sherds.

Clay Types-Santa Fe Black-on-white Sherds.

B. 5 to 9 percent silt (moderately silty clay)
C. 11 to 18 percent clay (moderately-high silt clay)
D. 21 to 26 percent clay (high silt clay)
E. > 26 percent clay (very high silt clay)

Clay Type B (Moderately Silty Clay). Specimens 6171-74 and 6169-56 were made with two different moderately silty clays. Each sherd has a silt mineralogy that is distinct from the other Santa Fe Black-on white sherds.

Clay Type C (Moderately-High Silt Clay). Four of the 13 Santa Fe Black-on-white sherds (6169-47, 6169-57, 6171-73, and 6171-42) were made with a moderately-high silt clay that is similar to clay types D and E.

Clay Type D (High Silt Clay). Five of the 13 Santa Fe Black-on-white sherds (6169-44, 6169-45, and 6169-48) were made with a high silt clay. Although the silt content is different, it is likely that the clay used to make these vessels was of a similar origin as the type C and E clays.

Clay Type E (Very High Silt Clay). Three Santa Fe Black-on-white sherds (6171-41, 6169-43, 6169-46, and 6169-47) were made with a very high silt clay that is similar to clay types C and D.

Vessel Coarseness-Santa Fe Black-on-white. Fifty-four percent of the Santa Fe Black-on-white sherds are medium, whereas the remaining 46 percent are fine.

Conclusions

It appears that Early Developmental sites in the NM 22 Project area favored the use of local sands to temper both utility and decorated wares. Although each site shared a similar ceramic technology, many communities were producing their own pottery. Utility wares were produced in at least two locations—LA 265 and the LA 6169/6170/6171 area. Each site, however, was likely producing its own San Marcial Black-on-white wares. Different strategies were employed for the production of utility wares and decorated wares. Utility wares were produced using a low silt sedimentary clay, whereas San Marcial Black-on-white wares were made with a moderately silty sedimentary clay. Decorated wares also incorporated less sand temper and tended to be finer than utility wares.

Most of the Late Developmental utility wares were tempered with a residual clay derived from a muscovite-bearing granite/gneiss from the Sangre de Cristo Mountains. The Kwahe'e Black-on-white wares, however, tended to be either untempered or tempered with local or nonlocal sands. These decorated vessels are characterized by a moderately-high silt clay that is distinct from the clay used to make the San Marcial Black-on-white wares. Ash flow tuff grains and the high density of ferromagnesian minerals in the paste suggests that the clay is volcanic in origin. Habicht-Mauche (1993) traced the origin of silty untempered and sand-tempered pastes of both Kwahe'e Black-on-white and Santa Fe Black-on-white to the Española Basin north of Santa Fe. Given that the utility wares are also from this area, the foothills of the Sangre de Cristo Mountains, it is possible that the decorated wares piggy backed the import of other vessels into the NM 22 project area, or vice-versa. Since the same sand types occur both within the project area and in the area north of Santa Fe, one would need to establish what types of clays outcrop locally to determine whether these sites were producing Kwahe'e Black-on-white wares.

Coalition utility wares were primarily tempered with pumice or tuff derived sands with some related basalt. Tempers were obtained in many different deposits since the composition of the pumice or tuff varies from one sherd to the next. One specific clay type, however, was used to produce many of these vessels, regardless of the type of tempering material. Since tuff and pumice are scattered throughout the region as both large volcanic deposits and as thin pumiceous lenses in sedimentary deposits, it is difficult to determine, without thorough sourcing studies of clays and volcanic sands, whether these ceramics were made locally. Nevertheless, locally occurring pumice and tuff are associated with basalt and could therefore have been used to make this pottery.

The majority of the Santa Fe Black-on-white wares (62 percent) were tempered with vitric ash. Several, however, were likely untempered or tempered with rhyolitic tuff or type I sand. Both Arroyo Hondo and the NM 22 Project area have similar proportions of each paste type in their assemblages (Habicht-Mauche 1993). Nevertheless, the clays used to make each assemblage appear to be different. Silty clays with fragments of calcareous siltstone and calcium carbonate are common in the Santa Fe Black-on-white sherds from Arroyo Hondo (Habicht-Mauche 1993). In the NM 22 Project area, a low silt clay was used to make the vessels that lacked ash, whereas a silty clay similar, but not identical, to the Kwahe'e Black-on-white clay was used to make the ash tempered vessels. Habicht-Mauche (1993) also reports that the clays used to make the Kwahe'e Black-on-white wares and the Santa Fe Black-on-white wares from Arroyo Hondo are similar. The sherds from the NM 22 Project area, however, lack calcareous sedimentary fragments and calcium carbonate and therefore may represent a different production location. The clays used to make both the Kwahe'e Black-on-white wares and the Santa Fe Black-on-white wares are similar in origin. Consequently, it seems likely that both were being produced in the same area.

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Appendix 2.

Source Provenance of Obsidian Artifacts from Various Prehistoric Contexts at Cochiti Reservoir, North-Central New Mexico

M. Steven Shackley, Ph.D.

The analysis of over 67 artifacts from a variety of sites near Cochiti Reservoir in north-central New Mexico is dominated by obsidian procured from the Jemez Mountains or some of the same primary sources in the Rio Grande alluvium. Some of the raw material had to be procured from the primary sources in the Sierra de los Valles and not secondary deposits (Fig.1).

Analysis and Instrumentation

All samples were analyzed whole with little or no formal preparation. The results presented here are quantitative in that they are derived from "filtered" intensity values ratioed to the appropriate x-ray continuum regions through a least squares fitting formula rather than plotting the proportions of the net intensities in a ternary system (McCarthy and Schamber 1981; Schamber 1977). Or more essentially, these data through the analysis of international rock standards, allow for inter-instrument comparison with a predictable degree of certainty (Hampel 1984).

The trace element analyses were performed in the Department of Geology and Geophysics, University of California, Berkeley, using a Philips PW 2400 wavelength x-ray fluorescence spectrometer using a LiF 200 crystal for all measurements. This crystal spectrometer uses specific software written by Philips (SuperQ/quantitative) and modifies the instrument settings between elements of interest. Practical detection limits have not been calculated for this new instrument, but the variance from established standards is shown in Table 1. Sample selection is automated and controlled by the Philips software. X-ray intensity K [alpha]-line data with the scintillation counter were measured for elements rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr), and niobium (Nb). X-ray intensities for barium (Ba) were measured with the flow counter from the L[alpha]-line. Trace element intensities were converted to concentration estimates by employing a least-squares calibration line established for each element from the analysis of international rock standards certified by the National Institute of Standards and Technology (NIST), the US. Geological Survey (USGS), Canadian Centre for Mineral and Energy Technology, and the Centre de Recherches Pétrographiques et Géochimiques in France (Govindaraju 1994). Specific standards used for the best fit regression calibration for elements Ti through Nb include G-2 (basalt), AGV-1 (andesite), GSP-1 and SY-2 (syenite), BHVO-1 (hawaiite), STM-1 (syenite), QLM-1 (quartz latite), RGM-1 (obsidian), W-2 (diabase), BIR-1 (basalt), SDC-1 (mica schist), TLM-1 (tonalite), SCO-1 (shale), all US Geological Survey standards, and BR-N (basalt) from the Centre de Recherches Pétrographiques et Géochimiques in France (Govindaraju 1994).

The data from the SuperQ software were translated directly into ExcelJ for Windows software for manipulation and on into SPSSJ for Windows for statistical analyses. In order to evaluate these quantitative determinations, machine data were compared to measurements of known standards during each run. An analysis of JR-1, a Japan Geological Survey rhyolite standard is included in Table 1. Source nomenclature follows Baugh and Nelson (1987), Glascock et al. (1999), and Shackley (1988, 1995, 1998a). Further information on the laboratory instrumentation can be found at: http://obsidian.pahma.berkeley.edu/ and Shackley (1998a). Trace element data

Table 1. Elemental Concentrations and Source Assignments for Archaeological Samples (all measurements in parts per million).

Sample	Rb	Sr	Y	Zr	Nb	Ba	Source
249-194-2	-2	8	2	21	-1	40	not obsidian
249-261-5	178	7	55	161	83	-8	Cerro Toledo Rhy.
249-270-7	-9	7	4	22	0	90	not obsidian
249-277-9	196	7	60	172	91	10	Valle Grande
265-1000-95	194	7	59	173	93	254	Cerro Toledo Rhy.
265-1031-102	204	6	64	183	99	9	Cerro Toledo Rhy.
265-1040-112	204	7	64	179	96	19	Cerro Toledo Rhy.
265-1071-524	193	7	57	162	85	52	Cerro Toledo Rhy.
265-1098-120	203	7	63	176	95	13	Cerro Toledo Rhy.
265-1238-138	207	7	62	175	93	37	Cerro Toledo Rhy.
265-1239-139	205	7	64	180	97	-6	Cerro Toledo Rhy.
265-1246-140	115	40	22	109	51	333	Bland Canyon
265-1303-147	150	10	24	77	45	13	El Rechuelos
265-1324-148	161	10	43	172	55	42	Valle Grande
265-1433-154	148	10	24	78	46	32	El Rechuelos
265-1433-510	190	6	53	151	78	65	Cerro Toledo Rhy.
265-1433-511	230	6	65	189	99	19	Cerro Toledo Rhy.
265-1433-512	216	6	62	177	91	-22	Cerro Toledo Rhy.
265-1433-513	216	9	60	170	87	75	Cerro Toledo Rhy.
265-1433-514	205	8	57	163	85	32	Cerro Toledo Rhy.
265-1433-515	212	6	59	173	90	41	Cerro Toledo Rhy.
265-1433-517	173	7	50	148	76	32	Cerro Toledo Rhy.?
265-1433-518	226	7	61	190	90	15	Cerro Toledo Rhy.
265-1433-519	180	8	50	144	75	-23	Cerro Toledo Rhy.
265-1548-161	202	6	63	178	97	-1	Cerro Toledo Rhy.
265-1627-165	154	10	43	163	53	26	Valle Grande
265-326-37	155	9	42	164	52	47	Valle Grande
265-957-88	209	8	64	184	98	13	Cerro Toledo Rhy.
265-962-91	210	7	64	182	97	30	Cerro Toledo Rhy.
6169-1166-234	206	7	63	177	96	13	Cerro Toledo Rhy.
6169-1191-237	195	7	60	176	96	17	Cerro Toledo Rhy.
6169-1648-254	203	7	63	186	98	5	Cerro Toledo Rhy.
6169-1664-259	110	40	22	105	48	271	Bland Canyon
6169-287-187	201	7	62	179	93	13	Cerro Toledo Rhy.
6169-505-192	190	8	57	168	90	26	Cerro Toledo Rhy.
6169-708-199	209	7	64	182	98	37	Cerro Toledo Rhy.
6169-936-215	203	7	62	175	93	8	Cerro Toledo Rhy.
6170-1070-285	155	10	42	170	53	22	Valle Grande
6170-1914-304	158	10	44	169	55	23	Valle Grande
6170-2056-331	147	10	40	163	50	51	Valle Grande
6170-2074-336	209	7	64	182	97	8	Cerro Toledo Rhy.
6170-2156-343	157	12	43	164	54	58	Valle Grande
6170-2156-344	209	7	64	180	98	27	Cerro Toledo Rhy.
6170-2156-345	211	6	65	188	96	-7	Cerro Toledo Rhy.
6170-2156-346	205	7	63	183	94	22	Cerro Toledo Rhy.
6170-2156-521	126	7	33	102	53	-16	unknown
6170-2172-350	203	6	61	177	95	-3	Cerro Toledo Rhy.
6170-2172-351	161	10	45	174	57	37	Valle Grande
6170-2172-352	196	7	61	175	93	11	Cerro Toledo Rhy.

Table 1. Continued.

Sample	Rb	Sr	Y	Zr	Nb	Ba	Source
6170-2180-356	192	8	61	173	90	29	Cerro Toledo Rhy.
6170-2242-378	195	6	62	174	95	5	Cerro Toledo Rhy.
6170-2243-379	210	8	64	183	98	17	Cerro Toledo Rhy.
6171-297-404	161	10	45	174	55	33	Valle Grande
6171-349-416	199	5	60	178	89	-16	Cerro Toledo Rhy.
6171-521-423	123	41	23	113	52	378	Bland Canyon
6171-532-424	201	7	63	182	100	10	Cerro Toledo Rhy.
6171-532-425	201	7	62	180	98	5	Cerro Toledo Rhy.
6171-613-431	118	40	22	111	52	329	Bland Canyon
6171-613-432	124	48	23	117	54	392	Bland Canyon
6171-632-433	199	7	61	179	96	22	Cerro Toledo Rhy.
6171-642-434	204	6	62	178	97	13	Cerro Toledo Rhy.
6171-682-438	206	7	64	183	99	16	Cerro Toledo Rhy.
6171-695-439	198	7	61	178	95	10	Cerro Toledo Rhy.
6171-747-444	204	6	62	178	97	-1	Cerro Toledo Rhy.
115862-145-450	203	7	63	180	95	14	Cerro Toledo Rhy.
115862-233-520	211	8	58	167	87	64	Cerro Toledo Rhy.
115863-145-451	124	42	23	112	52	352	Bland Canyon
JR-1	254	33	45	106	16	57	standard
JR-1	255	33	45	106	16	57	standard

exhibited in table are reported in parts per million (ppm), a quantitative measure by weight (see also Figures 3 and 4).

Silicic Volcanism in the Jemez Mountains

Due to its proximity and relationship to the Rio Grande Rift System, potential uranium ore, geothermal possibilities, an active magma chamber, and a number of other geological issues, the Jemez Mountains and the Toledo and Valles Calderas particularly have been the subject of intensive structural and petrological study particularly since the 1970s (Bailey et al. 1969; Gardner et al. 1986; Heiken et al. 1986; Ross et al. 1961; Self et al. 1986; Smith et al. 1970; Fig. 1). Half of the 1986 *Journal of Geophysical Research*, volume 91, was devoted to the then current research on the Jemez Mountains. More accessible for archaeologists, the geology of which is mainly derived from the above, is Baugh and Nelson's (1987) article on the relationship between northern New Mexico archaeological obsidian sources and procurement on the southern Plains.

Due to continuing tectonic stress along the Rio Grande, a lineament down into the mantle has produced a great amount of mafic volcanism during the last 13 million years (Self et al. 1986). Similar to the Mount Taylor field to the west, earlier eruptive events during the Tertiary more likely related to the complex interaction of the Basin and Range and Colorado Plateau provinces produced bimodal andesite-rhyolite fields, of which the Paliza Canyon (Keres Group) and probably the Polvadera Group is a part (Shackley 1998a; Smith et al. 1970). While both these appear to have produced artifact quality obsidian, the nodule sizes are relatively small due to hydration and devitrification over time (see Hughes and Smith 1993; Shackley 1990, 1998b). Later, during rifting along the lineament and other processes not well understood, first the Toledo Caldera (ca. 1.45 Ma) and then the Valles Caldera (1.12 Ma) collapsed causing the ring eruptive events that were dominated by crustally derived silicic volcanism and dome formation (Self et al. 1986). The Cerro Toledo Rhyolite and Valles Grande Member obsidians are grouped within the Tewa Group due to their similar magmatic origins. The slight dif-

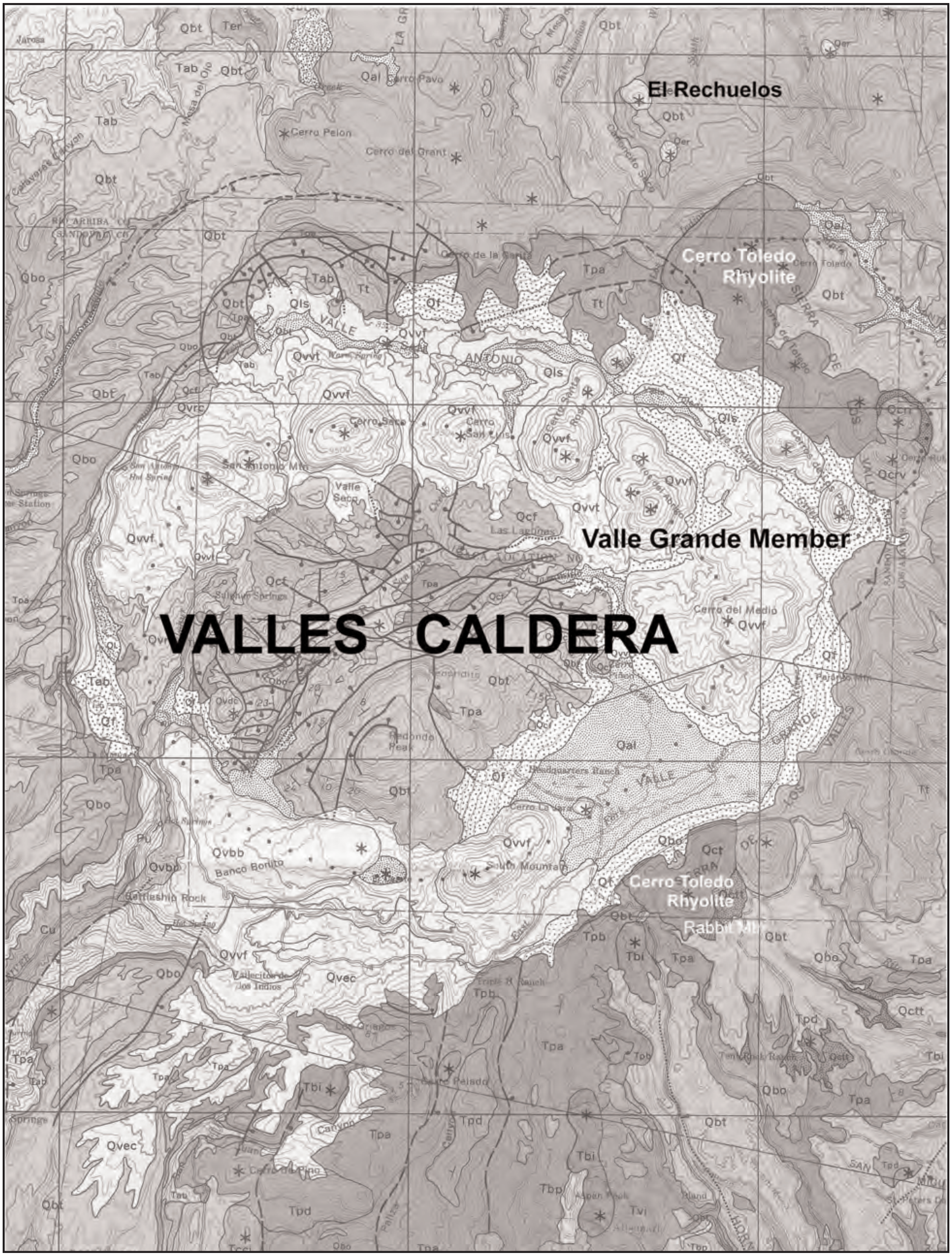

Figure 1. Topographical rendering of a portion of the Jemez Mountais, Valles Caldera, and relevant features.

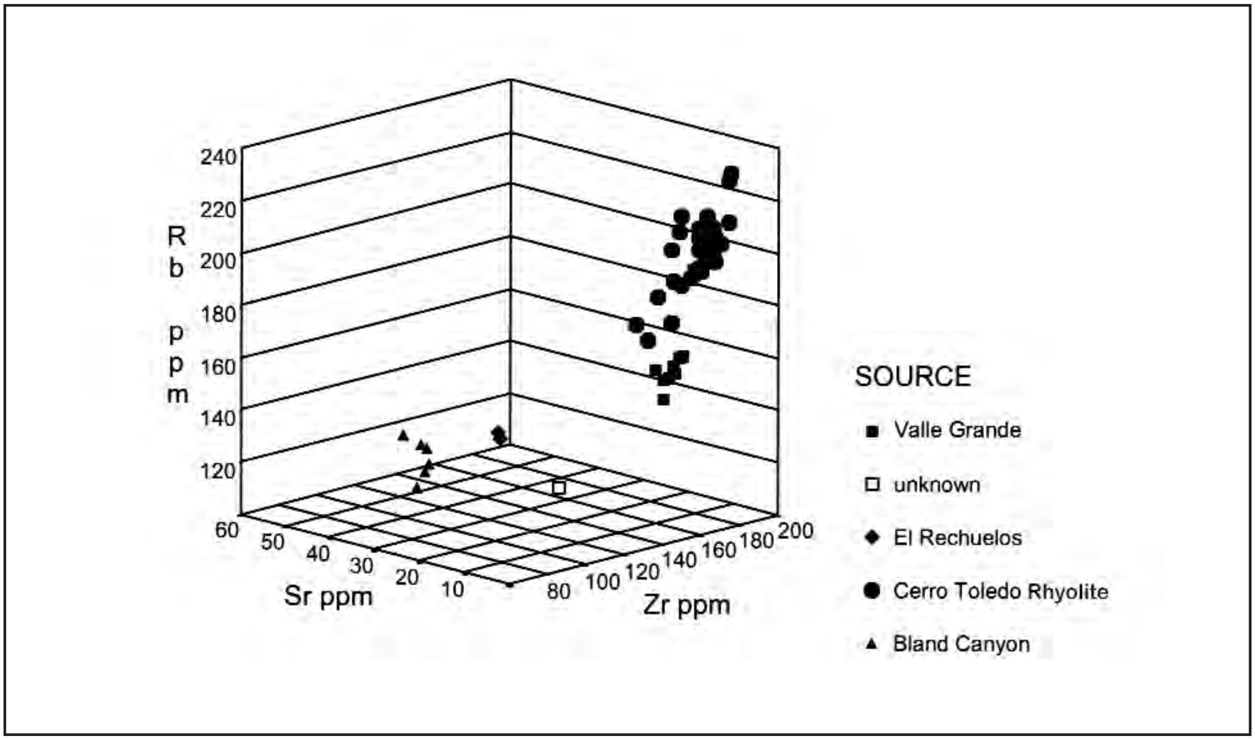

Figure 2. Rb, Sr, Zr three dimensional plot of archaeological data. Note the genetic similarity between the Jemez obsidian sources, particularly the Valle Grande Member and Cerro Toledo Rhyolites. These can be discriminated using Y as below.

