MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

VALENCIA:
A SPANISH COLONIAL AND MEXICAN-PERIOD SITE ALONG NM 47 IN VALENCIA COUNTY, NEW MEXICO

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ARCHAEOLOGY NOTES 267

SANTA FE 2001 NEW MEXICO

ADMINISTRATIVE SUMMARY

Excavations at LA 67321 were carried out along NM 47 in December 1996 and January 1997 at the request of the New Mexico State Highway and Transportation Department (NMSHTD). Previous data recovery at the site had recovered a large sample of artifacts but did not locate any structural remains. Testing determined that potentially significant dense trash deposits lay within the right-of-way both east and west of the highway. To ensure that no structural remains or significant features remained in the right-of-way, further excavations were recommended and carried out during this project.

The site area was investigated in hand-excavated units, exploratory backhoe trenches, and areas of backhoe scrapes. No structural remains were found. However, a large trash-burning pit and a smaller trash-filled pit were found, along with a large sample of artifacts. Analysis of the recovered material suggests the deposits date to between about 1770 and 1830. The deposits provide considerable information about the people that left them and their interactions with surrounding populations.

The NMSHTD provided funding for this project. This report is submitted in fulfillment of Joint Powers Agreement J00343/97/L3 between the Office of Archaeological Studies, Museum of New Mexico (MNM), and the NMSHTD.

NMSHTD Project No. TPO-0047(13), CN 1842
MNM Project No. 41.5991
NM Cultural Properties Review Committee Archaeological Excavation Permit No. SE-116

ACKNOWLEDGMENTS

Our excavations at LA 67321 were aided by a number of volunteers. Interested community members made considerable effort, as did John D. Schelberg and Greg Everhart, in spite of often unpleasant weather and working conditions. Their help is greatly appreciated. Mr. and Mrs. Alarid gave us permission to work on their property and provided information on the ownership and history of the area.

The analysts worked hard to obtain as much information as possible from the material recovered. David H. Snow provided invaluable advice on the ceramic assemblages. Tom Ireland edited the report, and Ann Noble produced the graphics.

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INTRODUCTION

At the request of the New Mexico State Highway and Transportation Department, the Office of Archaeological Studies (OAS) conducted a data recovery program at LA 67321 (Fig. 1 and Appendix 1). Testing within the project area determined that widening NM 47 would impact this Spanish Colonial and Mexican period site. Limited data recovery was recommended. Valencia and Bernalillo Counties own the property east of NM 47, and property west of the highway is privately owned.

Little has changed in the outward appearance of LA 67321 since it was initially described as a few widely scattered sherds of pottery, glass, and porcelain in a plowed field (Wiseman 1988:14). Centered on the intersection of NM 47, Lujan Road, and the frontage road, the site is deeply buried, but a few historic and prehistoric artifacts have made their way to the surface. Plowing and road construction have scattered the artifacts over a considerable area, so that the actual distribution of material is discernable only through subsurface investigations. As a result, site boundaries are still unknown, except for the areas investigated, which are limited to the NM 47 right-of-way.

Located on the Rio Grande floodplain, the site area is essentially flat, with less than 50 cm difference in elevation over the 85 by 40 m project area. Beyond the right-of-way, on the east side of NM 47, vegetation in December and January was a dense stand of galleta, probably *Hilaria ridida* (big galleta), occupying a fallow field (Fig. 2). A windbreak of elms grew along the right-of-way fence in the southern part of the project area. On the west side, vegetation was not as dense. It consisted of the remains of weedy annuals and short annual grasses. Scattered cottonwood trees formerly grew near the project area. Stumps and a few branches remain.

Physiology and Geology

Valencia is at the center of the Albuquerque Basin, the largest in a string of basins along the Rio Grande rift. It extends about 160 km north to south and 56 km east to west. The northern boundary is formed by the Nacimimento and Jemez Uplifts, the eastern by the fault blocks of the Sandia, Manzano, and Los Pinos Uplifts, the southern by the Joyita and Socorro Uplifts, the southwestern by the Ladron and Lucero Uplifts, and the northwest by the Rio Puerco Fault Zone (Fox et al. 1995:53-54).

Fill material in the Albuquerque Basin consists mostly of Cenozoic deposits of the Santa Fe Group, deposited during the middle Miocene to early Pleistocene. Alluvial sediments originate in the adjacent highlands. Fluvial sediments are from the northern part of the state and southern Colorado (Fox et al. 1995:54).

The middle Rio Grande channel has a shifting sand substratum and poorly defined banks. Cottonwood, willow, Russian olive, and salt cedar grow on the floodplain. Sediment bars form in the channel during low-flow periods (Fox et al. 1995:52).

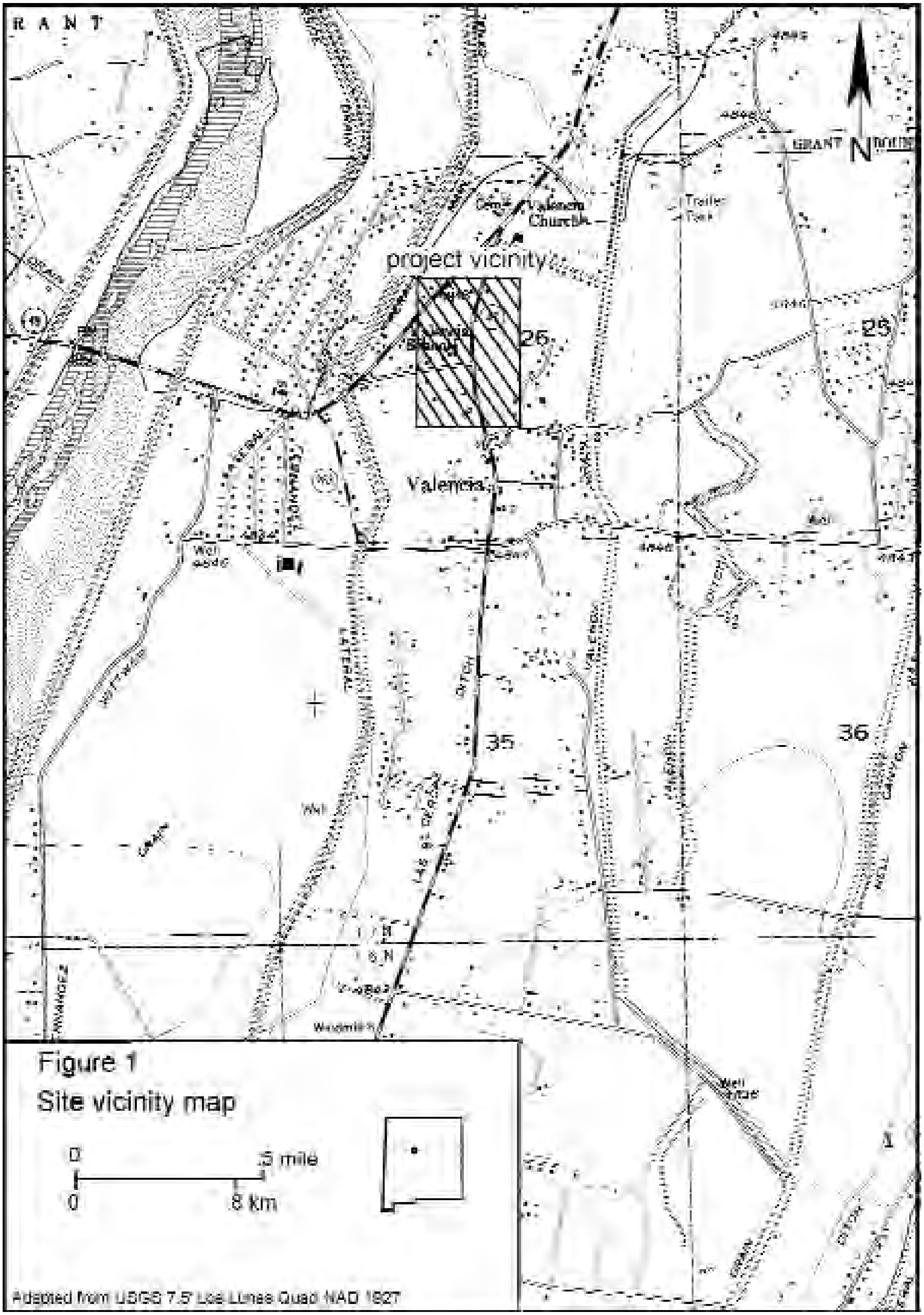
Soils in the immediate site area are of the Gila-Vinton-Agua association, described as level, well-drained, loamy soils in stratified alluvium (Pease 1975:3). The site is at the intersection of three soil types: Vinton loamy, fine sand, slightly saline; Gila loam, moderately alkali; and Gila clay loam. Nearby are Gila loam and Agua loam. The Gila series are well-drained soils formed in the floodplain of recent alluvium. They are stratified fine sandy loam, very fine sandy loam, and loam. Areas of Gila clay loam have a surface layer of clay loam that is cloddy and difficult to plow (Pease 1975:26). The Vinton series also consists of well-drained soils on the floodplain in recent alluvium (Pease 1975:47). Both soil types are suited for irrigated crops, orchards, pasture, and wildlife habitat.

Some of the subsurface soil at LA 67321 is gleyed, that is, the soils wholly or partially developed while saturated with water in the presence of organic matter. This produces a layer of intense reduction that is characterized by ferrous iron and neutral gray colors. Gleyed soils can be quite thick and uniform when an area fills gradually in a wet basin (Soil Conservation Service 1951:180, 184).

Historic Period Climate and Hydrology

Climate in the Valencia area is arid continental, with an annual precipitation of 178 to 254 mm, high solar radiation, low humidity, and high evaporation and transpiration rates. Almost half of the average precipitation falls from July to September, mostly as high-intensity summer thunderstorms (Pease 1975:112; Scurlock 1995:12). In the project area, the average January temperature is 0.2 degrees C (32.4 degrees F); in July, it is 25.2 degrees C (77.3 degrees F) (Gabin and Lesperance 1977:430). The frost-free season averages about 180 days (Tuan et al. 1973: Fig. 38).

As reconstructed by Scurlock (1998a:22-29), the climate in the Rio Grande drainage during the historic period has remained relatively stable but variable, with episodic drought and wet years. During the early Spanish Colonial period (1540 to 1680), the region was still under the influence of what is called the "Little Ice Age," when temperatures were 1.8 to 3.6 degrees F lower than today. It began between 1430 and 1450 and



project vicinity
Valencia Church
Valencia
Trailer Park
GRANT
N
26
25
35
36
LAS DE CERRO
DITCH
LATERAL
Well
Windmill
Figure 1
Site vicinity map
0
.5 mile
0
.8 km
Adapted from USGS 7.5' Los Lunas Quad NAD 1927

ended in the mid 1800s. Cooler temperatures, combined with a drought that started around 1650, resulted in widespread famine, the abandonment of the Piro and Tompiro Pueblos, and increased raids by nomadic groups--events that contributed to the Pueblo Revolt in 1680.

In the early Spanish Colonial period, the Rio Grande was relatively deeper. A larger volume of water resulted in a low sediment load and a slightly sinuous, aggrading sand substrate. Overbank flooding peaked between April and early June from snowpack melt and again in August and September from intense precipitation. The river moved across the floodplain with shifting channels, causing island and sandbar formation and destruction (Scurlock 1998a:390).

Stream flow decreased, and the Rio Grande became wider and shallower, resulting in sinuous increasing aggradation during the middle to late Spanish Colonial periods. Overbank flooding was more frequent and severe with channel shifting from intense floods. Riverbanks and islands became less stable, and riparian forests were reduced and more fragmented (Scurlock 1998a:390).

In 1822-1823, the early part of the Mexican and Territorial periods (1821-1912), the general drought ended. Flooding in 1823, 1828, 1830, 1854-1857, 1862, 1866-1872, 1874, 1884-1886, 1891, 1903-1905, and 1911 was interspersed with drought years and years of extremely cold and hot temperatures (Scurlock 1998a:27-29).

Figure 2. Site area, looking southeast.

Drought conditions continued into the early 1700s, during the middle to late Spanish Colonial periods (1680-1821). Precipitation remained below normal most years through 1739. A major flood along the Rio Grande in 1741 was followed by severe drought and wildfires. Flooding occurred almost every year between 1753 and 1760, followed by severe drought from 1772 to 1785. Even during the drought, there were years when above-normal spring runoff from heavy snow packs caused the Rio Grande to flood. A few wet years (1791, the winter of 1792-93, and 1814) among mostly dry years combined with warm temperatures to cause hardship for people and livestock (Scurlock 1998a:26-27).

Stream flow in the Rio Grande continued to decrease while the sediment load and aggradation increased. Flood frequency and intensity also increased, with some scouring and incision of the channel from floods. Soil alkalinity increased from waterlogging and a rising and falling water table (Scurlock 1998a:390).

Throughout the historic era, few years were without climatic disruption in some portion of the Rio Grande Valley. Flood, drought, and severe cold shifted populations and settlements and resulted in increased nomadic raiding. Food shortages caused by drought and floods led to starvation and left the population more vulnerable to epidemic diseases (Scurlock 1998a:90-91).

HISTORICAL BACKGROUND

Several works provide detailed overviews of the historic period in New Mexico (e.g., John 1981; Pratt and Snow 1988; Scurlock 1998a; Wozniak 1995). This review focuses on settlement patterns and events that impacted the Rio Abajo--the area south from Cochiti to Socorro.

Prior to the arrival of Spaniards, pueblo groups, probably Tiwas, occupied the Valencia area. At nearby Valencia Pueblo (LA 953), just north of LA 67321, recent excavations recovered large numbers of Glaze A ceramics (A.D. 1325-1425) but also smaller amounts of Glaze B and Glaze C ceramics (A.D. 1400-1490). Glaze D (A.D. 1490 to 1515), Glaze E (A.D. 1515-1650), and Glaze F (A.D. 1650-1700) were present but rare. Beneath the Glaze or Pueblo IV component is evidence of a Pueblo III occupation (Brown 1997a:488-489).

Early Spanish Colonial Period (1540-1680)

Several *entradas* passed through the Valencia area: Francisco Vásquez de Coronado in 1540, Capt. Francisco Sánchez Chamuscado and Fray Agustín Rodríguez in 1581, and Antonio de Espejo in 1582. By the time the first colonists arrived with Juan de Oñate in 1598, most of the pueblos in the area had been deserted (Scurlock 1997:17-19; Scurlock 1998a:106-107).

A mission was established at Isleta in 1612-1613 as Hispanic colonists began moving south into the Rio Abajo. Settlements were formal grants of land (*estancias* or haciendas) made as *encomiendas*, or scattered settlements of ranchos. *Encomiendas*, established near pueblos and missions, were a grant of Indian labor to colonists in exchange for defending the area and its inhabitants. The Hispanics oversaw livestock, farming, and other pueblo activities, often illegally forcing the Indians to labor for the benefit of the *encomendero*. Ranchos were small farming and livestock operations granted as *labores* (small tracts given to farmers), *caballerinas* (grants to cavalry men or officers), or *peonias* (footsoldiers' grants, which were about 20 percent the size of those granted to officers) (John 1981:9; Scurlock 1998a:107; Snow 1979:46). Under Spanish law, legal title to grant lands depended on occupation and improvement of the land (Wozniak 1987:63).

From 1637 to 1641, New Mexico had 35 formal *encomiendas*. The names of the *encomenderos* and the tribute extracted are not well documented. Colonial documents refer to eight haciendas and *estancias* (rural habitations) in the Rio Abajo along the Rio Grande, including the hacienda of Francisco de Valencia, between Isleta and Tomé. Fourteen *estancias* were within the jurisdiction of the mission at Isleta between 1663 and 1666. The majority of the settlers in this period were professional soldiers with *encomiendas* or *estancias* (Pratt and Snow 1988:55; Tainter and Levine 1987:83, 87-89).

The earliest settlements and *estancias* were near pueblos and along streams on arable land. Less affluent settlers lived in scattered ranchos on or near streams, springs, or *ciénagas* (swamps). Topography determined the placement of houses, outbuildings, and orchards. Fields were often located away from the house, as were grazing areas (Scurlock 1998a:107).

Region-wide famines occurred between 1666 and 1668 and again in 1670 and 1671. By the end of 1672, virtually all livestock had been lost to disease or raids or had been consumed. Economic exploitation through the *encomienda* system, religious persecution, and failure to protect the Rio Grande pueblos from nomadic raiders attracted to the livestock and metal implements at valley pueblos and scattered ranchos led to the Pueblo Revolt of 1680 (John 1981:55, 93; Wozniak 1995:31).

The Revolt, which began on August 10, 1680, left 21 of the 33 friars and 380 to 400 of the 2,500 colonists dead. Puaray, Sandia, and Alameda Pueblos joined the Revolt, killing about 120 residents of the Rio Abajo. Lt. Gov. Alonso García, who was stationed at Isleta with a small group of soldiers, rescued the Rio Abajo survivors, gathering over a thousand at Isleta for the southward retreat. Some Piros and Isletas joined the colonists in their withdrawal to El Paso (Montoya 1978:13-15; Tainter and Levine 1987:90-91).

Middle to Late Spanish Colonial Period (1680-1821)

In 1681, when Gov. Antonio de Otermín attempted a reconquest, he found all of the pueblos south of Isleta deserted, the residents having fled to the hills. Isleta was not yet deserted and received the military force peacefully. Sacking and burning Isleta and seven other pueblos whose residents had fled, Otermín's troops advanced as far as Cochiti before returning to El Paso with 385 of the 511 Piros and Isletas occupying Isleta. Other attempts at reconquest in 1688 and 1689 laid waste to Santa Ana and Zia (John 1981:110, 113; Montoya 1978:17-18; Pratt and Snow 1988:65; Scurlock 1997:21; Tainter and Levine 1987:92).

Following the Revolt, most vestiges of Hispanic culture were destroyed. Tompiro and Tiwa groups had already abandoned the eastern flank of the Manzano Mountains, leaving the valley pueblos open to attack by Plains and Apache groups. Tewas and Tanos centered in Santa Fe were at war with most other pueblos. The Keresans feared these groups at least as much as they did the Spaniards (John 1981:113; Tainter and Levine

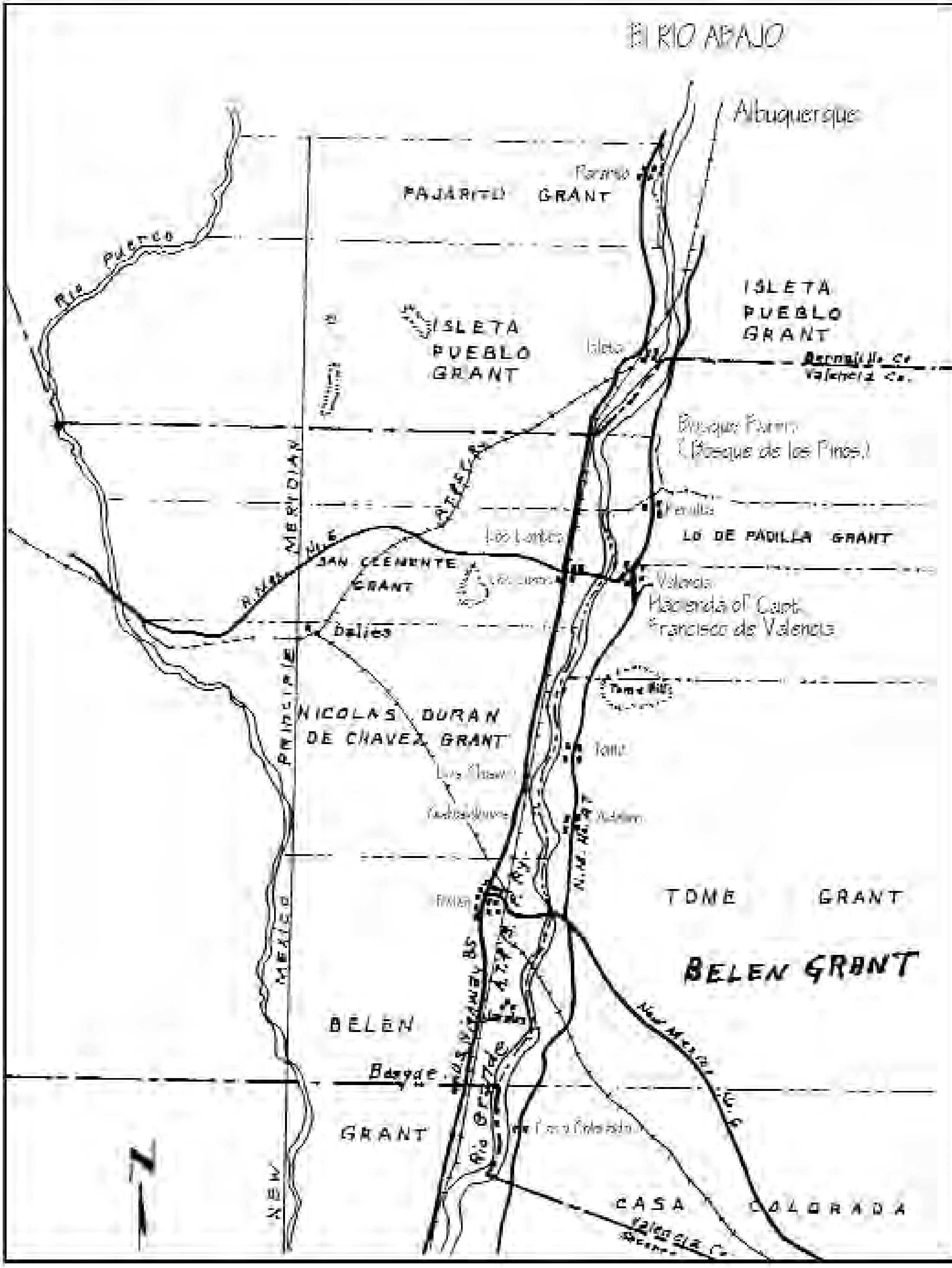


Figure 3. Valencia area (after Espinosa and Chavez 1975).

1987:92).

It was not until 1692 that Diego de Vargas and 800 settlers, soldiers, and missionaries successfully recolonized New Mexico (Pratt and Snow 1988:66). Factionalism within and between pueblos, raids by Navajos, Apaches, and Utes, and crop failures left most pueblos open to a peaceful return of the Spaniards. With fewer Pueblos impeding their selection, new and returning settlers occupied the best lands. The entire Tiwa area from San Felipe to Socorro was deserted. Settlement east of the Rio Grande was hampered by marauding Plains and Apache groups (John 1981:115-123; Pratt and Snow 1988:217-218).

The disastrous pre-Revolt policy of small numbers of large exploitative grants was replaced with one of smaller individual grants designed to ensure effective occupation by self-sufficient farming and herding communities (Wozniak 1987:23). Post-Revolt grants of land were of three types. Private grants were usually made to prominent men--former military personnel who were owed salary or their descendants. Other private grants were for small holdings occupied by a rancho, often plots held by squatters. Communal grants generally went to poor landless families and resulted in either fortified plazas or clusters of scattered ranchos, or *poblaciones*. These grants included communal rights to pasture, wood-gathering land, and subsurface water (Scurlock 1998a:110). Although it was illegal, Spanish-speaking squatters impinged on Pueblo land holdings (Scurlock 1998a:88). Westphall (1983:12) estimates that in 1765 at least 20 percent of all households occupied ungranted tracts of land. By 1827, it was about 14 percent, or one in seven households.

Land grants made after the Reconquest were smaller than those in the 1600s, in part because the new policy favored successful occupation and defense rather than economic prosperity for the grantees. As grants were broken up through sales and inheritance, parcels gradually assumed the narrow strip or long lot form as a means of retaining access to limited water sources and irrigation. Community grants to groups of individuals often took the form of scattered ranchos rather than formal plazas. Compact plaza organized communities were rare. Community grants gradually spread into areas that were more marginal in terms of resource availability and protection and were favored because they settled more people and could provide defensible settlements (Pratt and Snow 1988:220, 224, 231; Wozniak 1987:23, 1995:33).

Mexican Period (1821-1846)

The Spanish government had banned all trade with foreign governments. With Mexican independence came a more open trade policy and an influx of foreigners. Outside influence was mostly from the East, rather than the South. Opening the Santa Fe Trail brought a wealth of new goods as well as cash (Pratt and Snow 1988:72-73; Tainter and Levine 1987:107). By 1824, commercial outlets in New Mexico were saturated with goods. More goods were purchased from Missouri than Chihuahua. Commerce provided a means for local merchants to advance their class and station (Sandoval 1978:89-90, 107).

More land was granted than in the previous period. Most grants were large tracts of grazing land, often obtained through fraud on the part of individuals and Mexican government officials. Development of a livestock industry, more open trade, and mining began to slowly transform the economy (Wozniak 1995:33).

Grants during the Mexican period included *empresario* grants, made to promoters who contracted for colonization of designated areas, which required settling 200 families within 12 years. Individuals could receive grants from the town council. Grant size reflected different land-use patterns. A *labor*, measuring 1,000 varas (1 vara = 0.9 m or 3 feet) on a side, was granted to farmers, while stock raisers received at least a *sitio* (1 square league). A hacienda was comprised of five *sitios* (Tainter and Levine 1987:100-101).

Territorial Period (1846-1912)

American troops occupied New Mexico at the outbreak of the Mexican War in 1846 (Scurlock 1998a:122). The United States annexed Texas and acquired New Mexico in the Treaty of Guadalupe Hidalgo in 1848. New Mexico residents were given rights as American citizens or could move to Mexico. Trade along the Camino Real or Chihuahua Trail, curtailed during the Mexican War, was further reduced because shorter routes between Mexico and the United States now passed through Texas. The Santa Fe Trail became the major supply route for the American frontier (Tainter and Levine 1987:113-114).

New Mexico in 1846 was largely an agrarian society, dependant on irrigation agriculture and raising livestock (Wozniak 1995:34). The government quickly recognized that the nomadic Indian groups that preyed on the Hispanic villages and pueblos had to be subdued. This was not accomplished until the mid 1860s (Tainter and Levine 1987:117-118).

American reliance on precisely defined land boundaries quickly conflicted with Hispanic concepts, which combined exclusive rights and communal holdings, and boundaries that were often described by geographic markers. To resolve the conflict, the surveyor general was charged with surveying the public domain, establishing the township grid, and recommending to Congress actions regarding the validity of land claims made under the laws and customs of Spain and Mexico. Few claims were settled because of problems with procedures, which required a legal survey paid for by the claimant, and fear of turning over documents to government officials. In 1891, the Court of Private Land Claims was created to review the claims. Grants that were found invalid were placed in the public domain, and those upheld passed into private ownership. Land fraud was widespread (Tainter and Levine 1987:119, 122-123).