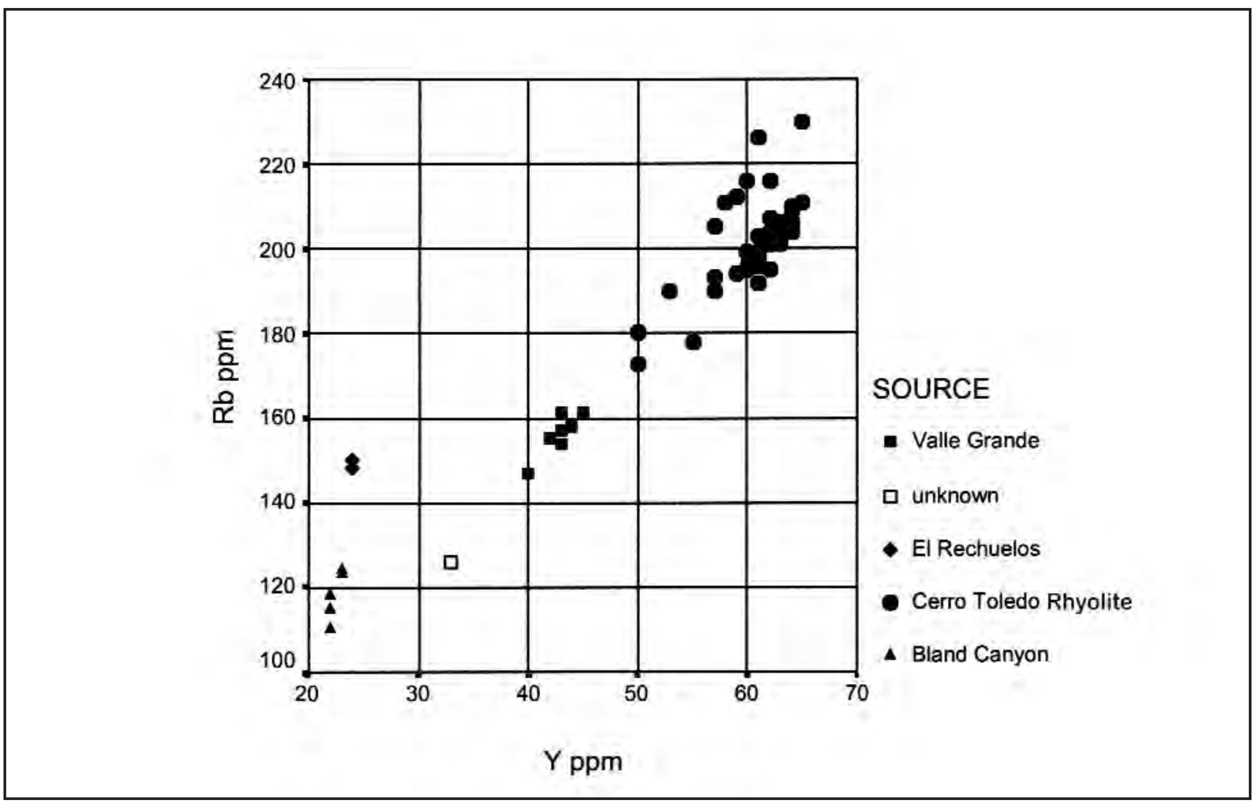

Figure 3. Rb versus Y biplot of archaeological data effectively separating the Valle Grande field sources, Valle Grande, and Cerro Toledo Rhyolite.

Table 2. Crosstabulation of Site by Obsidian Source Provenance. Non-obsidian deleted.

			Source					
			Bland Canyon	Cerro Toledo Rhyolite	El Rechuelos	Valle Grande	Unknown	Total
SITE (LA)	249	Count	-	1	-	1	-	2
		% within Site	-	50.0%	-	50.0%	-	100.0%
		% within Source	-	2.2%	-	10.0%	-	3.1%
		% of Total	-	1.5%	-	1.5%	-	3.1%
	265	Count	1	19	2	3	-	25
		% within Site	4.0%	76.0%	8.0%	12.0%	-	100.0%
		% within Source	16.7%	41.3%	100.0%	30.0%	-	38.5%
		% of Total	1.5%	29.2%	3.1%	4.6%	-	38.5%
	6169	Count	1	7	-	-	-	8
		% within Site	12.5%	87.5%	-	-	-	100.0%
		% within Source	16.7%	15.2%	-	-	-	12.3%
		% of Total	1.5%	10.8%	-	-	-	12.3%
	6170	Count	-	9	-	5	1	15
		% within Site	-	60.0%	-	33.3%	6.7%	100.0%
		% within Source	-	19.6%	-	50.0%	100.0%	23.1%
		% of Total	-	13.8%	-	7.7%	1.5%	23.1%
	6171	Count	3	8	-	1	-	12
		% within Site	25.0%	66.7%	-	8.3%	-	100.0%
		% within Source	50.0%	17.4%	-	10.0%	-	18.5%
		% of Total	4.6%	12.3%	-	1.5%	-	18.5%
	11562	Count	-	2	-	-	-	0
		% within Site	-	100.0%	-	-	-	100.0%
		% within Source	-	4.3%	-	-	-	3.1%
		% of Total	-	3.1%	-	-	-	3.1%
	11563	Count	1	-	-	-	-	1
		% within Site	100.0%	-	-	-	-	100.0%
		% within Source	16.7%	-	-	-	-	1.5%
		% of Total	1.5%	-	-	-	-	1.5%
Total		Count	6	46	2	10	1	65
		% within Site	9.2%	70.8%	3.1%	15.4%	1.5%	100.0%
		% within Source	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	9.2%	70.8%	3.1%	15.4%	1.5%	100.0%

ference in trace element chemistry is probably due to evolution of the magma through time from the Cerro Toledo event to the Valle Grande events (see Hildreth 1981; Mahood and Stimac 1990; Shackley 1998a, 1998b; see Fig. 1). Given the relatively recent events in the Tewa Group, nodule size is large and hydration and devitrification minimal, yielding the best natural glass media for tool production in the Jemez Mountains.

The mix of sources in the assemblage overall deserves some comment. Valle Grande and El Rechuelos are sources present as primary sources in the northern portion of the caldera, while the Cerro Toledo Rhyolite, mainly distributed from Rabbit Mountain on the southern edge of the caldera, flows southeast into the Rio Grande system through erosion of the ash flow tuff through south trending canyons such as Cochiti and Bland Canyons. Recent research in around the perimeter of the caldera, including the Puye Formation to west indicates that the latest eruptive event, the Valle Grande Member, does not erode outside the perimeter of the caldera. Any Valle Grande obsidian found in archaeological contexts must have originally been procured from the caldera floor. It does not erode into the Rio Grande system as Cerro Toledo Rhyolite does (Shackley 2000). The presence of the Bland Canyon material is more problematic as discussed below, and its known presence only on the southern edge of the caldera further complicates simple inferences about procurement.

Important for this study is that some of the potentially minor sources of archaeological obsidian from the Jemez Mountain area such as the glass from the Bland Canyon area, appears to be better artifact quality obsidian than previously reported. My recent survey in Bland Canyon (August 1999) below the Bearhead Rhyolite yielded a sample of over 100 marekenites of which a sample of 15 analyzed matched the Cerro Toledo Rhyolite signature, not the "Bland Canyon/Apache Tears" signature reported by Glascock et al. (1999, Table 1). The exact sampling location for the Glascock et al. (1999) samples was not reported (see also Wolfman 1994). While this discrepancy could be sampling error in this study, it certainly suggests by this research that the eruptive event history and trace element chemistry of artifact quality obsidian from the Jemez Mountains is somewhat more complex than originally described and warrants more intensive geoprospection.

Geochemical Results and Summary

Four known sources of obsidian were detected in the assemblage (see Tables 1 and 2). Source assignment was made by subjecting the source data for Rb, Sr, Zr and Y to three-dimensional plots and biplots to search for separation (see Figs. 2 and 3). While the four Jemez Mountains sources can be separated well using Rb, Sr, and Zr, yttrium and niobium more effectively discriminates the magmatically related Valle Grande and Cerro Toledo Rhyolite sources from the Valles Caldera (Fig. 3).

Table 2 and Figure 4 exhibit the proportion of the various sources within the assemblage by site. The dominance of Cerro Toledo Rhyolite glass at these sites is expectable given that it is very common in the alluvium at the base of the canyons eroding south of the caldera (i.e., Cochiti and Bland), as well as in the Rio Grande alluvium (Shackley 2000).

The sample that could not be assigned to source is relatively small, and does not match any known sources in the Southwest (see Glascock et al. 1999; Shackley 1995, 1998a). It is possible that it is an unusual chemical outlier of a known source.

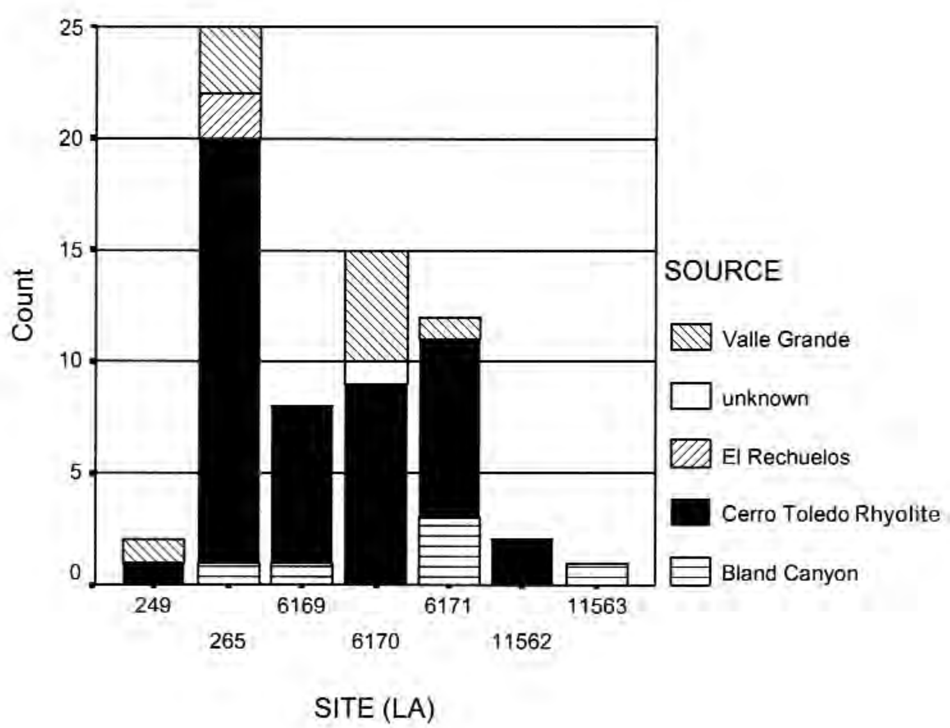

Figure 4. Distribution of obsidian sources by site in the assemblage.

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Appendix 3. Shell Artifacts

Ronna J. Bradley

The NM 22 project yielded 249 remnants of shell, the majority (71percent) of which are freshwater *Anodonta californiensis* from the Gila River drainage. *Olivella* sp. beads comprised 23percent of the shell. Marine shell in general made up 28.5 percent of the total. One *Haliotis* sp. and one *Columbella* sp. were identified, as well as one naturally occurring land snail. All of the marine shell can be obtained in the Gulf of California.

LA 249

LA 249 yielded six shell artifacts, including three disc beads, an *Olivella* sp. bead, and two *Anodonta californiensis* fragments. The disc beads measured approximately 8 mm in diameter by about 1 mm thick, ovoid, with a slightly concave-convex cross-section. Four of the six artifacts were found in Feature 6.

LA 265

LA 265 produced 79 shell artifacts, the majority of which were *Anodonta californiensis* fragments. One of the fragments appeared to be ground on the edges, a possible pendant preform, while another had a perforation without shaped edges. One *Olivella* sp. bead was identified as well as a *Columbella* sp. bead and an unknown marine gastropod fragment that featured grinding on the body. A burial from this site also featured an ovoid *Haliotis* sp. pendant that was reburied with the burial.

The shell at LA 265 was found in a variety of locations and features. The presence of unfinished ornaments suggests that the inhabitants may have been involved in ornament production, particularly with the easily modified Anodonta californiensis. None of the marine specimens appeared to be only partially finished, indicating that they may have been brought to the site in finished form.

LA 6169

LA 6169 produced 60 shell artifacts, most of which were freshwater *Anodonta californiensis* fragments. Several of the fragments featured ground edges. One of the freshwater shell artifacts is an ovoid pendant that was reburied with a burial. One *Olivella* sp. bead was recovered, as well as two discoidal beads of unknown marine shell, and three land snail fragments. The shell at LA 6169 was distributed across the site, occurring in a variety of features and locations.

LA 6170

LA 6170 yielded 41 shell artifacts, the majority of which are *Anodonta californiensis* fragments. Several fragments featured grinding on the edges and notching. *Olivella* sp. beads and bead fragments are also represented as well as an unknown marine shell fragment and land snails.

The shell was found in several locations across the site. Feature 50 yielded a number of specimens, including *Olivella* beads. Feature 180 produced a pendant preform of *Anodonta californiensis.*

LA 6171

LA 6171 contained 15 shell artifacts, with *Anodonta californiensis* fragments and four *Olivella* sp. beads represented. One pendant fragment of an unknown marine species and one fragment of an *Anodonta californiensis* pendant were identified. The shell was recovered from several locations and features across the site.

LA 115861

LA 115861 yielded one fragment of *Anodonta californiensis* from Feature 2. The *Anodonta californiensis* is native to the Gila drainage of Arizona and western New Mexico.

LA 115862

LA 115862 contained 47 shell beads associated with a single burial. The beads were distributed into clusters, suggesting that they may have been sewn onto a garment, rather than being incorporated into necklaces or bracelets. Most of the shells were in very poor condition and many were fragmented with the apex missing.

Although the poor condition of the beads did not permit identification to species, they were likely obtained from the Gulf of California. The vast majority of *Olivella* on Southwestern sites are *O. dama* that were obtained from the Gulf of California (Bradley 1996). Although *Olivella biplicata* from the Pacific Coast occur in small numbers on Southwestern sites, they have a distinctive bulbous shape that is easily distinguished from the *O. dama* and other Gulf of California *Olivella*.

Summary and Discussion

These sites reflect use of freshwater shell from the Gila drainage of western New Mexico and Arizona, as well as marine shell. The majority of marine shell likely originated in the Gulf of California, with one specimen of *Haliotis* sp. from the Pacific Coast.

Both freshwater and marine taxa would likely have been obtained from exchange with groups to the southeast in the Mogollon heartland. *Olivella* sp. and *Anodonta californiensis* are found in limited quantities on sites in the Mogollon and Jornada Mogollon area (Anyon and LeBlanc 1984; Bradley 1983:75, 1993a, 1993b, 1996a, 1996b; Brook 1980: 59, 67-70; LeBlanc and Whalen 1980; Lehmer 1948:61-62; Nelson and LeBlanc 1986). The freshwater taxa *Anodonta californiensis* has not been documented in Anasazi assemblages, but is found primarily in Mogollon and Hohokam contexts (Bradley 1996a: 80-82).

There appears to be local manufacture or shaping of the freshwater *Anodonta californiensis*. Several of the pieces are unfinished preforms. Shaping of the shell requires minimal expertise and effort because of the soft, friable nature of *Anodonta*. There is no evidence of local ornament manufacture with the marine specimens.

In summary, although the shell assemblages do not constitute a large proportion of the total artifacts recovered, they provide interesting evidence for interaction with groups to the southwest and perhaps exchange ties with the Mogollon and Gila River areas.

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Appendix 4. Mineral Identification

Gary Smith

LA Number	FS Number	Rock/Mineral Type	Notes (possible provenance, etc.)
249	285	a) bone bead. b) turquoise bead.	
249	326	Turquoise.	
265	1611	Turquoise.	
265	1628	Fine, quartz-rich sand, poorly consolidated.	Resembles local eolian sand; minor consolidation may be related to cementation along margins of insect burrows. One mass slightly reddened.
265	1076	Shell fragment.	
265	1246	Fine, quartz-rich sand, poorly consolidated and shaped; unknown very fine light beige material.	Eolian or fluvial sand in an artifactual context with which I'm not familiar. Light-colored material probably a pigment.
265	1621	Sand mixed with yellow pigmenting compound; moderately consolidated.	
265	868	Fine sand, well consolidated and cemented (?) by yellow pigmenting compound.	
265	883	Fine sand, moderately consolidated and cemented (?) by red pigmenting compound (Hematite?).	
265	807	Turquoise.	
265	1624	Turquoise.	
265	1433	Turquoise.	
265	1300	Fine grained, consolidated sand with yellow pigmenting compound; minor roots.	
265	1423	Turquoise.	
265	1543	Shaped (?) lump of friable silty fine sand; contains sparse fine pumice fragments.	Presence of pumice fragments consistent with local sand-Adobe mud? - but lacks voids for straw and air bubbles.
265	705	Fine grained, consolidated sand with yellow pigmentation.	
265	708	Fine grained, consolidated sand with yellow pigmentation.	
265	751	Fine grained, consolidated sand with yellow pigmentation.	
265	797	Fine grained, consolidated sand with yellow pigmentation.	
265	710	Turquoise.	
265	788	Turquoise.	
265	783	Turquoise.	
265	1624	Friable fragments of silty fine sand with irregular voids; small pumice fragments.	Pumice fragments suggest local sand. Looks like adobe pieces.
265	618	Turquoise; fragment of pendant or large bead.	
265	619	2 turquoise fragments.	
265	621	2 turquoise fragments.	
265	643	a) Sandy siltstone coated with orange pigmenting compound. b) Sandy siltstone with yellow-orange pigment; contains one small pumice grain and possible small glassy basalt fragments.	FS 643b differs from previously described pigment fragments by presence of pumice that negates a Galisteo Fm provenance, presence of possible glassy basalt fragments suggests possibility that this is a sample of hydromagnatic tuff that crops out discontinuously along base of Cochiti Dam from the outlet works to the Santa Fe River. If so, then yellow is likely palagonite.
265	649	Turquoise.	
265	653	Turquoise (pendant?)	
265	671	Fine grained silty sandstone with yellow pigment coloration	
265	1643	Turquoise.	
265	996	Very fine sandstone with black Mountain oxide and red (hematite?) cement.	Possible small tool marks.
265	1713	Several pieces of friable sandy siltstone with yellow pigmenting compound; roots.	

LA Number	FS Number	Rock/Mineral Type	Notes (possible provenance, etc.)
265	1720	Turquoise.	
265	1759	Turquoise.	
265	1762	Turquoise.	
265	1781	Very fine sand partly cemented with yellow pigmenting compound.	
265	1642	Gray shale (many fragments).	Mancos Shale (Cretaceous) - nearest outcrops are along and southeast of I-25 La Bajada grade and continuing continuously to Cerrillos.
265	1675	Platey quartz grain.	Field ID as mica based on shing, platy character but this is quartz, platy character suggests that it is a piece of Metaquartzite, which is abundant in local sediment.
265	1001	Etched, single-termination clear quartz crystal.	
265	1036	Turquoise.	
265	1073	Turquoise.	
265	1024	Turquoise. (4 pieces)	
265	1040	a) red, hematite-rich mudstone. b) yellow pigmented siltstone.	
265	1036	2 fragments of gray-brown very fine grained sandstone with red hematite coating.	
265	1039	Very fine grained sandstone completely impregnated with yellow pigmenting compound.	
265	1001	Siltstone, completely impregnated with yellow pigmenting compound.	
265	1037	Solid piece of red ochre hematite.	
265	901	Turquoise.	
265	980	Turquoise. (2 pieces)	
265	1352	Siltstone, completely impregnated with yellow pigmenting compound.	
265	1384	Poorly sorted red sandy mud with possible root traces; indurated.	Resembles baked sediment below basalt lava flow along La Bajada escarpment.
265	1379	Claystone with white calcite effervescence and coated with fine sand.	Probably a fragment of Santa Fe group sediment.
265	1324	Turquoise.	
265	1301	Turquoise.	
265	1315	Rounded quartzite cobble with broken edge and red-ochre stain.	Quartzite cobbles are the most common constituent of the local gravel.
265	1265a	Turquoise, bead or pendant fragment.	
265	1265b	Hard, platey, siliceous fragment coated with yellow pigmenting compound.	
265	1238	Turquoise.	
265	1230	Turquoise.	
265	1248	Friable mass of yellow ochre.	
265	867	Poorly sorted silty sandstone with quartz grains to 0.5 mm; discontinuous yellow coating.	
265	304	Turquoise.	
265	305	Turquoise.	
265	311	Turquoise.	
265	322	Turquoise.	
265	1166	Multiple fragments of opaque, light green opal or agate. Exterior surfaces have bark-like texture and interiors are amorphous.	Looks like silica-replaced wood but is very unlike petrified wood in regional Triassic and Eocene strata.
265	1139	2 fragments of friable gray-brown fine sandstone; 1 with red coating and 1 with yellow coating.	
265	1139	Turquoise.	
265	1138	Mudstone(?) impregnated and coated with hematite.	
265	1102	Turquoise.	
265	1101	Turquoise.	
6169	339	Very fine sandstone impregnated with yellow-pigment compound.	
6169	1836	Turquoise. (6 small pieces)	
6169	816	Unconsolidated quartz-rich fine to medium sand with dispersed charcoal fragments. Some yellow coating on friable, consolidated aggregates.	
6169	318	Turquoise in matrix.	
6169	1925	Broken fragments of white vein quartz.	
6169	500	Partly rounded pumice with drilled holes. Contains quartz and sanidine crystals.	Stream-transported pebble of Bandelier Tuff pumice. Sparse occurrences in top of Qt3 fill terrace of Smith and Kuhle, 1997, east of Highway 22.

LA Number	FS Number	Rock/Mineral Type	Notes (possible provenance, etc.)
6169	2026	Very fine, platey, siliceous fragment with one smooth face and one side with boxwork fracture fill.	Possibly a fragment of petrified wood or silicified bone.
6169	1995	Very fine volcanic ash.	
6169	409	Dark gray fragment with very fine mica; drilled; elongate tapered bead or pipestem?	Does not resemble natural rock. More likely ceramic?
6169	1625	Solid fragment of very fine red ochre hematite.	
6169	1182	Sandy siltstone, friable with discontinuous yellow-pigment coat.	
6169	1425	Poorly sorted friable silty sandstone with dispersed quartz grains to 0.5 mm and irregular yellow-pigment coating and cement.	
6169	1290	Muscovite mica cleavage sheet.	Much larger than mica fragments preserved in local alluvial deposits. Closest outcrops are probably in Santa Fe Range.
6169	1248	Muscovite mica cleavage fragment with partial preservation of crystal outline.	
6169	1243	Sandy mudstone with coating of yellow pigment.	
6169	1244	Muscovite mica cleavage sheet similar to FS 1290.	See notes for FS 1290.
6169	1885	Fine silty sandstone, friable, with discontinuous yellow pigment coating.	
6169	1252	Silty very fine sandstone with discontinuous yellow pigment coating.	
6169	700	Turquoise.	
6169	1745	Rounded pebble of vesicular oxidized basalt.	Could be from local gravel.
6169	130	Fragment of oxidized, flow banded volcanic rock, possibly rhyolite.	Could be from local gravel.
6169	1152	Platy fragment of siliceous mudstone with yellow pigment coatng.	
6169	1191	Turquoise.	
6169	1389	Platey fragment of siliceous mudstone with yellow pigment coating.	
6169	1906	Turquoise, drilled.	
6169	15	Pale turquoise.	
6169	1755	Turquoise.	
6169	966	Very fine grained sandstone with yellow pigment coating.	
6169	1615	Turquoise in matrix.	
6169	1190	Indurated pale green claystone.	
6169	1833	Chalcedony or clear agate.	Possibly Pedernal Chert, which is present as pebbles in local gravel.
6169	1206	Fine sandy siltstone with discontinuous impregnation and coating of yellow pigment.	
6169	1904	Empty bag.	
6169	1243	Muscovite mica cleavage sheet.	
6169	1147	Muscovite mica cleavage sheet.	
6169	1648	Muscovite mica cleavage sheet.	
6169	1212	Muscovite mica cleavage sheet.	
6169	836	Turquoise.	
6169	655	Turquoise in matrix.	
6169	12	Turquoise. (2 pieces)	
6169	1672	Fine, pale-green clay fragments with attached fine sand.	Resembles FS 1190 material.
6169	428	Etched selenite gypsum crystal.	Closest known source is local occurrences in Qt3 terrace fill of Smith & Kuhle, 1997, at south edge of Peña Blanca.
6169	168	Platey, brown-red, fine grained volcanic rock with rare pyroxene crystals; probably andesite.	
6169	304	Very fine sandy siltstone impregnated with and coated by yellow-pigment compound.	
	156	Platey yellow-ochre fragment; very fine grained.	
6169	999	Siltstone impregnated with and coated by yellow pigment.	
6169	1414	Very fine sandstone coated with yellow pigment.	
6170	2029	Partially melted and fused sand; some impressions of burned plant matter.	
6170	2277	Turquoise. (3 pieces)	
6170	2498	Turquoise, pendant or bead.	
6170	2272	Turquoise. (3 pieces)	
6170	2125	Turquoise.	
6170	2124	Turquoise.	
6170	2029	Turquoise.	
6170	2304	Turquoise.	

LA Number	FS Number	Rock/Mineral Type	Notes (possible provenance, etc.)
6170	2319	Turquoise. (2 pieces)	
6170	2318	2, acicluar cleavage splinters of selenite gypsum.	See note for LA 6169, FS 428.
6170	1819a	White calcite in fine sand. 1 coarse crystal and 3 fine grained pieces.	
6170	1819b	Very fine grained, friable, quartz-rich sand with hematite grain coatings.	Possibly from Galisteo Formation; closest outcrops south of La Bajada; could also be from younger sandstone "baked" at base of lava flows.
6170	2156	Very small fragment; mostly or entirely hematite.	
6170	2277	Platey fragment of very fine-grained red hematite or hematite-rich clay.C391	
6170	1284	Fine sandy siltstone impregnated with and coated by yellow pigment.	
6170	1285	Fine sandy siltstone impregnated with and coated by yellow pigment.	
6170	1819a	Fine sandy siltstone impregnated with and coated by yellow pigment.	
6170	1819b	Splintered fossil bone fragments.	
6170	1301	Fine sandy siltstone impregnated with and coated by yellow pigment.	
6170	1971	Turquoise - bead.	
6171	929	Turquoise.	
6171	746	Turquoise.	
6171	782	a) 3 pieces of sandy siltstone impregnated with yellow pigment b) 3 pieces of gray shale c) 1 piece pale green claystone	 b) Mancos Shale, LA 265 FS 1642 c) See LA 6169 FS 1190
6171	752	Turquoise.	
6171	711	Turquoise. (2 pieces)	
6171	719	Sandy siltstone, impregnated with yellow pigment.	
6171	734	1 - small piece of pale turquoise? 1 - faintly laminated hematite-rich claystone.	
6171	695a	Turquoise. (5 pieces)	
6171	686	4 pieces of fibrous pumice with quartz and sanidine crystals.	Pumice from Bandelier Tuff, see LA 6169, FS 500
6171	685	Poorly sorted sandy mud with conspicuous muscovite flakes; splotchy impregnation with yellow pigment; bioturbation fabric.	
6171	695b	3 fragments of sandy siltstone, friable, with dispersed yellow pigment.	
6171	988	Fine sandstone with turquoise or chrysacolla cement.	
6171	975	Quartzite, part of elongate bead or pendant.	
6171	906	Turquoise.	
6171	842	Ampule with small turquoise fragments in loose sand.	
6171	800	Very fine sandy silt with splotchy impregnation with yellow pigment and charcoal fragments, roots.	Resembles all other yellow-ochre specimens, but presence of charcoal raises question if this is very young or reconstituted material.
6171	854	Very fine hematite or hematite-rich clay encased in loose sand.	
6171	542	Small pieces of very fine hematite or hematite-rich clay.	
6171	656	Silty fine sandstone with dispersed quartz granules with splotchy, impregnation and coating of yellow pigment.	
6171	315	Very fine grained sandstone; grains coated with hematite.	Possibly Galisteo Fm, see LA 6170, FS 1819.
6171	682a	a) sandy siltstone impregnated with yellow pigment. b) silty sandstone with subangular quartz grains and hematite cement with local yellow-pigment coating.	
6171	682b	Turquoise. (4 pieces)	
6171	657	Turquoise.	
6171	674	Fine sand and silty sand with splotchy impregnation and coating by yellow pigment. Bioturbation fabric. Roots.	
6171	528	Clean, single-terminated quartz crystal.	
6171	527	Gray to tan sandy clay with air bubble voids. Remnant curved surfaces on all 3 pieces.	
6171	525	Turquoise.	
6171	344	Well indurated, brittle red clay.	
6171	399	Broken pebble of red basalt agglutinate with calcite coating; hematite rich.	
6171	509	Turquoise.	
6171	646	Turquoise.	
6171	652	Friable sandy silt with irregular coatings of yellow pigment.	
6171	601	Turquoise. (2 pieces)	
6171	653	Turquoise. (2 pieces)	
6171	544	Pale green silty claystone.	
6171	565	Turquoise.	
6171	563	Turquoise.	
6171	589	Turquoise.	
6171	557	Red, hematite-rich clay.	
6171	594	Light green claystone.	

Appendix 5.1
Summary of Human Burials

Nancy J. Akins

(Scoring and definitions follow Buikstra and Ubelaker 1994)

SITE: LA 249

BURIAL: 1

PROVENIENCE: FS 293; Feature 4, pit in midden

AGE: 45±5; pubic symphysis damaged, R Todd Stage 10 (50+), Suchey-Brooks Stage 6 (42+); auricular surface stages 5-6 (40-50); teeth and lack of DJD suggest middle of range

SEX: female; pelvis clearly female all aspects; skull mastoid process intermediate (3), supraorbital margin small (2), glabella small (1), mental eminence intermediate (3)

CONDITION: surface etching with some breakage; some deterioration of long bone ends and vertebrae

REPRESENTATION: fairly complete missing some rib pieces and foot elements and most of the left hand; hand elements were found in grids 105N 115E, Level 8 and 106N 115E Level 6-7 and 8. A hand phalanx 2 and tarsal fragment from Feature 2 106N 112E, Level 5 could also be from this individual

DENTAL
- INVENTORY: premortem loss, fully reabsorbed: LM_2
- HYPOPLASIAS: lines: RM^3, RP^1 (n=2), RC(n=2), RI^2, LI^1 (n=2), LI ^{2}, LC (n=2), LM^2, LP_2 (n=2), $LP_{1\&2}$, LC, LI_1 (n=2), RI_1 (n=2), RC, RP_{1-2} RM_2; linear horizontal pits: max LC, LP_1; nonlinear arrays of pits: RI^{1-2}, LI^1, LP^1, LM^3. man L&RC; single pits: RM^2, RP^2 (n=2), RC, LI^2, LM^2, LP_2, LI_2, RP_1, RP_2 (n=2)
- WEAR: anterior (1-8): moderate (max range 5-6, mean 5.4, man. 4-6, mean 5.3); molars (1-10): moderate (max. range 1-6, mean 3.8, man. range 1-10, mean, 3.6)
- CARIES: interproximal: LM_3; cervical: RM^3, RM_2; large caries: LM_1, RM_1; noncarious pulp exposure: RM^2, LI^2, LP_2
- ABSCESSES: LM_{1-2}, RM_1
- COMMENTS: light (n=17), moderate (n=3), and heavy calculus deposits (n=1); few morphological observations due to wear

MEASUREMENTS AVAILABLE: most dental; cranial - mandible only; most postcranial

NONMETRIC TRAITS AVAILABLE: most

TAPHONOMIC OBSERVATIONS: carnivore damage on at least three left ribs; possible cuts and chops on both tibiae and the right fibula; L mandible coronoid process broken off and missing; L anterior zygomat cracked with peel-like break; other cranial breaks could be from soil pressure

CONGENITAL: large sternal foramen

BONE LOSS: shallow dorsal pitting or parturition pit R pubis

POROTIC HYPEROSTOSIS: orbits fragmentary but no evidence on pieces present; parietals have barely discernable healed pits near the sutures

VERTEBRAL PATHOLOGY: osteophytes: curved spicules: some C, some T, L3 and L4; minor

ARTHRITIS: slight lipping: occipital condyles, distal humerus, proximal radii, distal ulnae, R hand phalanges; sharp ridge or minor spicules: C, T, L vertebrae, T rib facets, rib facets, sacroiliac, acetabulum, proximal femur, glenoid, proximal humeri, R carpals, R metacapals, R tarsals; extensive spicules: C3-4 L intervertebral facets are greatly enlarged; proximal ulna; pinpoint surface porosity: sacroiliacs; coalesced surface porosity: T verts; pinpoint and coalesced porosity C3-4; periarticular resorptive foci barely discernable: R carpals, R metacarpals; clearly present: proximal humeri

SITE: LA 265

BURIAL: 1

PROVENIENCE: FS 1483, Feature 23, fill of extramural bell-shaped pit

AGE: 3 ± 1 year; fusion and primary ossification centers - all observable epiphyses are open, cervical and thoracic neural arches are fused (2.5-6 y) but are not fused to the centrum (2.5-6 y); dental development

SEX: unknown

CONDITION: fair to poor; portions of bones deteriorated; rodent burrowing removed some elements; a hand phalanx and carpal were found in the general fill of the burial pit

REPRESENTATION: missing: L scapula, most of the innominates; deteriorated or missing: vertebrae, some ribs, R arm, most of L arm, R fibula, parts of both hands and feet

DENTAL
  INVENTORY: deciduous: missing Lc-m_2; permanent not in occlusion: RLM^1, LI_2
  HYPOPLASIAS: none on permanent; diffuse brown opacity 12 deciduous
  CARIES: none
  ABSCESSES: none

MEASUREMENTS AVAILABLE: some cranial and postcranial, 2 dental

NONMETRIC TRAITS AVAILABLE: most cranial, no postcranial; apical bone

TAPHONOMIC OBSERVATIONS: R mandible – coronoid process looks torn off with tear-like marks on upper body – rodent?

POROTIC HYPEROSTOSIS: orbits barely discernable, healed

VERTEBRAL PATHOLOGY: spina bifida S1 & S4

COMMENTS: no cranial deformation; L femur is fairly broad and flat at the trochanter and twisted with a fairly rugose ridge midshaft medial

SITE: LA 265

BURIAL: 2

PROVENIENCE: FS 1679, Feature 238, pit above pit structure vent shaft

AGE: 9±3 months; dental development; size compared to aged individuals
SEX: unknown

CONDITION: mostly poor with much breakage and most surfaces deeply etched and eroded; some cranial pieces fair to good

REPRESENTATION: present: some cranium, clavicle fragments, C and T fragments; 5+ rib shaft fragments, shaft fragments of the R ulna and both tibiae and fibulae, most of the L femur shaft, 1 metacarpal, 2 foot phalanges, and small fragments of other long bones

DENTAL
  INVENTORY: maxillary deciduous teeth except both m^1
  HYPOPLASIAS: 2 pits on Li^2
  CARIES: none

MEASUREMENTS AVAILABLE: 1 cranial

NONMETRIC TRAITS AVAILABLE: few

TAPHONOMIC OBSERVATIONS: the left femur shaft has a chop mark medial at midshaft; at the anterior end of the chop is a small area of missing bone

POROTIC HYPEROSTOSIS: none observed

COMMENTS: no evidence of cranial deformation - but young; poor representation and condition precludes many observations

SITE: LA 265

BURIAL: 3

PROVENIENCE: FS 1700, Feature 244, extramural pit

AGE: 30 ± 5; no pubic symphysis; auricular surface L stage 3 (30-34 y), R stage 4 (35-39 y); most cranial sutures open (20-35 y); fusion of iliac crest fairly recent (fuses 15-23); M^3 root closed; little wear on teeth

SEX: female; pelvis female, skull female

CONDITION: poor to fair; much damage and deterioration of joint surfaces and noncortical bone; C and T vertebrae very poor condition

REPRESENTATION: missing: sternum and some foot bones; parts of many elements are deteriorated

DENTAL
INVENTORY: all present and all but RM^3 in occlusion
HYPOPLASIAS: lines: RM^2 (n=2), RP^2, $R\&LI^1$(n=2 each), LI^2 (n=2), LP^2, $LM^{1\&2}$; LC (n=2), RI_2, RC(n=3), RM_1; linear horizontal pits: LM^3; nonlinear arrays of pits: RC, LI^1; single pits: RP_1
WEAR: anterior (1-8) slight to moderate(max range 1-4, mean 2.7, man range 2-4, mean 3.0); molars (1-10) slight to moderate (max range 3.2-4.7, mean 3.9, man range 2.7-5.0, mean 3.6)
CARIES: 1 occlusal, 1 interproximal, both on RP^1
ABSCESSES: none
CONGENITAL: distinct cusp lingual LI^2
COMMENTS: light calculus 1 maxillary incisor, 8 maxillary; moderate 2 maxillary; lower anterior teeth crowded - RP_1 partially in front of C; LI^1 winged 30+

MEASUREMENTS AVAILABLE: dental, most cranial and postcranial

NONMETRIC TRAITS AVAILABLE: most; trace of mandibular torus left only

CONGENITAL: L6 sacralized (fused to sacrum)

BONE FORMATION: posterior callus (thickened cortex) L posterior upper midshaft of femur (23 X 10 X 3 mm), R posterior tibia just below midshaft (18 X 15 X 1 mm)

POROTIC HYPEROSTOSIS: none in orbits; occipital has barely discernable healed adjacent to sutures

VERTEBRAL PATHOLOGY: none observed on intact surfaces but most are deteriorated

ARTHRITIS: none observed on intact joint surfaces but most are deteriorated; eburnation L talus calcaneus articulation and barely discernable lipping around the same surface

COMMENTS: crania - probably not deformed but has an unusual shape, flattened on the left side, bulge on the right

SITE: LA 265

BURIAL: 4

PROVENIENCE: FS 1485, extramural bell-shaped pit

AGE: 45±5; pubic symphysis: Todd stage 9 (45-49), Suchey-Brooks stage 6 (42+); auricular surface stage 6? (45-49); cranial sutures mostly open (25+); tooth wear suggests young to middle of suggested range
SEX: female; pelvis clearly female, skull female

CONDITION: good

REPRESENTATION: essentially complete

DENTAL
INVENTORY: all present (M_3 cong. absent or impacted)
HYPOPLASIAS: linear horizontal pits: RM^3; diffuse boundary brown opacity: RM^2
WEAR: anterior (1-8) moderate (max range 5-6, mean 5.1; man range 4-6, mean 5.0); molars (1-10) moderate to heavy except M^3 with no wear (range M1-2 4.2-6.2, mean 5.3; man range 4.5-10.0, mean 7.5)
CARIES: cervical: RM^1, LM^1, LM^2, LP_2; large LM_1, RM_1
ABSCESSES: none
CONGENITAL: both M_3 absent or impacted with no evidence of presence
COMMENTS: LM_1 roots only and these are loose with bone almost totally resorbed; severe resorption of maxilla and mandible; light to heavy calculus on all teeth with enamel; $R\&LM_1$ crowns totally destroyed

MEASUREMENTS AVAILABLE: most dental, cranial, and postcranial

NONMETRIC TRAITS AVAILABLE: most; trace of mandibular torus; septal aperture R humerus

BONE LOSS: lesion (pitting) foot proximal phalanx

1, digit 1; dorsal pitting or parturition pits and ventral pitting on both pubic symphysis

BONE FORMATION: enthesopathy: R calcaneus inferior; enthesopathy or large spicule: R & L ilia at inferior demiface of auricular surface

FRACTURES AND DISLOCATIONS: L rib complete fracture just proximal of the articular tubercle; callus formed but proximal piece missing

POROTIC HYPEROSTOSIS: orbits: healed porosity with coalesced foramina; parietals and occipital: barely discernable healed near sutures

VERTEBRAL PATHOLOGY: osteophytes: elevated rings T10-11, curved spicules C3-6, C7, T8-9, L3-5, S1; syndesmophytes: elevated rings same as above except none on S1

ARTHRITIS: barely discernable lipping: proximal ribs, acetabulums, distal humeri, proximal and distal radii and ulnae; sharp ridge: temporal TMJ, T & L vert. articular facets, proximal humeri, carpals, metacarpals, hand phalanges, proximal and distal femora and tibiae, proximal fibulae, tarsals, metatarsals, foot phalanges; pinpoint surface porosity: proximal ribs, proximal and distal femora and tibiae; coalesced surface porosity: T vert rib facets, L facets, medial clavicles, manubrium; barely discernable surface osteophytes T vert facets, proximal fibulae; barely discernable periarticular resorptive foci: proximal and distal radii and ulnae, hand phalanges; periarticular resorptive foci: manubrium, carpals, metacarpals, tarsals, metatarsals

COMMENTS: cranial deformation perpendicular centered at squmous; both ilia have small smooth-walled perforations (L 6.904 X 4.78, R 4.79 X 5.42 mm) - developmental defects?; round flat piece of dense bone above right orbit – trauma or osteoma?

SITE: LA 265

BURIAL: 5

PROVENIENCE: FS 1537, Feature 131, pit structure, subfloor pit, middle fill

AGE: 50+; pubic symphysis Todd stage 10 (50+), Suchey-Brooks stage 6 (43-60, mean 57)

SEX: female; pelvis – few observations possible L ventral arc and greater sciatic notch clearly female; skull intermediate

CONDITION: fair to good, some deterioration

REPRESENTATION: most present with some deterioration; missing some hand and foot bones

DENTAL
INVENTORY: premortem loss: R M^{2-3}, LM^{1-3}, RM_{2-3}
HYPOPLASIAS: all teeth are worn to enamel base or nearly so
WEAR: anterior (1-8): heavy (max range 6-8, mean 7.5, man range 6-8, mean 7.0); molars (1-10): moderate to heavy (max 10, man range 3.7-8.7, mean 6.3)
CARIES: cervical: LM_{1-3} (n=4), RI_2; large caries: RM^1, LP^1; noncarious pulp exposure: RP_2, RM_1
ABSCESSES: RM^1, LP^1, LI_2-RI_1, LP_1-M_1 (mandibular abscesses span several teeth)
COMMENTS: calculus slight on 4 maxillary teeth, slight to heavy on almost all (n=12) mandibular teeth; calculus on roots indicate exposure; heavy resorption both maxilla and mandible; little or no bone for several teeth

MEASUREMENTS AVAILABLE: few dental, all cranial, most postcranial

NONMETRIC TRAITS AVAILABLE: all; apical bone; moderate mandibular torus R and L

CONGENITAL: S1 completely lumbarized (e.g. Barnes 1994 :112G)

POROTIC HYPEROSTOSIS: none

VERTEBRAL PATHOLOGY: osteophytes: curved spicules C, T, L vertebrae - especially T9-11 with more to the left side; syndesmophytes: elevated rings most C, T, L vertebrae; T11 wedged

ARTHRITIS: barely discernable lipping: glenoid, L carpals, R distal femur, R tibia, patella, L acetabulum; sharp ridges: sternum, humeri, proximal L radius and ulna, metacarpals, L distal femur, L proximal tibia, L distal fibula, tarsals, metatarsals, phalanges; extensive spicules: R carpals; pinpoint porosity: C, T, L vertebrae, glenoids, clavicles; pinpoint and coalesced: sacrum; surface osteophytes present: L proximal radius, L proximal ulna, L distal femur, L proximal tibia, sacrum; periarticular resorptive foci: glenoids (barely), proximal humeri, L proximal ulna, carpals, L metacarpals, L distal femur, L proximal tibia, tarsals, metatarsals, phalanges

COMMENTS: no cranial deformation

SITE: LA 265

BURIAL: 6

PROVENIENCE: FS 1482; Feature 22; lower fill of pit structure

AGE: 50+; pubic symphysis: Todd stage 10 (50+); Suchey-Brooks stage 6 (40-60, mean 60); auricular surface stage 4 (35-39); cranial sutures 47+; auricular surface still has stria, all other evidence suggests an older individual
SEX: female; pelvis clearly female, cranium clearly female

CONDITION: fair; deterioration of some bones, carnivore damage to others

REPRESENTATION: R lower arm and lower leg missing - due to carnivores; much breakage and some deterioration

DENTAL
- INVENTORY: premortem loss: RM^3-C, LM^{1-3}, LM_1, R&LP_2, RM_{2-3}
- HYPOPLASIAS: lines: RI^1, LI^1, LM_3, LC, RC
- WEAR: anterior (1-8) moderate (max range 5-6, mean 5.9, man range 5-7, mean 5.7); molars (1-10) light (man range 4-4.2, mean 4.1)
- CARIES: interproximal: R&LI^2; cervical: LC, LP^2, LM_3(n=3), LM_2
- ABSCESSES: RP^1, RC, LM^1, LM_3
- COMMENTS: light calculus on remaining teeth; light wear probably due to problems resulting from dislocated jaw

MEASUREMENTS AVAILABLE: some dental, some cranial, some postcranial

NONMETRIC TRAITS AVAILABLE: few

TAPHONOMIC OBSERVATIONS: carnivore gnawing: parietal?, both distal femurs, L proximal tibia, L proximal fibula, R distal humerus

CONGENITAL: S1 lumbarized; C2-C3 ankylosed; spine and body; probably congenital block vertebra (e.g. Barnes 1994:69)

BONE LOSS: dorsal pitting or parturition pits R and L pubes; pitting R foot distal first phalanx, proximal second phalanx

BONE FORMATION: large enthesopathy L calcaneus plantar

FRACTURES AND DISLOCATIONS: bilateral dislocation of mandible, condyles shortened but enlarged with a porous surface and distinct lip on R; L joint almost totally destroyed with only a porous amorphous mass remaining

POROTIC HYPEROSTOSIS: barely discernable headed in orbits; parietals and occipital too fragmentary for observation

VERTEBRAL PATHOLOGY: osteophytes: curved spicules C3-6, T, L, S1; syndesmophytes: curved spicules C3-6, T, L

ARTHRITIS: barely discernable lipping: atlas vert, T verts, proximal humeri, L metacarpals, proximal femurs; sharp ridge: occipital condyles, C and L verts, lateral clavicles, manubrium, proximal ribs, L distal humerus, L ulna, L radius, L carpals, L hand phalanges, ilia, acetabulums, L tibia, L fibula, L tarsals, L metatarsals, L foot phalanges; pinpoint porosity: C verts, glenoids, proximal humeri, L ulna, L metacarpals; coalesced porosity: occipital and mandibular condyles, lateral clavicles, manubrium, proximal ribs, L distal humerus, L hand phalanges, L acetabulum; both: L verts, L metatarsals; barely discernable periarticular resorptive foci: atlas; L carpals; periarticular resorptive foci: C verts, lateral clavicles, glenoids, proximal humeri, L distal humerus, L distal ulna, metacarpals, hand phalanges, L acetabulum, R proximal femur, L tarsals, L metatarsals

COMMENTS: cranial deformation unknown; R ilium has a small smooth-walled perforation; similar perforation in the body of the left scapula at center near glenoid - developmental defects?; an area of dense bone at bregma and slight elevation on frontal could be traumatic or a flat osteoma and crease; the L glenoid has a small dense osteoma-like nodule on the joint surface (3 x 5 x .4 mm); small nodules of bone on the L hand phalanx 1 of digits 3 and 4 - arthritis?