Of the land claimed by Pueblos and Hispanics, about 77 percent was lost in the land claims proceedings. Most became public domain, state land, or railroad land. Public domain in the mountains became the national forests. Mostly Anglo homesteaders filed for land outside the grants under the Donation Act of 1854 and the Homestead Act of 1862. Claimants of Spanish or Mexican land grants were not eligible for homestead claims under the Donation Act (Scurlock 1998a:122). Without access to huge tracts of land that formed their traditional land base, small Hispanic ranchers and farmers were virtually eliminated, and many small villages disappeared (Snow 1979:49).

Site History

The Valencia area (Fig. 3) is the subject of several local histories (Espinosa and Chavez 1975; Lopopolo n.d.a; Scurlock 1997; Valencia County Historical Society 1982) and is mentioned in other more inclusive works. Differences in interpretation by these authors warrant a review of the issues involved, especially those with a direct bearing on the deposits at LA 67321.

Origin of the Name Valencia

Most agree that the name Valencia came from the initial Hispanic settler of the area, Francisco de Valencia. Francisco was probably the son of Blas de Valencia, a soldier in Oñate's forces. A native of Santa Fe, Francisco was the lieutenant general of the Rio Abajo area between about 1661 and 1664 and lived at an *estancia* on the site of the present town of Valencia (Chávez 1992:397). Scurlock (1997:19) states that Francisco had an *encomienda* grant south of Isleta on both sides of the river and built a hacienda or large *estancia* on or near the abandoned pueblo of Valencia between 1630 and 1640. He lived there until his death in 1668. His wife and son remained there until forced to flee during the Pueblo Revolt. At the time of the revolt, the Valencia household consisted of Francisco's widow, María López Millan; his son, Juan de Valencia; and his wife, children, and grandchildren and their servants, a total of 46 persons (Chávez 1992:109). The *estancia* was reportedly burned in the revolt (Scurlock 1997:42).

Discrepancies in the reported distance of the Valencia hacienda from Isleta and a 1693 reference prompted Lopopolo (n.d.a:3-5; n.d.b:2) to propose a second Valencia hacienda, that of Juan de Valencia. The 1661 testimony of Thomé Domínguez (holder of the Tomé grant) and María López Millan describe the Francisco de Valencia hacienda as one league (4.2 km or 2.6 miles) south of the Isleta convent and three leagues (12.5 km or 7.8 miles) above the house of Thomé Domínguez (Hackett 1937:177-178; Lopopolo n.d.a:3-4). Valencia Pueblo (LA 953) is about 11 km, or 6.8 miles, south of Isleta, while Cerro Tomé is 17 km, or 15.6 miles, south. Later accounts, such as a 1776 description by Fray Francisco Atanasio Domínguez, locate Valencia on the site of the hacienda of Francisco de Valencia, six leagues (25.1 km, or 15.6 miles) south of the church at Alameda (Adams and Chávez 1956:153). Espinosa and Chavez (1975:27) and Chávez (1992:109) place the hacienda of Francisco de Valencia at the exact site of the present Valencia. According to Moorhead (1958:24), the hacienda of Francisco de Valencia was destroyed during the revolt but reoccupied as the Pueblo of Valencia, a town of *genízaros*, in 1740 (an issue addressed later in this section).

Lopopolo points out that if Francisco's hacienda were one league south of Isleta, it would be at the northern limits of Bosque Farms on Isleta tribal land (almost 7 km, or 4.2 miles, north of Valencia Pueblo). He goes on to cite an account (from Espinosa 1940:66-67) in which Diego de Vargas states that on Saturday, September 6, 1693, they camped at a place within sight of Thomé Domínguez's former hacienda. The next day, they arrived at the abandoned farm of Juan de Valencia, having traveled about two leagues (Lopopolo n.d.a:5). An earlier source similarly places Valencia six leagues from Albuquerque and says that it was named after Juan de Valencia (Armijo 1929:278).

Distances and directions reported during the Spanish Colonial period were sometimes inaccurate or invalid (e.g., Pratt and Snow 1988:27). So the question remains whether there was more than one Valencia hacienda, one at the present site of the Sangre de Cristo church in Valencia, and the other farther north, or whether the same hacienda was referred to as Juan's hacienda after Francisco's death. If there were two Valencia haciendas in the pre-Revolt era, this would explain much of the confusion in the literature. Certainly, a more northern location for Francisco's hacienda would be more consistent with its being an *encomienda* of Isleta.

An alternative origin for the name is that Valencia was named for Valencia, Spain, birthplace of Pedro Otero, who settled south of Isleta in 1776 with his brothers, wife, and child (Salazar 1982:17). This is unlikely, given historical accounts that consistently refer to the area in terms of the original settler before 1776. Furthermore, no Otero is listed for Valencia in the 1790 census (Olmsted 1975:17-19) or an 1802 list of residents of the Villa de Albuquerque, which included Valencia (Olmsted 1981).

Resettlement of Valencia

None of the Valencia family were among those who returned after the Revolt (Chávez 1992:109; Scurlock 1997:21). De Vargas had a difficult time convincing the previous colonists to return. Only a few of the 70 families were former settlers who, after years of poverty in El Paso, returned because of promises to restore their land and anticipated high status and wealth after the Reconquest. Other settlers were soldiers--new settlers --including about 27 families of blacks and mestizos, some Indian allies, and 18 friars (John 1981:128-129).

Settlement spread slowly southward. Albuquerque was settled and relatively secure in 1705. In January of 1710, Isleta was refounded by Father Fray Juan de la Peña, who assembled Tiwas, Tanos, and Jemez from Hopi, Tiwas scattered in different pueblos and among the Apaches, and Tiwas who had settled in El Paso (Montoya 1978:22). Soon afterwards, in 1716, Antonia de Sandoval y Manzanares and her son, Felipe Candelaria, received a grant of land west of the Rio Grande (the San Clemente Grant) that was formerly part of the *encomienda* of Juan de Valencia but had been transferred to her husband, Blas de la Candelaria, before the Revolt (Scurlock 1997:42). In another version, Antonia de Sandoval y Manzanares claimed that the Rancho de San Clemente had belonged to her father, Matais Sandoval, before the Revolt (Chávez 1992:155; Lopopolo n.d.b:2; Wozniak 1987:36). Regardless, settlers had began to move into the general area. Pedro de Rivera noted several ruined ranchos in the Valencia area, but that none had been reoccupied as of 1726 (Scurlock 1997:43). Isleta was inhabited by a small number of Tiwa families (Sanchez 1995:147).

Resettlement at Valencia is usually given a date of 1739 or 1740. Most of those who cite this early resettlement by *genízaros* (Chávez 1979:199; Pratt and Snow 1988:223; Tainter and Levine 1987:97), quote--or rather misquote--Hackett (1937, 3:401-402), who translates Menchero's 1744 account as follows: “In fact a number [of *genízaros*] did apply to him [the governor], and he assigned them for their residence and settlement, in the name of his Majesty, *a* place called Valencia *and* Cerro Tome” (emphasis added). Scurlock (1997:21) cites Hackett and an unpublished 1989 manuscript by J. M. Taylor (*History of Guadalupe Parish History Project*), saying that in 1740, another group of *genízaros* was allowed to settle at Valencia, although there was no formal grant. Bolton (1996:184-185) places *genízaro* settlements at Tomé, and later at Belen and Sabinal, and Thomas refers to a post built by Spaniards at Valencia and Cerro de Tomé (Thomas 1940:18).

Horvath (1979:80), like Thomas, concludes that Menchero was mistaken about the *genízaro* component of the settlement. The Tomé community grant, made in 1739, was to a group of Hispanics from Albuquerque, and there is no mention of more than one or two *genízaro* families in the Tomé and Valencia baptismal and marriage records of the period (see also Ellis 1955:91). The list of 30 settlers who applied for the grant complained that the Albuquerque location could not provide for their needs and asked to settle the land once granted to Tomé Domínguez de Mendosa (Lopopolo n.d.c:8; Wozniak 1987:80).

Settlement continued southward in the 1730s. Fifty families settled at Nuestra Señora de la Concepción (renamed Cañada or Gracia Real and located between Isleta and San Clemente on a map of the Camino Real in Hallenbeck 1950) in 1737 and in grants made to Nicholas Durán y Chávez for land between the Rio Grande and Rio Puerco in 1739, for Tomé (Nuestra Señora de la Concepción de Tomé Domínguez grant) in 1739, and for Belen in 1740. Settlement, which had been rapid south of Isleta in the early 1740s, shifted to areas closer to Bernalillo and Albuquerque by the mid-1740s (Lopopolo n.d.b:13; Wozniak 1987:39-40, 43). Reluctance to occupy the area was due in part to Comanche raids, which caused the settlers at Tomé to abandon their community in the late 1750s or early 1760s, resettling in 1765 (Wozniak 1987:46). Tjarks (1978:53-4) has 50 Spanish families or 212 persons in the Valencia and Tomé area in 1746-48 but feels the numbers are high and must include others besides Spanish inhabitants.

The 1750 census (Olmsted 1981) lists only the Villa de Albuquerque, Isleta Pueblo, Paxarito, Rancho de Padilla, Sitio de Gutierres, San Clemente, and Belen. Settlers in the Valencia and the Tomé areas were considered part of the Villa de Albuquerque, which had a population of 200 Indians and 500 “gente de razon” (Olmsted 1981:87). Distinguishing Belen from Albuquerque in the census but not Tomé is perplexing, since Tomé became a grant just before Belen. Furthermore, it does not make sense to lump Valencia and Tomé with Albuquerque when there are intervening areas that were treated separately. Several (4 or 5 of the 7 to 10) of the individuals listed for Valencia in the 1790 census (Olmsted 1975:17-19) are found in the 1750 census of about 190 households (Olmsted 1981:73-187), spelling and slight differences in ages aside. Unfortunately, when all are lumped with Albuquerque, it cannot be determined where they resided at that time.

A 1752 census summary separates the Villa de Albuquerque from the Partido de Velen (Belen) and the Partido de Fonclara (Tomé), but not Valencia. Albuquerque had 107 families, Tomé 57, and Belen 23 (reproduced in Lopopolo n.d.a:28). If a separate *genízaro* settlement existed at Valencia, it too should have been listed, arguing for a later settlement of the area. In 1776 Juan Candelaria, resident of Albuquerque, placed the settlement of Valencia in 1751 and said that it covered a league in area. He recalled that it was named after the old owner, Juan Valencia (Armijo 1929:278). No other references to this date were found.

It is not until the 1770s that mention of Valencia becomes frequent enough that its existence can no longer be questioned. By 1776, Tomé had a population of 737, living in scattered ranchos and irrigating their fields. The smaller community of Valencia was described by Fray Francisco Atanasio Domínguez as a settlement of ranchos including 17 families with 90 people (Adams and Chavez 1956:153; Scurlock 1997:44).

Flooding in 1769 changed the course of the Rio Grande at Tomé; a major Comanche raid in 1776 or 1777 killed several of the residents and nearly destroyed Tomé; a Comanche raid on Valencia purportedly killed 23 at Valencia in 1777; and a severe flood occurred in 1780 (Ellis 1955:95; Scurlock 1997:44; Thomas 1940:51). In 1779 Miera y Pacheco, who accompanied Fray Domínguez, produced a map of the area that includes Isleta, San Clemente, Valencia, Los Cháves, and Tomé. Valencia is represented by five houses, Tomé by a church and eight houses (reproduced in Scurlock 1998a:333 and Simmons 1979:192).

While there is a chance that the area around Valencia Pueblo was settled before the 1770s, it was probably too insecure for significant settlement. Herders, traffic on the Camino Real, lost heirlooms, and collecting from the pre-Revolt haciendas could easily account for the small amount of earlier material found at LA 67321. Excavations by the Office of Contract Archeology (OCA), University of New Mexico, at Valencia Pueblo (LA 953) also support this conclusion. No direct depositional evidence of a pre-Revolt occupation and no architecture assignable to the historic period were found. The swampy area near the church parking lot had ceramics that could date as early as 1720 and as late as 1850 (Brown 1997a:489).

Character of Settlements in the Spanish Colonial Period

Scurlock's conclusion that LA 67321 represents the remains of a Southern Tiwa or Spanish Colonial camp or activity area dating after 1716 seems to be based, at least in part, on its location, which he places halfway between the two plazas of Valencia, which are discussed in the following section (Scurlock 1997:40). The Sangre de Cristo Church, the site of Plaza 1, and the possible location of Plaza 2 are only about 1.6 km or a mile apart. Settlement patterns during the occupation period suggest there could have been ranchos in the LA 67321 area.

Theoretically, during the Spanish Colonial period, all settlement was regulated by the Spanish Crown, which owned the land and water. When land was granted, the individual owned only what was produced through his own labors, i.e., the dwelling and adjacent yard and garden, and had usufruct or use rights to grazing and woodlands (Pratt and Snow 1988:33). For the most part, settlements consisted of scattered ranchos comprised of one or more households on farm and orchard land and a few plaza-centered communities (Pratt and Snow 1988:220-223; Simmons 1969:11, 13; Wozniak 1987:23-24). The term *plaza* was used loosely and referred both to scattered ranchos and compact plaza communities (Nostrand 1987:363).

Even Santa Fe, as described by Fray Francisco Atanasio Domínguez in 1776, was mainly a collection of scattered ranchos: “[T]he Villa of Santa Fe (for the most part) consists of many small ranchos at various distances from one another, with no plan as to their location, for each owner built as he was able, wished to, or found convenient, now for the little farms they have there, now for the small herd of cattle which they keep in corrals of stakes, or else for other reasons” (Adams and Chavez 1956:40).

Communities often took this form as settlers built near their fields and fields were allotted to maximize accessibility to bottom lands and irrigation systems. Introduced crops such as wheat, barley, oats, and some fruits required irrigation, and the system, which evolved into a long-lot form, assured maximum access to limited water resources among the large number of settlers required by defensive concerns (Scurlock 1998a:94; Simmons 1969:13; Wozniak 1987:23-24).In 1776 Fray Domínguez described a settlement of ranchos with farmland and irrigation (Adams and Chavez 1956:153). Similarly, in 1780 settlements and ranchos spread all over the Rio Abajo in the vicinity of Isleta (Jones 1996:126). In 1778, de Anza was ordered to regularize settlement by aggregating scattered families into compact units with enclosed walls for defense. This was accomplished in a few towns, but most resisted, while still requesting protection (Hallenbeck 1950:243).

Thus, settlement in the Valencia area was probably a continuous or nearly continuous string of ranchos. Some attempt at aggregation or at least fortification of ranchos may have been made in response to defensive needs, which could have resulted in the identification of two plazas in the 1790 census. However, the predominant settlement pattern was characterized by the scattered ranchos typical of the period.

Residents of Valencia and LA 67321

It is not until the 1790 census that information on individual settlers in Valencia becomes available (Olmsted 1975:17-19). Fray Domínguez places 17 families with 90 people at Valencia in 1776 but gives no further information (Adams and Chávez 1956:153). A 1750 census includes any settlers in this area in the population of the Villa of Albuquerque (Olmsted 1981:73-187).

The 1790 census divides the Valencia residents into two plazas. As mentioned, Scurlock (1997:40) calls one the north plaza and places it around the Sangre de Cristo Church, and the other, the south plaza, about 1.6 km or a mile south at the intersection of North El Cerro Loop and NM 47. Lopopolo locates Plaza 1 (called Valencia) near the Valencia cemetery at the base of the escarpment, and the other, Plaza 2 (called Aragontown), about 3.2 km or 2 miles away, just south of the church. After the church was built, around 1800, he believes that families from Plaza 1 moved toward the church and Plaza 2 (Lopopolo n.d.a:15, 23). Neither provides their rationale for these locations. According to Scurlock, LA 67321 could have been occupied by ranchos of either plaza since it is between the two. Lopopolo writes that deposits dating before 1800 would be associated with Aragontown, and those after 1800 would represent a merging of the two plaza populations.

According to the 1790 census data (Table 1), Plaza 1 was comprised of 15 households, including farmers (n=8), sheepherders (n=2), weavers (n=3), and widows (n=2). Three households had female servants. Spanish is the predominant ethnicity (n=10 of 12 adult males and n=11 of 15 adult females). One sheepherder is listed as a “coyote,” as are two servants and an orphan. Two households are mestizos, and one is a Spanish farmer with a mestizo wife. A female servant is recorded as Ute. Common family names--Gallegos (n=2), Garcia (n=4), de Luna (n=2), Molina (n=4), Montoya (n=4), Mora (n=2), Sedillo (n=2), Serna (n=3), and Vallegos (n=3)--suggest a good number of family relationships. All three of the surnames that occur only once (the coyote and two of the mestizos) have spouses with names that occur more than once.

All initial entries and their spouses in the second plaza, comprised of 10 households, are listed as Spanish. They were farmers (n=6) or ranchers (n=4). Two households had servants: a female coyote and a female Apache. Plaza 2 is comprised mainly of Aragóns (n=9), along with multiple listings for Baca (n=3) and Cháves (n=2). If the occupations recorded in the census are accurate, Plaza 2 was the better off of the two from an economic perspective. In the 1790s ranching was an elite occupation, and ranchers were among the wealthiest men in New Mexico (Horvath 1979:111, 121).

Demographically, the two clusters are similar. Each has an older household with what appears to be extensive family ties (common surnames) to others in the plaza. Montoyas and Vallejos appear in both plazas, suggesting family ties between the two plazas. The age pattern, a few older individuals along with what would have been a younger generation, and degree of relatedness has several implications. First, the older individuals could have been the initial settlers in the area. Their presence could have attracted other family members to the area, and their children could have expanded into nearby ranchos. Second, these older, more established residences could have been larger and more complex, leading the census takers to identify two plazas. Finally, common names in the two plazas suggest that both were a scattered community of ranchos, rather than distinct entities.

Tracing the 1790 residents back and forward tends to support these suggestions. Entries in the 1750 census for the Villa de Albuquerque include Ygnacio, Tomassa, and María Ballejos (ages 16, 10, and 12) (Olmsted 1981:152), who are probably the same as Ignacio Vallegos, the widow Tomaza Vallegos of Plaza 1, and María Vallejos of Plaza 2 (see also Chávez 1992:303), placing them in Albuquerque or the surrounding area. Two different María de Luna entries (Olmsted 1981:122, 149) could also be linked to Plaza 1.

Examining the Aragon family genealogy, Lopopolo (n.d.a:17-21) identifies Ignacio Aragón as one of the settlers who came with De Vargas in 1693. He settled in the Santa Fe area, moving south to Bernalillo between 1701 and 1708. One of Ignacio's sons, Nicholas Aragón, married Margarito Gallego in Albuquerque in 1744. Three of the Plaza 2 Aragóns (Manuel, Juan Francisco, and José Francisco), are children of Nicholas and Margarito, suggesting Nicholas could have been one of the initial settlers of the Valencia area. The oldest son, Manuel, married María Vallejos.

These initial settlers were apparently squatters. No records of grants or law suits claiming ownership of the Valencia plazas have been reported. This lack of title is further suggested by the 1797 purchase of a portion of the Lo de Padilla Grant by Manuel Aragón, Manuel Antonio Aragón, Domingo Chávez, Vincente Chávez, Juan Aragón, Francisco Javier Aragón, Jacinto Sánchez, Felipe Montoya, Simon Sedillo, Francisco García, José Ignacio Molina, Lorenzo Romero, and Francisco Aragón. They bought the land from the Pueblo of Isleta, which had purchased it from Diego de Padilla and his heirs. The area is described as bounded on the north by Isleta land, on the south by Los Lentes or Peralta land, on the east by the mountain, and on the west by the Rio Grande (Indian Claims Commission 1959:627). The group of purchasers includes three from Plaza 1, seven from Plaza 2, one who is listed for Valencia in 1802, and two others--one a Sanchez, a name found at Plaza 2. If 7 of the 10 Plaza 2 families were among the purchasers, and they moved onto the grant, it would have substantially reduced the population of that plaza and the general area.

The Sangre de Cristo church was built around 1800 (Ellis 1955:108). A list of settlers and residents of the La Sangre de Cristo Puesto de Valencia indicates that several of those listed in Table 1 were still in the Valencia area in 1802. Some were also purchasers of the Lo de Padilla grant, but since the name Peralta was not commonly found in records until the 1840s (Baca and Baca 1993:3) and the Peralta church was built in 1879 (Valencia County Historical Society 1982:15), these were probably considered part of the Valencia parish. Among those listed in the 1790 Plaza 1 group are Felipe Montoya, María Manuela García, Francisco García, Anna María Molina, and Ygnacio Ballegos. The Plaza 2 group includes Don Manuel Aragón, María Vallejos, Juan Antonio Aragón, Manuel Antonio Aragón, Mariana Antonia Sánches, Vincent Chávez, Juana Aragón, María Baca, and José Aragón. Lt. Don Barthólome Baca and María de la Luz Chávez are listed under Tomé. Many of the new settlers could have been related to or descended from the 1790 residents; others are new (Olmsted 1981:134-135). Table 2 lists the new names. Most are Aragón or Chávez or have names common to others in the 1790 census.

An order filed at Valencia on March 11, 1820 (Spanish American Archive 1278, New Mexico State Records Center and Archives), concerning La Peralta probably refers to the Lo de Padilla purchase. Here, it appears that Domingo Cháves, one of the owners, requested a partitioning of the land. Some of the other owners, he claimed, had done almost nothing to improve the land and should accept his purchase cost and the value of his share for his interest in the property. The other settlers claim to have possessed the land for at least six years, leveling, fertilizing, planting, and building houses, and felt they were more entitled to the land. Thus, at least some of the original Valencia plaza settlers had shifted north but were still considered residents of the Valencia area.

Burial records from 1793-95 and 1809-46 suggest a substantial population in the Valencia (or Ballencia) area. Several of the individuals listed in the 1790 census and 1802 list of settlers appear in this list, along with a good number of individuals who do not (Baca and Baca 1993). An 1850 census lists numerous Peralto and Valencia residents. Some of the names suggest they were descendants of the 1790 plaza groups. Miguel Aragon (age 70) and his wife Rita (Windham 1976:16) are the only persons who also appear on the 1802 list of settlers.

In the 1840s the Valencia area prospered as the Otero brothers–Juan José, Antonio, and Manuel--became prominent merchants and stockraisers (Espinosa and Chavez 1975:66). Other prominent traders based in Valencia included Janinato Sánchez and Miguel Aragón. Common trade items at that time included metal, cloth, candy, sugar, and chocolate. Mules, pelts, stock, and minerals were exported (Sandoval 1978:104). The Otero family became almost a feudal hierarchy of rich merchants. They married into other prominent merchant, political, and military families (Luna, Perea, and Chávez), and with their progeny controlled a vast empire in New Mexico (Sandoval 1978:76).

Valencia was designated the county seat of Valencia County by the Republic of Mexico in 1844. In 1852 the county seat was moved to Tomé, where it stayed until 1872, when it was moved to Belen (Scurlock 1997:47-49).

Scurlock's research on LA 67321 indicates that Vincent Lujan was on the property by at least 1860 and by 1895 had three houses, fences, stables, an acequia, and fields in the area. The land was patented in 1910 and remained in the family until the eastern portion was purchased in 1960 (Scurlock 1997:40, 50).

Mr. Alarid, who owns the portion of the site west of NM 47, is a nephew of Vincent Lujan. Vincent appears in the 1850 census for Valencia as a 20 year old (Windham 1976:49). Vincent's father, Gregorio Lujan, operated a mercantile and hacienda just south of LA 67321. Vincent lived at the hacienda in the early 1800s and traveled to Santa Fe with Diego Aragón to get supplies for the mercantile. The 1860 census lists Vincent Lujan as a farmer and the 1870 census lists him as a merchant (Scurlock 1997:49). Mr. Alarid recalls that there were no structures in the area, except for the hacienda/mercantile in 1932 (personal communication, January 8, 1997). No structures are indicated for the site on the 1881 General Land Office survey plat or a 1922 Bureau of Reclamation land use map for the area (reproduced in Scurlock 1997:34-35).

Abandonment of the LA 67321 Area

It is clear that Valencia itself was not abandoned. Many settlers continued to occupy the general area. However, the archaeological deposits recovered from LA 67321 predate the Santa Fe Trail period, suggesting that households in the immediate area were gone by 1843, when the economic monopoly of the Chihuahua merchants was broken, and expensive European and Asian dry goods increasingly came into New Mexico and headed south (Moorhead 1958:72; Sandoval 1978:89). Several events probably contributed to the desertion of the immediate area as well as a lack of evidence of structures. Flooding and waterlogging were a contributing factor, as was the acquisition of legal title to land in other areas and attacks by hostile Indians.

A 1769 flood changed the Rio Grande's course, destroying homes and land at Tomé (Ellis 1955:95) and possibly Valencia. A smallpox epidemic occurred in 1815-16, killing at least one individual from Valencia and possibly contributing to the deaths of others whose cause of death was not recorded (Baca 1995:247). Low precipitation between 1818 and 1820 caused problems for ranchers and farmers (Scurlock 1997:45). Burial records from April of 1822 list seven Valencia residents who were "murdered by Navajos." Also killed by Navajos at about this same time were four men from Tomé, one from Los Lentes, and three from Los Enlames (Baca and Baca 1993:22-23). Local farmers in the 1820s began to note the formation of marshes in the Rio Grande Valley caused by excess flows from irrigation ditches (Wozniak 1987:99). A major flood in 1828 caused extensive damage at Valencia and Tomé. Water extended completely across the valley, and a new river channel was cut east of the present one (Carter 1953; Scurlock 1997:46). As late as 1869, Father P. Luis Benavides complained of the pools of standing water left by the 1828 floods (Ellis 1955:201).

Apaches killed adult males from Valencia in 1833, 1835, and 1836 (Baca 1995:251). Severe drought returned in the mid 1840s and continued into the early 1850s. Indian groups increased their raids along the Rio Grande (Scurlock 1997:47). Over 450,000 sheep were stolen from the Rio Grande settlements between 1846 and 1850 (Pratt and Snow 1988:376). Vincent Otero buried three Indian women from his household lost to contagious disease in 1840 (Baca 1995:247). Gila Apaches attacked Valencia in 1852 (Scurlock 1997:48). Droughts in 1859 and 1860 reduced harvests and native grasses (Scurlock 1997:48). A major flood in 1862 destroyed crops and damaged structures in the Valencia area (Scurlock 1997:49). On May 21, 1874, a record flood lasted nine days. It was similar to a previous flood, in which the old channel was obliterated and a new one established (Salazar 1982:23). In June 1884 Valencia was totally abandoned because of a flood that left five feet of water from Los Pinos to Tomé and destroyed many homes in the area. Portions of the Valencia church had to be rebuilt. Another equally severe flood occurred in June of 1885, followed by a less severe flood in September of 1886. In May 1891 floods washed away about 60 houses, leaving not one house standing at Valencia (Scurlock 1997:50; Wozniak 1987:112).

By the early twentieth century, most irrigable land had been damaged by poor drainage and the rising water table. Shortages of water from the late 1890s to the mid 1920 caused by drought and over-exploitation of surface water for irrigation in the San Luis Valley in Colorado affected the annual flow of the Rio Grande and increased sedimentation, causing channel aggradation and waterlogging. Alkalinization combined with floods and destruction of structures led to the abandonment of some land for agricultural purposes (Wozniak 1987:112, 130).

It is not difficult to see how the series of events chronicled above prompted movement out of the LA 67321 area and resulted in complete or near complete destruction of any structural remains. Lack of legal title and relocation of several of the original plaza families to Peralta, as well as the prominence of the merchants based in Valencia, could have further contributed to the resettlement of individual families or at least caused a change in refuse deposition practices.

Camino Real

The effect of the Camino Real (or Chihuahua Trail) on the residents of the Valencia area is difficult to assess. Some could have interacted with merchants traveling to Santa Fe, resulting in the relatively large quantities of majolica found at LA 67321. Perhaps some residents of Valencia were rural merchants, such as Miguel Romero, who in 1771 lived at Cañada de Cochiti, a short distance from the Camino Real. In his will, he declared merchandise including buckskins, woolen and fine scarlet cloth, carpet, linen, knives, and a variety of cattle and horses at his house (Snow 1993:141-142). The Camino Real corridor was traveled by hundreds of thousands of livestock and thousands of carts, soldiers, settlers, and travelers. This traffic impacted the landscape through grazing, wheel and hoof cuts, and general trampling (Scurlock 1998a:274).

In the 1600s, wagon trains made the 1500-mile trip from Mexico City to Santa Fe about every three years to supply the missions. The trip took six months each way and was subsidized by the royal treasury. Caravans were made up of about 32 wagons accompanied by Plains Indians, who served as scouts; drovers; hunters; cooks; soldiers; livestock; and additional draft animals (Ivey 1993:41, 43; Moorhead 1958:32-23). Missionaries used the income from trade to buy items such as horses, musical instruments, rich vestments, decorations and gold and silver implements for the church, clothing for servants and themselves, tools, and other luxuries (Ivey

1993:46).

Merchants did not gain control of the caravans until the mid-eighteenth century, when these became annual events. Regular caravans left Santa Fe in November and took 40 days to reach Chihuahua (Moorhead1958:41-43). Merchandise sent south included sheep, wool, buffalo, deer and pronghorn hides, wheat, corn, pine nuts, salt, a few Indian blankets, and occasional captives. Goods returned were ironware, especially tools and arms; fabric; boots; shoes and other clothing; chocolate; sugar; tobacco; liquor; paper and ink; and books. In 1803 internal commerce was tightly controlled by only 12 to 15 local traders, who were almost continuously in debt to merchants from Chihuahua (Moorhead 1958:49-51). Additional taxes on foreign goods coming down the Santa Fe trail suppressed trade until 1845 (Moorhead 1958:73-74).

Scurlock (1997:40) places the Camino Real under or close to the present route of NM 47 in the site area. Travelers in the early nineteenth century describe a difficult chain of sand hills at Chaves, Peralta, and Valencia (Moorhead 1958:110), which suggests it lies east of LA 67321. A 1922 Reclamation Service map of the area shows sand hills about 2.4 km or 1.5 miles to the east.

PREVIOUS WORK AT LA 67321

Valencia Y Testing

LA 67321 was initially described as part of an archaeological testing and evaluation undertaken prior to road construction at the Valencia Y. The site was manifest as a few scattered pieces of pottery, glass, and porcelain on the surface of a plowed field east of NM 47. In June 1988 surface collection, auger testing, and two test pits (1 m sq each) north of the proposed frontage road uncovered substantial quantities of subsurface material, especially between 60 and 75 cm deep. Subsurface material suggested that the deposits date from the late Spanish Colonial, Mexican, and/or early Territorial periods (A.D. 1700-1850) (Wiseman 1988:14-16).

Goals outlined for future excavations at the site included recovery of basic data to determine the boundaries of the site and whether any structural remains survived; determining the age of the site and identifying any components represented; recovery of material culture from dated proveniences to document changes in site use through time; locating architecture that would provide information on site use and the social units of it's inhabitants; determining which plants and animals were utilized; finding and collecting commercial goods to address questions of relative isolation and local and regional trade networks; and examining archival documents to serve as independent tests of patterns detected archaeologically and linking the site to historic events, processes, or people (Wiseman 1988:17-18).

Valencia Y Data Recovery

The next phase of work was undertaken by OCA (Brown and Vierra 1997). Excavations in July and August 1989 were confined to the area east of NM 47 and north of and under the proposed frontage road. Five mechanically excavated trenches were followed by 38 hand excavated units of 1 m sq. Large numbers of artifacts recovered from these excavations indicate that two components contribute to the site. An early component dating about A.D. 1200 to 1350 was concentrated in a small area of the south-central portion of the site at a depth of 1.0 to 1.5 m below the surface. The Spanish Colonial component was best represented in the southeastern and northwestern portions of the project area, also at depths of 1.0 to 1.5 m below the current ground surface. Clay or adobe mixing pits were the only features in an area primarily used for refuse disposal (Brown 1997b:103-110).

NM 47 Testing

In 1995, OAS returned to this portion of NM 47 to determine if widening the road would impact LA 67321 (Mensel 1996). Construction and leveling in the area of the frontage road resulted in a thin scatter of cultural material in the area previously investigated by OCA. Additional cultural material was noted on private land west of NM 47 and east of NM 47 but south of the frontage road. Auger tests confirmed the presence of cultural material west of NM 47. Backhoe trenches north of the frontage road encountered additional deposits, but none that differed significantly from those investigated by OCA. South of the frontage road, auger tests and a backhoe trench paralleling NM 47 revealed deep and dense cultural materials, including portions of two dogs, possibly burials. Because the deposits south of the frontage road were dense and the previous excavations had not uncovered evidence of structures or features that could help to define the occupation, data recovery was recommended in the areas south of the frontage road and west of NM 47.

DATA RECOVERY AT LA 67321

This latest work at the site was carried out during December 1996 and January 1997 by Nancy Akins and Macy Mensel, aided by volunteers (Fig. 4). East of NM 47, a grid system was established, of which 200N 200E formed the northwest corner. Given the disturbance generated by decades of plowing and the presence of road construction debris, no surface collection was made. General procedures included hand-excavated units taken to sterile followed by excavation of backhoe trenches to define the site area. After stratigraphic profiling, two additional units adjacent to the backhoe trenches were hand excavated. The backhoe was used to scrape down to and define the lower layer of cultural deposits so that additional material from that stratigraphic unit could be collected.

No grid system was established for the west side. Excavation units and auger holes were placed midway between the right-of-way fence and the project boundary and tied to the east side by a Pentax total station.

Figure 4. Work in progress.

Methods

Hand excavations were carried out in 10 cm levels or natural stratigraphic layers. Horizontal control was based on the grid system on the east side, and units were plotted later for the west side. Vertical control was maintained through subdatums established at the corner of each unit and related back to the main site datum. All fill was screened through quarter-inch mesh hardware cloth. Soils were sufficiently clayey (and often wet) that use of a smaller screen would have taken far more time and would have been even more destructive because the clay would have had to be hammered into small pieces or squished through the screen.

Hand-excavated units and the backhoe trenches containing cultural deposits were profiled and photographed to record the stratigraphy. Glen Greene examined and prepared a geomorphological report on the soils revealed in the main north-south profile (Appendix 2). Excavation units, backhoe trenches and scrapes, contact lines in the scrapes, and modern features were mapped with a Pentax total station.

LA 67321 West

On the west side of NM 47, the project area consisted of a 9 m wide strip comprised of the highway right-of-way and a parcel of private land once part of an agricultural field. Surface and subsurface deposits adjacent to NM 47 and within the right-of-way fence were extensively disturbed by the installation of a county sewer line. The area outside the right-of-way fence had

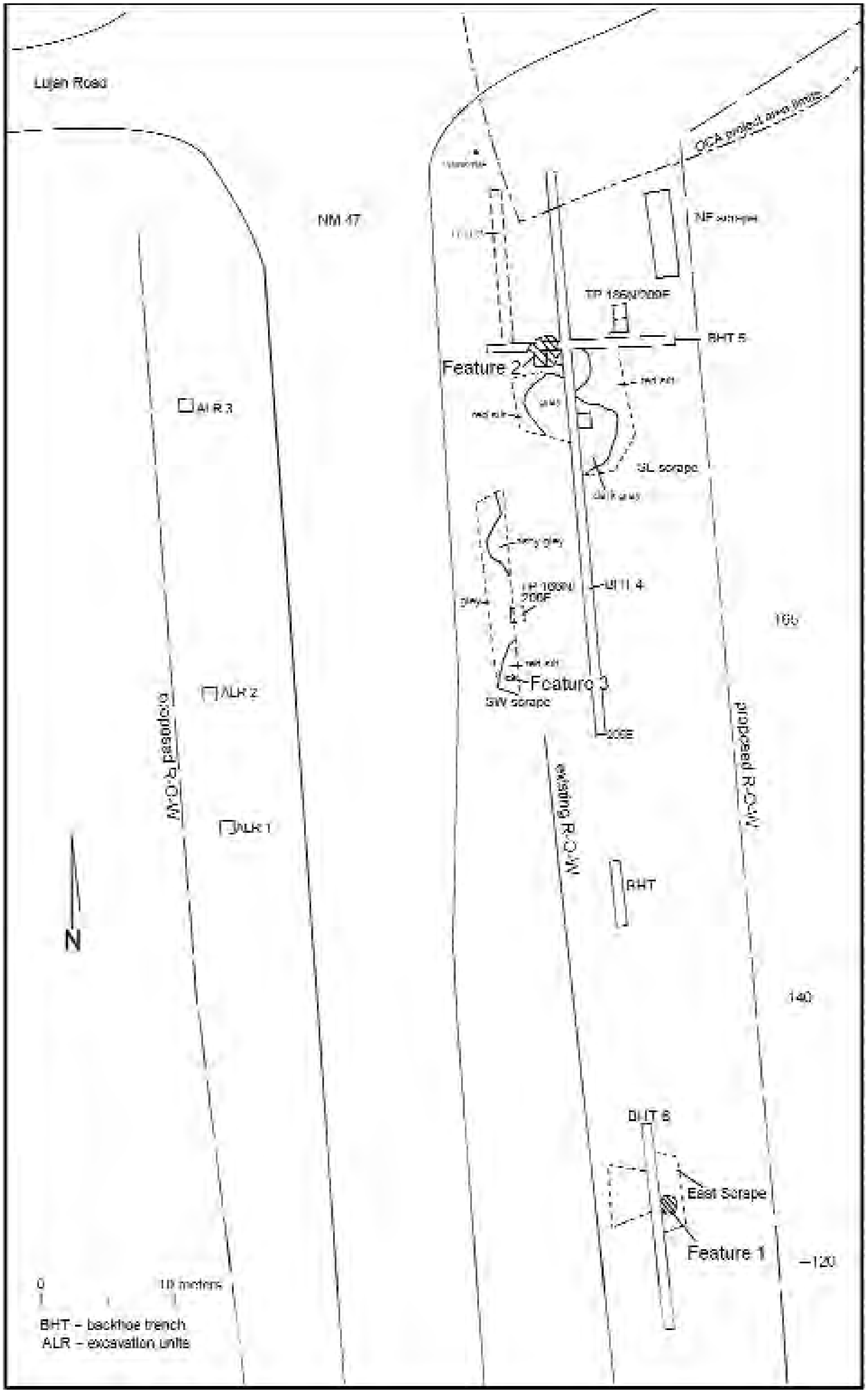


Figure 5. Plan of LA 67321.

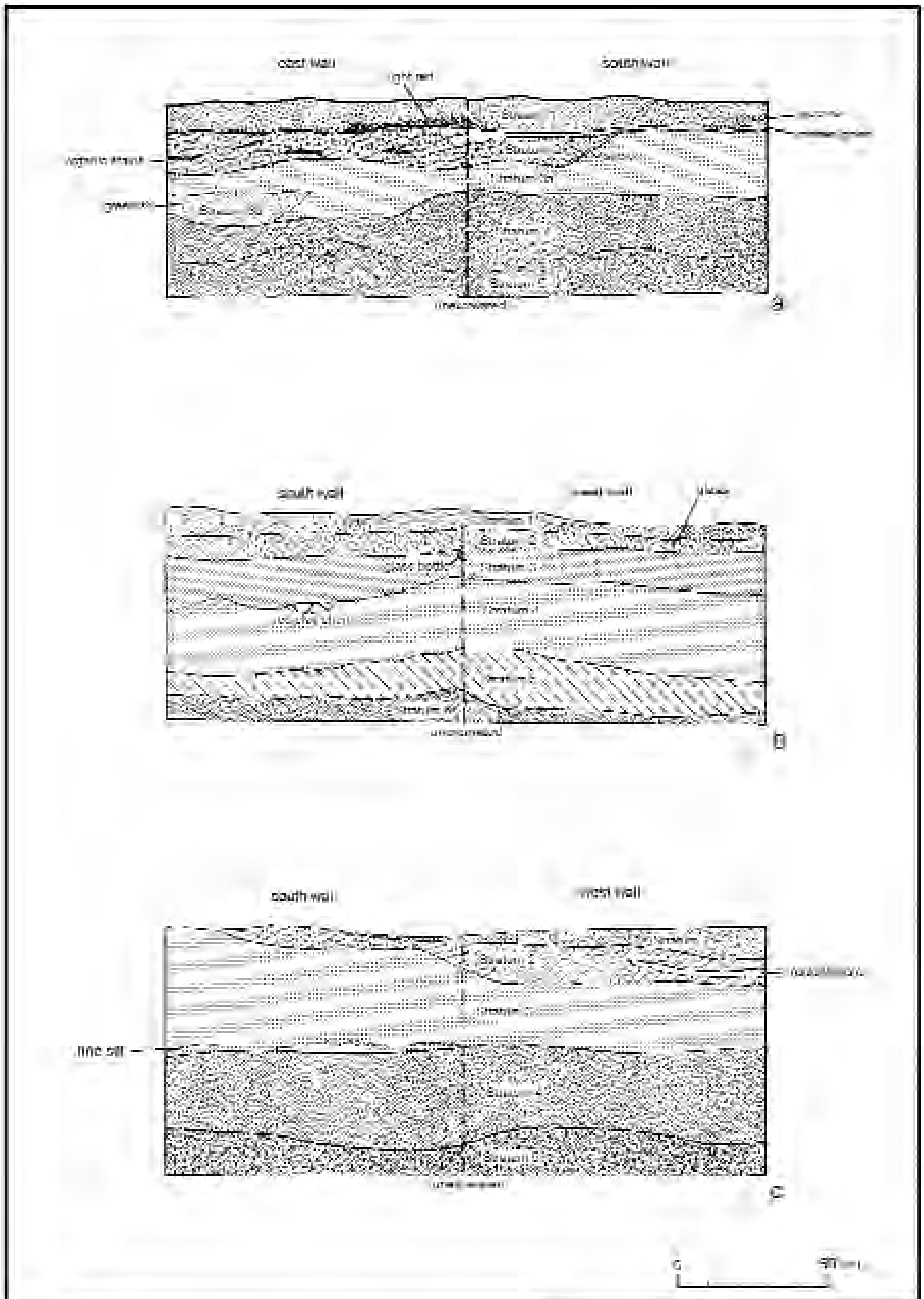


Figure 6. Profiles of ALR1 (a), ALR2 (b), and ALR3 (c).

been plowed. Backdirt containing cultural material from the sewer trenches was tossed into the area west of the fence. Because of the disturbance between the right-of-way and the NM 47 pavement, excavations were concentrated in the narrow (3.0 to 4.0 m), less disturbed strip west of the fence. Three excavation units (ALR1-ALR3) and three auger tests (AT1-AT3) were placed in the area (Fig. 5).

ALR1

The southernmost of the excavation units, ALR1 had a single red ceramic on the surface. Six levels were excavated (Fig. 6), and an auger test extended down an additional 80 cm. The uppermost 10 to 12 cm of fill (Stratum 1) was loose but mottled fill from the sewer trench excavations. Soils reflected the range of strata in the area, from light red to yellowish brown silt and sandy clay to greenish gleyed sand, all overlaying a mat of grass that grew on the surface at the time the trench was excavated. Beneath this was the plow zone (Stratum 2), 2 to 16 cm of red brown sand with streaks of organic material. The cultural layer (Stratum 3) was mostly reddish silt with some green or gleyed silt and moderate charcoal, white precipitates, and light trash ranging from 8 to 20 cm thick. Beneath this was 8 to 28 cm of overbank deposits composed of clean red silty sand (Stratum 4) with very sparse charcoal and cultural material. Stratum 4 graded into a more tan and red sand with a similar texture (Stratum 5) up to 32 cm thick.

Fill removed by the auger was 13 cm of mottled clayey sand (7.5 YR 5/3), 12 cm of darker brown sandy clay (10 YR 4/3), 12 cm of wet silty sand (10 YR 5/4) with organic streaks and rust, 18 cm of red silt (10 YR 5/4) with iron staining but less organic material, and finally, at least 4 cm of heavy brown clay (10 YR 5/6) that was on the verge of a gley and contained small lumps of white clay.

Glass and metal were abundant in the upper two levels of this unit, attesting to recent disturbances affecting Strata 1 and 2. Pieces of white plaster along with burned adobe chunks (up to 10 cm in diameter), probably from the dismantling of features or structures, were found in Stratum 3, along with an abundance of charcoal, ceramics, and fauna.

ALR2

Approximately 9 m north of ALR1, seven levels were excavated, and an auger test extended another 1.07 m below the excavation limit in ALR2. Two stratigraphic layers not found in ALR1 were present (Fig. 6), and overall, the fill layers were much more uniform in color and texture. The upper 2 to 10 cm of fill (Stratum 1) was primarily eolian sand. There was less evidence of trench soils deposited in this area. Some disturbance was evident in ceramics and small chunks of burned adobe. The next unit was the plow zone (Stratum 2), 4 to 9 cm of silty sand darkened by decaying organic material. Beneath this was a layer not found in ALR1, 10 to 16 cm of reddish silty sand containing precipitates, some charcoal, asphalt, and glass (Stratum 3). Here, the cultural layer (Stratum 4) was 20 to 28 cm of red silty sand with some gleying and containing moderate amounts of charcoal, burned adobe, and trash. This overlay 6 to 20 cm of sandy clay (Stratum 5) with some charcoal. Beneath this was at least 26 cm of clean red sand (Stratum 6), similar to Stratum 4 in ALR1.

None of the auger test fill was identical to that found in ALR1. Here, the next layer encountered was about 12 cm of brown gray silty clay with organic streaks and becoming clayier with depth (10 YR 4/4). This was followed by about 28 cm of fill similar to that above but with streaks of tan sand (10YR 5/4). Beneath this was platy, sticky gray clay mixed with red partially gleyed silt (10 YR 5/2). This fill continued for at least 27 cm.

Overall, the disturbance was deeper (Strata 1-3) and artifacts much less numerous than in ALR1. The presence of burned adobe chunks and abundant charcoal continue to suggest debris from dismantled structures or features.

ALR3

Located 22 m north of ALR2, ALR3 had fairly simple stratigraphy (Fig. 6). Again, the upper fill (0 to 12 cm) was disturbed silt containing some charcoal and artifacts (Stratum 1). The plow zone (Stratum 2) ranged up to 13 cm thick, tapering out to the east. The fill was silt with extensive root networks and rodent disturbance. The cultural layer (Stratum 3) was 24 to 44 cm of silt containing charcoal, trash, and white precipitates. Fine silt lenses near the base of Stratum 3 suggest flooding or puddling of water during its deposition. Beneath this, (Stratum 4) was 26 to 34 cm of fairly clean sandy silt with a few artifacts. At the base of the excavation unit and continuing into the auger test was about 40 cm of clean dark clay with white precipitates (Stratum 5). This was followed by a 5 cm thick interface level (10 YR 4/4) of the above material and increasing clay lumps, organic stains, and small mica particles. Beneath this was at least 5 cm of wet, coarse brown sand (10 YR 5/4) with iron stains.

Artifact frequencies increased in this excavation unit, but the burned adobe chunks found in ALR1 and ALR2 were no longer present this far north. More disturbance was also noted: glass was found down to the base of Stratum 4 or upper portion of Stratum 5.

Auger Tests

Auger tests were placed about halfway between ALR2 and ALR3 (AT1), 8 m south of ALR1 (AT2) and 16 m south of ALR1 (AT3). The fill is summarized in Table 3.

West Side Summary

Deposits on the west side of NM 47 included a zone of recent disturbance caused by sewer line excavations and eolian accumulations overlaying a 10 cm plow zone. Beneath this was a 20 to 30 cm layer that contained much of the cultural material. Beginning about 30 to 50 cm below the present ground surface, fill was largely void of cultural material, except for small amounts that could have been worked into lower strata or moved by rodents. ALR2 differs fairly significantly from the other two units. Whereas the greatest artifact counts for ALR1 and ALR3 were in the cultural layer, it was the upper disturbed layer in ALR2, and counts are significantly lower (by about 60 percent). This suggests additional disturbance in the area of ALR2, possibly from the sewer line that passes through the field to a house to the west. Overall artifact densities are about the same for ALR1 and ALR3; however, counts for ceramic and bone are greater in ALR1 and for lithic and historic artifacts (largely recent bottle glass) in ALR3.

LA 67321 East

Excavations on the east side of NM 47 included hand-excavated grids, backhoe trenches (BHT4-6), backhoe scrapes (BHS1-7), and feature excavations (Fig. 5).

Three hand-excavated grids were excavated before the backhoe work to assess the subsurface stratigraphy (186N 209E, 187N 209E, and 166N 200E). Grids 185N 203E and 185N 204E were placed at the intersection of BHT 4 and 5, and grid 180N 206E was excavated at the base of a scrape in the gleyed trash layer.

The ground surface in 186N 209E and 187N 209E was heavily disturbed with road gravel, asphalt, brown and clear glass, aluminum foil, and other roadside debris. Four layers were defined in the two excavation units (Fig. 7). The upper 4 to 16 cm (Stratum 1) was sandy loam with some clay content and abundant roots. Beneath the surface, especially the northwest corner of 187N 209E (Stratum 1b), was abundant gravel and small cobbles that had been dumped in the area. Stratum 2 was 4 to 14 cm of dense relatively smooth-textured reddish clay containing sparse charcoal. The cultural layer (Stratum 3) consisted of about 15 cm of abundant cultural material in a sand matrix. Rodent disturbance was especially evident in this layer. The final layer (Stratum 4) was silt with some charcoal and sparse cultural material. A discontinuous iron stain within Stratum 4 indicates an episode of standing water (Enzel and Harrison 1997:102; Appendix 2).

An auger test in the base of 187N 209E found that Stratum 4 continued for another 11 cm before a layer of smooth sticky clay was reached (7.5 YR 4/3). The clay continued for about 25 cm before a layer of clean medium-grained sand (10 YR 6/3).

Disturbance from road construction is most evident in the northwest corner of the two excavation units. Artifacts of all kinds are more abundant in the northernmost of the two grids, suggesting that the deposits are thinning out to the south in this area.

Covered with weedy annuals and recent road trash, 166N 200E was excavated to a depth of 1.0 m below the current ground surface (Fig. 7). The uppermost fill was a recent accumulation of 8 to 16 cm of loamy silt containing gravel; green, brown, and clear glass; paper; and metal. At the base of Stratum 1 along the west side was a lens of intrusive gravel and small cobbles in a matrix of light tan sandy silt up to 6 cm thick. The third layer was hard reddish silty clay with a smooth texture and containing a few small charcoal flecks. Below this, a massive (32 to 50 cm) layer (Stratum 4) of tan sandy silt contained abundant charcoal, cultural material, and burned and unburned adobe. This overlay 8 to 28 cm of gleyed silt with abundant charcoal, a little burned adobe, and less cultural material (Stratum 5). The final layer (Stratum 6) was clean reddish sand with some fine gravel but very little charcoal or other inclusions.

The first two layers of fill may have been brought in to elevate the pavement of NM 47, 4 m to the west. Rodent disturbance was evident in the upper 70 cm of fill. A piece of glass in the lowest level may also be a product of rodent disturbance, or it could have been accidently removed from the unit wall when excavating or exiting from this 1 m deep unit. Ceramics and historic material are densest in Stratum 4, and bone and lithic artifacts in Stratum 5.

Two units, 185N 203E and 185N 204E, were placed adjacent to the intersection of BHT 4 and BHT 5 to investigate a large burned area exposed in BHT5. They were excavated by the stratigraphic layers revealed in the trenches. Eight layers, plus the Feature 2 fill, were identified (Fig. 7), and the thicker cultural layers (Strata 3 and 6) were divided into levels for better control. Unit 185N 203E was excavated to a depth of 1.75 m, while 185N 204E was taken down to the level of Feature 2 between 1.03 and 1.40 m.