SITE: LA 265

BURIAL: 7

PROVENIENCE: FS 1015, Feature 18, pit structure upper fill

AGE: 35-45; no pubic symphysis; moderate wear on teeth

SEX: female; no pubic symphysis, cranium female

CONDITION: poor condition, carnivore disturbed and impacted by backhoe

REPRESENTATION: poor; much breakage and missing parts of the cranium, most vertebrae, parts of most long bones, hands, and feet

DENTAL
- INVENTORY: missing with no associated alveolar bone: RM^{1-3}, RP^1, RC, $R\&LI^1$, LP^1, LM^1, LM_3-I_2, $RM_{1,3}$; the rest are present but not in occlusion; 3 maxillary molar roots are treated as LM^{2-3}
- HYPOPLASIAS: lines RI^2 (n=2), LI^2, $RI_{1\&2}$, RC
- WEAR: anterior (1-8): slight to moderate (max range 1-5, mean 3.7; man range 3-5, mean 4.7); molars (1-10): light (man 4.2)
- CARIES: interproximal: RM_2; cervical: LI^2, LP^2, LI_1, RI_1(n=2); large caries: RP^2, LM^{2-3}
- ABSCESSES: unknown
- CONGENITAL: RI^2 may have been a peg tooth, the adjacent canine is large - especially the root

MEASUREMENTS AVAILABLE: some dental, no cranial, two postcranial

NONMETRIC TRAITS AVAILABLE: few

TAPHONOMIC OBSERVATIONS: carnivore? punctures rib shafts; possible cuts: R&L distal radius, lateral, 2 upper rib shafts, L clavicle superior, L distal ulna, 1 long bone fragment, 1 cranial case fragment; slight burn on 1or 2 thoracic vertebrae; L metatarsals (n=2) are sun bleached

CONGENITAL: S1 lumbarized or L5 sacralized
POROTIC HYPEROSTOSIS: healed porosities in both orbits; none observed on case fragments but poorly represented; the vault is thick in places

VERTEBRAL PATHOLOGY: osteophytes: curved spicules some vertebra fragments; syndesmophytes: elevated rings T verts

ARTHRITIS: few joint surfaces intact; barely discernable lipping: L metacarpals; ridges: L vert articular facets, L proximal ribs, L humerus, L proximal ulna, acetabulums, L metatarsals; pin point porosities: L humerus, L proximal ulna, L metatarsals; coalesced porosity: L vert articular surfaces; barely discernible periarticular resorptive foci: L proximal ulna; clearly present L proximal humerus

COMMENTS: condition could obscure many conditions

SITE: LA 6169

BURIAL: 1

PROVENIENCE: FS 1172, Feature 82, pit structure (F 76), middle fill

AGE: 6 ± 2y years; fusion, vertebral arches fused to centrum (2-7 years); dental: M^1 about half erupted (6 ± 2y)

SEX: unknown

CONDITION: good to excellent

REPRESENTATION: missing only a few epiphyses and distal phalanges

DENTAL
- INVENTORY: permanent: present but unobservble: M^2, M_2, present not in occlusion: M^1, M_1; deciduous: all present and in occlusion
- HYPOPLASIAS: single pit: R max canine; cream or brown diffuse boundary opacity on most deciduous; occlusal pit Lm^2
- WEAR: facets buccal on both i^2
- CARIES: none
- ABSCESSES: none
- CONGENITAL: bilateral fusion of the crowns of c and i_2, roots unobservable

MEASUREMENTS AVAILABLE: mandible; postcranial; 2 dental
NONMETRIC TRAITS AVAILABLE: most; apical bone

CONGENITAL: base of nasal aperture unusually flat, no septum

ABNORMAL SHAPE: base of nasal opening flat

POROTIC HYPEROSTOSIS: parietals have barely discernable healed porosities near bosses; orbits have barely discernable healed porosities

VERTEBRAL PATHOLOGY: vertebral bodies have either lesions or, more likely, fusion defects; spina bifida S1-S5; L5 arch meets but is not fused

COMMENTS: cranial deformation lambdic obtuse (> 90)

SITE: LA 6169

BURIAL: 2

PROVENIENCE: FS 399 (+ 392), Feature 2 extramural pit

AGE: 45+; no pubic symphysis; only a small part of the L auricular surface remains and it suggests a score of 6+ (45-49)

SEX: female; only a small piece of the left sciatic notch is represented - score 1-2? When measurements are compared to other project burials, this one is smaller than the males. Some females are larger and some smaller for all measurements with B2 tending toward the larger end of the range.

CONDITION: very poor, virtually no joint surfaces remain and when found are represented by small fragments

REPRESENTATION: fragments of crania and most other bones are present but all are very fragmentary

DENTAL
- INVENTORY: none recovered; at least RM^1 through LP^2, LM_3 through LP_1 resorbed; bone is missing in most other areas

MEASUREMENTS AVAILABLE: 1 mandible, few postcranial

NONMETRIC TRAITS AVAILABLE: few

BONE LOSS: small lesion L mandible probably Stafne's defect (salivary gland defect) Man and Murphy 1990:30)

POROTIC HYPEROSTOSIS: unknown

VERTEBRAL PATHOLOGY: syndesmophytes: elevated rings lower C and T vertebrae

ARTHRITIS: sharp ridges: R proximal femur, lower C and T vertebrae

COMMENTS: few observations possible due to condition

SITE: LA 6169

BURIAL: 3

PROVENIENCE: FS 177, Feature 4 (pit structure), intrusive pit SW quadrant

AGE: 0 ± 2 m; dental development; slightly larger than LA 115862 B2, near term fetus
SEX: unknown

CONDITION: generally good but fragile with surface erosion

REPRESENTATION: missing some cranial, vertebrae, and rib parts and most carpals and tarsals, some phalanges; L radius and proximal ulna were found in fill above the burial (FS 160)

DENTAL
- INVENTORY: Rm^1-Li^1, Lm^1, Lm_1-Rc; teeth are not erupted but some are observable
- HYPOPLASIAS: most enamel not completely calcified; only Ri_2 is observable and it had none

MEASUREMENTS AVAILABLE: several cranial and postcranial

NONMETRIC TRAITS AVAILABLE: none

POROTIC HYPEROSTOSIS: none observed

COMMENTS: no pathologies observed

SITE: LA 6169

BURIAL: 4
PROVENIENCE: FS 1714; pit structure (F 47), upper fill

AGE: 0 ± 2 m, dental development
SEX: unknown

CONDITION: much surface erosion

REPRESENTATION: most parts are represented with some erosion and deterioration

DENTAL
INVENTORY: all present except Rm^2 and Ri^2, either present and loose or not erupted
HYPOPLASIAS: none in the teeth that could be observed (n=5)

MEASUREMENTS AVAILABLE: some cranial and postcranial

NONMETRIC TRAITS AVAILABLE: none

BONE FORMATION: some form of systemic infection is indicated by periostitis or reactive woven bone on most cranial bones along the sutures, the orbits, the medial and lateral surfaces of the mandible, clavicles, scapulae, rib shafts, ilia, most long bones, and the foot phalanges; other elements could be involved but are too eroded to observe; no evidence of remodeling

SITE: LA 6169

BURIAL: 5

PROVENIENCE: FS 212; Feature 4 (pit structure) floor

AGE: 20-40; suture closure - 18-45

SEX: male; cranial observation - nuchal crest, supraorbital margin, and glabella

CONDITION: good

REPRESENTATION: cranial case only

DENTAL
INVENTORY: none

MEASUREMENTS AVAILABLE: few cranial

NONMETRIC TRAITS AVAILABLE: few
TAPHONOMIC OBSERVATIONS: carnivore gnaws, punctures, and crushing on both upper orbits, left sphenoid, both mastoids, parts of the base, and the nasal area

POROTIC HYPEROSTOSIS: none

COMMENTS: cranial deformation: squamous portion of occipital, perpendicular

SITE: LA 6169

BURIAL: 6

PROVENIENCE: FS 222, Feature 3, pit structure

AGE: 20-25; L auricular surface score 2 (25-29 years); M_3 roots not quite closed (< 25)

SEX: female?; pelvis subpubic concavity and preauricular sulcus suggest female, the skull is indeterminate for the mastoid process, supraorbital margin, and mental eminence; female for glabella; not very rugose but large; femur head diameter is in the male range and chin height in the female range

CONDITION: poor to good; cranium crushed and most elements are severely eroded

REPRESENTATION: missing parts of the cranium, L scapula, patellas, some T and L vertebrae, some ribs, L tibia, R fibula, most of the right hand and both feet; some due to carnivore damage; portions of a right fibula found in the area are probably from this burial

DENTAL
INVENTORY: all present and in occlusion or impacted
HYPOPLASIAS: lines RP^2, RI^2, LM_2, LP_2, $RP_{1,2}$; pit LP_1
WEAR: anterior (1-8): light+ (max range 1-4, mean 3.3; man range 2-5, mean 3.5); molars (1-10): light (max range 3-4.2, mean 3.6, man range 0-3.2, mean 2.1)
CARIES: interproximal LM_1
ABSCESSES: none
CONGENITAL: both M^3 impacted; L is horizontal with crown above M^2 and roots above M^1, R crown is facing buccal above M^2 ; enamel defects in crowns of RM_{2-3}
COMMENTS: small to moderate calculus LI^{1-2}, P^1, M^{1-3}, RM_2
MEASUREMENTS AVAILABLE: dental, some cranial and postcranial

NONMETRIC TRAITS AVAILABLE: some; bregmatic bone

TAPHONOMIC OBSERVATIONS: carnivore gnawing and punctures: L pubic symphysis, L lateral clavicle, distal humeri, R proximal radius, proximal ulnae, R proximal and distal femur; human or carnivore - gnaws or dull cuts: L femur shaft; deep multiple chops: R femur and tibia

BONE LOSS: digit 1, phalanx 1 proximal, large smooth-walled lesion

BONE FORMATION: enthesopathy: clavicles at costocalvicular ligament attachment

POROTIC HYPEROSTOSIS: none

VERTEBRAL PATHOLOGY: C3 is missing the R fork at the end of the spinous process (probably congenital) and the arch is asymmetrical, this caused the articular facets on the left to increase in size and a distinct ridge on C2; Schmorl's nodes L5 superior (n=3), L4 superior and inferior; syndesmophyte elevated rings: C3-6, T

ARTHRITIS: barely discernable lipping: C1, L carpals, L metacarpals, L hand phalanges, tarsals, metatarsals, foot phalanges; L proximal femur has a depressed arc-shaped area with pin point porosities anterior to the fovea capitis

COMMENTS: clavicles: raised plateau-like attachment for costoclavicular ligament; ulnae have small smooth pits in the distal articular surfaces; cranial deformation: at lambda

SITE: LA 6169

BURIAL: 7

PROVENIENCE: FS 1033; pit structure (Feature 47) upper fill

AGE: 2.5y ± 10m; dental development

SEX: unknown

CONDITION: poor

REPRESENTATION: considerable breakage and missing parts - cranial, vertebral column and thorax, most long bones and hand and foot bones; parts from this individual or another of about the same age were scattered throughout the structure

DENTAL

INVENTORY: not in occlusion: Ri^2, Li^1, Rm^1, Lc (maxillary), Ri_1, Rm^1 (FS 1129)

HYPOPLASIAS: discrete boundary white/cream opacity: c

CARIES: none

MEASUREMENTS AVAILABLE: no cranial, few postcranial

NONMETRIC TRAITS AVAILABLE: none

TAPHONOMIC OBSERVATIONS: possible carnivore damage (scalloped end) L distal femur; abrasions or fine cuts on posterior parietals; possible chops (n = 2): R posterior ulna

ABNORMAL SHAPE: anagenisis or craniosynostosis of coronal suture; no evidence of a suture on either the endo- or ectocranial surface

BONE FORMATION: FS 781 and 1203 (possibly B7): periosteal surface: inferior occipital, inferior surface of sphenoid wings; sclerotic reaction: temporal

POROTIC HYPEROSTOSIS: no orbits; occipital: adjacent to sutures, healed coalescence of foramina with no thickening; parietals: adjacent to sutures; headed coalescence of foramina with increased thickness

COMMENTS: cranial deformation: lambda, obtuse (> 90)

SITE: LA 6169

BURIAL: 8

PROVENIENCE: FS 1713; pit room (Feature 70) floor

AGE: 45+; suture closure 47+; heavy dental wear and tooth loss

SEX: male; no pelvis indicators; cranium: nucal crest, mastoid process, mental eminence indeterminate; supraorbital margin female; humerus and femur head diameters male; ulna and femur length male; male or large female

CONDITION: poor; fragile and deteriorating

REPRESENTATION: cranium missing some parts and fragile, missing some vertebrae, R innominate and radius, most of left foot and all foot phalanges; 1 foot phalange (FS 1616) is probably from B8

DENTAL

INVENTORY: premortem loss: RM^{3}-P^{1}, RI^{1}, LM^{1-3}, LM_{3}-P_{1}, L & R I_{1}, RM_{1-2}

HYPOPLASIAS: heavy wear may have removed some, 4 other teeth have enough enamel to observe have none; line and linear array of pits: mand LC

WEAR: anterior (1-8): heavy (max range 6-8, mean 7.1; man range 6-8, mean 6.7); molars (1-10): heavy on the one molar present (score 10)

CARIES: interproximal: LP^{1} (n=2), LP^{2}, cervical caries: $LP^{1,2}$, root caries: LI_{2}; noncarious pulp exposure: R&LC, R&LI^{2}, LC, R&LI_{2}, RM_{3}

ABSCESSES: LI_{2}, probable abscesses: RP^{2}, LI_{1}

COMMENTS: light calculus LI^{2}, LP^{1-2}, mandibular L&RC, RI_{2}, RP_{1}; much alveolar resorption

MEASUREMENTS AVAILABLE: few dental, few cranial, some postcranial

NONMETRIC TRAITS AVAILABLE: some; apical bone

TAPHONOMIC OBSERVATIONS: carnivore punctures: L innominate, pubis; ribs; other elements have breaks that could be from carnivores but no diagnostic marks

BONE FORMATION: enthesopathy: R tibia distal medial shaft; R calcaneus medial plantar

FRACTURES AND DISLOCATIONS: R metacarpal 5 is bent as if it has a completely healed fracture midshaft; the distal end of the R ulna is beveled inward with a small protruding lump of bone suggesting a fracture of the distal end; the R hamate has a raised area that could be related to the same injury

POROTIC HYPEROSTOSIS: no orbits; none on parietals or occipital

VERTEBRAL PATHOLOGY: osteophytes: elevated rings, T verts; curved spicules, C verts, especially C4-C6, L4(?); syndesmophytes: curved spicules, T verts

ARTHRITIS: barely discernable lipping: R proximal radius, proximal femora; sharp ridges: C vert articular facets, T vert articular and rib facets, L vert articular facets, rib proximal facets, glenoid, R humerus proximal and distal, R proximal ulna, carpals, metacarpals, phalanges, distal femora, proximal and distal tibiae and fibulae, tarsals, proximal metatarsals; pin point surface porosity: T vert articular and rib facets, medial and lateral clavicles, tarsals; coalesced surface porosity: L4 vert superior articular facets, L ribs 1 & 2, R proximal radius, R hamate; both pin point and coalesced surface porosity: C3-7 vert superior and inferior bodies, superior and lateral manubrium; barely discernable resorptive foci: R distal humerus; resorptive foci: R proximal humerus and ulna, metacarpals, proximal and distal femora, tibiae, fibulae, tarsals, metatarsals

SITE: LA 6169

BURIAL: 9

PROVENIENCE: FS 1212, pit structure (Feature 70), lower fill

AGE: 18-19; pubic symphysis: Todd stage 1 (18-19); Suchey-Brooks stage 1 (15-24); epiphyseal fusion: S1-2 fused (16+)

SEX: male; pelvis: ventral arch, subpubic concavity, and sciatic notch male; ischiopubic ridge intermediate; cranium: nuchal crest female, supraorbital margin male

CONDITION: poor; cranium fragmented; most are soft and deteriorated

REPRESENTATION: missing (some removed and scattered by rodents): both clavicles, some vertebrae, some carpals, 3 L metacarpals, some teeth; deteriorated with parts missing: cranium, vertebrae, scapulae, pelvis, ribs, long bone ends

DENTAL

INVENTORY: present not in occlusion: RC (FS 1426), RP^{2} (FS 1426), RM^{3} (FS 1426), LC, LP^{1} (FS 1315), LP^{2} (FS 1445), M^{1-2}, M^{3}(FS 1315), $RM_{1,3}$

HYPOPLASIAS: lines:; RC; linear vertical groove: RC, LM^{3}; linear horizontal pits: LC; single

pit: LC, RC, LM^3; brown diffuse boundary opacity: LP^2
WEAR: anterior (1-8): light to moderate (max range 1-4, mean 2.4); molars (1-10) light to moderate (max range 1-4.5, mean 2.4; man range 1-4, mean 2.5)
CARIES: occlusal and interproximal: RM_1
ABSCESSES: unknown
COMMENTS: light calculus RP^2 & C

MEASUREMENTS AVAILABLE: some dental, no cranial, some postcranial

NONMETRIC TRAITS AVAILABLE: few

TAPHONOMIC OBSERVATIONS: rodent gnawing and damage (and displacement) L humerus shaft; carnivore gnaw marks R proximal humerus shaft; possible carnivore puncture and crunch rib shaft fragment

CONGENITAL: foot phalanges 2 & 3 fused - probably digit 5

BONE FORMATION: femora and tibiae (fibulae are too eroded to score) periostitis; tibiae posterior shaft: inactive reactive woven bone; femora posterior shaft: active in small patches, reactive woven bone; osteoma: R femur posterior midshaft

FRACTURES AND DISLOCATIONS: projectile point tip embedded in L rib 12, no healing

POROTIC HYPEROSTOSIS: unknown

VERTEBRAL PATHOLOGY: Schmorl's nodes T11 superior and inferior, T12 superior (n=2)

ARTHRITIS: ridges and barely discernable periarticular resorptive foci: distal femora and tibiae, proximal tibiae, tarsals, metatarsals

COMMENTS: projectile point was found in the rib cage and was probably the cause of death; large rodent burrow disturbed and displaced elements from the thoracic vertebrae to the base of the cranium

SITE: LA 6169

BURIAL: 10
PROVENIENCE: FS 1207, upper fill of vent shaft (Feature 66) for pit structure (Feature 4)

AGE: 7 ± 2; dental development

SEX: unknown

CONDITION: poor; eroded, etched, and broken

REPRESENTATION: some mixing with B11 found just above B10; fragmentary cranium, damaged and missing vertebrae and ribs; most carpals and metacarpals missing; parts scattered throughout Feature 4 and general area

DENTAL
INVENTORY: deciduous: R&Lm^2-c, R&Lm_2-c; permanent: not in occlusion: RM^2-C, LI_{1-2}, RI_{1-2}, RC, RP_1, RM_{1-2}; in occlusion: LM^1, LM_1; unerupted: R&LI^2, LC-P^2, LM^2, LM_2, LP_2-C;
HYPOPLASIAS: lines: maxillary RC, RM^1, mandibular LC; single pit: RP^2
WEAR: anterior (1-8) none (man 1 (n=5)); molars (1-10): none (max 1 (n=2), man 1 (n=1)
CARIES: interproximal: Lm^2
ABSCESSES: none
COMMENTS: calculus: light LI_2, moderate RI_{1-2}

MEASUREMENTS AVAILABLE: some dental, few cranial, some post cranial.

NONMETRIC TRAITS AVAILABLE: few.

TAPHONOMIC OBSERVATIONS: possible chop marks R lateral fibula, proximal shaft; L ulna, medial midshaft

BONE LOSS: pit (6 X 12 m, .7 mm deep) on R femur distal lateral shaft at plantaris attachment - probably traumatic: in periostium and cortex, sclerotic

POROTIC HYPEROSTOSIS: unknown, no orbits or cranial case

SITE: LA 6169

BURIAL: 11

PROVENIENCE: FS 1209, upper fill of vent shaft (Feature 66) for pit structure (Feature 4)

AGE: 5 ± 1.5 years; dental development, epiphyseal fusion - cervical and thoracic arches are fusing to centrum

SEX: unknown

CONDITION: fair

REPRESENTATION: cranium: broken with missing parts, vertebra and ribs damaged and missing, parts of long bones missing, only the R fibula is missing entirely; hands missing some bones, feet represented by one phalanx; additional parts scattered throughout Feature 4

DENTAL
INVENTORY: all deciduous are present with m^{1-2} and Lc in occlusion; permanent: not in occlusion: $R\&LM^1$ and I^1, LI^2, LM_1-P_1, RC-M_2, unerupted: R&LM ^{2}, RP^2-I^2, LC-P^2, LC-RI_2
HYPOPLASIAS: lines: RM^1 (n=2), LM^1, LM_1,LI_1(n=2), RI_1 (n=2), RM_1; pits: RI^2, LI^1, RP_1, maxillary Rc, Li^1
WEAR: none except for M1s that all have a score of 1
CARIES: none
ABSCESSES: none
COMMENTS: light calculus Rm^2, mandibular RC, Rm_2

MEASUREMENTS AVAILABLE: 1 cranial, some postcranial and dental

NONMETRIC TRAITS AVAILABLE: some

TAPHONOMIC OBSERVATIONS: possible chop marks: R humerus distal shaft with portion removed, R ulna shaft, L ulna midshaft, L radius midshaft; 3 L ribs have ends that look like they were cut off, some with parallel cut marks; unusual breaks on 3 R ribs – carnivore?