Stratum 1 was about 12 cm of intrusive fill com-

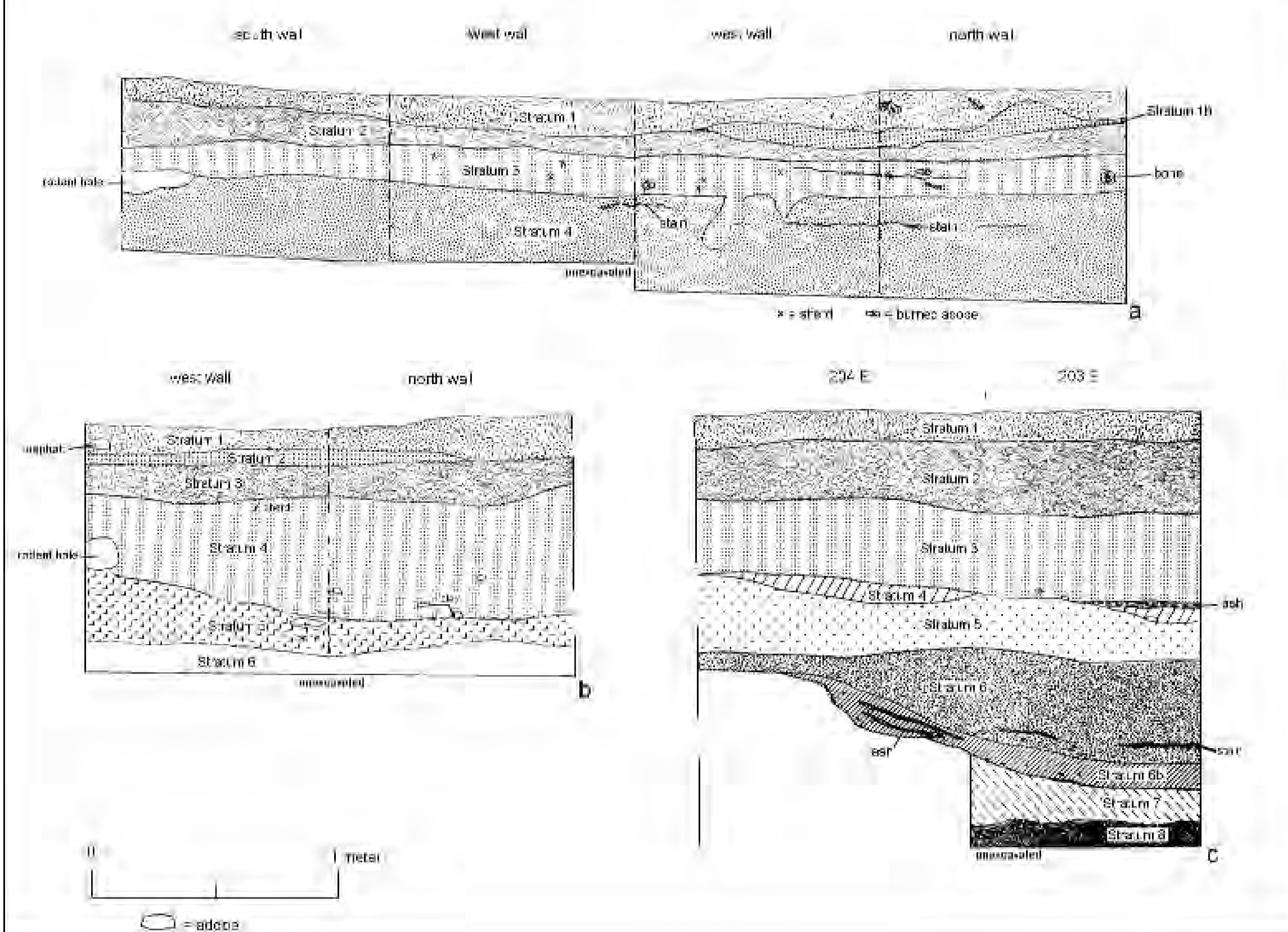


Figure 7. Profiles of 186-187N 209E (a), 166N 200E (b), and 185N 203-204E (c).

prised of abundant gravel in the 2 to 3 cm size range in a matrix of coarse sand. Glass present in this layer was obviously very recent and was not collected. This overlay 22 to 30 cm of hard-packed red clay (Stratum 2) with some charcoal and trash, but also clear, brown, and green glass and asphalt chunks, indicating disturbance or an intrusive layer. The third layer was 30 to 44 cm of fine sandy silt containing charcoal, precipitates, pieces of burned adobe, and abundant cultural material, along with ash lenses near the base. In the eastern grid, Stratum 4 was up to 10 cm of clean tannish fine sand, distinct from Stratum 5, which was 16 to 32 cm of clean pink sand that was slightly coarser than Stratum 4. Both are probably overbank deposits. Artifact densities drop considerably in Strata 4 and 5 but increase again in Stratum 6, a 6 to 42 cm layer of greenish-gray gleyed sandy silt with abundant trash, charcoal, ash, and ash lensing. Portions of this layer look like the trashy fill that would result from cleaning thermal features. This overlies the fill of Feature 2, a probable trash burning pit. Fill in Feature 2 was 10 to 14 cm of fill similar to that in Stratum 6, an ashy, charcoal, and wood-laden soil with abundant bone and ceramic trash. Beneath the feature was 13 to 26 cm of additional gleyed silt with abundant trash (Stratum 7), and finally (Stratum 8), at least 10 cm of very wet gleyed clay containing a few artifacts that could have worked their way down in the moisture-laden fill. Fill from the base of Stratum 6 until excavation stopped was below the watertable and very wet, obscuring small stratigraphic differences.

These two units best represent the two trash episodes, referred to as the upper and lower cultural layers. The upper layer, Stratum 3, has the denser artifact concentration and probably results, at least in part, from alluvial and overbank deposits (Enzel and Harrison 1997:101; Appendix 1). The lower cultural layer (Stratum 6) is gleyed silt, sand, or clay, indicating some degree of standing water on either a semiannual basis or for relatively long periods (Enzel and Harrison 1997:102).

In 180N 206E, approximately 80 cm of fill was removed from BHS3 before this grid was initiated. Fill removed by level (Levels 1-6) was the gleyed lower cultural fill (Levels 1-5) with sterile deposits at the base (Levels 5 and 6). In the upper levels, fill was a reddish-gray sand with abundant chunks of charcoal, burned adobe, and cultural material. In the third level the ash content increased, as did the density of cultural materials, especially bone. A pocket (8 cm thick) of clean gleyed sand containing trash was present in the north portion of the pit in Level 4. In the lower portion of Level 5, fill became gray clay with no artifacts but some charcoal flecks. The final level was reddish silt and sand alternating with the gray clay.

Backhoe Trenches

Site stratigraphy was investigated through approximately 62 m of north-south trenches (BHT4 and BHT6) and a 16 m east-west trench (BHT5) (Fig. 5). All were excavated to sterile, and all but one were profiled. A short 5 m trench between BHT4 and BHT6 was not given a number or profiled because the fill was the same hard-packed silt found at the south end of BHT4 overlying coarse sand at 1.45 m below the current ground surface.

BHT4. At least 10 distinct layers of fill were observed and mapped in this 42 m trench, which extended from 156N to 198N (Fig. 8). The fill consisted of four layers of upper fill that postdate the historic use of the site area. As in the hand-excavated units, this included disturbed eolian and alluvial surface material with a layer of gravel and red clay, then silt. The upper layer (Stratum 1), probably a result of the frontage road construction, tapers out about 7 m south in the profile. The gravel layer (Stratum 2) is more extensive, ending 21 m into the profiled area. The red clay of the next layer (Stratum 3) probably represents the plow zone, because it is rather uniform for most of the profile. A short discontinuous lens of silt (Stratum 4) occurs only at the north end and could represent fill in an old channel. The main or upper cultural layer (Stratum 5) is quite variable and contains adobe chunks, trash, and lenses of charcoal in a silty clay matrix. Except in a short 4 m long stretch where the fill resembles Stratum 5 but is clean and smooth textured (Stratum 7), Stratum 5 overlies the gleyed lower cultural layer (Strata 6a and 6b). The upper portion of the gleyed layer (Stratum 6a) is silt with some charcoal and cultural material but is cleaner than Stratum 6b, which is dense with trash. Strata 6a and 6b have a fairly uneven base and terminate 22 m into the profiled area. Undulations in the lower limits appear to result from topography and channelization in what appears to be clean silty overbank material (Stratum 8), which appears at the north end and central portion of the trench under the Stratum 6 material. Farther south, a smooth reddish silt (Stratum 9) begins just before Stratum 6 tapers out. At 22 m into the trench, only two stratigraphic layers are found, Stratum 3 and Stratum 9. Some rust or gleying and rare artifacts, often in clusters, occur in Stratum 9 in this portion of the trench. Stratum 10, a dry and compact clean silt within Stratum 9, begins about 36.5 m into the trench.

BHT5. At 185N, this 16 m trench intersects BHT4. The BHT4 fill descriptions also apply to BHT5 (Fig. 9). The gravel layer (Stratum 2) is found west of BHT4. Stratum 3, the plow zone, covers the entire area revealed by the trench in a fairly uniform manner. Stratum 5 is present as a thick trashy strata at the west end of the

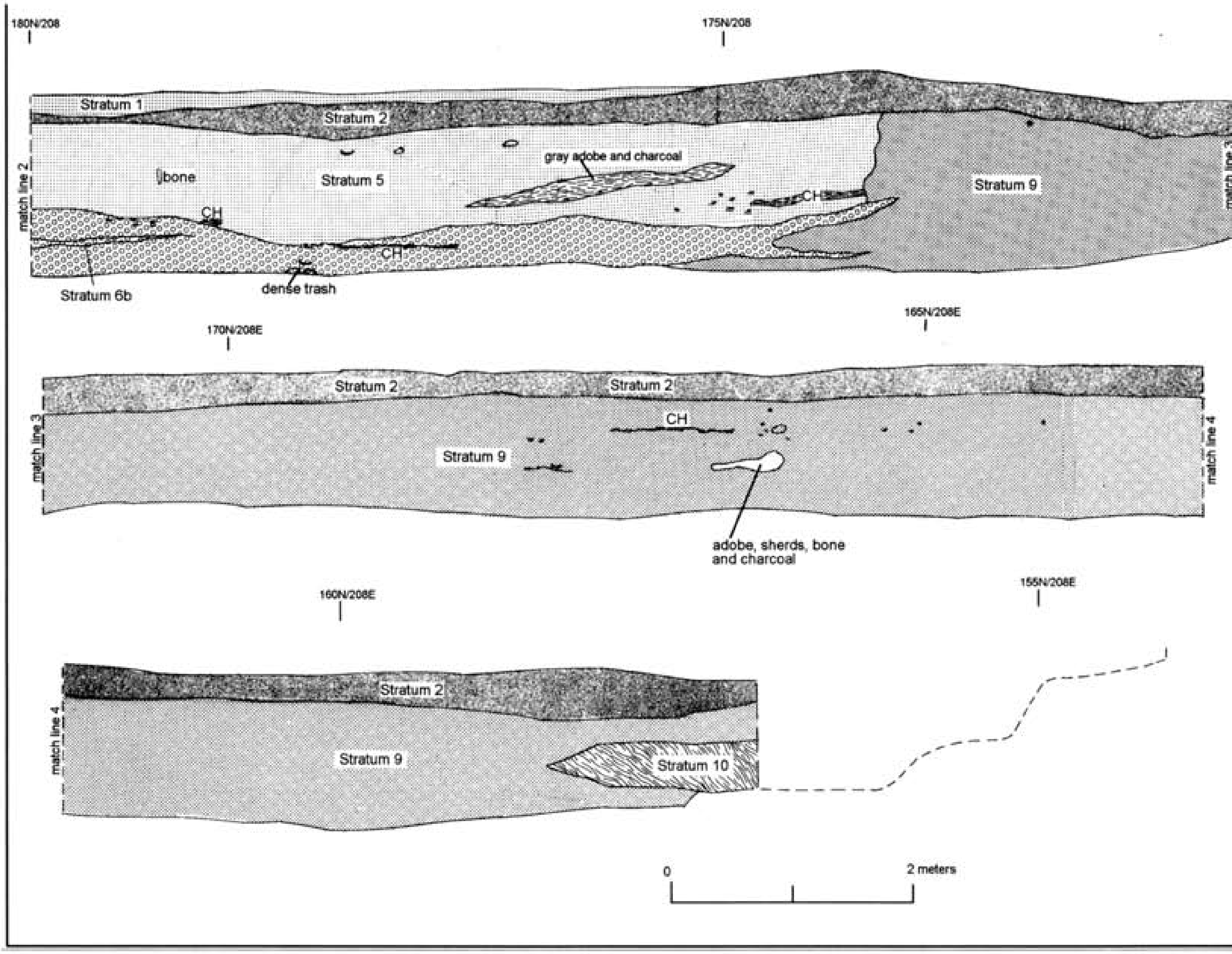


Figure 8. Profile, BHT 4 (continued).

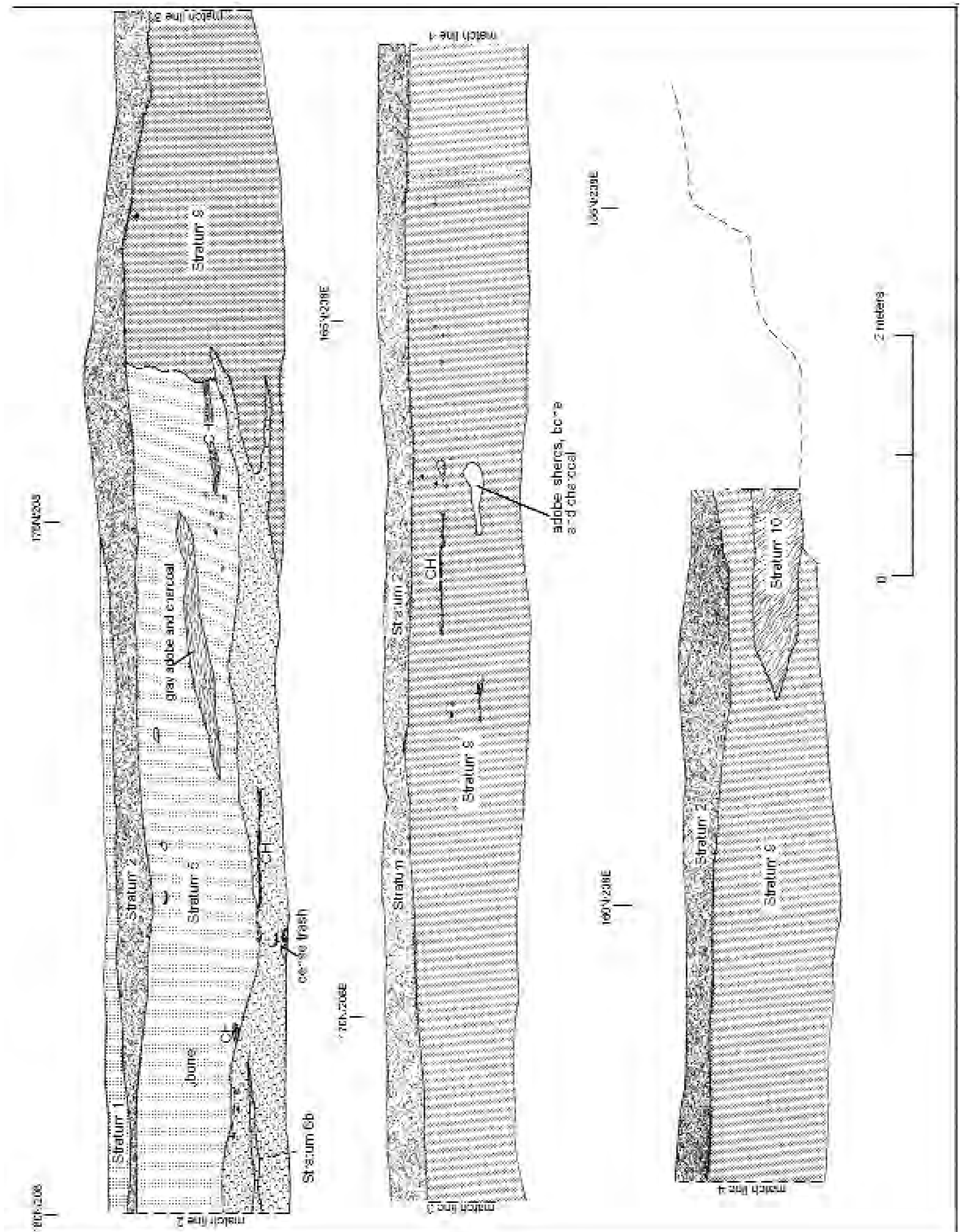


Figure 8. Profile, BHT 4.

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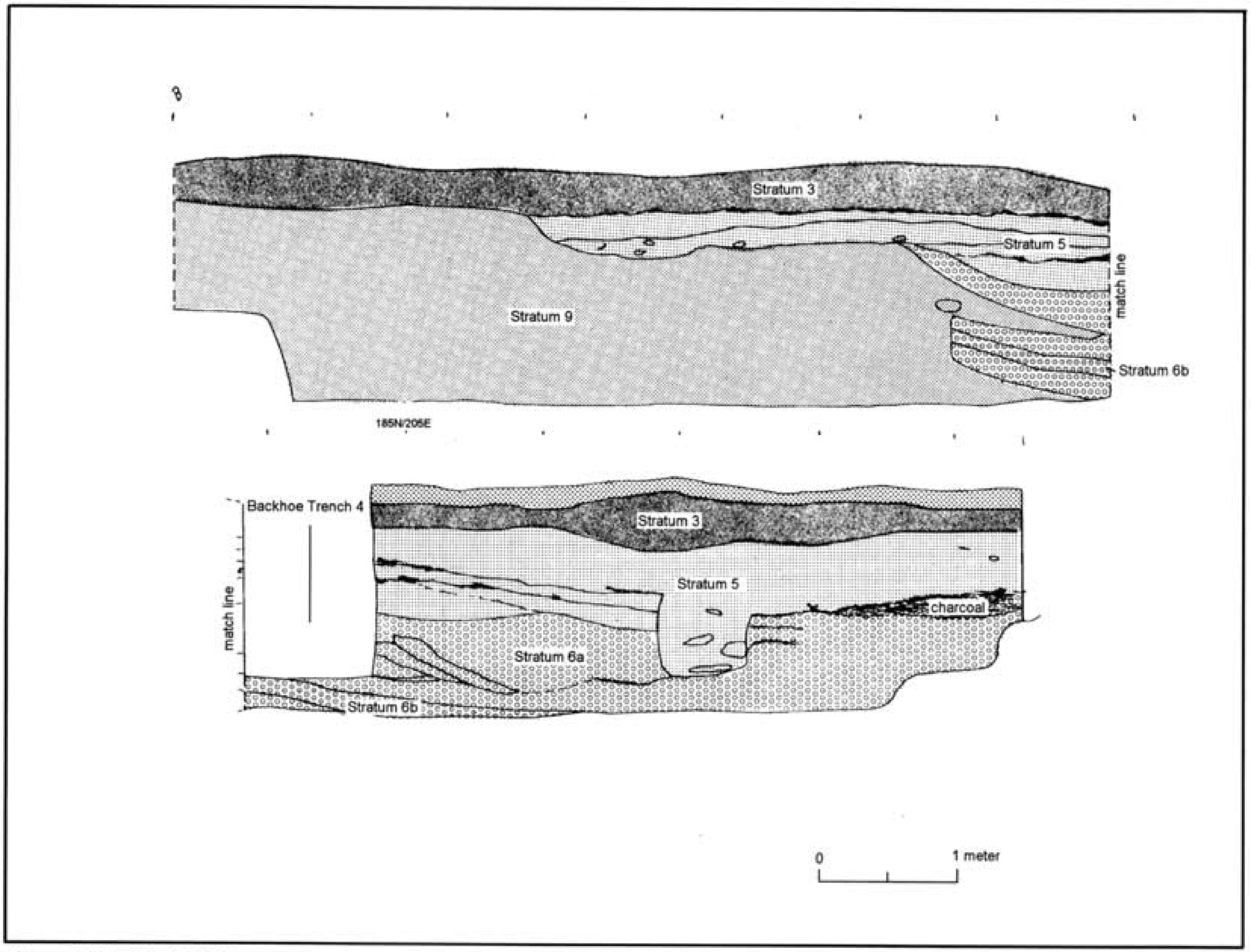

Figure 9. Profile, BHT 5.

trench but ends about 210E in a manner resembling the fill of a shallow channel. The same is true of Stratum 6, which comprises much of the fill at the western end and slopes upward, ending about 207E. To the extreme east there are only two layers, the plow zone (Stratum 3), and fill and overbank material, probably Stratum 9.

BHT6. This trench is in the southern part of the site, from 115N to 131N. The fill is quite different from that to the north (Fig. 10) and is a spatially, and probably chronologically, distinct episode of deposition. It lies within a broad and fairly shallow channel or depression that terminates at the south end of BHT6. The uppermost fill is plow zone material, a loosely packed loamy clay (Stratum 1). Beneath this is a relatively sparse cultural layer (Stratum 2) comprised of moderately hard sandy silt with occasional charcoal and cultural material. Trash is not nearly as dense as to the north. Within Stratum 2 is a dense lens of trash (Feature 1 and Stratum 3) with distinct boundaries, indicating an intrusive feature. Gleyed sandy silt with some charcoal and some cultural material (Stratum 4) interbedded with red clay lenses (Stratum 5) underlies the cultural material. Various clean strata occupy the rest of the profile: a hard red chunky clay (Stratum 6) at the south end, a clean sandy silt at the base of the trench (Stratum 7), fine red sand at the south end (Stratum 8), and large-grained multicolored sand at the north end (Stratum 9).

Backhoe Scrapes

Seven areas were scraped to varying depths to investigate stains in the trench walls or examine the horizontal extent of subsurface deposits. Using a wide blade in a pulling motion, thin layers of soil were removed, producing a clean scrape, so that features and stratigraphic changes would be revealed. The cultural fill and potential features were so deep that only limited areas could be scraped due to the logistics of piling dirt.

BHS1. BHS1 is in the northeast corner of the project area (Fig. 5). An area 6.5 by 1.8 m was scraped to a depth of 1.10 to 1.30 m. Fill in this area is the same as found at the east end of BHT5. Upper fill was disturbed by road construction and agricultural activities. Lower fill was clean red silt. Alluvial channeling was evident in the east wall of the scrape.

BHS2. In the northwest portion of the site, BHS2 (roughly 9.0 by 3.9 m) is bordered on the west by the backhoe trench excavated during the testing phase, on the east by BHT4, and on the south by BHT5. Depths ranged from about 0.7 m on the north edge to about 1.2 m along BHT4. Other than a red silt-filled anomaly, probably an old channel, in the southwest corner, the fill duplicated that recorded in the trenches. No features or structural evidence was found, and no contact lines from distinct stratigraphic breaks were visible when the site was mapped.

BHS3. This irregularly shaped area (about 9 by 4 m) adjacent to the south edge of BHT5 and the east edge of BHT4 was excavated to a depth of 80 to 90 cm to expose and collect material from the lower cultural layer. After being scraped clean, the area was mapped (Fig. 11) and the material exposed at this level collected. Scraping revealed a distinct contact line between the gleyed cultural deposit and clean red silt. Pockets of ash, charcoal, and cultural material were in depressions that have concentrated the material and held moisture, resulting in gleying. The overall pattern suggests repeated trash dumping in a wet area with some topography. Hand-excavated unit 180N 206E was excavated 68 cm below the base of this scrape.

BHS4. Across BHT4 but not extending north to BH5, BHS4 (4 by 5 m) exposed the lower cultural level and red silt interface at a depth of 0.8 to 1.15 m. No evidence of features was found, and the contact line was mapped.

BHS5. On the west edge of the study area and clipping excavated unit 166N 200E, BHS5, a large scrape (15 by 2 m), was excavated to a depth of between 0.6 and 1.0 m. Clean red silt was exposed at the south end, interrupted by an ovoid spot (Feature 3) that was ultimately determined to be a low spot that retained the gleyed trashy fill found to the north of the red silt. In the northern third of the scrape, along the east wall, fill was still gleyed but ashy.

BHS6. This 6.0 by 1.7 m scrape was placed over a concentrated pocket of ash and charcoal (Feature 1) exposed in the east wall of BHT6. It was excavated to a depth of 60 to 70 cm to expose the top of the feature. Artifacts exposed by the scrape at this level were also collected.

BHS7. Across BHT6 from BHS6, this scrape (3 by 3 m) was excavated to a depth of about 40 cm, exposing a small charcoal stain in the west face of the backhoe trench. The stain produced no evidence of a feature.

Features

Three potential features were defined and excavated. One was no more than an undulation in a previous surface where fill from an upper fill unit intruded and was exposed as an oval stain. The other two were intentional deposits.

Feature 1. Feature 1 was exposed in the east face of BHT6 (Fig. 10). This dense concentration of ash and charcoal contrasted markedly with the relatively sterile surrounding fill. BHS6 removed about 5 to 10 cm of the stain before the outline became distinct (Fig. 12).

The nearly round feature (Fig. 13) was shallow, up to 20 cm in depth, and 1.6 m in diameter. Fill (Fig. 14) was a fine gray sand with abundant charcoal, burned

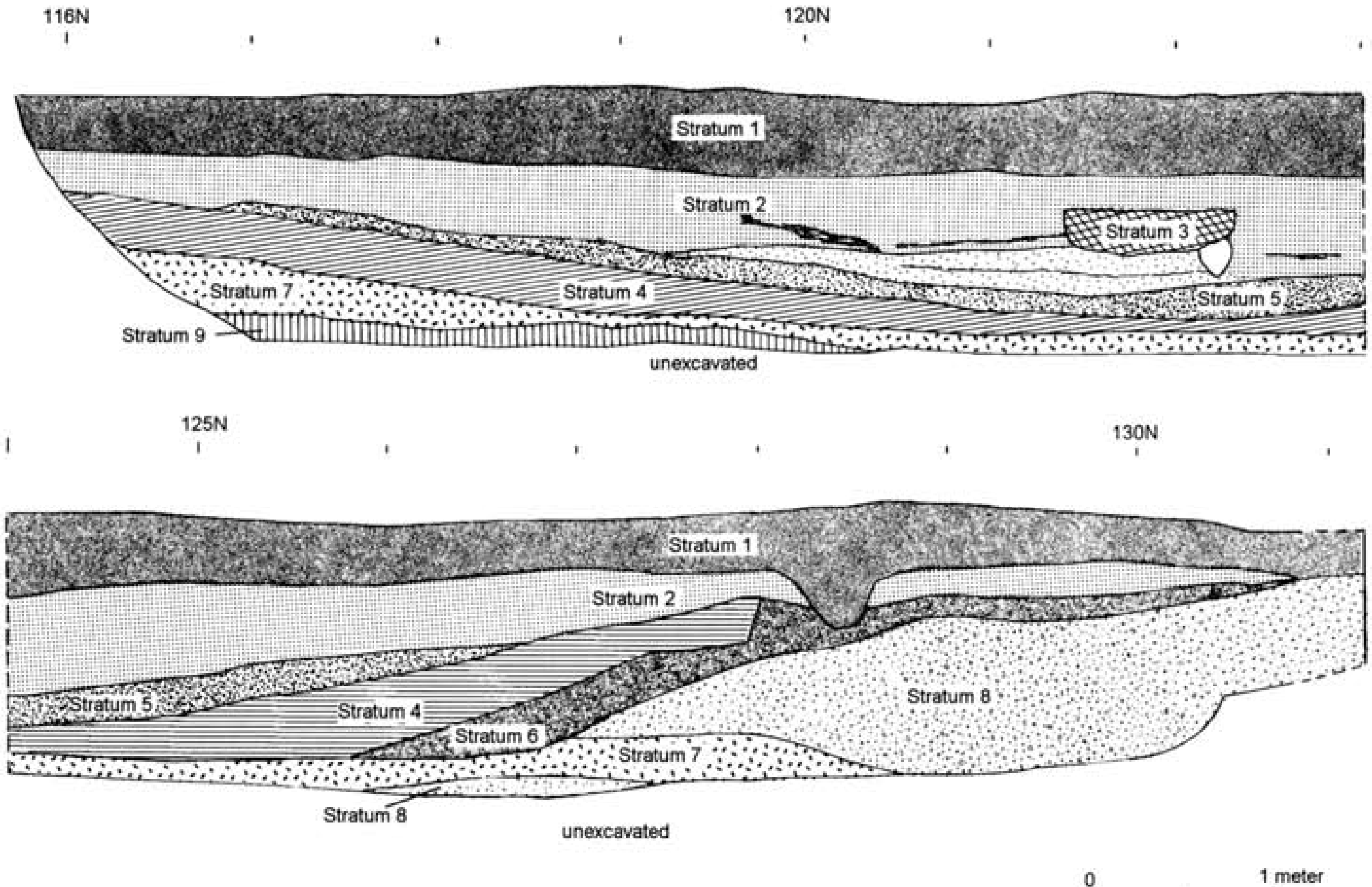

Figure 10. Profile, BHT 6.

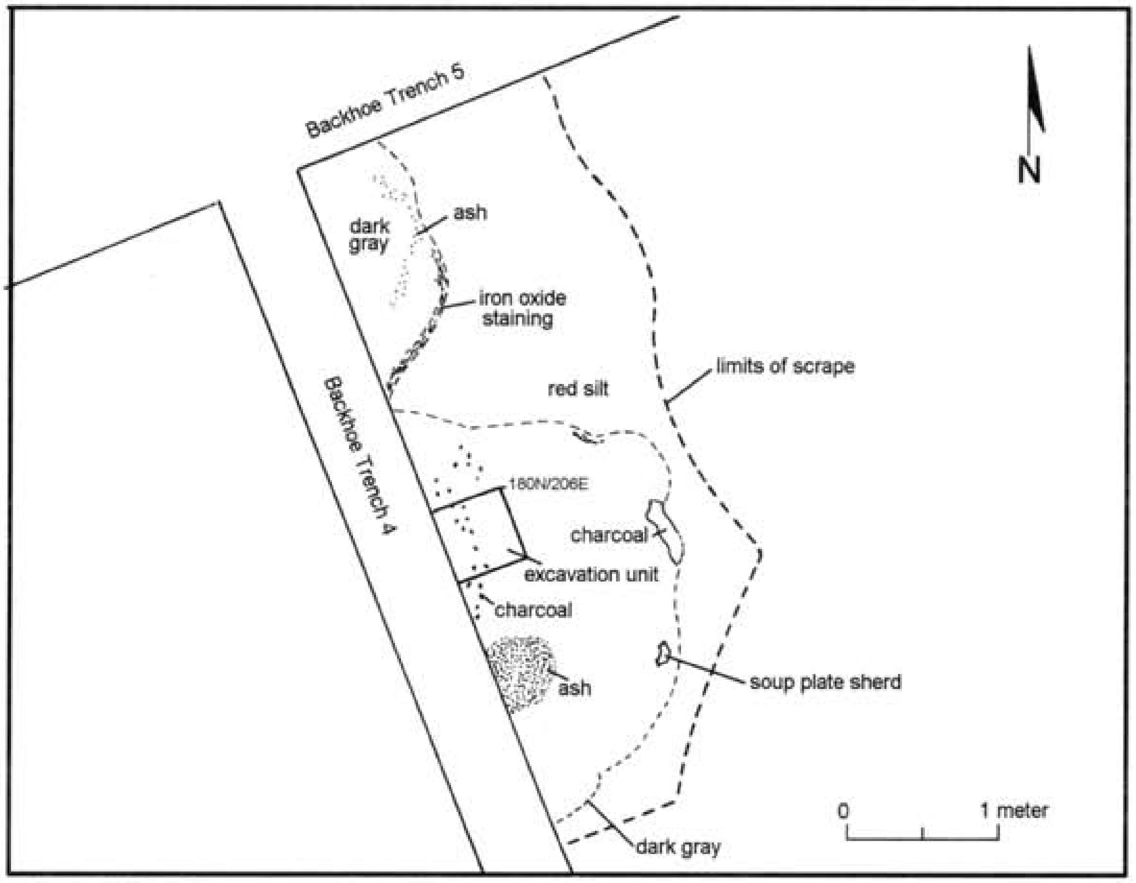

Figure 11. Backhoe Scrape 3, at 70 to 90 cm below ground surface.

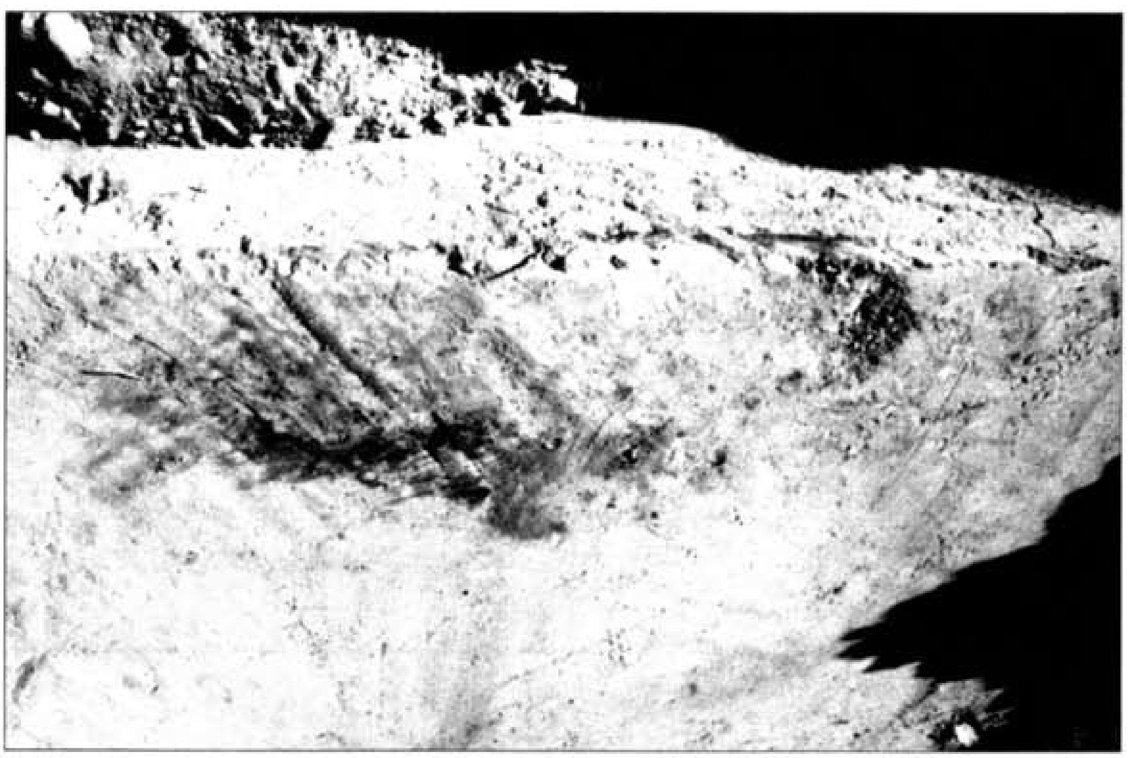

Figure 12. Feature 1 at base of backhoe scrape.

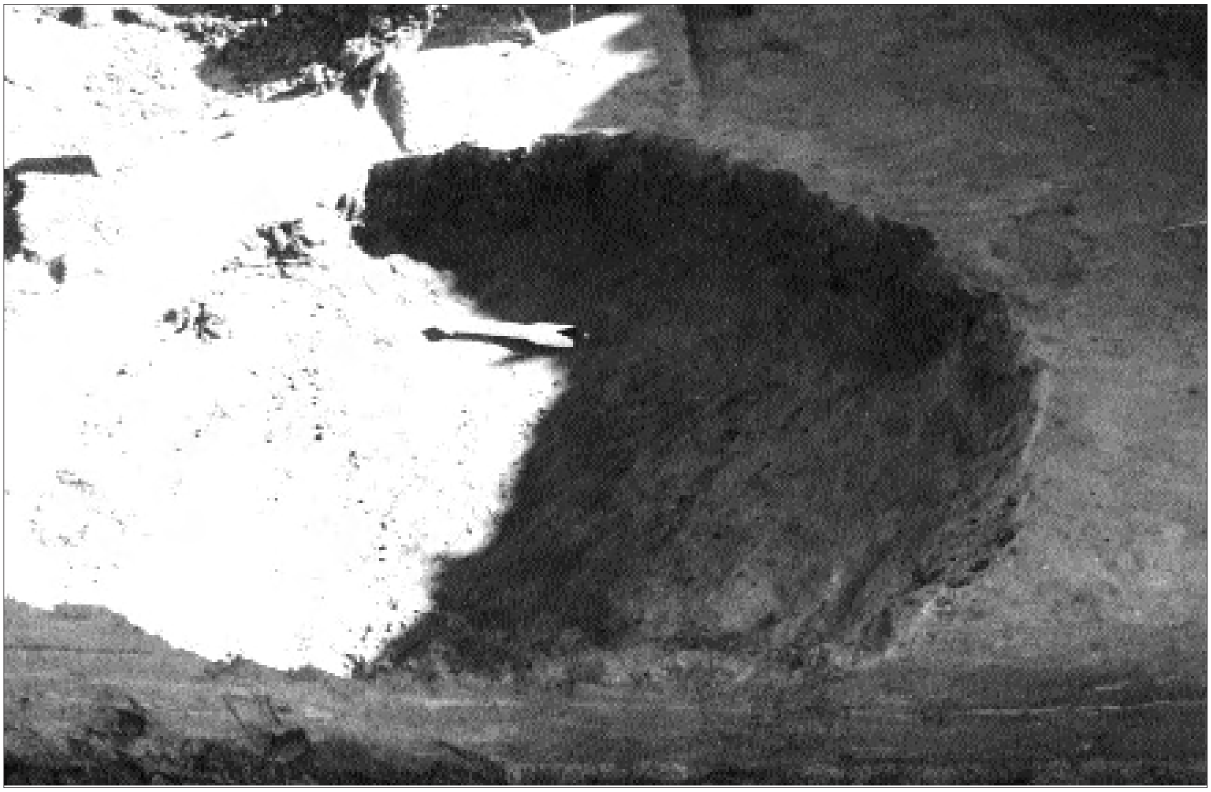

Figure 13. Feature 1 excavated.

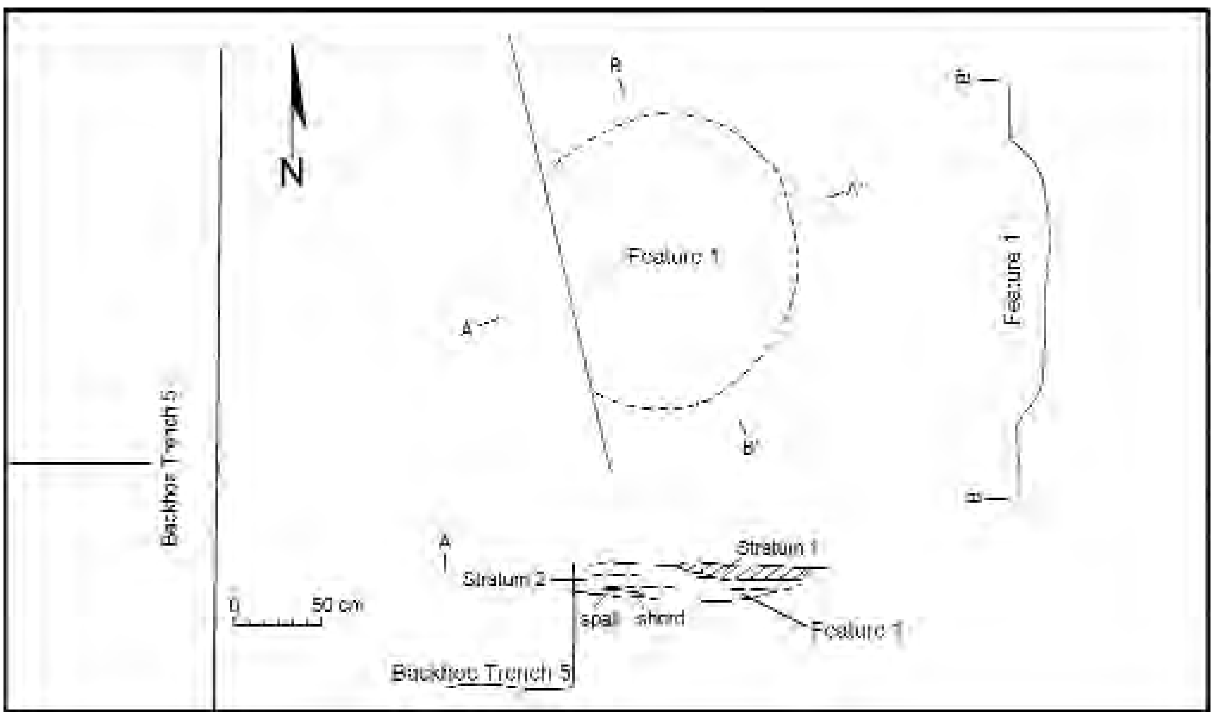

Figure 14. Plan and profiles of Feature 1.

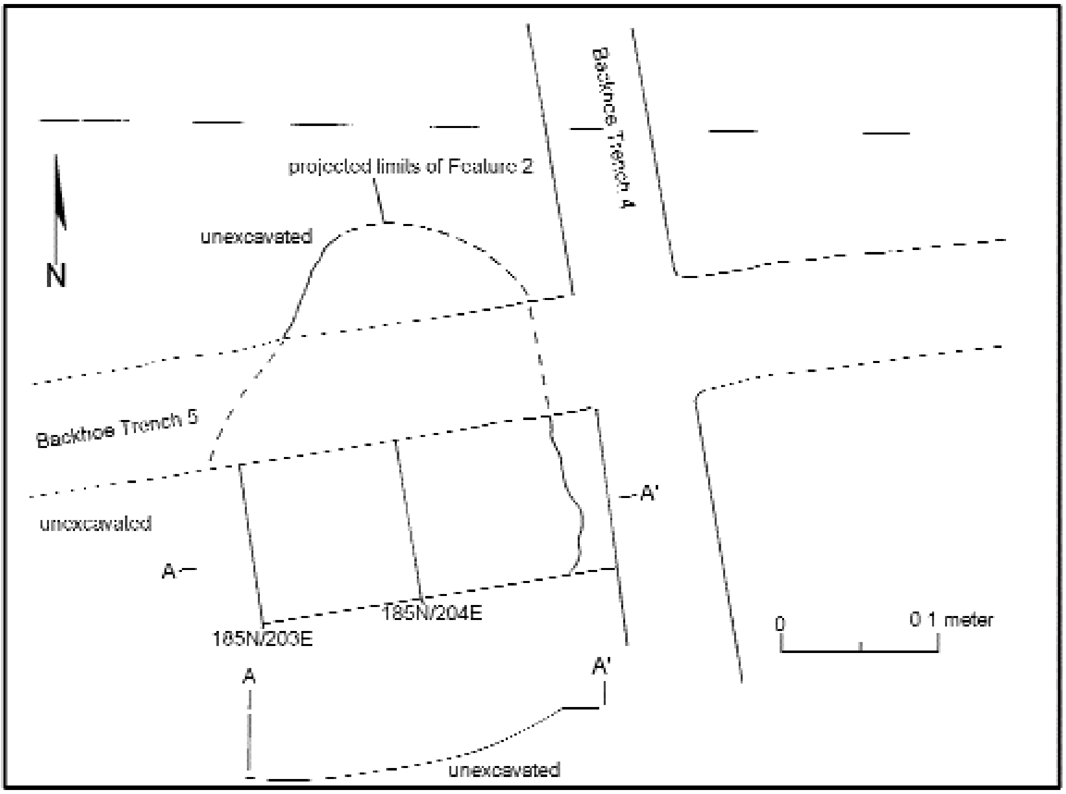

Figure 15. Plan of Feature 2.

Figure 16. Feature 2 excavated.

adobe, occasional fire-spalled rock, and dense trash. Beneath this and comprising most of the fill was a red sand with less charcoal and sparse trash. The surrounding matrix is tan sand that was fairly clean but has some charcoal and trash.

The feature is a shallow bowl-shaped pit. Pit sides were not distinct but blended into the fill, probably from flooding. The base was more definite, but here, too, charcoal and artifacts protruded into the underling sterile fill. It is difficult to say whether this was an intentionally excavated feature or a shallow depression used to deposit trash. The shape and symmetry suggests the former. Material seems to have been deposited over a relatively short period because there was no evidence of alluvial or eolian processes within the pit. The abundance of charcoal, burned adobe, and heat-spalled rock indicate that some of the fill came from cleaning thermal features. Little of the bone is burned, and other material, such as quantities of eggshell, a gold button, and a metal cross, suggest some material was from other contexts.

This pit produced an unusual array of artifacts. The ceramic assemblage is similar to those from other areas in the site, dominated by local historic plain wares but with proportionally more western polychromes than any other major provenience (Wilson, this volume). Chipped stone artifacts were sparse, but the small sample (n=4) contains three strike-a-light flints, which is consistent with the idea that pit fill resulted from cleaning thermal features. A single piece of ground stone is a fragment of a pitted burned pounding stone. Faunal remains were fairly abundant (n=410), with more egg shell than the rest of the site combined (184 of the 244 pieces). Flotation samples produced burned purslane and maize. More interesting is the wood content, which is more diverse than the rest of the site. Juniper, pine, cottonwood/willow, oak, rose family, and an unknown nonconifer were all found in this small feature (McBride, this volume). It is the historic artifact assemblage that contrasts most with the other proveniences. A nicely made cast gold button, a cast cross, and a small leaded glaze pot are the most unusual finds. In addition, this pit and area around the pit produced all of the Chinese porcelain (n=18), most (12 of 14 pieces) of the Mexican glaze ware, and a small number (n=8) of majolica sherds (Williamson, this volume).

An uncalibrated radiocarbon date of A.D. 1830 (cal A.D. 1675 to 1770 and cal A.D. 1800 to 1940) (Beta-107682) is consistent with the artifact assemblage. Trade wares, mostly western glaze wares, and the type of local utility ware indicate that Feature 1 is similar to the upper site fill, and thus, more recent. Mexican glaze wares, majolica, the ornaments, and probably even the Chinese porcelain suggest Camino Real/Chihuahua Trail trade rather than Santa Fe Trail goods of American origin.

Feature 2. This feature was first suspected when BHT5 revealed a dark stain near the base of the trench. Two hand-excavated test pits (185N 203E and 185N 204E) were placed above the stain and excavated in layers down to the top of the feature. Once the outer margin was exposed, it was treated as a feature, and the fill was removed in four 10 cm levels. The outline was exposed in BHS2, but this part was not excavated.

Feature 2 was not a formal feature (Figs. 15 and 16). The irregular sides and shape suggest a natural depression or hastily prepared pit used to burn trash. Fill was a dark ashy charcoal and wood laden gleyed sand with chunks of burned adobe and abundant bone and ceramic trash. Burned lumps of soil and slumping occurred with no indication of how many times the pit was used. Ash was in lenses suggesting multiple burns or burn and dumping episodes. Detailed observations were not possible because the soil was near the water table and quite wet. The burn was 2 cm thick in some areas and completely absent in others. Iron oxide lenses at the top of the feature suggest it formed a fairly impenetrable barrier causing moisture to collect above the feature.

Not all of the pit was excavated because it extended beyond the two excavated units. It was roughly hemispherical, measuring 2.4 m east to west and at least 2.0 m north to south and up to 46 cm deep. As the profile for BHT5 (Fig. 9) shows, the west edge of the pit was interrupted by a pocket of fill extending down from the upper cultural layer (Stratum 5). In this area, Stratum 5 was fairly clean red silt, probably alluvial. Hand-excavated grid 195N 203E just missed this interruption, which was presumed to be a channel cut associated with flooding at the site. Fill beneath the feature was also gleyed and contained dense trash.

This feature also produced an interesting sample of cultural material. The ceramic assemblage (n=479) has a variety of wares, including prehistoric white wares (n=3) and glaze ware (n=1). Most are local utility wares (95.4 percent), mainly Carnue Utility (62.6 percent) and buff/tan utility (21.5 percent), Valencia White (5.4 percent), and Isleta Red-on-tan (4.6 percent). Tewa polychromes (n=13) vastly outnumber western polychromes (n=1). Chipped stone was again sparse (n=17) but includes six strike-a-light flints, a piece of utilized debitage, and a drill fragment that is probably of Pueblo manufacture (Moore, this volume).

Historic artifacts include intrusive pieces of glass and rubber (n=1 each) and 16 pieces of majolica. Most of the majolica is Puebla Blue-on-white (n=6) and San Elizario Polychrome (n=5) dating from 1700 to 1850. Three other pieces are earlier varieties, Fig Springs

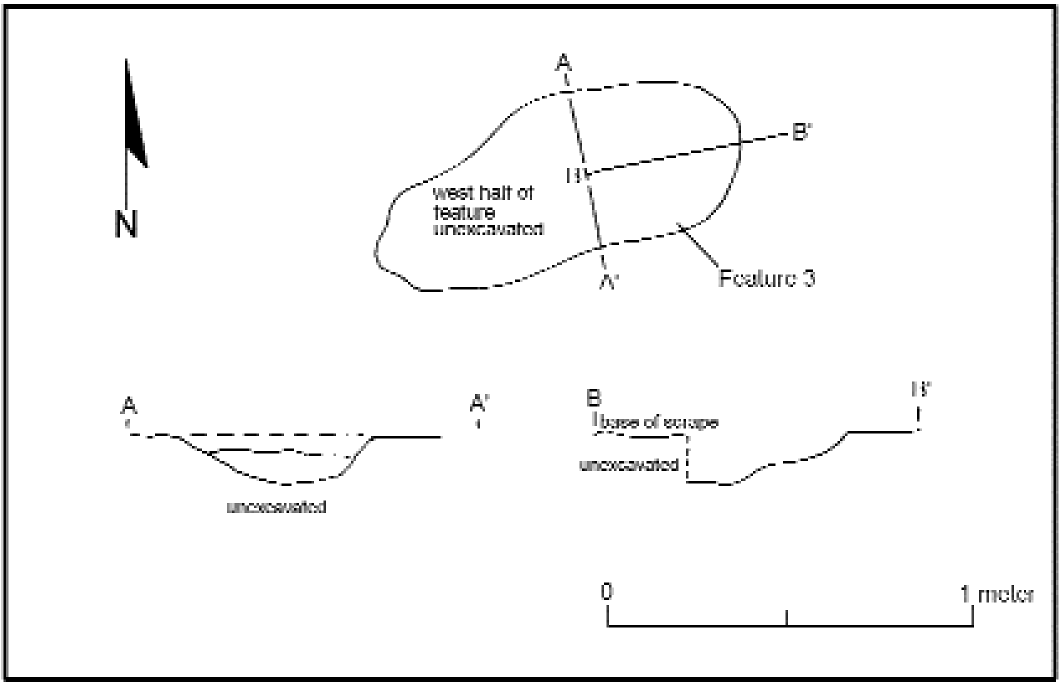

Figure 17. Plan and profiles of Feature 3.

(n=1) and Abo Polychrome (n=2), which date from 1598 to 1725 (Williamson, this volume).

Fauna was even more abundant (n=705) than ceramics. Sheep/goat (26.5 percent) and unidentifiable artiodactyls of that size (16.0 percent) are the most abundant of the identified taxa. Also present was the only cottontail bone and most of the *Bos/Bison*. Much of the bone is burned (31.1 percent), either heavily burned or sooted, calcined, or a combination of burns, and almost none (6.8 percent) exhibit no discoloration. In this layer, the gleying process turned most bone that was not burned (62.1 percent) a brown that is indistinguishable from a light scorch.

A flotation sample from the base of Feature 2 held a diversity of seldom recovered plants and plant parts. In addition to charred pigweed, amaranth, sunflower, ground cherry, purslane, sedge, and grass, there were burned seeds from tobacco, chile pepper, watermelon, coriander, cantaloupe, beans, wheat, and corn. A portion of chile pod, squash rind, wheat rachilla, and corn cobs compete the floral assemblage. The wood was all cottonwood/willow (McBride, this volume).

A radiocarbon sample (Beta 107683) gave an uncalibrated date of A.D. 1750 with a calibrated range of 1665-1690 to 1735-1815. While this date is possible, it is early, given the historic background of this area. The three very early majolica sherds probably predate the use of this pit and could represent heirlooms or pieces collected from abandoned haciendas in the area. Dated native ceramic types found in Feature 2 include Kapo Black, 1720 to 1800 (Oppelt 1988:261); Isleta Red-on-tan, 1700 to 1890 (Franklin 1997:145); and Powhoge style, if it dates the same as Powhoge Polychrome, 1760 to 1850 (Oppelt 1988:280). It is unlikely that this trash burning pit was used over a great period of time. Taking the above dates at face value, we would have to assume its use-life extended from 1720 to 1760.

Feature 3. A pocket of ashy, trashy fill revealed in BHS5 was investigated as a feature but determined to be no more than a low spot with a different fill. The spot was ovoid (Fig. 17), measuring 1.03 by 0.4 m and 14 cm deep from the base of BHS5. Only the north half was excavated.

The fill immediately surrounding Feature 3 was red alluvial silt. Southwest of the red silt was a clear stratigraphic break between the red silt and gray gleyed sand, both of which were void of artifacts and cultural material. Fill within the depression was 4 to 5 cm of fill that could have resulted from cleaning thermal features, a sandy silt matrix containing abundant ash, charcoal, and pieces of burned adobe. The remaining fill was similar but had less ash and charcoal.

East Side Summary

Compared to the west side of NM 47, the east side has deeper and more complex cultural deposition. Cultural material extended at least 1.4 m below the current ground surface in the deepest parts of the area investigated. Simplistically, the fill is comprised of four units: upper disturbed deposits, the upper cultural fill in alluvial deposits, the lower cultural fill or gleyed deposits, and sterile deposition. Table 4 gives the corresponding strata or excavation layers and upper elevation below the site datum for Greene's profile, the intersection of BHT4 and BHT5, BHT6, the hand-excavated units, and ALR3 for comparison.

In general, the top of the upper cultural fill is deeper by about 25 cm going north to south and 10 cm east to west, with the highest area around the intersection of BHT4 and BHT5. The base of this layer is more varied, with a 45 cm difference north to south and east to west. The gleyed lower cultural level is probably deepest around the trench intersection and absent to the north, south, east, and west and on the other side of NM 47. A gleyed layer occurs to the south in BHT 6 but is quite different from that in the main site area. Rather than a dense trash deposit, it is gleyed sandy silt with sparse charcoal and occasional artifacts.

The gleyed cultural deposits occur in large pockets. The one investigated here is one example. The testing phase backhoe trench closer to NM 47, and beneath concrete protective barriers during data recovery, exposed a similar pocket that apparently ended just outside of these excavations.

ARTIFACT ANALYSIS

To organize the information generated by the quantities of artifacts recovered, material was uniformly analyzed in six units or strata. These strata are defined on the basis of fill characteristics and both vertical and horizontal position. Table 5 gives a synopsis of the more easily quantifiable artifacts.

Stratum 1 (Disturbed, East)

Stratum 1 is primarily the disturbed upper fill on the east side of NM 47. It includes modern roadside trash, material brought in with road gravel and fill during previous road construction, and site material that was brought to the surface by ground-disturbing activities. Also included is material for which the provenience was recorded as "general site."

The artifact assemblage from this unit is dominated by native ceramics, mostly historic plain wares. Several pieces of majolica and old glass were also recovered. Fauna is sparse, largely due to poor preservation in the upper fill at the site. The disproportionate amount of chipped stone indicates that some was brought in with the gravel associated with road construction.

Stratum 2 (Disturbed, West)

Disturbance on the west side was slightly different. It includes more recent bottle glass and cans than on the east side, the usual roadside trash, and historic material brought to the surface by a utility line that runs along NM 47 and across the field.