ABNORMAL SHAPE: tibia is flattened medial-lateral - as in adults

BONE FORMATION: enthesopathy: small spur medial on R radius midshaft

POROTIC HYPEROSTOSIS: orbits: porosity with coalescence of foramina but no thickening, some evidence of healing and active lesions; parietals and occipital: near sutures, porosity only, some evidence of healing and active lesions; more extensive with less healing in orbits
VERTEBRAL PATHOLOGY: clefts in anterior centrums – fusion defects or growth related?

SITE: LA 6169

BURIAL: 12

PROVENIENCE: FS 876, Feature 46, extramural

AGE: 4 ± 1 year; dental development

SEX: unknown

CONDITION: poor

REPRESENTATION: portions of maxilla, mandible, humeri, R radius, ulnae, L fibula only

DENTAL
INVENTORY: deciduous, not in occlusion: max L&Rc, Lm_2-c, Li_1, Rc, Rm_2; permanent, not in occlusion:RM^1, LM_1, LP_1-I_1, RC, RM_1
HYPOPLASIAS: line:LI_2, all deciduous and many permanent teeth have surface erosion and pitting could obscure lines and pits, only one other tooth was scorable (LM_1)
WEAR: none
CARIES: none
ABSCESSES: unknown

MEASUREMENTS AVAILABLE: few dental, no cranial or postcranial

NONMETRIC TRAITS AVAILABLE: none

COMMENTS: condition and poor representation make most observations not possible

SITE: LA 6169

BURIAL: 13 recovered from fill layer, not as a burial

PROVENIENCE: FS 363, pit structure (Feature 4) fill SE quad and FS 243 - south wall of backhoe trench

AGE: 0 ± 2 m; size

SEX: unknown

CONDITION: fair to good

REPRESENTATION: L frontal and parietal, 10 case fragments (1 larger parietal piece), 4 R metatarsals

DENTAL
INVENTORY: none

MEASUREMENTS AVAILABLE: metatarsal 5 length =8.24 mm; parietal:49.16 X 54.59 mm

POROTIC HYPEROSTOSIS: none

COMMENTS: elements duplicate those of B3, same age and same structure

SITE: LA 6171

BURIAL: 1

PROVENIENCE: FS 843, extramural pit (Feature 24), base

AGE: 45 ± 5; mixed results, pelvis: Todd stage 8 (40-45), Suchey-Brooks stage 4 (25-57), auricular surface stage 7 (50-59), cranial sutures: 56+; extreme tooth wear and moderate arthritis

SEX: male; pelvis: sciatic notch wide (score 2), otherwise male; cranium: clearly male

CONDITION: good

REPRESENTATION: essentially complete, some breakage and deterioration

DENTAL

INVENTORY: RM_3 congenital absence; others present; LM^{1-2} largely destroyed by large caries with only partial roots remaining; RM^2 root not attached to bone and bone completely resorbed

HYPOPLASIAS: some teeth, especially molars and left maxillary teeth are worn and have little enamel, others are completely obscured by calculus; lines: LM^3, LP_1, LC (n=3), RC, RP_2; pits: mandibular RC (n=2)

WEAR: anterior (1-8): heavy (max range 7-8, mean 7.3, man range 6-7, mean 6.3; molars (1-10): heavy (max range 1-10, mean 7.2, man range 7-9, mean 8)

CARIES: cervical: RM^3; occlusal: RM^1; large caries: $RM^{1\&2}$

ABSCESSES: LM^2

CONGENITAL: absence of RM_3

COMMENTS: light calculus $R\&LI^1$, light to moderate LM_1-RP_1, RM_1

MEASUREMENTS AVAILABLE: most dental and cranial, all postcranial

NONMETRIC TRAITS AVAILABLE: yes; trace mandibular tori

TAPHONOMIC OBSERVATIONS: slight damage to medial margin of the R scapula could be from a carnivore

BONE FORMATION: enthesopathy: very large on palmar side of hand phalanx 1 for digit 2; upper ribs (L more developed than R) have small bumps both superior and inferior near sternal ends - increased for muscle attachment (e.g. Mann and Murphy 1990:67); foot phalanx 2 for digit 2 has a ridge that is an arthritic response to a fracture - midshaft plantar

FRACTURES AND DISLOCATIONS: small (9X10 mm) depression fracture R side on coronal suture, completely healed; complete fracture of foot phalanx 2 for digit 2, callus formation - woven bone only with arthritic response

POROTIC HYPEROSTOSIS: none

VERTEBRAL PATHOLOGY: osteophytes: elevated rings - T and L; syndesmophytes: barely discernable - T elevated rings - C3-7, L, curved spicules - C1-2

ARTHRITIS: barely discernable lipping: C vert articular facets, proximal and distal humeri, proximal femora, tarsals; sharp ridge: T vert articular and rib facets, superior and lateral sacrum, glenoid, manubrium, proximal ribs, proximal and distal radii and ulnae, carpals, hand phalanges, distal femora, patella, proximal and distal tibiae and fibulae, foot phalanges; pinpoint surface porosity: glenoid, ventral acromion; coalesced porosity: manubrium, proximal ribs, distal metacarpals; eburnation: rib 1 polished T1 barely; periarticular resorptive foci: proximal and distal humeri and ulnae, proximal and distal radii (barely discernable), carpals, phalanges, proximal femora, patellas

COMMENTS: facial characteristics are different than most of the population, the head is long with prominent nasals and a nasal spine, the palate is very deep, the malars slope inward to the maxilla with a more depressed area beneath the malars; C2-C4 vertebrae have very wide forks at end of spinous process; no cranial deformation

SITE: LA 6171

BURIAL: 2

PROVENIENCE: FS 540, Feature 10 fill

AGE: 30-40; dental wear
SEX: unknown

CONDITION: poor

REPRESENTATION: partial mandible and R cuboid fragment only

DENTAL
INVENTORY: LM_2-I_2
HYPOPLASIAS: lines: LP_2 (n=2), LP_1, LC
WEAR: anterior (1-8) moderate+: range 4-6, mean 4.7; molar (1-14) moderate+: 8.5
CARIES: cervical: LM_1
ABSCESSES: none
COMMENTS: light calculus LM_1

MEASUREMENTS AVAILABLE: some teeth

SITE: LA 115862

BURIAL: 1

PROVENIENCE: FS 172, extramural pit (Feature 6)

AGE: 35 ± 5; pubic symphysis: Todd stage 7 (35-39), Suchey-Brooks stage 4 (25-60); auricular surface stage 3-4 (30-39); moderate dental wear

SEX: female; pelvis clearly female; cranium: female to intermediate; fetus resting on L ilium

CONDITION: mostly very poor but ranges to good; badly eroded and deteriorated

REPRESENTATION: essentially complete, missing all metatarsals and some hand and most foot phalanges - probably deteriorated

DENTAL
INVENTORY: missing only LI^1 - probably postmortem, maxillary teeth in occlusion, LM_3-C, RP_2 not in occlusion
HYPOPLASIAS: lines: LP_2, LC, RC, RP_2, RM_3; pit: RI^2; brown diffuse boundary opacity: RI^1, LI^2-LM^1, LM^3, LM_2, LP_2, LI_2, RI_2, RP_1
WEAR: anterior (1-8): moderate (max range 4-5, mean 4.4, man range 4-5, mean 4.6); molars (1-10): light to moderate (max range 2-4.7, mean 3.5, man range 2-4.7, range 3.5)
CARIES: occlusal: LM_3; interproximal: LM_3; cervical: RI_2; L:M_1 has 2 deep occlusal pits that started as enamel defects and could be carious
ABSCESSES: none
COMMENTS: light to heavy calculus on all but LP_1 and LM_2

MEASUREMENTS AVAILABLE: all dental, few cranial, most postcranial

NONMETRIC TRAITS AVAILABLE: some

BONE FORMATION: enthesopathy: L proximal clavicle, dorsal

POROTIC HYPEROSTOSIS: none

VERTEBRAL PATHOLOGY: osteophytes: elevated rings L, spicules T1-9; syndesmophytes: elevated rings C

ARTHRITIS: barely discernable lipping: C1-2, proximal ribs, ilia-sacroiliac and acetabulum, L distal humerus, R proximal radius, proximal ulnae, carpals, proximal metacarpals, phalanges, tali, R navicular; coalesced porosity: R proximal humerus, radius, and ulna; periarticular resorptive foci: R proximal humerus

COMMENTS: elements (especially lower limb bones) are too eroded for many observations; near term fetus on L ilium

SITE: LA 115862

BURIAL: 2

PROVENIENCE: FS 172, extramural pit (Feature 6)

AGE: near term fetus; compared to LA 6169 B3 at 0 ± 2 m, the head is close in size but long bones and vertebrae are about 20 percent smaller
SEX: unknown

CONDITION: poor, incomplete and fragile with some left in situ with B1

REPRESENTATION: missing parts of all elements with no representation of the scapula, pelvis, leg bones, hands and feet (except 1 metatarsal); vertebrae and rib fragments

DENTAL
INVENTORY: none

MEASUREMENTS AVAILABLE: 3 cranial, 2 postcranial

COMMENTS: no observations possible

SITE: LA 115862

BURIAL: 3

PROVENIENCE: FS 183, extramural pit (Feature 7)

AGE: 18-19; pubic symphysis: Todd stage 2 (19-18), Suchey-Brooks stage 1 (18-19); fusion

SEX: female; pelvis remaining parts are clearly female; cranium female

CONDITION: mostly poor, fragile and broken with deterioration

REPRESENTATION: good representation but deterioration of cranium, pelvis, and vertebrae; long bones generally broken, fragile, and eroded; missing some hand and foot bones

DENTAL

INVENTORY: missing postmortem: LM^{2-3}; most in occlusion; not in occlusion: RI^1-LI^2, LM_3; RM^3 unerupted

HYPOPLASIAS: lines: RI^2(n=2), LI^1, LI^2(n=2), LM^1, LM_3, RC, RM_2; pits: LI^2, RP_{1-2}; linear horizontal pits: mandibular Cs; nonlinear arrays of pits: maxillary Cs, $LM^{2\&3}$

WEAR: anterior (1-8): light to moderate (max range 1-3, mean 2, man range 2-4, mean 2.7); molars (1-10): light (max range 3-3.2, mean 3.1, man range 1-3.7, mean 2.6)

CARIES: none

ABSCESSES: none

COMMENTS: light calculus LM_2, LI_2-P_1, RM_1

MEASUREMENTS AVAILABLE: dental, some cranial and postcranial

NONMETRIC TRAITS AVAILABLE: some

TAPHONOMIC OBSERVATIONS: chops or rodent damage L radius, midshaft – probably rodent

ABNORMAL SIZE: L metacarpals and phalanges are the same length as the right but much slimmer, probably atrophied and related to bone loss below

BONE LOSS: L phalanx 1 from digit 1, proximal and lateral lesion from periosteum to internal table, boundaries well defined but no sclerosis – trauma?

POROTIC HYPEROSTOSIS: none observed but condition poor

ARTHRITIS: barely discernable lipping on L tarsals, metatarsals, and phalanges; R side too eroded to score

COMMENTS: condition could obscure many conditions; cranial deformation at lambda, perpendicular (90)

SITE: LA 115862

BURIAL: 4

PROVENIENCE: FS 185, extramural pit (Feature 8)

AGE: 6-9 months; size

SEX: unknown

CONDITION: poor, etched and fragmentary

REPRESENTATION: poor, few cranial fragments, partial R femur and L tibia, rib shaft fragment, unidentifiable long bone shaft fragments

DENTAL

INVENTORY: none

MEASUREMENTS AVAILABLE: none

NONMETRIC TRAITS AVAILABLE: none

COMMENTS: badly eroded; recovered from general fill of the pit

APPENDIX 5.2

ADULT CRANIAL AND POSTCRANIAL MEASUREMENTS (MM)

	249-1♀	265-3♀	265-4♀	265-5♀	265-6♀	6169-2♀	6169-6♀	115862-1♀	115862-3♀	6169-5♂	6169-8♂	6171-1♂
Max cranial length		163	154	176								183
Max cranial breadth		112	151	132								
Bizygomatic diameter		120	136	124								
Basion-bregma height		141	127	134								141
Cranial base length		99	91	100								127.8
Basion-prosthion length		97	94*	99.3								
Maxillo-alveolar breadth		61.2	65.8	54.9**								64.9
Maxillo-alveolar length				52.2	51.2							
Biauricular breadth		117.9	122.1	117.7								133.1
Upper facial height		67.7	66.1	64.9	66.7*		77.3		62.9		71.4	70
Minimum frontal breadth		88	101	89.9				94.7	93.3	89.8		94
Upper facial breadth		101	111	107.7					103.4	107.4		
Nasal height		45.4	44.9	48.7	46.4*		57.2		47.3		50.3	44.1*
Nasal breadth		26.4	26.5	26.3	24.3				27.2		27.9	23.9
Orbital breadth		34.3	38.8	35.7	36.6*		39.7	34.1R	34.4		40	
Orbital height		34.8	33.1	31.7	34.6		32.6		31.7			
Biorbital breadth		93.6	99.5	97.4					91.9	99.1		
Interorbital breadth		24	26.8	26.2			28.2	34.4	23.4		25.9	
Frontal chord		101	121	112.2	109				98	106		113.8
Parietal chord		94	169	105.3						108		113.2
Occipital chord		110	75	70.9						69.0*		96
Foramen magnum length		35.2	32.2	31.4								36
Foramen magnum breadth		24.3	28.5	25.9								29.6*
Mastoid length		22.2	27.6	25.4				26.7	29.9		26.4R	33.6
Chin height	31.2	35.5	33	33	27.6	30.0+	29.4	34.9	28.5		35.4	34.7
Mandibular body height	28.3R	32.7	31.8	32.6	25.1R		34.0R		27.3		28.2	16.7
Mandibular body breadth	12.1R	11.1	12.5	12.7	10.6		10.4R		9.7		10.9	9.5
Bigonial width		82.7	91.3	90.9	92							104.22
Bicondylar breadth				116.5	111							127.6
Minimum ramus breadth	36.9R	25.6	34.7R	34.9	32.8		35		33.9R		40.5	36.1
Maximum ramus breadth	47.7R	50.6R	43.2R	42.6	41		46.4		44.3R		54.8	48.9R
Maximum ramus height	57.4R	56.2R	47.5R	56.1	44.2		65.5		49.0R		57.8	65.1
Mandibular length	93.7R	92.7R	81.3	94.6	86.9		100.5R		91.0R		103.7	93.3
Mandibular angle (°)	117	128	110R	110	119		115		119		110	119

R = right side substituted; * = estimated for minor erosion or reconstruction; ** = severe alveolar resorption; + probably larger than estimated.

POSTCRANIAL

	249-1♀	265-3♀	245-4♀	265-5♀	265-6♀	265-7♀	6169-2♀	6169-6♀	115862-1♀	115862-3♂	6169-8♂	6169-9♂	6171-1♂
Clavicle: max length	136+	131.1*	135	128.2				141.1R		124.7+*	161		145.4
A-P dia at mid	9.4	8.7	8	9.5				10.0R	9.2R	8.7	11.2		9.8
S-I dia at mid	8.2	7	8.9	8.4				8.9R	8.9R	6.9	9.6		7.3
Scapula: height	133.7R										159R		
breadth	106.3R										103.3R		
Humerus: max length	292	292R*	289R*	284	290*				286R	270	327+R		292
epicond breadth	52.9	50.7R*	51.1						52.4R	51.3			63.4
vert head dia	36.1		37.8R	38.6	39.3			42.6R	37.8R	36.2	43.5		41
max dia at mid	22.6	20.8	20.3	22.9	20.4R		22	22.6R	20.4R	18.6	22.2R	20.7*	20.9
min dia at mid	14.1	14.7	14.7	15.4	13.1R		15.9	15.8R	14.1R	12.7	16.6R	16.4*	14.4
Radius: max length	232R	220R	216	216+*	224*			230R*	220R*	220R*		260R*	242
A-P dia at mid	10.0R	8.6R	9.7	10.5	10.4			10.3R	9.3R	9.3R	10.5R	10.6R	9.4
M-L dia at mid	13.0R	13.0R	13.5	13.1	14.3			13.7R	13.3R	13.4R	14.5R	14.7R	13.6
Ulna: max length	247R	236	238	237	238			255*	242R	232R*	268R*		260
A-P dia	11.4R	13.1	16	15	14.2		13.3	15	15.2R	13.2R	16.1R		14.6
M-L dia	13.7R	10.2	12.3	13	12.1		13.4	10.6	9.4R	10.5R	13.1R		11
physiolog length	223R	206	210	210	212			222	214R	205R	242R		228
min circumfer	29R	2.8	32	34	30			35	31R	29R	33		33
Sacrum: anterior length	101.4	111			114.8				113.1				99.5
ant sup breadth	106.8	105	117.7*										115.9
max trans dia	44.4	48.4	49.2	49.6				51.9	47.4				51.7
Innominate: height	188R	192	198.2*		194*				182R				204
iliac breadth	131.3R	133.2	140.5		150				136.1R				152.9
pubis length	71.7R		88*		85.0*								93.8
ischium length		81			76.4*				76.7				66.4
Femur: max length		400R	401R*		383				388R	363*	448R*	430+	422
bicondylar leng		396R	402R*	382					384R	360*	448R*	430+	421
epicond breadth			71.2R	71.3				73.8	69.7R	66.3	78.8	72.3	80.2
max head dia	38.9R	38.6	39.8R	39.3+				43.6	38.2R	38	44.7		43.9
A-P subtro dia	21.1	21.7	24.8R	25.7	22.7	23.9	27.2		29.1R	22	24.1R	25.1	24.6
M-L subtro dia	29.7	28.7	31.7R	31.8	29.8	32.4	32.1		24.1R	30.4	33.8R	28.6	31.4
A-P dia at mid	26.8*	23.7R	30.5R	27.2	29.7		27		27.5R	18.8	29.4R	29.9	29.9
M-L dia at mid	20.9*	21.8R	23.9R	26.5	23.1		24.9		23.4R	29.3	26.3R	27	24.9
mid circumfer	75	72R	86R	84	83		80		78R	80	88R	88	87
Tibia: length	348*		340	323					329		378R*		357R
max prx breadth			64.5	62.5									72.2R
max dist breadth		46.0*	38.8*	40.2	40.7					40.9	47.9R	45.7	50.4R
max dia nut foramen	30.2	26.9	34.2	32.2	30.9		33.3	30.7	29.9	26.6	35.7R	34.3	38.2R
M-L dia nut fora	18.6	16.9	20.7	20.8	17.4		18	23.9	19.2	15.6	19.5R	20.1	20.7R
circum at nut foramen	80	69	85	85	78		8.4	84	77	71	92R	87	93R
Fibula: maximum length			334	316*							364		346
max dia mid	13.1*	15.5	15.8	13.1	14.1				14.6		16.5		13.9
Calcaneus: max length	65.4	62.3	69.7	64.7	59.1				66.9	65.3	75.5	76.9	77.7
middle breadth	34.6	37.5	35.4	38.5	34.4				35.6	36.7	40.9	36.7	39.7

R = right element substituted; * = estimated for minor erosion or reconstruction; ** = severe alveolar resorption; + probably larger than estimated

Appendix 5.3

MEASUREMENTS (MM) FOR SUBADULT INDIVIDUALS, YOUNGEST TO OLDEST

Individual	115862-2	6169-3	6169-4	265–2	265-1	6169-11	6169-1	6169-10
Age	0	0±2m	0±2m	9±3m	3±1y	5±1.5y	6±2y	7±2y
Lesser wing of sphenoid:								
L length	-	-	14.4	-	-	-	-	-
R length	-	-	14	-	-	-	-	-
L width	-	-	17.2	-	-	-	-	-
Greater wing of sphenoid:								
L length	-	28.7	-	-	-	-	-	-
R length	-	30	39.4	-	46	-	-	-
L width	-	18.1	-	-	-	-	-	-
R width	-	22.1	23.1	-	26.2	-	-	-
Body of sphenoid:								
length	-	18.7	17.8	-	-	-	-	-
width	-	11.3	12.9	-	-	-	-	-
Petros and mastoid:								
L length	-	34.6	42.2	-	53.5	-	-	-
R length	26.4*	-	43.9	39.7	50.5	56.1	-	-
L width	-	17	16.7	-	25.5	-	-	-
R width	11	18.1	20.4	20.1	25.2	25.4	-	-
Basilar occipital:								
length	12.3	12.3	13.9	-	15.9	-	-	19.5
width	-	14.3	16.3	-	21.9	-	-	-
Zygomatic:								
L length	-	22.7	27.1	-	-	-	-	43.7
R length	-	-	-	-	39.2	-	-	-
L width	-	18.6	24.7	-	-	-	-	35.6
R width	-	-	-	-	26	-	-	-
Maxilla:								
L length	-	-	-	-	43.6	-	-	47.1
R length	-	-	-	-	39	-	-	-
R height	-	-	-	-	37.7	-	-	-
R width	-	-	-	-	-	-	-	-
Mandible:								
L body length	-	36.3	44.9	-	-	-	62.3	-
R body length	-	37.7	-	-	-	54.8	56.8	-
R width of arc	-	-	-	-	-	-	28.6	36.4
L width of arc	-	-	-	-	-	-	30.2	-
length of half mandible	-	-	44.1+	-	-	77.9	86.2	104.8
Clavicle:								
L length	-	43.6	-	-	-	85.7	76.6	95.4+
R length	-	-	-	-	63.4*	-	76.6	-
L diameter	-	3.4	3.4*	-	-	5.7	5.2	7.7
R diameter	-	-	-	-	-	-	5.3	-
Scapula:								
L height	-	33.8	-	-	-	-	-	65.2
R height	-	-	-	-	-	-	-	64.5
L width	-	30.2	-	-	-	-	-	49.8
R width	-	-	-	-	-	-	-	48.7
L spine length	-	32.1	-	-	-	-	-	59
R spine length	-	31.9	-	-	-	-	-	-
Ilium:								
L length	-	33.6	-	-	-	-	73.3	-
R length	-	-	-	-	-	84.9	74.4	96.9
L width	-	30.8	34.3	-	-	75.3	65.4*	90.8
L width	-	-	33.3+	-	-	-	64.3*	90.9

MEASUREMENTS (MM) FOR SUBADULT INDIVIDUALS, YOUNGEST TO OLDEST

Individual	115862-2	6169-3	6169-4	265–2	265-1	6169-11	6169-1	6169-10
Age	0	0±2m	0±2m	9±3m	3±1y	5±1.5y	6±2y	7±2y
Ischium:								
L length	-	-	-	-	-	46.6	41.6	-
R length	-	18.6	-	-	34	-	40.6	58.7
L width	-	-	-	-	-	31.9	29.3	-
R width	-	11.7	-	-	21.4	-	29.7	40.9
Pubis:								
L length	-	-	-	-	29.6	44.3	34.6	-
R length	-	16.8	-	-	33.3	45.2	35	55.1
Humerus:								
L length	-	63.6	-	-	-	158	143.3	-
R length	-	-	-	-	-	-	142.1	-
L width	-	16.4	-	-	-	-	26.2	-
R width	-	-	-	-	-	-	26.6	37.2
L diameter	-	5.2	5.7*	-	-	12.3*	10.4	-
R diameter	5.1	-	6.0*	-	-	13.2*	10.3	15.1*
Ulna:								
L length	-	-	-	-	-	-	119.5	-
R length	-	-	-	-	-	-	119.8	162
L diameter	-	-	-	-	-	-	6.8	-
R diameter	4	-	-	-	-	7.8*	7	8.6
Radius:								
L length	-	51.8	-	-	-	-	107	-
R length	-	-	-	-	-	124.5	107.8	150.8
L diameter	-	4.1	-	-	-	-	6.5	-
R diameter	-	-	-	-	-	8.1	6.6	9.1
Femur:								
L length	-	75	82.8+	-	140.3	-	196	-
R length	-	74.5	-	-	-	226	196	265
L width	-	19	-	-	-	-	39	55.8
R width	-	19.3	-	-	-	48.6	-	-
L diameter	-	6.2	7.3	-	10.6	15.1	11.8	17.5
R diameter	-	6.2	6.8*	-	-	15.3	12.2	-
Tibia:								
L length	-	65.5	71.3*	-	-	-	163	224
R length	-	65	70.3	-	-	-	163	219
L diameter	-	5.9	6.5	-	-	18.1*	12.3	19.6
R diameter	-	6	7	-	-	-	12.4	19.8
Fibula:								
L length	-	62.5	-	-	-	-	159	219
R length	-	62.6	-	-	113.2	-	158	-
L diameter	-	3.3	3.7*	-	-	-	6.8	10.8
R diameter	-	3.3	3.5*	-	5.4	-	7.3	10.5

Appendix 6. Faunal Counts

Counts for Sites by Ceramic Date

LA 249	Mainly Late Developmental		Mainly Classic		Site Total	
	Count	Col %	Count	Col %	Count	Col %
Small maml/med-lrg bird			1	1.3%	1	0.5%
Small mammal	18	14.4%	3	3.8%	21	10.2%
Small-medium mammal	1	0.8%			1	0.5%
Medium-large mammal	8	6.4%	10	12.5%	18	8.8%
Large mammal	5	4.0%	5	6.3%	10	4.9%
Botta's pocket gopher	2	1.6%	1	1.3%	3	1.5%
Yellow-faced pocket gopher	10	8.0%	1	1.3%	11	5.4%
Ord's kangaroo rat	1	0.8%			1	0.5%
Banner-tailed kangaroo rat	1	0.8%			1	0.5%
Beaver	3	2.4%			3	1.5%
Woodrats	1	0.8%			1	0.5%
Mexican woodrat	1	0.8%			1	0.5%
Medium-large rodent	2	1.6%			2	1.0%
Desert cottontail	14	11.2%	9	11.3%	23	11.2%
Black-tailed jack rabbit	13	10.4%	3	3.8%	16	7.8%
Medium artiodactyl	26	20.8%	39	48.8%	65	31.7%
Mule deer	6	4.8%	1	1.3%	7	3.4%
Pronghorn	1	0.8%			1	0.5%
Bighorn sheep	1	0.8%	1	1.3%	2	1.0%
Large bird	1	0.8%			1	0.5%
Eggshell	7	5.6%	5	6.3%	12	5.9%
Painted turtle			1	1.3%	1	0.5%
Horned lizards	1	0.8%			1	0.5%
Plains or Woodhouse's toad	2	1.6%			2	1.0%
Total	125	100.0%	80	100.0%	205	100.0%

LA 265	Early Developmental	
	Count	Col %
Unknown small	1	0.0%
Small mammal/med-lrg bird	8	0.2%
Small mammal	834	24.0%
Small-medium mammal	92	2.6%
Medium-large mammal	230	6.6%
Large mammal	216	6.2%
Spotted ground squirrel	9	0.3%
Black-tailed prairie dog	7	0.2%
Gunnison's prairie dog	14	0.4%
Botta's pocket gopher	12	0.3%
Yellow-faced pocket gopher	33	1.0%
Ord's kangaroo rat	4	0.1%
Banner-tailed kangaroo rat	26	0.7%
Cricetid rodents	2	0.1%
Permyscus sp.	5	0.1%
Woodrats	23	0.7%
White-throated woodrat	14	0.4%
Large woodrat	14	0.4%
Small rodent	7	0.2%
Medium-large rodent	27	0.8%
Desert cottontail	960	27.6%
Black-tailed jack rabbit	366	10.5%
Medium carnivore	1	0.0%
Large carnivore	5	0.1%
Dog, coyote, wolf	3	0.1%
Dog	101	2.9%
Long-tailed weasel	1	0.0%
Badger	5	0.1%
Bobcat	3	0.1%
Medium artiodactyl	215	6.2%
Large artiodactyl	3	0.1%
Medium-large artiodactyl	3	0.1%
Deer or elk	1	0.0%
Elk	22	0.6%
Mule deer	50	1.4%
Pronghorn	17	0.5%
Bison	5	0.1%
Bighorn sheep	17	0.5%
Sheep or goat	2	0.1%
Small bird	1	0.0%
Medium bird	4	0.1%
Large bird	3	0.1%
Medium-large bird	4	0.1%
Eggshell	1	0.0%
Golden eagle	1	0.0%
Scaled quail	3	0.1%
Turkey	7	0.2%
Flicker	8	0.2%
Horned lark	6	0.2%
LA 265	Early Developmenta	
	Count	Col %
Western meadowlark	8	0.2%
Passeriformes	6	0.2%
Lizards	6	0.2%
Horned lizards	2	0.1%
Nonvenomous snakes	19	0.5%
Frogs and toads	4	0.1%
Plains spadefoot	1	0.0%
True toads	1	0.0%
Great plains toad	4	0.1%
Plains or Woodhouse's toad	12	0.3%
Red spotted toad	4	0.1%
Woodhouse toad	9	0.3%
Northern leapord frog	1	0.0%
Total	3473	100.0%

LA 6169

	Early Developmental		Late Developmental		Mainly Late Developmental		Coalition		Mainly Coalition		Unknown		Site Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Unknown	-	-	1	0.8%	-	-	-	-	-	-	-	-	1	0.0%
Small maml/med-lrg bird	33	1.6%	-	-	2	0.5%	24	4.4%	-	-	-	-	59	1.5%
Small mammal	274	13.3%	15	12.4%	42	9.7%	87	16.0%	83	12.2%	5	20.8%	506	13.1%
Small-medium mammal	42	2.0%	1	0.8%	28	6.5%	7	1.3%	49	7.2%	-	-	127	3.3%
Medium mammal	2	0.1%	-	-	1	0.2%	1	0.2%	3	0.4%	1	4.2%	8	0.2%
Medium-large mammal	30	1.5%	9	7.4%	50	11.6%	21	3.9%	27	4.0%	2	8.3%	139	3.6%
Large mammal	20	1.0%	4	3.3%	21	4.9%	13	2.4%	25	3.7%	1	4.2%	84	2.2%
Very large mammal	-	-	-	-	-	-	-	-	1	0.1%	-	-	1	0.0%
Rock squirrel	-	-	-	-	-	-	-	-	1	0.1%	-	-	1	0.0%
Black-tailed prairie dog	2	0.1%	1	0.8%	2	0.5%	2	0.4%	-		-	-	7	0.2%
Gunnison's prairie dog	-	-	-	-	-	-	9	1.7%	2	0.3%	-	-	11	0.3%
Botta's pocket gopher	13	0.6%	-	-	9	2.1%	1	0.2%	5	0.7%	-	-	28	0.7%
Yellow-faced pocket gopher	12	0.6%	4	3.3%	23	5.3%	11	2.0%	8	1.2%	-	-	58	1.5%
Ord's kangaroo rat	-	-	1	0.8%	-	-	6	1.1%	5	0.7%	-	-	12	0.3%
Banner-tailed kangaroo rat	3	0.1%	1	0.8%	1	0.2%	1	0.2%	6	0.9%	-	-	12	0.3%
Peromyscus sp.	-	-	1	0.8%	16	3.7%	1	0.2%	3	0.4%	-	-	21	0.5%
Northern grasshopper mouse	-	-	-	-	-	-	-	-	1	0.1%	-	-	1	0.0%
Woodrats	16	0.8%	-	-	6	1.4%	-	-	3	0.4%	-	-	25	0.6%
White-throated woodrat	2	0.1%	-	-	4	0.9%	-	-	1	0.1%	-	-	7	0.2%
Large woodrat	1	0.0%	1	0.8%	-	-	-	-	-	-	-	-	2	0.1%
Small rodent	-	-	-	-	3	0.7%	-	-	-	-	-	-	3	0.1%
Medium-large rodent	3	0.1%	-	-	4	0.9%	3	0.6%	-	-	-	-	10	0.3%
Desert cottontail	899	43.7%	26	21.5%	52	12.0%	111	20.4%	290	42.6%	6	25.0%	1384	35.9%
Black-tailed jack rabbit	170	8.3%	13	10.7%	27	6.3%	33	6.1%	54	7.9%	4	16.7%	301	7.8%
Medium carnivore	-	-	-	-	1	0.2%	-	-	-	-	-	-	1	0.0%
Large carnivore	2	0.1%	-	-	-	-	-	-	-	-	-	-	2	0.1%
Dog, coyote, wolf	-	-	-	-	-	-	-	-	3	0.4%	1	4.2%	4	0.1%
Coyote	-	-	-	-	-	-	-	-	2	0.3%	-	-	2	0.1%
Dog	51	2.5%	-	-	1	0.2%	-	-	15	2.2%	-	-	67	1.7%
Black bear	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Badger	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Medium artiodactyl	86	4.2%	26	21.5%	90	20.8%	13	2.4%	6	0.9%	-	-	221	5.7%
Large artiodactyl	-	-	-	-	-	-	-	-	1	0.1%	-	-	1	0.0%
Medium-large artiodactyl	2	0.1%	-	-	-	-	-	-	1	0.1%	1	4.2%	4	0.1%
Deer or elk	1	0.0%	1	0.8%	-	-	2	0.4%	10	1.5%	-	-	14	0.4%
Elk	1	0.0%	-	-	-	-	-	-	1	0.1%	-	-	2	0.1%
Mule deer	8	0.4%	8	6.6%	14	3.2%	3	0.6%	7	1.0%	2	8.3%	42	1.1%

LA 6169

	Early Developmental		Late Developmental		Mainly Late Developmental		Coalition		Mainly Coalition		Unknown		Site Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Pronghorn	5	0.2%	2	1.7%	13	3.0%	3	0.6%	2	0.3%	-	-	25	0.6%
Bighorn sheep	-	-	2	1.7%	4	0.9%	1	0.2%	2	0.3%	-	-	9	0.2%
Sheep or goat	-	-	-	-	-	-	-	-	1	0.1%	-	-	1	0.0%
Medium bird	11	0.5%	-	-	-	-	1	0.2%	1	0.1%	-	-	13	0.3%
Large bird	23	1.1%	1	0.8%	7	1.6%	31	5.7%	6	0.9%	-	-	68	1.8%
Medium-large bird	9	0.4%	-	-	5	1.2%	1	0.2%	1	0.1%	-	-	16	0.4%
Very large bird	65	3.2%	-	-	-	-	-	-	-	-	-	-	65	1.7%
Surface-feeding ducks	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Sharp-shinned hawk	-	-	-	-	-	-	1	0.2%	-	-	-	-	1	0.0%
Golden eagle	-	-	-	-	-	-	1	0.2%	-	-	-	-	1	0.0%
Prairie falcon	-	-	-	-	1	0.2%	-	-	-	-	-	-	1	0.0%
Merlin	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Scaled quail	2	0.1%	-	-	-	-	-	-	2	0.3%	-	-	4	0.1%
Turkey	233	11.3%	1	0.8%	2	0.5%	148	27.3%	44	6.5%	-	-	428	11.1%
Sandhill crane	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Flicker	6	0.3%	-	-	-	-	-	-	-	-	-	-	6	0.2%
Horned lark	7	0.3%	-	-	-	-	-	-	-	-	-	-	7	0.2%
Western meadowlark	2	0.1%	-	-	-	-	-	-	-	-	-	-	2	0.1%
Passeriformes	1	0.0%	-	-	-	-	1	0.2%	2	0.3%	-	-	4	0.1%
Painted turtle	-	-	2	1.7%	1	0.2%	-	-	-	-	-	-	3	0.1%
Ornate box turtle	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Lizards	-	-	-	-	-	-	1	0.2%	-	-	-	-	1	0.0%
Nonvenomous snakes	-	-	-	-	-	-	1	0.2%	1	0.1%	-	-	2	0.1%
True toads	2	0.1%	-	-	-	-	-	-	1	0.1%	-	-	3	0.1%
Great Plains toad	1	0.0%	-	-	-	-	-	-	-	-	-	-	1	0.0%
Plains or Woodhouse's toad	4	0.2%	-	-	1	0.2%	-	-	-	-	-	-	5	0.1%
Plains or red-spotted toad	-	-	-	-	-	-	2	0.4%	1	0.1%	-	-	3	0.1%
Woodhouse toad	7	0.3%	-	-	1	0.2%	2	0.4%	-	-	1	4.2%	11	0.3%
Northern leopard frog	2	0.1%	-	-	-	-	-	-	-	-	-	-	2	0.1%
Suckers	-	-	-	-	-	-	-	-	2	0.3%	-	-	2	0.1%
Small mouth buffalofish	-	-	-	-	-	-	-	-	1	0.1%	-	-	1	0.0%
Total	2059	100.0%	121	100.0%	432	100.0%	543	100.0%	680	100.0%	24	100.0%	3859	100.0%

LA 6170

	Early Developmental		Mainly Early Developmental		Late Developmental		Mainly Late Developmental		Unknown		Site Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Unknown small	2	0.1%	-	-	-	-	-	-	-	-	2	0.1%
Small mammal/med-lrg bird	18	0.9%	1	0.6%	-	-	1	2.8%	-	-	20	0.9%
Small mammal	351	17.4%	6	3.3%	-	-	-	-	2	11.8%	359	15.9%
Small-medium mammal	18	0.9%	1	0.6%	-	-	-	-	-	-	19	0.8%
Medium-large mammal	58	2.9%	5	2.8%	-	-	3	8.3%	-	-	66	2.9%
Large mammal	137	6.8%	10	5.5%	1	7.7%	6	16.7%	1	5.9%	155	6.9%
Small squirrels	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Black-tailed prairie dog	3	0.1%	6	3.3%	-	-	-	-	-	-	9	0.4%
Gunnison's prairie dog	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Botta's pocket gopher	6	0.3%	1	0.6%	-	-	1	2.8%	-	-	8	0.4%
Yellow-faced pocket gopher	34	1.7%	6	3.3%	-	-	2	5.6%	-	-	42	1.9%
Pocket mice	7	0.3%	-	-	-	-	-	-	-	-	7	0.3%
Ord's kangaroo rat	22	1.1%	-	-	-	-	-	-	-	-	22	1.0%
Banner-tailed kangaroo rat	8	0.4%	1	0.6%	-	-	1	2.8%	1	5.9%	11	0.5%
Beaver	2	0.1%	2	1.1%	-	-	-	-	-	-	4	0.2%
Peromyscus sp.	17	0.8%	1	0.6%	-	-	-	-	-	-	18	0.8%
Woodrats	25	1.2%	-	-	-	-	-	-	1	5.9%	26	1.2%
White-throated woodrat	4	0.2%	-	-	-	-	-	-	-	-	4	0.2%
Mexican woodrat	4	0.2%	-	-	-	-	-	-	-	-	4	0.2%
Large woodrat	17	0.8%	-	-	-	-	-	-	-	-	17	0.8%
Small rodent	8	0.4%	-	-	-	-	-	-	-	-	8	0.4%
Medium-large rodent	32	1.6%	2	1.1%	-	-	-	-	-	-	34	1.5%
Nuttall's cottontail	-	-	1	0.6%	-	-	-	-	-	-	1	0.0%
Desert cottontail	545	27.1%	59	32.6%	6	46.2%	14	38.9%	6	35.3%	630	27.9%
Black-tailed jack rabbit	179	8.9%	25	13.8%	3	23.1%	1	2.8%	3	17.6%	211	9.3%
Medium carnivore	-	-	1	0.6%	-	-	-	-	-	-	1	0.0%
Dog	16	0.8%	36	19.9%	2	15.4%	1	2.8%	-	-	55	2.4%
Badger	2	0.1%	-	-	-	-	-	-	-	-	2	0.1%
Medium artiodactyl	320	15.9%	6	3.3%	-	-	-	-	1	5.9%	327	14.5%
Large artiodactyl	16	0.8%	-	-	-	-	-	-	-	-	16	0.7%
Medium-large artiodactyl	-	-	1	0.6%	-	-	-	-	-	-	1	0.0%
Deer or elk	2	0.1%	1	0.6%	-	-	-	-	-	-	3	0.1%

LA 6170

	Early Developmental		Mainly Early Developmental		Late Developmental		Mainly Late Developmental		Unknown		Site Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Elk	8	0.4%	-	-	1	7.7%	-	-	-	-	9	0.4%
Mule deer	45	2.2%	-	-	-	-	2	5.6%	-	-	47	2.1%
Pronghorn	32	1.6%	-	-	-	-	-	-	-	-	32	1.4%
Bison	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Cattle or bison	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Bighorn sheep	3	0.1%	1	0.6%	-	-	-	-	-	-	4	0.2%
Small bird	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Medium-large bird	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Very large bird	1	0.0%	1	0.6%	-	-	2	5.6%	-	-	4	0.2%
Surface-feeding ducks	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Golden eagle	-	-	1	0.6%	-	-	-	-	-	-	1	0.0%
Scaled quail	4	0.2%	-	-	-	-	-	-	1	5.9%	5	0.2%
Turkey	-	-	2	1.1%	-	-	1	2.8%	-	-	3	0.1%
Flicker	3	0.1%	-	-	-	-	-	-	-	-	3	0.1%
Horned lark	8	0.4%	-	-	-	-	-	-	-	-	8	0.4%
Passeriformes	6	0.3%	-	-	-	-	-	-	-	-	6	0.3%
Lizards	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Whiptails	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Snakes	-	-	2	1.1%	-	-	-	-	-	-	2	0.1%
Nonvenomous snakes	18	0.9%	1	0.6%	-	-	-	-	-	-	19	0.8%
Frogs and toads	-	-	-	-	-	-	1	2.8%	-	-	1	0.0%
Plains spadefoot	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
New Mexico spadefoot	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
True toads	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Great Plains toad	8	0.4%	1	0.6%	-	-	-	-	1	5.9%	10	0.4%
Plains or Woodhouse's toad	4	0.2%	-	-	-	-	-	-	-	-	4	0.2%
Red spotted toad	4	0.2%	-	-	-	-	-	-	-	-	4	0.2%
Woodhouse toad	2	0.1%	-	-	-	-	-	-	-	-	2	0.1%
Northern leopard frog	1	0.0%	-	-	-	-	-	-	-	-	1	0.0%
Total	2012	100.0%	181	100.0%	13	100.0%	36	100.0%	17	100.0%	2259	100.0%

LA 6171

	Early Developmental		Mainly Early Developmental		Coalition		Mainly Coalition		Mainly Classic		Unknown		Site Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Small mammal/med-lrg bird	1	2.9%	1	0.4%	-	-	1	0.3%	-	-	-	-	3	0.4%
Small mammal	5	14.7%	56	21.9%	-	-	62	20.9%	-	-	10	6.5%	133	17.3%
Small-medium mammal	-	-	1	0.4%	-	-	-	-	-	-	1	0.6%	2	0.3%
Medium-large mammal	1	2.9%	27	10.5%	2	6.9%	19	6.4%	1	100.0%	19	12.3%	69	9.0%
Large mammal	1	2.9%	21	8.2%	4	13.8%	22	7.4%	-	-	7	4.5%	55	7.1%
Spotted ground squirrel	-	-	-	-	-	-	1	0.3%	-	-	-	-	1	0.1%
Botta's pocket gopher	-	-	2	0.8%	-	-	6	2.0%	-	-	2	1.3%	10	1.3%
Yellow-faced pocket gopher	-	-	8	3.1%	-	-	20	6.8%	-	-	-	-	28	3.6%
Pocket mice	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Ord's kangaroo rat	-	-	-	-	-	-	-	-	-	-	9	5.8%	9	1.2%
Banner-tailed kangaroo rat	2	5.9%	2	0.8%	-	-	18	6.1%	-	-	34	22.1%	56	7.3%
Cricetid rodents	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Northern grasshopper mouse	-	-	-	-	-	-	18	6.1%	-	-	-	-	18	2.3%
Woodrats	-	-	3	1.2%	-	-	-	-	-	-	1	0.6%	4	0.5%
White-throated woodrat	-	-	-	-	-	-	-	-	-	-	1	0.6%	1	0.1%
Small rodent	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Medium-large rodent	-	-	-	-	-	-	2	0.7%	-	-	7	4.5%	9	1.2%
Desert cottontail	6	17.6%	58	22.7%	-	-	25	8.4%	-	-	3	1.9%	92	11.9%
Black-tailed jack rabbit	10	29.4%	22	8.6%	1	3.4%	29	9.8%	-	-	1	0.6%	63	8.2%
Dog, coyote, wolf	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Medium artiodactyl	5	14.7%	36	14.1%	2	6.9%	50	16.9%	-	-	33	21.4%	126	16.4%
Large artiodactyl	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Deer or elk	1	2.9%	-	-	-	-	-	-	-	-	-	-	1	0.1%
Mule deer	1	2.9%	3	1.2%	-	-	9	3.0%	-	-	2	1.3%	15	1.9%
Pronghorn	-	-	8	3.1%	2	6.9%	6	2.0%	-	-	-	-	16	2.1%
Cow or bison	-	-	-	-	18	62.1%	-	-	-	-	22	14.3%	40	5.2%
Bighorn sheep	1	2.9%	1	0.4%	-	-	1	0.3%	-	-	-	-	3	0.4%
Medium bird	-	-	-	-	-	-	1	0.3%	-	-	-	-	1	0.1%
Very large bird	-	-	-	-	-	-	1	0.3%	-	-	-	-	1	0.1%
Golden eagle	-	-	-	-	-	-	1	0.3%	-	-	-	-	1	0.1%
Scaled quail	-	-	-	-	-	-	1	0.3%	-	-	-	-	1	0.1%
Great horned owl	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Lizards	-	-	-	-	-	-	-	-	-	-	1	0.6%	1	0.1%
Plains or Woodhouse's toad	-	-	1	0.4%	-	-	-	-	-	-	-	-	1	0.1%
Woodhouse toad	-	-	-	-	-	-	3	1.0%	-	-	1	0.6%	4	0.5%
Total	34	100.0%	256	100.0%	29	100.0%	296	100.0%	1	100.0%	154	100.0%	770	100.0%