Recent glass and pieces of cans comprise most of the artifacts recovered from this unit. Native ceramics, chipped stone, and fauna are all relatively sparse. Majolica and a piece of Mexican glaze ware were found in this unit.

Stratum 3 (Upper Cultural Layer, East)

Material in this unit is historic trash deposited in alluvium. Overbank flooding has repeatedly inundated the area, so the origin and conditions of deposit of these artifacts is unknown. They could have been deposited here and moved little during alluvial events, or they could have been transported and deposited.

Stratum 3 contained more ceramics than any other unit. Most are plain wares, but western polychromes and nonlocal plain wares are comparatively abundant. Slag was particularly abundant in this unit, as was majolica. Chipped stone was relatively abundant, with more strike-a-light flints than any other unit. Faunal counts are fairly large. However, compared to the more durable artifact categories, there is an indication that poor preservation has affected the faunal content. Ratios of bone to ceramics from this strata are 1 to 1.17, compared to 1 to .47 in the lower cultural unit.

Stratum 4 (Upper Cultural Layer, West)

Fill west of the road is similar to the upper fill on the east. Since it appeared to be alluvial with sterile gleyed strata below, it was considered part of the upper cultural layer.

Artifacts of all types are relatively sparse in this unit, due to limited excavations in this area. The native ceramic assemblage is comprised almost entirely of plain wares. Recent glass is abundant, but four pieces of majolica were found. The few lithic artifacts recovered are all debitage. Fauna is close to ceramics in overall counts (1:1.23) and fairly comparable to the upper cultural, east, in ratio.

Stratum 5 (South Area/Feature 1)

Cultural material from the South Area is mainly from Feature 1 or found at the level where the scrape defined the pit. The recovered artifacts could have come from the pit but were smeared into the surrounding matrix by the backhoe scrape. While the feature itself was in an alluvial unit, fill within the pit seemed to be a primary deposit rather than a concentration of washed material. An abundance of ash and burned material suggests it was an accumulation of debris generated by cleaning hearths or other thermal features.

For a small pit, this unit produced a respectable number of artifacts and a diverse artifact assemblage. Plain wares dominate the native ceramic assemblage, with a respectable number of western polychromes. Most of the Mexican glaze ware and all of the porcelain are from this unit, as were the gold button and cross. Chipped stone was rare: of four pieces, three are strike-a-light flints. The faunal assemblage includes a large concentration of egg shell (184 pieces or 44.9 percent), which probably represents very few eggs, possibly only one. Otherwise, it has one of the higher proportions of unidentified bone and a fairly low bone-to-ceramic ratio when the egg shell is excluded (1:1.48).

Stratum 6 (Lower Cultural Layer/Gleyed Layer)

This stratum consists of the gleyed deposits containing cultural material and was found only on the east side of the road. Presumably, the gley indicates wet conditions with decaying organic material or marshy conditions. While not an ideal place to live, it was ideal for dumping trash. The presence of a large trash-burning pit near the base of this unit attests to that use.

Artifacts of all kinds were abundant and diverse in this unit. Native ceramics are again mostly plain wares, but the majority of the Tewa and Tewa-style wares are from here. Half (n=2) of the old glass and a large part of the majolica (40 percent) originated here. Although small, the chipped stone assemblage is the most diverse found. In addition to debitage, there are cores, strike-a-lights, the gunflint, and the drill. Fauna is especially abundant. The wet organic soil matrix aided in the preservation of bone, or more bone was deposited here. It is the only unit where fauna significantly outnumber the more durable ceramics (1:0.47).

CERAMICS

C. Dean Wilson

Investigations by OAS at LA 67321 resulted in the recovery of 5,389 sherds manufactured by various southwestern Indian or Hispanic groups. Distributions of pottery types and attributes may assist in determining the time of occupation of this site as well as examining a range of issues. One of the main issues involves determining the ethnicity of the individuals who produced the local pottery. In addition, distributions of forms and surface characteristics of this pottery may provide clues about the activities this pottery was used for. To examine these issues, a variety of data was recorded during the present analysis. These include the associated contexts or provenience of this pottery, various descriptive attributes, ceramic typological categories, sherd counts, and weights.

Analysis of the pottery recovered from LA 67321 was originally designed and conducted by Macy Mensel in 1997. In 1998 I reviewed this analysis, and based on my data and interpretative needs, I made some modifications in the categories utilized. However, time limited the extent of changes that could be made. Thus, the categories and approach presented here represent a compromise between the original goals and approach and the needs as defined during later stages of this study.

The associated provenience of this pottery was monitored by recording of field sample (FS) numbers as assigned during field investigations. These FS numbers were grouped into basic provenience units utilized during the present study. Quantitative data recorded includes both counts and weights. Most of the pottery examined during this study was assigned to ceramic typological categories using previously described type names and definitions, although a few new type categories were defined and employed during the present study.

Attribute Analysis Categories

Descriptive attribute categories recorded include temper type, paste profile, interior pigment, exterior pigment, interior slip, exterior slip, vessel form, and modification. In addition, refired paste color was recorded during special analysis of small samples of selected sherds.

Temper

Temper categories were identified by examining freshly broken sherd surfaces through a binocular microscope. Temper refers to either aplastic particles that have been intentionally added to the clay or naturally occurring fragments that would have served the same purpose as added temper. Temper categories were distinguished based on combinations of color, shape, size, fracture, and sheen of observed particles. It is often not possible to differentiate rock types based on microscopic analysis of temper fragments, so the categories employed represent groupings exhibiting similar visual characteristics rather than specific rock and mineral classifications. Still, these categories provide information relating to the range of types of materials known to have been utilized by potters in a particular area.

Indeterminate refers to examples where the kind of tempering material could not be determined. *Self-tempered, silty* was used in cases where distinct temper was absent and aplastic particles are limited to silt grains naturally occurring in the clay. *Sherd* refers to the use of crushed sherds as temper. Crushed sherd fragments may be white, buff, gray, or orange. These fragments are often distinguished from crushed rock temper by their dull nonreflective appearance. Fragments of tuff, however, are often similar in appearance. Small reflective rock particles may occur inside or outside the sherd fragments. In some cases, the presence of fairly large particles alongside crushed sherd reflects the addition of both crushed rock and sherd.

Sand refers to rounded or subrounded and well-sorted sand grains. These grains are usually light to transparent, although rounded black grains are sometimes present. This category is distinguished from the sandstone category by the presence of large even-sized quartz grains and the absence of matrix. Petrographic analysis indicates that sand temper could be separated into coarse sand and fine sand (Hill, Appendix 3). Both coarse and fine sands occur in local sandbars and alluvial clays along the Rio Grande (Hill, Appendix 3). Other categories refer to sand in combination with other particles and include *sand and sherd*, *sand and shale, sand and mica, sand in blocky paste, sand and scoria*, and *sand and white particles*.

Sandstone was assigned to examples with sand particles held together with matrix indicating the use of crushed sandstone or sands from weathered sandstone. Overlap exists in tempering material assigned to the sand and sandstone category. Other categories refer to sandstone in combination with other particles and include *sandstone and mica, sandstone and sherd*, and *sand and tuff.*

Other temper types are represented by material derived from various igneous sources. *Tuff* refers to the presence of fine volcanic fragments and presumably includes tuff or ash deposits occurring in the Valencia area. Tempers assigned to this category display clear, dark vitreous, angular to rod-shaped particles, and light-colored dull pumice particles. The presence of such particles may indicate the use of self-tempered ash-derived clays or the addition of crushed or weathered tuff or ash to the clay. Petrographic analysis indicates that the use of self-tempered clays derives from volcanic ash. Other categories refer to variations noted in this temper and include *tuff and sherd, tuff and sand*, and *tuff and mica*.

Other temper types are represented by various classes of crushed igneous porphyries. *Granite* refers to crushed leucocratic igneous rock dominated by white to light gray fragments with smaller amounts of black fragments. These include quartz, feldspar, brown biotite, and mica fragments and represent material commonly used as temper for utility wares along much of the Rio Grande Valley. *Crushed andesite or diorite* represent the use of mesocratic leucocratic rocks characterized primarily by angular to subangular lithic particles that are clear to milky white and sometimes reddish. Small, black, rod-shaped crystals are present and may occur individually or within the larger particles. A few sherds also contain combinations of *igneous rock and sherd*, and *igneous rock, sand, and sherd*.

Other tempers are represented by very low frequencies of other igneous or metaphoric rocks. Basalt is characterized by dark gray, black, or dark green angular rock fragments of similar size and dark color. The presence of a crystalline basalt temper appears to be indicative of sherds from the Puname district, such as the Pueblo of Zia. *Sand and scoria* refers to the presence of reddish basalt and sand. *Mica schist* is recognized by small to large white to light gray fragments, with mica. Fragments tend to be long and platy, and mica sometimes occurs inside and outside fragments.

Paste Color and Profile

The color of vessel wall cross section reflects the combination of clay sources used and firing conditions to which a vessel was exposed. Vessels fired in reduction atmospheres tend to have dark gray to black cross sections. Those fired in a low oxidizing or neutral atmosphere are usually light gray or white. Vessels fired in a oxidization atmosphere display reddish or yellow pastes depending on the iron content of the clay. Paste profile categories recorded reflect combinations of paste color in terms of darkness and redness or combinations of colors. Paste color categories recorded include *dark gray, dark gray core, brown paste, tan, gray core, dark pink, salmon, brown gray, orange, buff/pink, cream, olive, gray core with white block paste, gray and reddish, blue gray, tan and orange, black and dark brown, dark red, white, buff and gray, buff and dark brown*, and *pink with brown core*.

Pigment Type

The presence, type, and color of painted pigments were recorded for all decorated sherds. Despite the relatively small number of painted sherds, a number of distinct paint categories associated with various prehistoric and historic Southwest decorative pottery traditions were noted.

Organic paint refers to the use of vegetal pigment only. Organic paint is soaked into rather than deposited on a vessel surface. Thus, streaks and polish are often visible through the paint. The painted surface is generally lustrous, depending on the degree of surface polishing. The pigment may be gray, black, bluish, and occasionally orange in color. The edges of the painted designs are often fuzzy, and there may be a slight ghosting beyond the painted area. The majority of the sherds exhibiting organic paint are Tewa types, which may include surfaces with black paint as well as those with a polychrome effect from using red slip and black organic paint.

Matte mineral paint refers to the use of ground minerals such as iron oxides as pigment. These are applied as powdered compounds, usually with an organic binder. The pigment is a physical layer and rests on the vessel surface. Pigments are often thick enough to exhibit visible relief. Mineral pigments usually cover and obscure surface polish and irregularities. The firing atmosphere to which mineral pigments were exposed affects color. Mineral pigment categories identified during the present study include *mineral black, mineral red*, and *mineral brown*.

Glaze paint refers to the use of lead as a fluxing agent to produce vitreous decorations. Glaze pigments are often very thick and runny, and bubbles may protrude through the surface. The glaze may weather from the surface, leaving a thin organic layer. Pigment color ranges from brown, black, orange, to green. Pigments on glaze polychrome types were described as *glaze and red mineral*.

Sherds exhibiting decorations in low-iron clay paint were assigned to a *white clay* pigment category.

Manipulation

Manipulation refers to the type of treatment noted on each vessel surface. *Polished* implies intentional smoothing with a polishing stone to produce a compact and lustrous surface. Sherds without a distinct polished surface were assigned to *smoothed* or *rough* categories. *Smudged* refers to the intentional application of carbon soot to a highly polished surface to produce a black lustrous surface. Other categories described the presence of *striated, impressed*, and *incised surface* treatments.

Vessel Form

Vessel form categories were assigned to all sherds and vessels based on observed shape. Inferences concerning the possible functions of vessels represented by sherd collections are difficult and may be misleading. The consistent placement of all sherds into similarly defined vessel form categories allows for basic interpretations of functional trends of vessels represented by sherd collections, and involves form class definitions of varying degrees of resolution.

Indeterminate refers to vessels whose form cannot be determined. A few sherds whose basic form could not be determined were assigned to the *bowl or jar rim* or *bowl or jar body* or *bowl base and wall* categories.

Bowl rim refers to rim sherds exhibiting inward curvature indicative of bowl forms. *Bowl body* alludes to body sherds exhibiting polishing or painted decoration on the interior surface, indicating they originated from bowls. Some sherds clearly from the lower part of a bowl were assigned to a *bowl base* category. Soup plates are a European bowl form consisting of a flat tray-like area close to the rim and flaring that created the bowl near the center. Some forms assigned to this category most closely resemble bowls with a only a narrow outflaring rim, while other are more plate-like, exhibiting a wide rim and a low curve in the bowl area. Both *soup plate body* and *soup plate rim* sherds were identified. Related categories include *shallow bowl with flared rim* and *tray base and sides*.

The most common category identified during the present study is body sherds unpolished on both surfaces or the exterior surface. While all unpolished gray body sherds were assigned to a *jar body* category, some of these could have derived from bowls. Polished body sherds were assigned to this category only if they exhibited evidence of painting or polishing on the exterior surface. Some sherds that are clearly from the lower part of a jar were assigned to a *jar base* category.

It was possible to recognize a variety of jar forms based on the diameter and shape of these sherds. *Cooking/storage jar neck* includes nonrim jar sherds with a curvature indicating they originated somewhere along the upper portion or neck of a jar. *Cooking/storage jar rim* implies forms with relatively wide rim diameters, which could have been utilized for cooking or storage. Wide mouth jar or cooking/storage sherds are distinguished from those belonging to other jar rim forms by a wide rim diameter relative to vessel size. *Olla rim* refers to forms with relatively narrow rim diameters and elongated necks. These forms often exhibit handles near the base, which presumably aided in the carrying of water. *Seed jar rim* refers to sherds derived from spherical shaped vessels not exhibiting distinct necks, but with rim openings near the top.

Jar sherds with a connecting handle were classified as *pitcher handles*. Miniatures include vessels too small to have been used as those forms and include *miniature bowl rim* and *pinch pot* forms. Other forms recorded include *ringed base, jar with handle stub*, and *cylindrical base*. Forms clearly of European influence include *candlestick holder* and *candlestick holder rim*.

Modified Sherds

Modified sherd categories denote evidence of modification or breakage including abrasion, drilling, chipping, and spalling. Modification categories incorporate information about item shape and size as well as the process by which they were modified. While most of the sherds examined do not exhibit postfiring modifications and were coded as *none*, data concerning such treatments provides information about the actual use and modification of sherds and vessels. *Drilled hole for repair refers* to the presence of drilled holes used to mend a vessel by lacing it together through repair holes. Repair holes are usually within 2 cm of an old break. *Rounded sherd edge* refers to the presence of one or more abraded edges resulting from intentional shaping of a vessel or sherd. *Disc* refers to small shaped items.

Type Categories

All pottery examined during this study was assigned to ceramic types based on surface and technological treatment that may have ethnic, temporal, spatial, and functional implications. The pottery types identified during the present study could be placed into one of nine basic groups with broad temporal and areal implications (Table 6). A very small number of sherds were placed into types produced during the prehistoric period, many centuries before the main occupation of this site. These sherds are associated with two broad functionally distinct groups: *prehistoric utility ware* and *prehistoric white ware*. The *glaze ware* group includes types that could date from the late thirteenth to early eighteenth century, and thus, sherds associated with large spans of the prehistoric and historic occupation of this area. The great majority of pottery analyzed during the present study represents types associated with the historic occupation of this site. The majority of these were assigned to types that were probably locally produced and assigned to a *local historic plain ware* group, while types indicative of utility ware pottery probably not of local production were placed into the *other historic plain ware* group. The remaining groups include types associated with various regional historic Pueblo polychrome traditions: *local polychrome, Tewa tradi-*

tion polychrome, Puname-region polychrome, and *western polychrome*.

Table 7 illustrates the frequency of pottery from LA 67321 assigned to various ceramic types. The great majority of the native ceramics from LA 67321 represent historic types dating to the eighteenth and nineteenth centuries. This is not surprising, because the main deposits excavated at the site are related to a Hispanic settlement dating from the late Spanish Colonial to Territorial periods, although the occurrence of certain ceramic types also supports previous statements of limited evidence of a prehistoric occupation between A.D. 1200 to 1300 (Franklin 1997).

Ceramic types clearly associated with a prehistoric occupation are represented by only 0.9 percent of all the pottery examined. These include prehistoric types produced in the northern or Cibola Mogollon region and the Socorro district, as well as the middle and northern Rio Grande Valley, from A.D. 1100 to 1350. A few of the glaze ware sherds also represent types associated with prehistoric occupations. Pottery from LA 67321 was assigned to both descriptive and formally defined types.

Prehistoric Utility Ware Types

A total of 12 sherds display treatments indicative of prehistoric white ware types. These include pottery assigned to five prehistoric utility ware type categories based on paste and surface characteristics indicative of prehistoric types defined for the Albuquerque and Rio Abajo areas (Hill 1995; Marshall and Walt 1984; Mensel 1996; Mera 1935; Wiseman 1994). A few early plain gray forms may have also been associated with prehistoric occupations in this area but could not be differentiated from historic utility wares during the present study. Distributions of temper type and form categories assigned to various prehistoric utility ware types are presented in Tables 8 and 9.

Six sherds were classified as *corrugated utility*. Sherds were assigned to this type based on the presence of fine coil with regularly spaced indentations on the exterior surface. All six sherds exhibit polished interiors. Five sherds contain sandstone temper in dark gray or brown gray pastes and have sand temper. One sherd exhibiting similar textures but without the indentations on the exterior surface was classified *corrugated banded*. This sherd has a polished interior and contains igneous rock and sand temper.

Two sherds were assigned to Los Lunas Smudged. These sherds are characterized by smudged and polished interiors with exterior surfaces that appear to be textured by indented corrugation or very thin rows of protruding coils, often with incised spaces between them. Los Lunas Smudged was originally described by Mera (1935:28-29) as a utility ware type produced in the Socorro area. Paste color ranges from dark gray to light brown to red brown, and tempering materials usually consist of fine volcanic rock. Coil manipulations on the exterior were recorded as clapboard, flattened, textured, and punctate, and coil width ranges from 1 to 4 mm. Both jar and bowl forms were noted.

One sherd was assigned to Reserve Smudged, although it could be more closely related to Los Luna Smudged. This is a long-lived type produced in the northeastern Mogollon Highlands. Surfaces are smoothed and highly smudged, and interior surfaces are black, resulting from intentional smudging. Two other sherds exhibiting Mogollon pastes with plain corrugated exteriors were assigned to the *plain corrugated (Mogollon)* category. These are described as containing sandstone temper.

Prehistoric White Ware Types

A total of 40 sherds exhibit characteristics indicative of white ware pottery types produced during the Developmental or Coalition periods. These sherds were assigned to 10 type categories based on paste characteristics, surface manipulation, paint type, and designs. Distributions of temper and vessel form categories assigned to prehistoric white ware types are presented in Tables 10 and 11.

Two jar sherds exhibit pastes and painted decorations indicative of Kwahe'e Black-on-white. These are differentiated from later Rio Grande types exhibiting similar pastes by the presence of decorations applied in organic paint. Designs are typical of Pueblo II styles. Pastes were bluish to gray and slipped with a thin white clay. One sherd is tempered with sand and sherd, and the other with fine igneous rock. The interior of the sherds is smoothed but unpolished. Kwahe'e Black-on-white is best known at sites in the Tewa Basin, north of Santa Fe (Mera 1935; McNutt 1969), although a recent study of the Coors Road site (LA 15260) in west Albuquerque reports low frequencies of Kwahe'e Black-on-white (Post 1994). In the Albuquerque area, this ceramic type is estimated to occur from A.D. 1050 to 1175 (Sundt 1987).

One sherd with solid designs in a late Pueblo II style, white paste, and quartz and sand temper was classified as Puerco Escavada Black-on-white. A sherd of Tularosa Black-on-white was also identified. This sherd has white paste and is tempered with crushed sherd. Tularosa Black-on-white is typically found on southern Anasazi and northern Mogollon sites dating from A.D. 1000-1300 and is characterized by distinctive mineral-painted designs on a white-slipped background (Rinaldo and Bluhm 1956). Designs commonly consist of interlocking hatchured and solid curvilinear or rectilinear elements. Hatchured lines are closely spaced and are generally oriented in a longitudinal direction. Surfaces are slipped and well polished.

Four sherds were assigned to Socorro Black-on-white. These included two bowl body sherds and two jar body sherds. Two of these sherds are tempered with sand and the other two with sherd and sand. Socorro Black-on-white is often decorated with a vitrified mineral pigment. The estimated range of production for this type is from A.D. 1050 to 1300 (Sundt 1987; Hill 1995). Designs include thin parallel lines, solid rectilinear elements, and hatchured elements. One stylistic characteristic of Socorro Black-on-white noted on these sherds is the use of hatchure in a sequence of parallel lines. The lines are thicker than the spaces between them.

Five bowl sherds exhibit characteristics described for Santa Fe Black-on-white (Lang 1982; Mera 1935; Habicht-Mauche 1993). Four of these contain sherd temper in a dark gray paste, and one has tuff temper. The exterior surface is unpolished. Santa Fe Black-on-white is decorated with black organic pigment. In general, Santa Fe Black-on-white designs are in paneled bands on bowl interiors. Hatched triangular figures are common, as are motifs pendant from the rim. A Galisteo Black-on-white bowl rim sherd was also identified. This sherd has decoration in organic paint, a dark gray paste, and crushed sherd temper. Although the sherd is small, a series of thick framing lines and a ticked but rounded rim were used to identify the type. Both of the interior and exterior surfaces are slipped and well polished.

Several other sherds could not be assign to a specific type but exhibited characteristics indicating they were derived from prehistoric white ware vessels. Unpainted sherds that appear to have derived from prehistoric white ware vessels were assigned to *unpainted white ware*. Most of these are tempered with sherds of some form, although one example contains sand. Three sherds exhibiting decorations in indeterminate pigments were assigned to *white ware, indeterminate paint*. All three of these were tempered with crushed sherds. Six sherds were assigned to *mineral-on-white, undifferentiated*, because the ceramics do not exhibit sufficient stylistic design to allow for the assignment to a specific ceramic type or tradition. All six of these have crushed sherd temper. Five sherds decorated with organic paint apparently derive from prehistoric vessels but could not be assigned to a specific type and were assigned to *organic-on-white, undifferentiated*. These sherds are tempered with fine tuff or igneous rock.

Glaze Ware Ceramics

A total of 33 sherds exhibit a distinctive lead glaze or other characteristics of glaze ware types. These sherds were placed into 12 different type categories based on variations in slip color, design style, and rim shape. Some of these represent types known to have been produced in the Rio Grande region, and others represent Zuni or Acoma types produced in areas to the west. Glaze wares were produced in the middle Rio Grande from about A.D. 1325 to the early 1700s (Franklin 1997; Kidder and Shepard 1936; Mera 1933). At nearby Valencia Pueblo (LA 935), the dominance of Glaze A pottery types indicates a major occupation dominated by glaze ware types in the fourteenth and possibly to the very early fifteenth century, with very little evidence of occupation between 1500 to 1700 (Brown 1997a). Thus, while the presence of historic glaze ware types indicates a very long occupation, this span is probably divided by a long occupational hiatus. A similar hiatus is probably represented at LA 67321, and glaze ware sherds could potentially be associated with the late part of the prehistoric occupation defined by prehistoric contaminants or very early part of the main historic occupation. Examinations of characteristics of glaze ware sherds indicate that sherds associated with both of these time spans are represented. Distributions of temper and vessel form categories assigned to prehistoric glaze ware types identified during the present study are found in Tables 12 and 13.

Glaze-on-red is represented by nine body sherds with glaze paint on red slips. All of these sherds are derived from jars. Red slips vary from light reddish-brown to bright red. Most of these sherds are recorded as tempered with some form of sandstone. A partially reconstructed glaze-on-red jar is illustrated in Figure 18. This vessel exhibits a very drippy paint on a red surface, indicating it was produced late in the glaze period.

Figure 18. Partial glaze-on-red vessel (Vessel 1, FS 158).

A singe bowl rim sherd was assigned to Agua Fria Glaze-on-red. The rim is a typical Glaze A rim with a rounded rim lip. The interior glaze design is a series of thin parallel lines. A portion of a thick horizontal line appears on the bowl exterior. The red slip is worn off over much of the surface but appears to have been a thick, reddish-brown. Both surfaces are well polished. This sherd has a black basalt temper in a reddish-brown paste, which may indicate it was produced in the Zia area.

Heshotauthla Glaze-on-red is assumed to represent a Zuni-area type, produced during the period ca. A.D. 1275 to 1400 (Woodbury and Woodbury 1966). This type is characterize by thick, reddish-orange slip with copper and lead glaze-painted designs. All three of these sherds are from bowls and are tempered with granite and white opaque fragments. A sherd with similar temper and paint but in decorations over a white slip was classified as Pinnawa Glaze-on-white. Two sherds exhibiting sherd temper and white paste and glazed decoration were assigned to *western glaze, indeterminate*.

Glaze-on-yellow, identified by the presence of streaky, cream to light-colored slips with glaze designs, is represented by 13 sherds. A total of 10 are jar sherds, and 3 are from bowls. The glaze paint in all cases appears to be a late style glaze because of extensive running and bubbling that has obscured the designs. The paint is generally a thick, dark brown. A very wide range of tempers was identified for this group (Table 12). On one sherd the design is a sequence of parallel lines painted below the rim lip, although the rim is not present. Figure 19 illustrates a glaze-on-yellow sherd with a drippy paint, indicating production late in the glaze sequence.

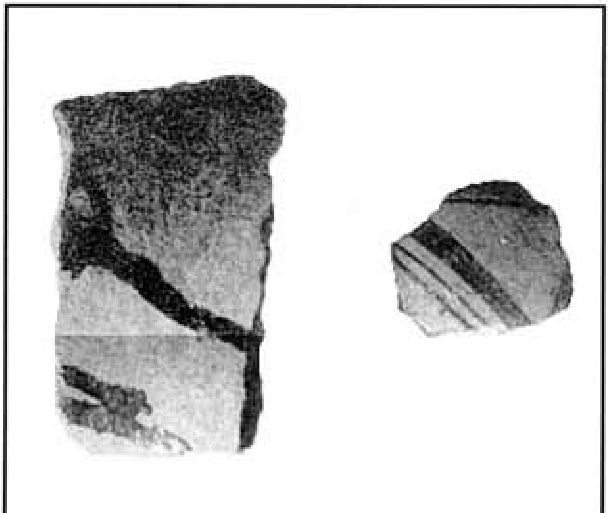

Figure 19. Glaze-on-yellow sherd (FS 165-41) and yellow ware (FS 100-1).

One unslipped *glaze-on-brown/tan* sherd, tempered with sandstone, was also identified. Glaze polychrome is represented by three sherds exhibiting a glaze paint and matte paint. Three glaze polychrome body sherds were assigned to *glaze-on-red and red matte* or *glaze-on-brown and red matte*.

Historic Types

The great majority (98.4 percent) of the sherds examined from LA 67321 represent types produced by Hispanic or Pueblo potters in New Mexico during the eighteenth or early nineteenth century. The historic ceramic assemblage is overwhelmingly dominated by sherds from plain unpainted vessels that could have been produced locally or at other Hispanic communities, as well as at nearby Isleta Pueblo. Polychrome types associated with several distinct Pueblo regional traditions are also represented.

"Local" Historic Plain Ware Types

A total of 5,034 sherds were assigned to five type categories belonging to a local plain ware group. Utility ware types from LA 67321 are similar to eighteenth and nineteenth-century utility ware types from Isleta Pueblo (Batkin 1987; Ellis 1979, 1983) as well as contemporaneous Hispanic settlements (Brody and Colburg 1966; Carrillo 1997; Dick 1968; Ferg 1984; Franklin 1997; Hurt 1996; Hurt and Dick 1946; Marshall and Marshall 1992; Marshall and Walt 1984). Marshall and Marshall (1992) describe the wide suite of "local" plain ware pottery types common at eighteenth- and nineteenth-century Hispanic sites in the Rio Abajo as a ceramic industry called the Carnue tradition. This class of pottery reflects considerable variety with both thin and thick forms and includes both unpolished and unslipped surfaces, as well as tan surfaces that are sometimes covered with thin red- or white-slipped washes. Pottery types at Hispanic sites in the Rio Abajo within this tradition include pottery classified as Carnue Utility, Casitas Red-on-brown, and Casitas White (Carrillo 1997; Marshall and Marshall 1992). Similar pottery has been noted from Isleta Pueblo, although the red-slipped variant is assigned to Isleta Red-on-tan (Batkin 1987; Ellis 1979, 1983; Franklin 1997). It is very likely that ceramic developments at Hispanic sites in the Rio Abajo and the Pueblo of Isleta were closely related. Distributions of temper and vessel forms noted for local utility ware types identified during the present study are presented in Tables 14 and 15.

The majority of the pottery (2968 or 55.1 percent of all sherds) from LA 67321 consists of plain utility wares displaying similar characteristics and classified here as

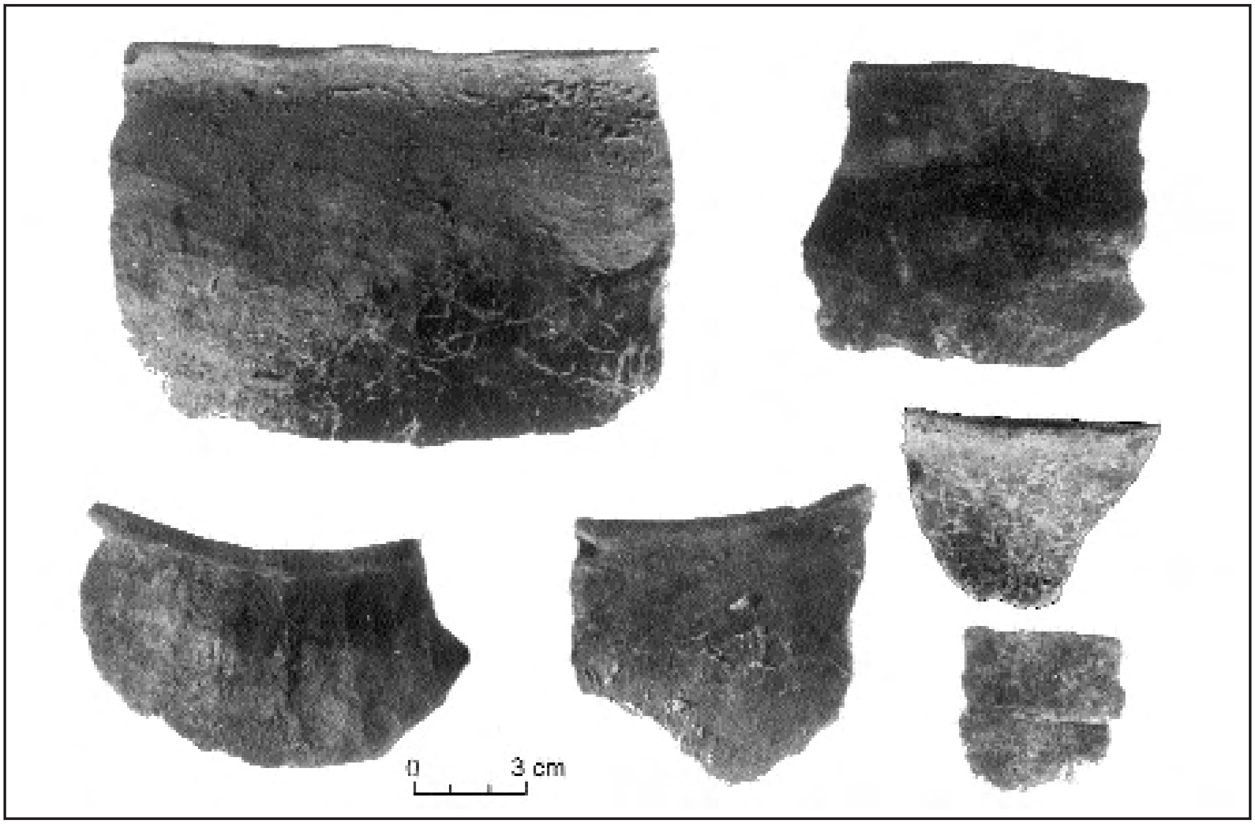

Figure 20. Carnue Utility sherds (FS 101-1, 185-17, 159-74, 105-3, 167-62, 159-35).

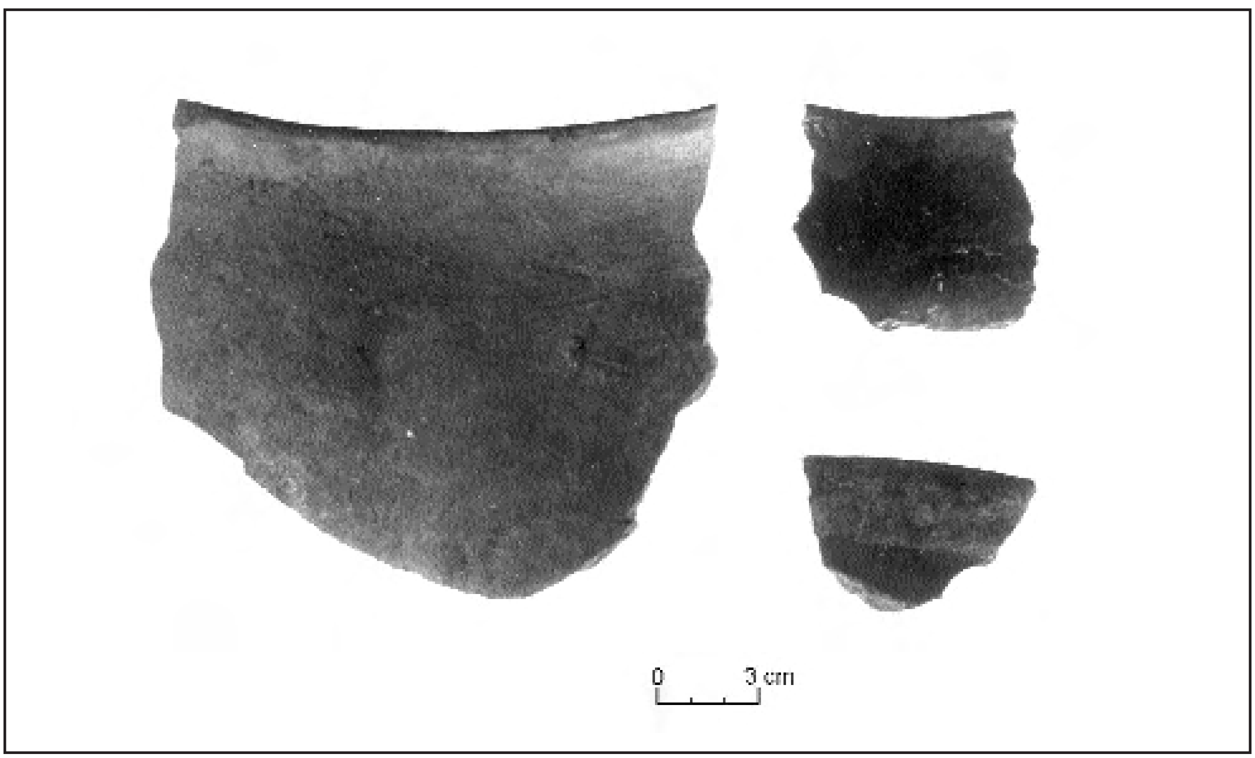

Figure 21. Carnue Utility sherds (FS 172-16, 162-53, 159-137).

Carnue Utility. Figures 20 and 21 show two sherds exhibiting filleted treatments near the rim. A partially reconstructed Carnue Utility bowl is illustrated in Figure 22. Carnue Utility is normally distinguished from other historic utility ware types by a coarse, non-micaceous sand temper, crumbly paste, and grayish paste and surface colors. Another distinguishing characteristic is rough vessel exteriors. This was the dominant type identified during the analysis of pottery from LA 67321 recovered during investigations by OCA (Franklin 1997), and it is often the most common type at other Spanish Colonial period Hispanic sites in the middle Rio Grande (Dick 1968; Ferg 1984). Franklin assigned pottery from LA 67321 to Carnue Plain based on the definition presented by Dick (1968). Similar pottery has been assigned to Yupa Plain, Santa Cruz Plain, and Manzano Coarse, Plain Faint-Striated, and Heavily Striated Plain (Brody and Colberg 1966; Hurt and Dick 1946; Kidder and Shepard 1936; Snow 1973b). Franklin (1997) also assumes that this type was locally produced by Hispanic potters residing at LA 67321, although Ellis (1983) notes that similar "bean pots" consisting of undecorated and unslipped jars were produced at Isleta Pueblo until the early twentieth century. Such vessels are produced with a red clay from riverine sources and are tempered with sand (Ellis 1983). Dick describes Carnue Utility as produced by both Hispanic and Pueblo potters. It is possible that pottery described here as Carnue Utility represents a mixture of vessels produced by local Hispanic potters as well as those from Isleta and other pueblos, where similar plain gray ware vessels may have been produced. Dick (1968) estimates this type was produced from 1700 until 1895. Pottery exhibiting the characteristics of Carnue Plain appears to have been very widespread, occurring along the Rio Grande drainage from Trinidad-Antonito, Colorado, to south of Mesilla, New Mexico (Dick 1968).

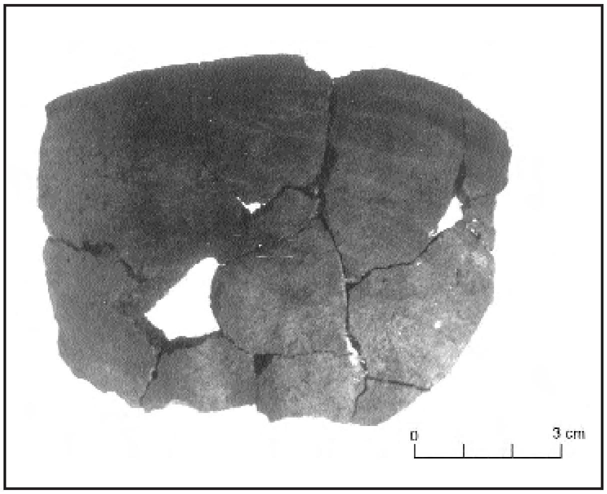

Figure 22. Partially reconstructed Carnue Utility bowl (Vessel 5, FS 146-4).

Carnue Utility sherds from LA 67321 were mostly tempered with a sand, sandstone, or granite temper and appear to reflect the use of sandy riverine clays occurring along the Rio Grande. Temper fragments tend to be larger than those in Isleta Red-on-tan and associated types. Paste and surface colors are highly variable, and most cross sections exhibit combinations of gray and reddish colors as cores or streaks. Interior and exterior surfaces are most often grayish and contrast with the buff and reddish colors dominating Isleta Red-on-tan, although red, orange, and brown surfaces are relatively common. Surface color varies considerably even on different surfaces and portions of the same vessel. Sherds exposed to controlled oxidation atmospheres fire to yellow-red, red, or gray. Gray shades are much more common in Carnue Utility than other local types, indicating the use of distinct clay sources or firing atmospheres. While Dick (1968) postulates that different atmospheres were utilized by Hispanic (reducing) and Indian (oxidizing) potters, it is more likely that color ranges reflect the utilization of clays with fairly high iron content and poorly controlled firing atmosphere, tending toward a reducing atmosphere during the last stages of firing.

Carnue Utility is represented by a wide range of forms, although bowls and cooking jars dominate. Bowls tend to exhibit a gradual curve, and soup bowls are rare, particularly compared to Isleta Red-on-tan. While a number of bowl rims are unpolished on both sides, bowls are commonly polished and sometimes smudged on the interior surface. The other form represented by a large number of sherds is jars exhibiting a distinct neck and wide rim radius relative to the vessel size. Almost all Carnue Plain jars assigned to this type are unpolished on the exterior surface, although they often exhibit a slight polish on the interior surface. This pattern probably resulted in the recording of more bowls than are actually represented. The shapes and forms are distinct from those noted in other historic utility ware collections and are similar to forms common in earlier Anasazi gray wares. These forms appear to reflect the return to large undecorated "gray ware" cooking/storage vessels common in many areas of the Southwest during the prehistoric period. Other forms represented in very low frequencies include seed jars, pinch pots, miniature forms, and candlestick holders. Surfaces are usually smoothed over the entire vessel, although scraping marks are sometimes present. Vessel forms are primarily represented by wide mouth jars, which appear to have been utilized for cooking and storage activities. Jars are almost always unpolished on the exterior but sometimes exhibit a light polish on the interior surface. Thickness is variable, ranging from 5 to 10 mm. Most bowls range from 6 to 8 mm thick. Jars tend to be thick, most ranging from 7 to 10 mm. Sherds usually break with uneven textures. Sherds assigned to this type also tend to be slightly softer than other local utility wares from this site.

Sand or rock fragments often protrude through the exterior surface. Sherds assigned to this type are sometimes polished or smudged on the interior. Parallel polishing streaks are also common. A single sherd exhibiting characteristics similar to those of Carnue Utility, with the addition of a striated exterior, was assigned to Carnue Plain, striated. Striated exterior surfaces were made by scraping or wiping the vessel while the clay is still wet, which pulls the larger sand temper grains across the surface, leaving prominent striations. A couple of rim sherds exhibited a wide fillet near the rim about 20 to 25 mm across (see Fig. 20).

The next most common type is represented by sherds derived from Isleta Red-on-tan vessels. Characteristics of red-on-tan pottery produced by Isleta potters are briefly presented by Batkin (1987) and Ellis (1979, 1983). This form is mainly limited to bowls and soup plates (Ellis 1983). The slipped pottery produced at this pueblo is referred to as Isleta Red-on-tan by Batkin and is the only form mentioned that was produced at Isleta Pueblo during most of the nineteenth century (Batkin 1987). This type is described in more detail by Franklin (1997). Descriptions of Isleta Red-on-tan indicate a type that represents a southern version of types such as San Juan Red-on-tan, produced in areas to the north (Batkin 1987). Most of the sherds assumed here to derive from Isleta Red-on-tan vessels would have been assigned to Tewa types such as San Juan Red-on-tan or Tewa Red-on-tan or Tewa Red (Batkin 1987; Harlow 1973; Lang 1997) if they had been recovered at sites in the Tewa Basin. Another pottery type that is similar to Isleta Red-on-tan is Casitas Red-on-brown, which was produced by Hispanic potters over a very wide area (Dick 1968). At most, differences in these types are based on differences in pastes and temper available in the middle Rio Grande. I think it is likely that most of the sherds assigned to Isleta Red-on-tan during the present study would have been classified as Casitas Brown if they had been found at Hispanic sites in the Rio Abajo country farther away from Isleta Pueblo. As previously indicated, various historic types in which the upper part of the vessel has a red slip over a tan or brown surface represent minor areal variations of a widespread technology, which cut across ethnicity. Isleta Red-on-tan also resembles Salinas Red Ware, produced in the Gran Quivira area (Hayes et al. 1981). While the precise date of introduction of Isleta Red-on-tan is unknown, it may have been produced as early as 1680 (Franklin 1997; Parsons 1932).

Most of the sherds from Isleta Red-on-tan vessels are tempered with fine tuff or fine sand. While Franklin (1997) describes some of the sherds as tempered with sherds or mollusc shell, it is likely these fragments actually represent dull while tuff or pumice fragments. While there is overlap in temper types found in Carnue Plain and Isleta Red-on-tan, the latter tend to be much finer and are often very uniform in size. The paste and surfaces of Isleta Red-on-tan are usually tan, olive, brown, or buff. Surface color is sometimes variable, with combinations of tan and reddish patches. Small mica fragments are commonly visible on the surface. Small fire clouds or small sooted areas are also relatively common, mostly on exterior surfaces. Surface and paste characteristics indicate firing in oxidizing atmospheres. The surface firing of a number of large Isleta Red-on-tan vessels, shown in a photograph taken in the late nineteenth century and illustrated in Batkin (1987:190), probably would have resulted in such characteristics. Vessel cross sections are commonly pink to tan on the outside with very dark gray cores.

The first few centimeters of the upper vessel interior or exterior of Isleta Red-on-tan vessels are often covered with a high-iron slip clay, which may range from bright red to dark red to purple. The red slip is often on both surfaces where it forms a narrow band, usually about 2 to 5 cm wide. A few examples exhibit line designs in the slip. Slips tend to weather off easily and are often thin and patchy. They often are streaky horizontally to the rim, following polishing marks. Unslipped surfaces tend to be a tan to light brown and fairly consistent in color. Vessels are fairly hard with fine pastes. Both slipped and unslipped portions of these vessels tend to be polished.

Vessel wall thickness is variable, ranging from 5 to 11 mm, although some examples are extremely thick. Thickness of most sherds appears to be very even. Vessels appear to be well fired and hard. The majority of sherds assigned to this type appear to have derived from bowls or soup plates. These represent forms with everted rims slanting outward from the interior at about 1.5 to 2.5 cm from the rim, producing a curving profile.

During the present study, sherds exhibiting the combination of paste and surface characteristics described for Isleta Red-on-tan were placed into one of two type categories. A total of 594 rim or neck sherds exhibiting decorations in red slip are classified as Isleta Red-on-tan. Sherds assigned to this type are illustrated in Figures 23 and 24. Unslipped sherds exhibiting paste and surface treatments described for the later were assigned to a *tan/buff utility* category. This category was assigned to 1,058 sherds and refers mainly to sherds from the lower portions of red-on-tan vessels, although some rim sherds without slipped decorations exhibit characteristics otherwise indicative of Isleta Red-on-tan. Given other similarities, these sherds were still assigned to the tan/buff category and assumed to represent a variation of the Isleta Red-on-tan technology. Similar sherds from sites in the Tewa Basin and Chama Valley are assigned to Tewa Tan/Buff (Lang 1997).

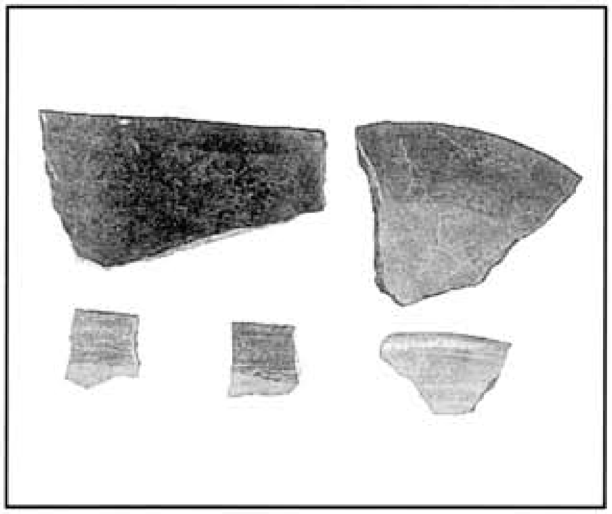

Figure 23. Isleta Red-on-tan sherds (FS 183-58, 170-35, 121-27, 195-40, 161-93).

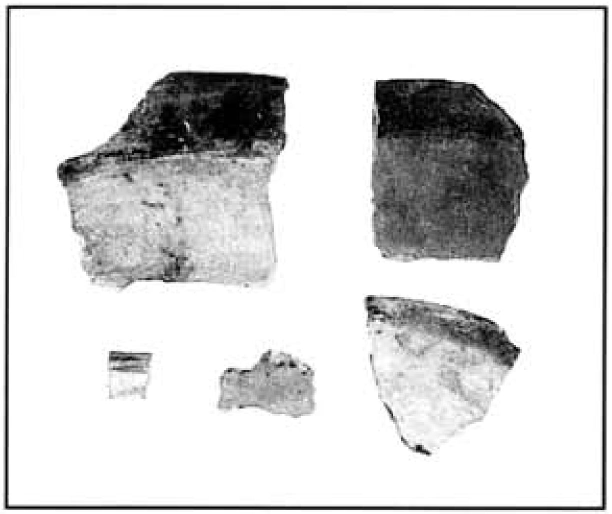

Figure 24. Isleta Red-on-tan sherds (FS 162-64, 105-1, 195-39, 126-45, 103-1).

For pottery recovered during earlier excavations of LA 67321 by OCA, red-slipped and tan unslipped sherds were classified as Isleta Red-on-tan (Franklin 1997). Franklin (1997) notes that this is the second most abundant pottery type at this site, occurring in slightly lower frequencies than Carnue Plain. Franklin (1997:242) postulates that Carnue Utility may have been locally manufactured but feels that Isleta Red-on-tan was produced by Puebloan potters at Isleta.

Another type, represented by 118 sherds, exhibits local pastes and temper with sooted or smudged surfaces. This pottery is similar to Kapo Black but tends to have local temper and surfaces that are often not as well polished. In addition, surfaces are less likely to have a red slip under the sooted surface than in Kapo or Tewa Black. Pottery exhibiting this combination of characteristics was classified as *smudged black ware*. Many of the sherds assigned to this category appear to be similar to pottery previously assigned to Manzano Burnished Black (Hurt and Dick 1946). Sooted black wares were originally associated with the northern Tewa ceramic tradition (Mera 1939) but have been documented at Indian and Hispanic sites from southern Colorado to the lower Rio Grande (Dick 1968; Levine 1990). Smudged black ware has also been attributed to Hispanic manufacture (Dick 1968; Levine in prep.). Many of the sherds assigned to this group exhibit pastes similar to other sherds from this site that are derived from local Carnue Utility and Isleta Red-on-tan vessels. It is also possible that some of these sherds may actually be Kapo Black, although most appear to represent locally produced forms. Other sherds assigned to this category may represent a variant of the plain gray utility types that replaced textured-surface utility sometime during the production of the early glaze wares and were produced into the late glaze sequence in the 1600s (Kidder and Shepard 1936). Most of the sherds assigned to this type appear to be from jars.

Another example of a type that may have been locally manufactured is represented by 294 sherds exhibiting pastes and shapes similar to those noted in Isleta Red-on-tan, but with a white slip over the interior or exterior surface. I could not find a reference to the production of slipped white wares at Isleta prior to 1870, and the only reference to similar slipped white wares in the general area are brief discussions of similar slipped pottery from eighteenth- and nineteenth-century sites in the Rio Abajo district to the south (Marshall and Walt 1984; Marshall and Marshall 1992; Carrillo 1997). Marshall and Marshall (1992) interpret this white-slipped pottery as a variation of a Hispanic Carnue Utility tradition. A relationship to Hispanic pottery is also inferred in an illustration of an example of similar sherds by Carrillo (1997:97), which are referred to as Casitas White slipped or Casitas White banded. An additional reference to similar white ware pottery produced elsewhere during the Spanish Colonial period is a brief observation by Snow (1982:260), who notes, "Soup plates were almost exclusively red-slipped, in conscious contrast, perhaps, with the white-enameled Mexican majolica forms; although Pecos potters, perhaps on request, made white-slipped soup plates and chalices." In addition, the Museum of New Mexico pottery type collection contains sherds labeled Salinas White. These sherds display a combination of characteristics similar to the white-slipped pottery described here and may reflect a regional variant of a similar technology spread over several areas of New Mexico during the Spanish Colonial period.

The slipped white ware pottery identified during the present study is assumed to have been produced nearby at Isleta Pueblo or by local Hispanic potters because of the fairly high frequency in which it occurs and similarities in pastes, forms, and treatments to local plain ware types. Additional evidence of local production is the distinctiveness of this pottery from slipped white ware vessels known to have been produced at other pueblos. Because the local red-slipped utility ware was assigned to Isleta Red-on-tan rather than Casitas Red-on-brown, I was reluctant to assign this pottery to Casitas White. The lack of any formal definition and description of Casitas White limits the use of this term. I was also reluctant the use the term Isleta White because of the absence of evidence that similar white wares were produced or utilized at Isleta Pueblo. Thus, during the present study, white-slipped pottery exhibiting the previously described characteristics were assigned to a Valencia White category. This is a new type, probably most similar to pottery labeled Salinas White, which has never been described. This type, as descried here, includes white-slipped pottery at LA 67321 and Hispanic sites south of Albuquerque and the Rio Abajo country. An example of a slipped white sherd is shown in Figure 25, and Figure 26 illustrates a partial vessel assigned to this type.

Figure 25. Slipped white sherd (FS 183-47).

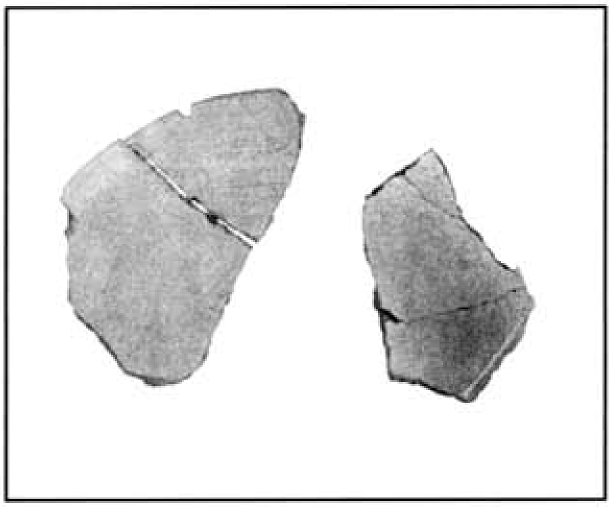

Figure 26. Slipped white vessel (Vessel 6, FS 146-19).