LA 118562

	Early Developmental	
	Count	Col %
Small mammal/med-lrg bird	2	0.9%
Small mammal	65	29.0%
Medium mammal	1	0.4%
Medium-large mammal	39	17.4%
Large mammal	6	2.7%
Ord's kangaroo rat	1	0.4%
Woodrats	1	0.4%
Medium-large rodent	1	0.4%
Desert cottontail	72	32.1%
Black-tailed jack rabbit	25	11.2%
Medium artiodactyl	6	2.7%
Mule deer	2	0.9%
Cattle or bison	1	0.4%
Horse, burro	1	0.4%
Flicker	1	0.4%
Total	224	100.0%

APPENDIX 6.2. TAXA BY TIME PERIOD

	Early Developmental		Mainly Early Developmental		Late Developmental		Mainly Late Developmental	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Unknown small	3	0.0%	-	-	-	-	-	-
Unknown	-	-	-	-	1	0.7%	-	-
Small mammal/med-lrg bird	62	0.8%	2	0.5%	-	-	3	0.5%
Small mammal	1529	19.6%	62	14.2%	15	11.2%	60	10.1%
Small-medium mammal	152	1.9%	2	0.5%	1	0.7%	29	4.9%
Medium mammal	3	0.0%	-	-	-	-	1	0.2%
Medium-large mammal	358	4.6%	32	7.3%	9	6.7%	61	10.3%
Large mammal	380	4.9%	31	731.0%	5	3.7%	32	5.4%
Very large mammal	-	-	-	-	-	-	-	-
Small squirrel	1	0.0%	-	-	-	-	-	-
Spotted ground squirrel	9	0.1%	-	-	-	-	-	-
Rock squirrel	-	-	-	-	-	-	-	-
Large prairie dog	12	0.2%	6	1.4%	1	0.7%	2	0.3%
Gunnison's prairie dog	15	0.2%	-	-	-	-	-	-
Botta's pocket gopher	31	0.4%	3	0.7%	-	-	12	2.0%
Yellow-faced pocket gopher	79	1.0%	14	3.2%	4	3.0%	35	5.9%
Pocket mice	7	0.1%	1	0.2%	-	-	-	-
Ord's kangaroo rat	27	0.3%	-	-	1	0.7%	1	0.2%
Banner-tailed kangaroo rat	39	0.5%	3	0.7%	1	0.7%	3	0.5%
Beaver	2	0.0%	2	0.5%	-	-	3	0.5%
Cricetid rodents	2	0.0%	1	0.2%	-	-	-	-
Peromyscus sp.	22	0.3%	1	0.2%	1	0.7%	16	2.7%
Northern grasshopper mouse	-	-	-	-	-	-	-	-
Woodrats	65	0.8%	3	0.7%	-	-	7	1.2%
White-throated woodrat	20	0.3%	-	-	-	-	4	0.7%
Mexican woodrat	4	0.1%	-	-	-	-	1	0.2%
Lar ge woodrat	32	0.4%	-	-	1	0.7%	-	-
Small rodent	15	0.2%	1	0.2%	-	-	3	0.5%
Medium-large rodent	63	0.8%	2	0.5%	-	-	6	1.0%
Nuttall's cottontail	-	-	1	0.2%	-	-	-	-
Desert cottontail	2482	31.8%	117	26.8%	32	23.9%	80	13.5%
Black-tailed jack rabbit	750	9.6%	47	10.8%	16	11.9%	41	6.9%
Medium carnivore	1	0.0%	1	0.2%	-	-	1	0.2%
Large carnivore	7	0.1%	-	-	-	-	-	-
Dog, coyote, wolf	3	0.0%	1	0.2%	-	-	-	-
Coyote	-	-	-	-	-	-	-	-
Dog	168	2.2%	36	8.2%	2	1.5%	2	0.3%
Black bear	1	0.0%	-	-	-	-	-	-
Long-tailed weasel	1	0.0%	-	-	-	-	-	-
Badger	8	0.1%	-	-	-	-	-	-
Bobcat	3	0.0%	-	-	-	-	-	-
Medium artiodactyl	632	8.1%	42	9.6%	26	19.4%	116	19.6%
Large artiodactyl	19	0.2%	1	0.2%	-	-	-	-
Medium-large artiodactyl	5	0.1%	1	0.2%	-	-	-	-

	Early Developmental		Mainly Early Developmental		Late Developmental		Mainly Late Developmental	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Deer or elk	5	0.1%	1	0.2%	1	0.7%	-	-
Elk	31	0.4%	-	-	1	0.7%	-	-
Mule deer	106	1.4%	3	0.7%	8	6.0%	22	3.7%
Pronghorn	54	0.7%	8	1.8%	2	1.5%	14	2.4%
Bison	6	0.1%	-	-	-	-	-	-
Cattle or bison	2	0.0%	-	-	-	-	-	-
Bighorn sheep	21	0.3%	2	0.5%	2	1.5%	5	0.8%
Sheep or goat	2	0.0%	-	-	-	-	-	-
Horse, burro	1	0.0%	-	-	-	-	-	-
Small bird	2	0.0%	-	-	-	-	-	-
Medium bird	15	0.2%	-	-	-	-	-	-
Large bird	26	0.3%	-	-	1	0.7%	8	1.3%
Medium-large bird	14	0.2%	-	-	-	-	5	0.8%
Very large bird	66	0.8%	1	0.2%	-	-	2	0.3%
Eggshell	1	0.0%	-	-	-	-	7	1.2%
Ducks	2	0.0%	-	-	-	-	-	-
Sharp-shinned hawk	-	-	-	-	-	-	-	-
Golden eagle	1	0.0%	1	0.2%	-	-	-	-
Prairie falcon	-	-	-	-	-	-	1	0.2%
Merlin	1	0.0%	-	-	-	-	-	-
Scaled quail	9	0.1%	-	-	-	-	-	-
Turkey	240	3.1%	2	0.5%	1	0.7%	3	0.5%
Sandhill crane	1	0.0%	-	-	-	-	-	-
Great horned owl	-	-	1	0.2%	-	-	-	-
Flicker	18	0.2%	-	-	-	-	-	-
Horned lark	21	0.3%	-	-	-	-	-	-
Western meadowlark	10	0.1%	-	-	-	-	-	-
Passeriformes	13	0.2%	-	-	-	-	-	-
Painted turtle	-	-	-	-	2	1.5%	1	0.2%
Ornate box turtle	1	0.0%	-	-	-	-	-	-
Lizards	7	0.1%	-	-	-	-	-	-
Horned lizards	2	0.0%	-	-	-	-	1	0.2%
Whiptails	1	0.0%	-	-	-	-	-	-
Snakes	-	-	2	0.5%	-	-	-	-
Nonvenomous snakes	37	0.5%	1	0.2%	-	-	-	-
Frogs and toads	4	0.1%	-	-	-	-	1	0.2%
Plains spadefoot	2	0.0%	-	-	-	-	-	-
New Mexico spadefoot	1	0.0%	-	-	-	-	-	-
True toads	4	0.1%	-	-	-	-	-	-
Great plains toad	13	0.2%	1	0.2%	-	-	-	-
Plains or Woodhouse's toad	20	0.3%	1	0.2%	-	-	3	0.5%
Red spotted toad	8	0.1%	-	-	-	-	-	-
Plains or red-spotted toad	-	-	-	-	-	-	-	-
Woodhouse toad	18	0.2%	-	-	-	-	1	0.2%
Northern leapord frog	4	0.1%	-	-	-	-	-	-
Suckers	-	-	-	-	-	-	-	-
Small mouth buffalofish	-	-	-	-	-	-	-	-
Total	7802	100.0%	437	100.0%	134	100.0%	593	100.0%

	Coalition		Mainly Coalition		Mainly Classic		Unknown		Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Unknown	-	-	-	-	-	-	-	-	1	0.0%
Small mammal/med-lrg bird	24	4.2%	1	0.1%	1	1.2%	-	-	93	0.9%
Small mammal	87	15.2%	145	14.9%	3	3.7%	17	8.7%	1918	17.8%
Small-medium mammal	7	1.2%	49	5.0%	-	-	1	0.5%	241	2.2%
Medium mammal	1	0.2%	3	0.3%	-	-	1	0.5%	9	0.1%
Medium-large mammal	23	4.0%	46	4.7%	11	13.6%	21	10.8%	561	5.2%
Large mammal	17	3.0%	47	4.8%	5	6.2%	9	4.6%	526	4.9%
Very large mammal	-	-	1	0.1%	-	-	-	-	1	0.0%
Small squirrels	-	-	-	-	-	-	-	-	1	0.0%
Spotted ground squirrel	-	-	1	0.1%	-	-	-	-	10	0.1%
Rock squirrel	-	-	1	0.1%	-	-	-	-	1	0.0%
Large prairie dog	2	0.3%	-	-	-	-	-	-	23	0.2%
Gunnison's prairie dog	9	1.6%	2	0.2%	-	-	-	-	26	0.2%
Botta's pocket gopher	1	0.2%	11	1.1%	1	1.2%	2	1.0%	61	0.6%
Yellow-faced pocket gopher	11	1.9%	28	2.9%	1	1.2%	-	-	172	1.6%
Pocket mice	-	-	-	-	-	-	-	-	8	0.1%
Ord's kangaroo rat	6	1.0%	5	0.5%	-	-	9	4.6%	49	0.5%
Banner-tailed kangaroo rat	1	0.2%	24	2.5%	-	-	35	17.9%	106	1.0%
Beaver	-	-	-	-	-	-	-	-	7	0.1%
Cricetid rodents	-	-	-	-	-	-	-	-	3	0.0%
Peromyscus sp.	1	0.2%	3	0.3%	-	-	-	-	44	0.4%
Northern grasshopper mouse	-	-	19	1.9%	-	-	-	-	19	0.2%
Woodrats	-	-	3	0.3%	-	-	2	1.0%	80	0.7%
White-throated woodrat	-	-	1	0.1%	-	-	1	0.5%	26	0.2%
Mexican woodrat	-	-	-	-	-	-	-	-	5	0.0%
Large woodrat	-	-	-	-	-	-	-	-	33	0.3%
Small rodent	-	-	-	-	-	-	-	-	19	0.2%
Medium-large rodent	3	0.5%	2	0.1%	-	-	7	3.6%	83	0.8%
Nuttall's cottontail	-	-	-	-	-	-	-	-	1	0.0%
Desert cottontail	111	19.4%	315	32.3%	9	11.1%	15	7.7%	3161	29.3%
Black-tailed jackrabbit	34	5.9%	83	8.5%	3	3.7%	8	4.1%	982	9.1%
Medium carnivore	-	-	-	-	-	-	-	-	3	0.0%
Large carnivore	-	-	-	-	-	-	-	-	7	0.1%
Dog, coyote, wolf	-	-	3	0.3%	-	-	1	0.5%	8	0.1%
Coyote	-	-	2	0.2%	-	-	-	-	2	0.0%
Dog	-	-	15	1.5%	-	-	-	-	223	2.1%
Black bear	-	-	-	-	-	-	-	-	1	0.0%
Long-tailed weasel	-	-	-	-	-	-	-	-	1	0.0%
Badger	-	-	-	-	-	-	-	-	8	0.1%
Bobcat	-	-	-	-	-	-	-	-	3	0.0%
Medium artiodactyl	15	2.6%	56	5.7%	39	48.1%	34	17.4%	960	8.9%
Large artiodactyl	-	-	1	0.1%	-	-	-	-	21	0.2%
Medium-large artiodactyl	-	-	1	0.1%	-	-	1	0.5%	8	0.1%
Deer or elk	2	0.3%	10	1.0%	-	-	-	-	19	0.2%
Elk	-	-	1	0.1%	-	-	-	-	33	0.3%
Mule deer	3	0.5%	16	1.6%	1	1.2%	4	2.1%	163	1.5%
Pronghorn	5	0.9%	8	0.8%	-	-	-	-	91	0.8%
Bison	-	-	-	-	-	-	-	-	6	0.1%
Cattle or bison	18	3.1%	-	-	-	-	22	11.3%	42	0.4%
Bighorn sheep	1	0.2%	3	0.3%	1	1.2%	-	-	35	0.3%
Sheep or goat	-	-	1	0.1%	-	-	-	-	3	0.0%
Horse, burro	-	-	-	-	-	-	-	-	1	0.0%
Small bird	-	-	-	-	-	-	-	-	2	0.0%
Medium bird	1	0.2%	2	0.2%	-	-	-	-	18	0.2%
Large bird	31	5.4%	6	0.6%	-	-	-	-	72	0.7%

	Coalition		Mainly Coalition		Mainly Classic		Unknown		Total	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Large bird	31	5.4%	6	0.6%	-	-	-	-	72	0.7%
Medium-large bird	1	0.2%	1	0.1%	-	-	-	-	21	0.2%
Very large bird	-	-	1	0.1%	-	-	-	-	70	0.6%
Eggshell	-	-	-	-	5	6.2%	-	-	13	0.1%
Ducks	-	-	-	-	-	-	-	-	2	0.0%
Sharp-shinned hawk	1	0.2%	-	-	-	-	-	-	1	0.0%
Golden eagle	1	0.2%	1	0.1%	-	-	-	-	4	0.0%
Prairie falcon	-	-	-	-	-	-	-	-	1	0.0%
Merlin	-	-	-	-	-	-	-	-	1	0.0%
Scaled quail	-	-	3	0.3%	-	-	1	0.5%	13	0.1%
Turkey	148	25.9%	44	4.5%	-	-	-	-	438	4.1%
Sandhill crane	-	-	-	-	-	-	-	-	1	0.0%
Great horned owl	-	-	-	-	-	-	-	-	1	0.0%
Flicker	-	-	-	-	-	-	-	-	18	0.2%
Horned lark	-	-	-	-	-	-	-	-	21	0.2%
Western meadowlark	-	-	-	-	-	-	-	-	10	0.1%
Passeriformes	1	0.2%	2	0.2%	-	-	-	-	16	0.1%
Painted turtle	-	-	-	-	1	1.2%	-	-	4	0.0%
Ornate box turtle	-	-	-	-	-	-	-	-	1	0.0%
Lizards	1	0.2%	-	-	-	-	1	0.5%	9	0.1%
Horned lizards	-	-	-	-	-	-	-	-	3	0.0%
Whiptails	-	-	-	-	-	-	-	-	1	0.0%
Snakes	-	-	-	-	-	-	-	-	2	0.0%
Nonvenomous snakes	1	0.2%	1	0.1%	-	-	-	-	40	0.4%
Frogs and toads	-	-	-	-	-	-	-	-	5	0.0%
Plains spadefoot	-	-	-	-	-	-	-	-	2	0.0%
New Mexico spadefoot	-	-	-	-	-	-	-	-	1	0.0%
True toads	-	-	1	0.1%	-	-	-	-	5	0.0%
Great plains toad	-	-	-	-	-	-	1	0.5%	15	0.1%
Plains or Woodhouse's toad	-	-	-	-	-	-	-	-	24	0.2%
Red spotted toad	-	-	-	-	-	-	-	-	8	0.1%
Plains or red-spotted toad	2	0.3%	1	0.1%	-	-	-	-	3	0.0%
Woodhouse toad	2	0.3%	3	0.3%	-	-	2	1.0%	26	0.2%
Northern leopard frog	-	-	-	-	-	-	-	-	4	0.0%
Suckers	-	-	2	0.2%	-	-	-	-	2	0.0%
Small mouth buffalofish	-	-	1	0.1%	-	-	-	-	1	0.0%
Total	572	100.0%	976	100.0%	81	100.0%	195	100.0%	10790	100.0%

Appendix 6.3. Dog Measurements in mm (after Haag 1948)

Site/FS Sex/Age	265/1017 ♀?/5-6m	265/1018 ♂/5-6m	265/1237 ♂/mature	265/1307 ?/6+m	265/1395 ♂/mature	265/1478 ♀/8-14m	265/A ♂/older	265/B ?/mature?	6169/487 ♀/mature	6170/1820 ♂/mature	6170/1821 ?/4-6m
CRANIAL	-	-	-	-	-	-	-	-	-	-	-
Occipital length	-	147.69	-	-	-	134.05	175	147.02	-	-	-
Basal length	-	131.5	-	-	-	-	153.83	137.16	-	-	-
Condyle-basal length	-	139.63	-	-	-	-	154	130.23	-	-	-
Palatal length	-	-	-	-	-	-	84.38	70.39	-	-	-
Palatal length at M^1	-	-	-	-	-	-	60.43	47.77	-	-	-
Width at C	-	-	-	-	-	-	28.78	-	-	-	-
Width at mastoids	43.86	52.22	-	-	-	-	58.4	54.61	50.22	-	-
Width at occ. condy.	27.08	30.72	-	-	-	29.82	32.71	28.63	29.34	-	-
Width of zyg. arch	-	-	-	-	-	-	-	80.92		-	-
Nasal length	-	45.00	-	-	-	38.17	-	46.28	30.57	-	-
Occiput to nasion	-	90.23	-	80.98	-	82.53	-	82.92	78.59	-	-
Orbit to alveolus I^1	-	65.21	-	-	-	58.53	76.77	63.8		-	-
Supraortital width	-	34.21	-	-	-	35.81	48.01	40.71	40.21	-	-
Interorbital width	-	24.86	-	24.03	-	25.75	32.93	27.27	29.09	-	-
Cranial height	51.84	51.35	-	-	-	49.75	55	50.32	48.7	-	-
Least cranial width	-	33.25	-	32.95	-	31.8	30.29	30.8	34.76	-	-
Max. cranial width	45.76	46.81	-	-	-	46.09	56.25	50.3	-	-	-
Meatus to alveolus	-	116.11	-	-	-	109.02	139.13	114.53	-	-	-
MANDIBLE		-	-	-	-	-	-		-	-	-
Condylo-sym. length	-	107.05	-	-	-	102.65	125.56	107.1	-	108.52	78.01
Bicondylar width	-	59.51	-	-	-	-	75.59	66.35	-	-	-
DENTAL		-	-	-	-	-	-		-	-	-
Alveolus I^1 to M^2	-	80.13	-	-	-	72.89	90.9	76.71	-	-	-
Alveolus C to M^2	-	68.62	-	-	-	59.07	76.19	64.82	-	-	-
Alveolus P^2 to M^2	-	55.84	-	-	-	45.86	-	45.35		-	-
Alveolus M^1 to M^2	-	50.55	-	-	-	18.9	35.31	16.44	-	-	-
Length carnassial	17.41	16.4	-	-	-	11.1	17.83	15.35	15.12	16.03	-
Alveolus I_1 to M_3	-	80.24	-	-	-	77.71	90.24	79.81	-	80.98	-
Alveolus C to M_3	-	74.85	-	-	-	71.5	84.38	73.37	-	75.99	-
Alveolus P_1 to M_3	-	63.36	-	-	-	59.25	-	-	-	62.2	-
Alveolus P_2 to M_3	-	58.75	-	-	-	55.35	-	55.34	-	56.77	-
Alveolus P_3 to M_3	-	50.8	-	-	-	48.31	54.62	48.19	-	48.88	-
Alveolus P_4 to M_3	-	40.39	-	-	-	39.64	-	37.76	-	38.91	-
Alveolus M_1 to M_3	-	31.43	-	-	-	31.31	33.24	29.92	-	29.22	-
Length of carnassial	19.54	19.94	-	-	-	19.22	20.99	18.16	17.71	20.58	16.76

APPENDIX 6.3. Continued.

Site/FS	265/1017	265/1018	265/1237	265/1307	265/1395	265/1478	265/A	265/B	6169/487	6170/1820	6170/1821
Sex/Age	♀?/5-6m	♂/5-6m	♂/mature	?/6+m	♂/mature	♀/8-14m	♂/older	?/mature?	♀/mature	♂/mature	?/4-6m
POSTCRANIAL		-	-	-	-	-	-	-	-	-	-
Humerus length	-	87.75*	-	-	-	-	-	109.83	101.56	-	59.40*
Humerus head dia.	-	26.87@	-	-	-	-	-	29.3	29.43	-	-
Hum. trans. head dia.	-	21.56	-	-	-	-	-	22.99	22.16	-	-
Radius length	-	91.84	127.38	-	-	-	-	112.61	-	-	60.50*
Ulna length	-	-	150.19	-	-	-	-	138.65	-	-	72.58*
Ulna length to notch	-	-	-	-	-	-	-	116.24	-	-	-
Femur length	91.00*	97.88*	132.05	-	-	-	-	-	-	-	66.51*
Tibia length	92.98*	100.76*	136.97	-	138.8	-	-	119.59	-	-	66.99*
Baculum length	-	-	78.23+	-	72.32	-	-	-	-	-	-
Baculum width	-	5.86	10.75	-	8.71	-	-	-	-	-	-

* without epiphyses

@ slight damage

Appendix 7.
Feature and Structure Coding Definitions

Feature Coding Guidelines

Age

Calibrated ^{14}C date or archaeomagnetic date as reported by the site writer. In cases where this information was not available from the site writer. Archaeomagnetic and ^{14}C dates compiled for NM 22 were used.

Period

Period refers to phases defined by the Rio Grande Classification as provided by site writers.

Feature Codes

Features are coded using "Peña Blanca Feature Terminology" list distributed to site directors during the beginning of the write up phase. For coding ease, some additional definitions have been changed or added and are in **bold.**

Thermal Features

Hearth. The primary thermal feature located within a structure. Varying in size and shape, hearth construction may include adobe lined collars, cobble lined or lined with flat rock slabs.

Collared Hearth. Hearth with a raised adobe collar surrounding it. The collar often exhibits signs of thermal alteration such as oxidation.

Ash pit. A pit or depression found in a structure adjacent or near the hearth. These held ash, charcoal, and debris removed from the hearth.

Fire-pit. A formally constructed (eg. slab-lined) thermally altered pit found outside of a structure.

Small burned pit. A small (< 50 cm) informal pit that is burned.

Large burned pit. A large (> 50 cm) informal pit that is burned.

Small cobble- filled thermal pit (< 50 cm). Also known as roasting or warming pits, these pits can be within or outside a structure and are filled with cobbles.

Large cobble- filled thermal pit (> 50). Also known as roasting or warming pits, these pits can be within or outside a structure and are filled with cobbles

Specialized Features

Activity area. Defined space, usually a shallow basin into which other pit features are excavated. Activity areas may also contain cobble concentrations or evidence of episodic dumping similar to midden deposits.

Pit structure. Habitation/ceremonial structure excavated into the ground. Pit structure depth ranges from approximately 30 cm to over a meter. Structures usually have vertical side walls and can be round to square/rectangular. Most structures have four post holes as evidence of roof support. Structures may contain thermal features such as a hearth and ash pit, roasting pit and unburned features such as storage pits, wall niches, small pits, pot rests and divots.

Foot drum. Long shallow pit in a group surrounding the hearth complex of a pit structure. Features have no obvious storage or thermal function and may have been used to create drum like resonance during ritual.

Ritual art. A feature purposefully created with no obvious or identifiable practical use other than to be aesthetically appreciated and possibly used in ceremony.

Human Burial. The intentional interment of a human. *Refers to the interment itself, not necessarily the pit it is placed in.* (This definition was used differently during excavation by site directors. In an attempt to accommodate the different recording methods at each site, burials in this database are defined interchangeably as the burial and pit, or just the burial. Features that only refer to remains have *convex* profiles to indicate lack of depth and measurable pit.)

Dog burial. The intentional interment of a dog.

The burial may be an offering.

Turkey burial. The intentional interment of a turkey. The burial may be an offering.

Mealing bin. Depression, pit, or bin constructed to hold a metate and a meal receptacle.

Metate rest. An arrangement of rocks or adobe on which a metate was propped. These features have no depth.

Posthole. A cylindrical or conical depression located within a structure or in an extramural area. Evidence of a posthole function can be inferred from the location within a structure, the presence of a post mold, shims or stone bases, or wood particles within the hole.

Pot rest. A shallow depression used to support a ceramic vessels with a rounded base. Usually found within a structure near a hearth or structure walls.

Small sub-pit. Small pit excavated into the floor of a storage pit or storage/roasting pit. The pit may or may not exhibit evidence of reddening from oxidation. Sub-pits can, but do not necessarily indicate remodeling of the larger feature in which they are contained. The designation is not used in activity areas or in structures.

Storage pit. A pit that was most likely used for storage. These are deeper than they are wide and are usually bell shaped or cylindrical. When in a structure they may extend underneath structure walls but open from the floor. Large oxidized pits at LA 6171 are not included in this category and are coded as storage/roasting pits because of well baked and reddened side walls indicating thermal alteration.

Storage/roasting pit. A large, oxidized, extramural, usually bell shaped, pit that could have been used for roasting, storage or both during its use life.

Ventilator. Refers to the ventilator complex when ventilator shaft and tunnels are not given separate feature numbers. Also used when the ventilator opening is undifferentiated in feature number or measurement from the ventilator shaft or tunnel.

Ventilator shaft. The vertical portion of a ventilator.

Ventilator tunnel. The horizontal portion of a ventilator

Wall niche. Intentional holes in structure walls. A wall niche opens at the structure wall although the feature may tunnel under the structure floor.

Warming pit. A small unburned pit, sometimes filled with clean sand into which a few fire- cracked rock, but no, or very little ash has been deposited.

Other Features

Cobble pile. An accumulation of cobbles, varying in size and height, which probably had a previous function, but that function is unknown.

Divot. Very small pits in a structure floor. These may occur singly or in alignments and could have functioned as holders for paho sticks, drying racks, ladder rests, loom holes.

Divot cluster. A cluster of three or more *divots* which may be associated with each other.

Fire-cracked rock (FCR) scatter. An indeterminate cluster of fire cracked rock with no or little depth. Impossible to determine whether the feature is a deflated hearth or redeposited hearth clean out.

Large unburned pit. An intentionally excavated pit of unknown function (> 50 cm diameter).

Small unburned pit. An intentionally excavated pit of unknown function (< 50 cm diameter).

Stain. An amorphous accumulation of ash or charcoal without depth or with minimal depth. A stain will likely have an irregular boundary.

Reas (Reused as)

This code refers to the original feature and its secondary use. Such as a large storage pit reused as a burial pit.

Fill

Primary deposit. Filled with material from last feature use. Primary deposits usually contain burned material. For burial fill and fill intentionally used during abandonment or remodeling see *intentional (clean or dirty)*.

Naturally filled. Fill deposited by alluvial/ colluvial processes. Fill may be any combination of naturally occurring strata most often (but not always) containing a low frequency mixture of artifacts, charcoal, carbonate and occasionally fire cracked rock. Fill may also be clean with low carbonate content exhibiting evidence of water pooling, and evidence of lamination such as layers of soil with small pebbles, varying grain size, and sand content. Natural fill may also contain oxidized soil, a product of degrading feature side walls. In structures or intramural features 'natural' may indicate a definable episode of natural intrusion before structural collapse.

Roof fall/ closing material. Strata that represents the fallen roof of a pit structure. Structures with intramural features containing *roof fall/ closing material* are burned and capped with the roof fall collapse. Strata may incorporate fragmentary reed matting, baked clay and, wood from roof beams. This layer is assumed to have little or no mixing of post-collapse naturally of colluvialy deposited materials and soil.

Roof fall/closing/natural. A mixture, or potential mixture of all three fill types deposited in intramural features that were left open at the time of abandonment fill. May or may not contain burned material. Strata with burned material may incorporate fragmentary reed matting, baked clay and, wood from roof beams in addition to materials found in unburned strata such as clay with reed imprints, cobbles ground stone and artifacts. Archaeobotanical samples recovered from this context may contain primary use material, burned roofing, and redeposited charcoal from surface sheet trash.

Intentionally filled

Trash filled. Filled with refuse from another area. Fill contains burned material, and likely contains fire-cracked rock. This code implies that fill was discarded from its primary context into another feature. Used if :

** the majority of feature fill is trash
** fill exhibits repeated episodic dumping that may be interspersed with natural fill episodes.

Intentional fill (clean) – Intentionally filled with soil containing no cultural material. (Most likely a decommissioned or remodeled intramural feature.)

Intentional fill (dirty)– Intentionally filled with charcoal stained soil or soil containing a low frequency of cultural materials such as charcoal and artifacts from unknown primary context. Unlike "Trash Fill" intentional fill does not describe the redeposit of high density refuse from one specific local to another but indicates the intentional redeposit of soil that may happen to contain cultural material. This fill is often found in capped intramural features as well as in burials.

Trash/Natural. Represents a discreet episode of refuse discard as described in "Trash Fill" covered by natural alluvial/colluvial deposits.

Other

Undifferentiated. Fill appears to be naturally deposited but there are indications of possible intentional filling such as large rock, or ground stone floating in feature fill. There are no other clear indications of deposition type.

NR (not recorded)– not reliably recorded/ not recorded (*this code is NOT used when other feature information is missing. It is only used when the fill in an other wise recordable feature was not recorded by the excavator. Features with no information were left blank.)*

Indeterminate. Unable to determine nature of fill. (*This code is used when, by looking at feature notes, I was unable to classify feature fill although the fill type was recorded. In some cases fill descriptions were absent from notes and this code was used instead of NR. Site directors should look over features with this code to make sure fill is truly indeterminate.)*

None. No fill has accumulated in the feature, only used for convex features such as metate rests.

Cache

Offering. A ceremonial or ceremonially involved object or group of objects that is intentionally placed in a specific context such as on a floor, within ventilators, capped pits, ash pits and burials. Animal remains are often placed in pairs and are usually dogs and small to medium bird wings. Other possible species may include toad and frog as inferred by context but not supported by ethnographic information (Akins this volume). Other objects may include lithics (often obsidian), turquoise and macrobotanical remains.

Cache. Utilitarian objects that are deposited for later use without any immediately evident ceremonial purpose or connection. Objects can be finished tools or material for production or consumption. In the case of animal remains, bones are more likely to be disarticulated and all of a certain element type good for making a specific tool or tools (such as dear tibia for awls). Context is less restricted than that of offerings.

Profile

Profile determinations were made by examining cross section sketches provided by site directors or by evaluating feature profiles drawn by excavators in the field. Feature shape was recorded while keeping feature volume calculations in mind. Although categorization was often a judgment call, criteria outlined below were used to guide profile classification. All feature angles refer to number of degrees if 90 degrees is vertical.

0. Profile needs to be recorded.

Gentle basin. The feature is shallow and sides slope at less than a 30-35 degrees. Base is often flat.

Steep-walled. Feature sides are angled at approximately 65 degrees or more. The feature is often about half as deep as it is wide if not deeper. Its base is most often flat.

Vertical. Feature side walls are nearly vertical (90 degrees). Feature is often deeper than it is wide.

Moderately Steep/basin. Feature side walls are more than about 40 degrees and less than approximately 60 degrees. Features are wider than they are deep.

Irregular. side walls were too rodent riddled or asymmetrical to calculate feature shape.

Deflated. The feature was washed out by natural processes leaving an incomplete or irregular profile.

Flat. A surface hearth that has no side walls.

Bell-shaped. Features that are measurably wider (by a ratio of approximately 1:3) at the base of the feature than at the top.

Conical. Features that are approximately 1/3 or less wide at their base then they are at the top. Conical features have steep sides (between 65 and 85 degrees) with straight or almost straight walls that slope to the base of the feature at less than a 90 degree angle.

Slanted. Features with a flat base that have parallel or nearly parallel side walls tending in the same direction. These features look like a parallelogram in profile. They are most often postholes.

Convex. Features that stick up from the ground, pot rests or cobble piles. Also used for features with no depth such as burials without a burial pit.

Indeterminate. The profile is not recorded or only partially recorded. (This code is *not* used when other feature information is missing. It is only used when the profile of an otherwise codeable feature was not recorded by excavators. Features with no information were left *blank.)*

Oxidation

Oxidation. Soil that is burned with sufficient heat to harden it and turn its iron content red orange, brown or black. (Site directors defined oxidation differently. Some recorded oxidation specifically as a red/orange hardened soil, others had a broader definition and considered any well baked feature with hardened soil oxidized. In this database, site directors definition for each site are used and may be variable). Oxidation is noted present or absent.

Rcount (FCR count)

Number of fire cracked rock in each feature. When no counts are given features are coded less than 20, more than 20 less than 50, and more than 50. When there is no information other than presence of fire cracked-rock. Fire-cracked rock is coded “present”.

Locus

IS (intramural structure)— intramural features within a pit structure or surface structure.

E (extramural)— extramural features. These features may or may not be associated with a structure.

Structure– the feature is itself a structure or part of the ventilator shaft, tunnel or opening.

Within feature, Superimposed. Refers to features floating in structure fill or human or faunal remains that were found in a burial pit but are coded separately as burials. Features such as small sub-pits, although they are within features are coded as *extramural* not *within feature* as are features that are part of *activity areas* and features that are the products of remodeling episodes.

Cult (Cultural Status)

This code indicates the presence or absence of charred plant remains.

Absent. Although plant remains may have been recovered from a flotation sample they were not charred.

Present. Charred seeds, fruits, or nuts were recovered from the sample. In some cases no plant remains were recovered from flotations samples but macrobotanical remains of economic plant species were recovered in wood or C-14 samples.

Not sorted. The flotation sample was not sorted, and no macrobotanical or C-14 samples yielded charred corn or other economic taxa.

Condition

Unburned. The feature is not burned

Burned. The feature is burned and may have oxidized limits.

Dismantled. The feature has been decommissioned and disassembled but not reused.

Remodeled. A change in shape *without* a change in function i.e.. A hearth made smaller. In this case the original hearth is coded remodeled *the second hearth is not.*

Reused. A feature that is re-used as something else, post hole reused as a potrest. In this case the post hole would be coded as reused *but not* the pot rest.

Capped– decommissioned, often filled and a plastered with mud– in the case of super imposed features, "capped" refers to the feature that the cap contacts.

Wood

Wood is coded to reflect the majority of the assemblage by weight. For instance an assemblage with 90% juniper and traces of other woods would be coded Juniper. Assemblages with no clear dominant are coded as a mix. More detailed wood information is available in the ethnobotanical section of the report (Mc Bride).

Woodeval

Woodeval is an attempt to classify wood by general biotic community in which it grows. This classification was only recorded for features with primary fill.

J. woodland and riparian. A sample dominated by juniper with some riparian wood.

J. woodland and poss riparian. A sample dominated by juniper with wood that can grow in both riparian and grassland context.

Mix. Mix of woods no dominant.

J. woodland. Just juniper

Corn

Corn is coded for features with primary fill only. This is an attempt to trace corn used as fuel. Although cobs may have been burned they often fracture into smaller parts (cupules and glumes) which are noted in the coding.

Absent. No corn

Cob mix. A mixture of corn parts likely including cupules and glumes that contains some fragmentary cobs.

Mix. A mix of corn parts, often including kernels. No cob fragments (defined as an intact segment of three cupules or more) were identified, but very fragmentary cob parts such as cupules and glumes are present.

Cupule. Cupules only (The divots that corn kernels sit in, in other words very small cob fragments.)

Glume or un identified. Glumes and unidentified corn parts only. Features with this code likely have trace amounts of corn.

Whole

Whole. Features that are measurable so that volume can be determined.

Partial. Features that have been cut by a backhoe trench or otherwise deflated so that the total feature dimensions were not available for measurement.

Equations

Areas:

Area of a sphere: 3.14 ((.5 length)(.5 width))

Area of a rectangle: (length)(width)

Volume:
Volume of an ellipse: 4/3 (radius^2)
Volume of ½ ellipse is the equation above divided by 2.
Volume of cylinder: (radius^2)(depth))
Volume of a circular frustum–used for bell shaped pits: 1/3 depth (surface radius ^{2} + surface radius x

base radius+ base radius^2)

Modified for pits with top measurements but only one base measurement: 1/3 depth (average surface radius^2 + average surface radius x average base radius+ average base radius^2)

Pit Structure Coding Definitions and Guidelines

This inventory is a list of structure attribute definitions used in both the Rio Grande and NM 22 databases. Most definitions used in the NM 22 database are derived from those used to code a database of Northern Rio grande pit structures originally created for the La Plata Highway project by H. Wolcot Toll (n.d.) and extensively expanded by Steven Lakatos (Lakatos 2000, 2002). For the most part, definitions are consistent between each data set. The exceptions are D-shaped and Key-hole shaped structures and specific criteria for defining burned structures.

In the Northern Rio Grande database, D-shaped structures are those with a ventilator aperture located in the arched wall, opposite the flat wall segment. These structures are often associated with room block construction. (Kidder:1958) In the NM 22 data set, they are defined as a subterranean structure with one strait wall. The ventilator aperture is not located along the arched wall and the structure is not associated with room block construction.

"Key-hole" in the Northern Rio grande database refers to distinctive PIII, Mesa Verde key-hole kiva often enclosed, or partially enclosed by rooms and walls and associated with Mesa Verde black-on-white pottery (Cordell 1984:103-104). In the NM 22 data set "key-hole" refers to a round structure with an attached entry way approximately half the diameter of the main structure body at its attachment. There is no ventilator shaft. These structures would be defined by Lakatos as round with a *stepped entry*.

"Burned" in the NM 22 database is more generally defined referring to a structure that exhibits unmistakable signs of a conflagration. Oxidized floor, side walls and or burned timbers.

The definition used in the Northern Rio Grande database is more specific referring to a structure in which usable construction materials such as support posts are burned in place.

Definitions below are those pertinent to the data sets reported in the structures chapter and do not represent all coding standards for the Northern Rio Grande data base in its entirety. They were operationalised by Bander and Lakatos for use in this publication.

Structure shape. Defined as a structure's closest regular geometric shape.

Round. Circular or almost circular with no definable corners or an obvious D or key-hole shape.

D-Shaped. Ventilator shaft is located opposite the flat wall segment structures are often associated with room block construction. (Kidder:1958) *In the NM 22 data set*– a subterranean structure with one strait wall.

Sub-rectangular. Wall junctures are defines but the angle is of more than 90 degrees. The structure is not round but can not be characterized as rectangular or square.

Rectangular/ Square. Structure has four clearly definable corners that come to an approximately 90 degree angle.

Key hole. Distinctive PIII, Mesa Verde key-hole kiva often enclosed or partially enclosed by rooms and walls. Associated with Mesa Verde black-on-white pottery (Cordell 1984:103-104). *In the NM 22 data set*– A round structure with an attached entry way approximately half the diameter of the main structure body at its attachment. There is no ventilator shaft. These structures would be defined by Lakatos as round with a *stepped entry*.

Ventilator Shaft:

Separate shaft. The ventilator shaft is attached to the structure only by the ventilator aperture and the vent tunnel (horizontal portion). Separate shafts are characteristically vertical with an attaching ventilator tunnel, the shaft and tunnel are well defined. Structures with separate ventilator shafts are often deeper than .50 m.

Contiguous shaft. Definition between the ventilator shaft and tunnel are not well defined. The ventilator shaft may not be vertical, veering towards the structure to attach to the ventilator aperture opening.

Roofed Trench. The ventilator was excavated as a trench not a tunnel. Earth surrounds this type of opening on three sides, the fourth side (the top) is made of a viga/latia construction. Post holes may support the construction.

Wall Opening. There is no formal shaft but the ventilator aperture is present.

Entry. No formal ventilator shaft, the ventilator and entry way are the same.

Unobservable/ Unknown. The ventilator shaft was either destroyed during excavation, deflated, or not recorded. The configuration of the ventilator shaft and/or the relationship with the structure to which it was attached is poorly defined.

Ventilator tunnel. This category records the ventilator aperture at the point which the ventilator tunnel enters the structure.

Above floor . The ventilator opening is flush with the structure wall positioned above the floor. There is no sill.

Above floor sill. The ventilator opening is positioned above the floor, flush with the structure wall, and a stone is placed horizontally at the base, creating a sill at the base of the opening.

At floor. The ventilator opening is at floor level, and is flush with the structure wall .

At floor sill. The ventilator opening is positioned at the floor, flush with the structure wall, and a stone is placed horizontally at the base, creating a sill.

At floor with horizontal stone divider. The ventilator opening is bisected horizontally with a tabular stone. Only present at NM 22.

None. There was no ventilator complex or the structure has an entry way.

Unknown. Ventilator aperture was not available or recording was insufficient to characterize the form of the opening. See ventilator shaft, unavailable/unknown.

Hearth type. Describes the hearth.

Plaster. The hearth was prepared with a layer of adobe plaster.

Cobble lined. Lined with cobbles.

Adobe collar. A formal coping of adobe surrounds the hearth perimeter.

Adobe collar with depressions. The collar coping exhibits flattened or depressed areas often to the outside of the coping.

Rectangular. Hearths with four definable sides, often adobe collared.

Tear drop. Collared hearth that is otherwise round, coping is pinched on one end.

Deflector

Deflector. Describes a fixed floor feature located between the hearth and ventilator opening.

Damper. A maneuverable divider located at the mouth of the ventilator opening. Usually a stone slab set in a grove in the structure floor.

Post and adobe. A core of small wooden posts set into the floor and covered with adobe plaster.

Unshaped stone/ post and adobe. Woden posts support a tabular stone set in the structure floor that acts as the deflector.

Slab and damper. A combination of damper and a deflector.

Puddled adobe. Constructed of a block of adobe set in place.

Sipapu. Traditionally defined–A small, well defined pit located on the structure axis, most often located on the side of the hearth opposite the ventilator shaft and ash pit and often filled with clean sand (Willshusen 1988e).

Ladder holes. Small paired postholes or depressions. Often located between the hearth and the ventilator shaft opening.

Reconsecration. Records the presence of defacto materials deposited in a structure before abandonment and interpreted as offerings based on context. These include human and animal interment. Categories are self descriptive. *At NM 22*– Offerings are placed on the floor unless otherwise noted."Animals" refers to animal elements that are detailed in the fauna section and in respective structure descriptions in this report.

Abandonment. The structure after occupation. Describes cultural processes relating to final closure and subsequent impact as indicated by stratigraphy. This includes building material salvage.

Dismantled. Major timbers and possibly stone wall segments were scavenged from the structure before or at the time of abandonment. The structure for the most part, was unburned.

Unfinished. Structure construction was never finished.

Burned. Usable construction materials such as support posts are burned in place. *At NM 22* the structure shows unmistakable signs of a conflagration. Oxidized floor, side walls and or burned timbers.

Dismantled and burned. Burned but major construction materials are scavenged. Evidence of material removal includes missing main support posts or deflector.

Dismantled and trash filled. Dismantled structure is used to contain secondary refuse. Structure is filled with unmistakable midden refuse indicating episodic dumping. Trash fill designation is determined by type and frequency of the deposit.

Dismantled and burned and superimposed. Dismantled and burned as above. The structure has another later structure excavated into its fill partially or completely obscuring the original fill.

Dismantled and superimposed. See above.

Burned and superimposed. See above.

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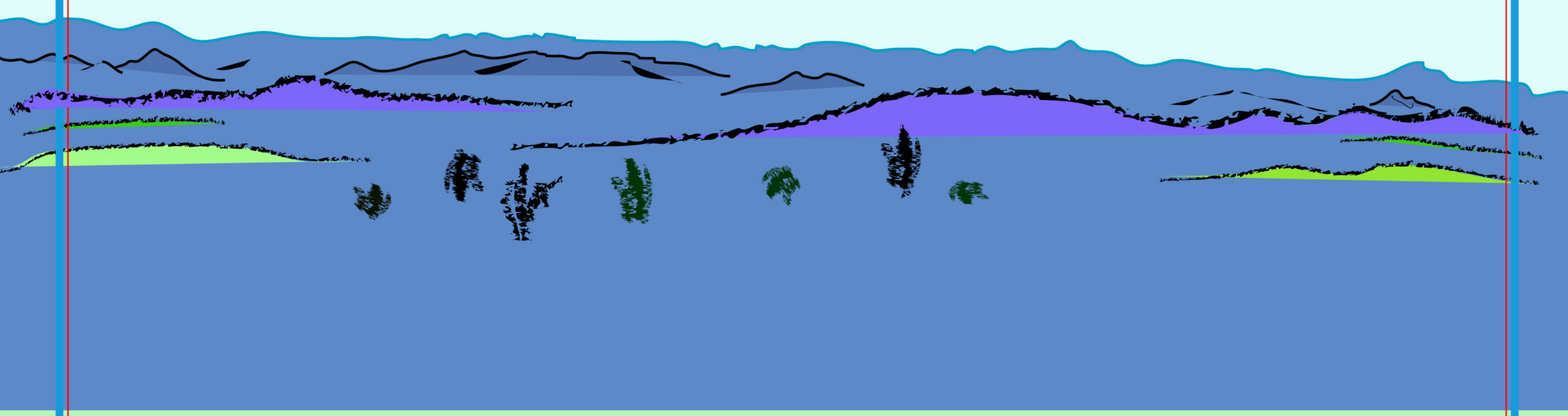

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