Valencia White sherds have pastes and treatments similar to locally produced types such as Isleta Red-on-tan but also exhibit a white slip without painted decorations over one or both surfaces. While the range of paste and temper characteristics of the great majority of white-slipped sherds is almost identical to that noted in Isleta Red-on-tan, an occasional slipped sherd exhibiting paste and surface manipulation similar to that noted for Carnue Plain was assigned to this category. Almost all slips are very white and similar in color and reflect the use of a clay with exceptionally low iron content. The slip is distinct from slips noted in most polychrome types, particularly Tewa Polychrome slips. Surfaces tend to be slightly polished, and surface characteristics more closely resemble Puname than Tewa polychrome types. Slipped surfaces are often thin and streaky, with tan, brown, or gray surfaces visible through parts of the slip. Sherds assigned to this type are mainly represented by bowls. Soup bowls are slightly rarer than with Isleta Red-on-tan but are still present in significant numbers. Exterior surfaces are most likely to be slipped, while interior surfaces are often unslipped. Examples of surfaces slipped on both sides and those exhibiting a white slip over the interior surface only were also identified. A few examples also exhibit bands of white slip, similar in treatment and thickness to those noted in Isleta Red-on-tan, further indicating that the two types are certainly part of the same tradition and may have been made by the same potters. Other sherds have a white thin band across the interior of the rim along with a completely slipped interior. Despite the large number of sherds and sherds representing large portions of vessels, none of the sherds exhibiting combinations of paste and surface tions. This may reflect the inability of the locally utilized slip to retain paint pigment. Forms are mainly bowls.

Other Historic Utility Ware Types

A total of 89 sherds were assigned to historic utility ware types exhibiting pastes or other characteristics indicating they were probably not locally produced. Two utility ware types that appear not to have been locally produced were assigned to Kapo (or Tewa) Black or *plain micaceous utility* (Fig. 27). Distributions of temper and vessel forms noted for these historic utility ware types are presented in Tables 16 and 17.

Plain micaceous utility was assigned to 22 sherds and is easily distinguished from other utility ware types by the presence of abundant mica schist temper, black or dark gray pastes, and very thin vessel walls (5 mm or less). These ceramics are visually distinctive and share attributes with pottery previously noted in various Hispanic, Puebloan, or Apachean traditions.

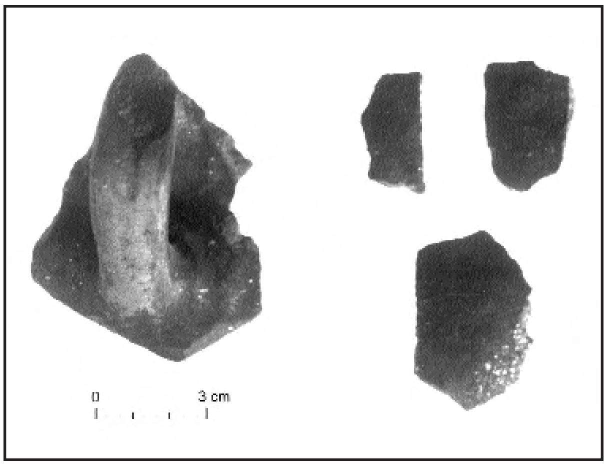

Figure 27. Kapo Black (FS 183-107) and micaceous utility (FS 159-39, 159-103).

The plain micaceous utility ware sherds from LA 67321 are characterized by dark gray, brown-gray, and black pastes with abundant mica schist temper. Pastes and surfaces are uniformly dark gray to black. A mica slip is not found, although the highly micaceous pastes result in numerous and visible mica fragments on both surfaces. The sherds are from bowls, jars, and forms that are bowls or jars. All sherds have wall thicknesses of 5 mm or less. Surface treatments include no polish, polished interiors, polished exteriors, polished interiors and exteriors, and smudged and polished interiors. One sherd has light striations on the exterior; another has tool marks from smoothing the interior.

Micaceous vessels exhibiting similar characteristics appear to have been produced by northern Tiwa- or Tewa-speaking Puebloan groups. Hispanic potters scattered throughout New Mexico and surrounding Apachean groups produced similar forms (Kidder and Shepard 1936; Ellis and Brody 1964; Dick 1968; Warren 1980). The distinctive characteristics of the pastes of these sherds indicate this pottery was probably not made by local potters (Carrillo 1997). Franklin (1997) assigns the micaceous pottery from LA 67321 to Nambe-Pojoaque Micaceous. He notes that trade of micaceous “bean pots” from the Tiwa and Tewa pueblos was widespread during the late 1700s and early 1800s, and this pottery was desired by many Hispanic households (Franklin 1997). There are also strong similarities between the micaceous pottery described here and contemporaneous utility ware produced by Tiwa potters at Taos Pueblo and nearby Jicarilla Apaches (Woosley and Olinger 1990; Ellis and Brody 1964). However, these micaceous sherds most closely resemble pottery made by surrounding Apachean groups, and the presence of possible Apachean ceramics at LA 76321 would not be surprising, since an Apache servant is listed in the 1790 census documents for Valencia (Olmsted 1975).

A total of 67 sherds exhibiting highly polished back smudged surfaces were classified as Kapo Black. A single Kapo Black sherd is illustrated in Figure 27. Kapo Black represents one of the dominant Tewa utility ware types produced during the historic period (Harlow 1973; Lang 1997). It is usually tempered with fine tuff sometimes accompanied by mica. Some examples are smudged over a red slip and may take a high polish. The range of paste colors and tempering material combinations indicates that a variety of regional traditions may be represented. Those thought to represent local variants were assigned to the previously described smudged black ware category. Kapo Black sherds identified during the present study are from jars and bowls. Bowl rims include examples with everted, inverted, and straight profiles. Jar rims are exclusively everted. Vessel wall thickness for bowl sherds was recorded at 5 mm or less and 6 to 10 mm. Surface treatment varies by vessel form. All bowls are polished on the interior and exterior, with the exception of one sherd that is too eroded to determine surface treatment. Jar sherds are generally unpolished on the interior but polished on the exterior.

Tewa Black, originally named Kapo Black (Mera 1939), was tall-necked ollas tempered with fine sand, tuff, or pumice. Mera (1939:15) proposed an introductory date in the late 1600s for Kapo Black wares because of their scarcity at Tewa Basin sites between 1680 to 1694. Harlow (1973) suggests an introductory date around 1720 for the production of Kapo Smudged, with village specialization evident by 1760.

Historic Polychrome Types

During the historic period a variety of very well-made and distinctive painted types were made in different regions or Pueblo provinces. By the late seventeenth and early eighteenth century, variation earlier reflected in the distribution of various glaze painted types south of Santa Fe and organic painted white ware types to the north were reflected in the production of pottery exhibiting the distinct characteristics of various matte painted polychrome traditions. It is usually an easy matter to distinguish historic pottery types produced in various areas of the Pueblo world based on characteristics of paste, temper, paint type, and design styles known to have been utilized in different regions (Batkin 1987; Frank and Harlow 1990; Harlow 1973; Mera 1939). These distinctive ceramic traditions partly, but not fully, correspond to groups associated with distinct cultures and languages. The most basic groupings of polychrome types involve the recognition of broadly defined traditions associated with various provinces or districts of the historic Pueblos (Harlow 1973; Mera 1939).

Local Polychromes

Polychrome vessels appear not to have been produced by Hispanic or Isleta Pueblo potters residing in the Valencia area during the eighteenth or first part of the nineteenth century. Thus, the low frequency of polychrome pottery is not surprising. Only one polychrome sherd exhibits a combination of a high-iron paste and sand temper similar to that noted in many of the "local" utility ware sherds, and a white slip with a design executed in a mineral paint. The white slip is fairly thick and well polished and is different from the slips noted in unpainted white-slipped sherds from this site. The design consists of fine hatchures and lines, and treatments and designs are very similar to those described for Zuni Polychrome and definitely exhibit styles and treatments utilized in the western pueblos. It is possible that this sherd is Isleta Polychrome, which was first produced in the 1870s. The production of Isleta Polychrome resulted from the movement of a small group of people from Laguna to a settlement near Isleta (Batkin 1987:190; Ellis 1979, 1983). Laguna women are thought to have taught individuals at Isleta Pueblo how to make this polychrome pottery. Potters who were already making Isleta Red-on-tan and associated utility ware did not employ the new polychrome technique, and those making this new polychrome did not produce red-on-tan wares (Batkin 1987; Ellis 1983). It is possible that this single sherd derived from an Isleta Polychrome vessel produced after 1870. Given the absence of other pottery types and historic artifacts dating after 1880, it is also possible that this sherd may actually reflect an earlier influence by potters from western pueblos. Therefore, this sherd was categorized as *western style local paste*.

Tewa Polychrome Types

A total of 105 sherds were assigned to six Tewa Polychrome types. The Tewa Polychrome tradition refers here to historic pottery known to have been produced at historic Tewa-speaking pueblos residing in the Tewa Basin or upper Rio Grande province as defined by Mera (1939), as well as some pottery from areas to the south strongly inspired by the Tewa Polychrome tradition. Tewa Polychrome types represent the most recent technological development in the evolution of Tewa decorated pottery. Distributions of temper and vessel noted for Tewa tradition polychrome types are presented in Tables 18 and 19.

Sequences for this tradition are known from investigations in areas north of Santa Fe, including the Tewa Basin, Pajarito Plateau, and Chama Valley. The Tewa series represents a long-lived tradition of painted white ware pottery manufactured from clays derived from local alluvial and ash deposits. These clays are characterized by a high iron content and fine tuff or ash inclusions (Fallon and Wening 1987; Harlow 1973; Wendorf 1953). The earliest common type in the Tewa series is Kwahe'e Black-on-white, which is distinguished from later types by Pueblo II design styles executed in mineral paint (McNutt 1969; Mera 1935). A shift to the use of Pueblo III design styles executed in organic paint occurred during the early Coalition period in about A.D. 1200 and is reflected by the production of Santa Fe Black-on-white (McNutt 1969). The manufacture of organic-painted white wares continued in areas north of Santa Fe into the Classic and protohistoric periods with the production of Biscuit Ware and Sankawi Black-on-cream (Mera 1934). A single sherd from Valencia exhibiting Tewa paste and organic paint was classified as Biscuit B. These types are often represented by thick, light, fine tempered forms. Pastes and slips are similar to those noted in later Tewa polychrome types.

Sometime during the late seventeenth century, polychrome pottery exhibiting pastes, temper, and paint combinations characteristic of earlier Tewa series types were produced. The production of organic-painted polychrome vessels in the Tewa Basin began with the production of Sakona Polychrome and Tewa Polychrome, which are distinguished from earlier types by red-slipped areas on the lower part of the vessel and in some cases red matte paint along with black organic paint. Tewa Polychrome types dating to the late eighteenth and early nineteenth century include Ogapoge Polychrome and Powhoge Polychrome (Frank and Harlow 1990).

While vessels that would be assigned to early Tewa Polychrome types were mainly produced in the Tewa Basin north of Santa Fe, a similar technological and stylistic pottery tradition spread to other pueblos during the early eighteenth century. This phenomenon is reflected by the production of pottery with characteristics of Tewa polychrome pottery at Keresan pueblos such as Cochiti and Santa Domingo, as well as at Pecos Pueblo (Harlow 1973; Mera 1939). Potters in such areas utilized locally available alluvial tuff or ash sources that were similar to those employed in the Tewa Basin, so that in many cases it is very difficult to separate locally produced Tewa Polychrome forms from those originating at pueblos in the Tewa Basin. Still, in at least some cases, slight differences in the way different groups adapted this basic technology allow for distinguishing pottery produced in the Tewa Basin from Tewa copies made at pueblos in other regions.

During the present study, pottery exhibiting a combination of red alluvial pastes, fine tuff temper, organic paint, and cream and red slips were assigned either to types of the Tewa Polychrome tradition or categories assumed to reflect Tewa copies produced at Keresan pueblos. While attempts were made to distinguish actual Tewa types from the southern varieties, this was not always possible on a sherd-by-sherd basis. Thus, in retrospect, the categories used in the present study represent sometimes flawed attempts to document a range of pottery that includes both intrusive Tewa Polychromes and variations on this tradition. Sherds exhibiting distinct painted styles were assigned to previously defined temporally sensitive types. Examples where such styles were not represented were assigned to grouped types based on the combination of paste and surface traits.

Ogapoge Polychrome was assigned to four sherds with treatments and design styles typical of eighteenth-century Tewa Polychrome types. All of these sherds are tempered with fine tuff. Three sherds are from bowls, and one is from a soup plate. Sherds assigned to this type (Fig. 28) are usually recognized by the mutual incorporation of decorations in black organic and red matt paint as the integral part of the painted decoration (Mera 1939). Designs include connecting lines, large solid designs such as triangles, and feather motifs. This type is thought to have been produced between 1725 and 1800.

Powhoge Polychrome exhibits a buff to cream slip and bold heavy geometric designs filling in the wide areas covering most of the vessel between framing lines (Figs. 28 and 29). All six sherds assigned to this category were tempered with tuff. Five are from bowls, and one is from a jar. Paint is usually a single color, so that the vessel is a polychrome solely in the use of a red slip on the rim top and in a band below the lowest framing lines. Designs often consist of interlocking solid triangles, diamond cross hatchures, and elliptical designs. Interiors of bowls often display elongated triangles over the entire surface. On jars, red decorations on the rim extend over the lip to form a band on the outside. A white slip, which is soft and crazed, dominates the upper vessel. This type was produced from about 1760 to 1900. In retrospect, there is considerable overlap in styles and attributes of pottery assigned to Powhoge Polychromes and other types, including presumed southern variation of this tradition. Examples of possible nonlocal stylistic forms placed into this type include those illustrated in Figure 29.

Tewa Polychrome, undifferentiated, includes painted sherds from polychrome vessels with pastes indicative of the Tewa tradition but not exhibiting enough design to determine the specific type. These sherds have a buff paste and various combinations of cream and red slips. Finally, 41 sherds displaying pastes, slips, and treatments similar to but outside of the range noted in the Tewa Polychrome types were assigned to Tewa Polychrome, southern variation. This category essentially served as a catchall to categorize Tewa-like sherds that appeared slightly different from sherds normally found at sites in the Tewa Basin. One characteristic used to place sherds in this category is a brownish paste clay that is denser than those normally encountered in Tewa Polychrome types. Such pastes often appear with slips just outside the Tewa norm. These include light slips on the painted surfaces that appear to be thinner and darker than those encountered in sites in the Tewa Basin. Red exterior slips also appear thin with striations. Several sherds with such pastes and slips also display designs representing stylized forms that are clearly different from those noted on most Tewa Polychrome types. Examples of sherds assigned to this category are illustrated in Figure 29. Some of the sherds assigned to this category may represent Kiua Polychrome, produced by Keresan potters at Santa Domingo and Cochiti (Harlow 1973; Frank and Harlow 1990), while others may represent Tewa copies produced at other pueblos. Sherds exhibiting paint treatments described for Powhoge Polychrome and pastes described for the southern Tewa variation were assigned to Powhoge style, southern variation (Fig. 30).

Historic Puname-Area Painted Wares

A total of 18 sherds were assigned to four types in the Puname tradition. The Puname district refers to the general area of present day Zia and associated pueblos where distinct matte-mineral painted polychrome pottery was produced historically. The Puname district, as

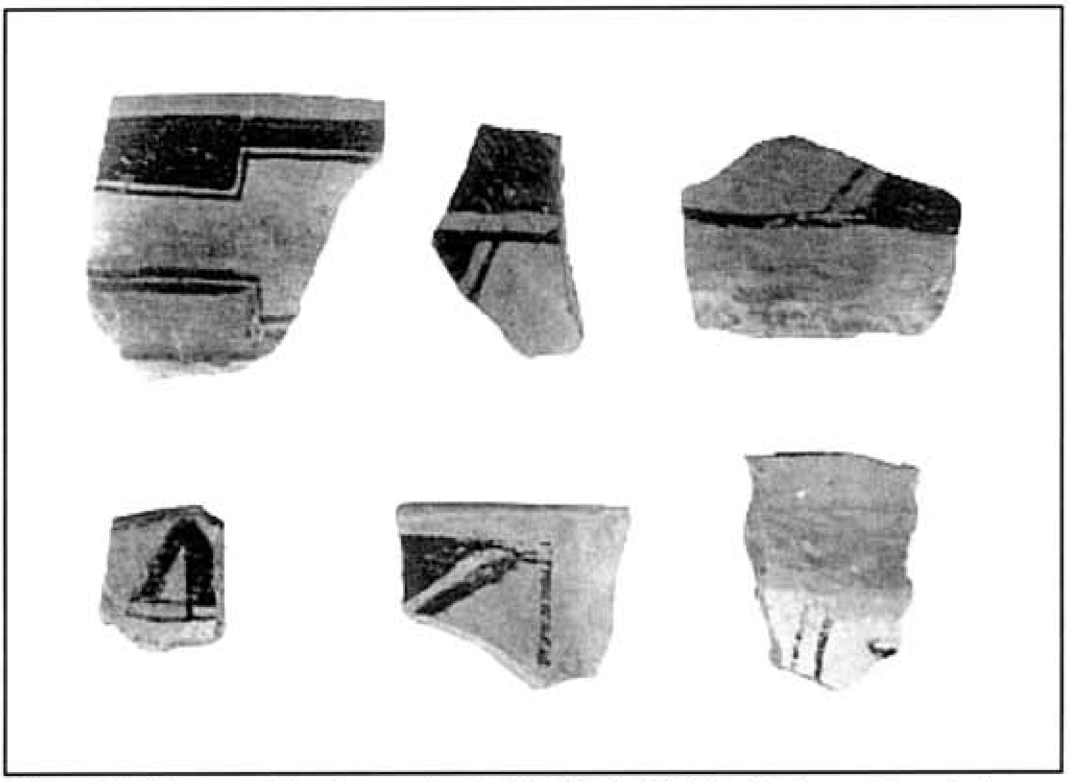

Figure 28. Ogapoge Polychrome sherds (FS 102-5, 165-47); Powhoge-style polychrome (FS 159-101, 159-102, 159-87, 159-99).

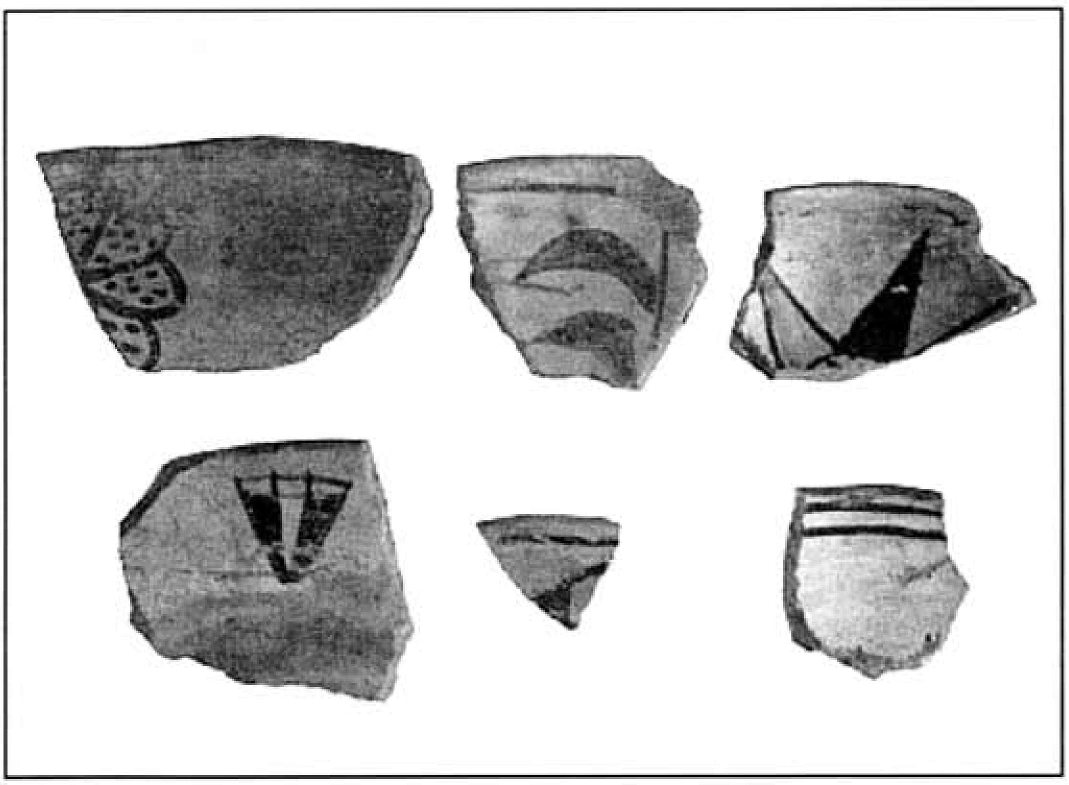

Figure 29. Powhoge Polychrome (FS 159-144, 179-34, 159-78, 159-86); Tewa Polychrome, undifferentiated (FS 183-100, 159-88).

where distinct matte-mineral painted polychrome pottery was produced historically. The Puname district, as commonly defined, corresponds in part with the middle Rio Grande district as defined by Mera (1939). As defined here, the Puname tradition includes pottery produced by the Pueblos of Zia and Santa Ana. In this area, the use of iron-based matte paint in black and red began sometime around 1700, replacing the glaze paint that had been used for the previous 400 years (Mera 1939). Mineral-painted pottery produced in this area is distinguished from that originating in the Keresan region to the north and the Tewa Basin region to the south by the use of matte mineral instead of organic paint and by the distinctive shape of the polychrome olla (Mera 1939). Distributions of temper and vessel noted for Puname Polychrome types are presented in Tables 20 and 21.

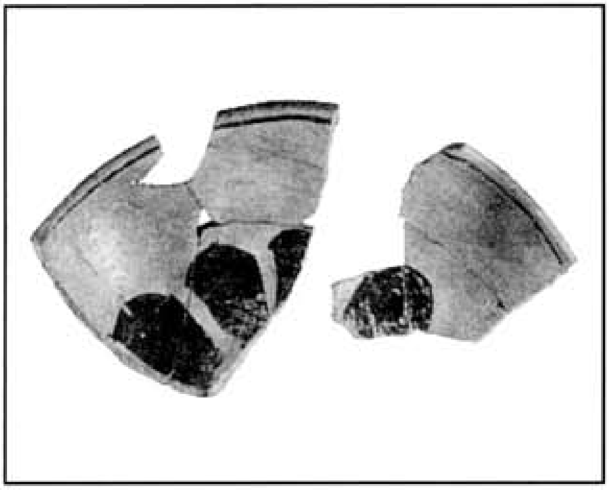

Figure 30. Southern Powhoge-style polychrome (Vessel 2, FS 160-24 and 160-25).

The earliest Puname ceramics are characterized by a reddish-brown paste, basalt temper, and a tan slip. Puname pastes may fire red to orange to tan and some have a dark grey cores. The tan slip is generally dull, rough, and unpolished. Vessel forms are distinctive and have a low, wide underbody bulge and short neck (Harlow 1973).

Puname Polychrome is characterized by a white polished slip, a red-slipped underbody or band, and mineral-painted designs that are often filled with a red or reddish-yellow paint. This type typically displays a reddish-brown to yellowish-red paste and black diabase basalt temper. The white slip covers most or all of the vessel, and the red slip, when present, is a band on the underbody or covers the underbody. Puname has been found at sites dating as early as the late seventeenth century and is common by the mid-1700s (Batkin 1987). In the Cochiti area, Puname was a major trade ware during the late 1700s and dates from 1680 to 1780 (Warren 1977).

Designs occur in paneled bands or in an all-over patterns on the upper part of the vessel and are framed above and below with parallel lines with line breaks. Paneled designs on the upperbody are separated by double vertical lines. Red matte-painted arcs on the midbody bulge are diagnostic features. Design elements include opposing geometric elements, arcs, feathers, and keys. On bowls, designs include a row of circular arcs on the interior below the rim and recurrent feather symbols. Rim lips are painted red, and the red often extends into the interior vessel wall. Bowl forms are rare and have a rounded underbody, with simple designs on the slipped vertical area. Five sherds exhibiting these pastes, temper, and designs were classified as Puname Polychrome. Examples of Puname Polychrome sherds are illustrated in Figure 31. A total of six sherds with similar pastes but without distinct designs were classified as *Puname-area polychrome*. In addition a single sherd with Zuni or Acoma style designs was assigned to *Puname-area western paste*.

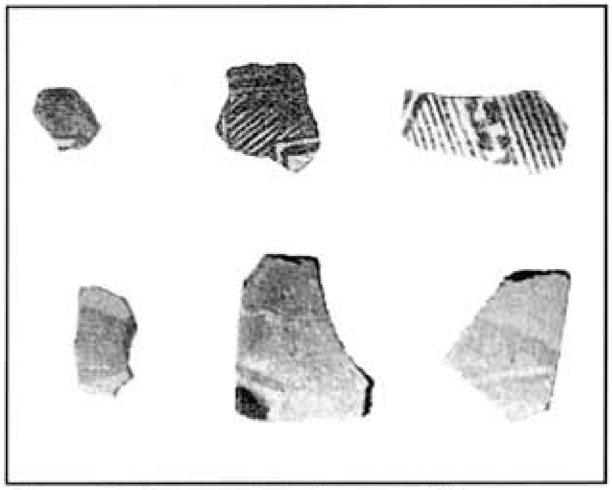

Figure 31. Puname Polychrome and Puname-area polychromes (FS 166-59, 116-1, 166-42, 113-20, 165-43).

In the 1700s, the historic pueblo of Santa Ana (Tamaya) moved from the Jemez River near Zia to farming lands along the Rio Grande (Batkin 1987). At this time, Santa Ana potters switched from crushed basalt temper to sand obtained from the Rio Grande. Santa Ana pottery typically contains abundant sand temper in paste colors ranging from beige to orange or gray, and vessels are decorated with black and red mineral-painted designs. *Santa Ana–area polychrome* was assigned to six sherds with manipulations and styles similar to those described for Puname Polychrome. These sherds contain sand or sand and tuff temper in a variety of paste colors. In general, surfaces are not well polished, and the white slip appears pinkish-white, white, or cream and is crackled or flakes off the surface. The red slip is thick, smooth, and better preserved. The black mineral paint fires true black but is light on some sherds and dense black on others. The red mineral paint fires reddish-brown and consistently flakes off the surface, obscuring the design elements.

Western-Area Historic Painted Ware

A total of 57 sherds were assigned to eight western Pueblo matte-painted ceramic types. The production of matte paint polychrome vessels began in the Acoma, Laguna, and Zuni areas sometime after the Pueblo Revolt in 1680. Pottery produced at these pueblos is characterized by the use of sherd temper and low-iron pastes and designs executed in black and red paint. Polychrome types originating at these western pueblos appear to be the dominant Pueblo polychrome type at eighteenth and nineteenth century Hispanic sites in the Rio Abajo (Marshall and Marshall 1992; Marshall and Walt 1984). Distributions of temper and vessel forms for western polychrome types are presented in Tables 22 and 23.

I had difficulty assigning sherds to specific western types defined for various pueblos. Combinations of yellow surface color and designs noted on larger sherds are indicative of pottery produced at Laguna or Acoma Pueblo (Figs. 32 and 33). Styles associated with pottery assigned to this tradition are most similar to those described for Ako Polychrome.

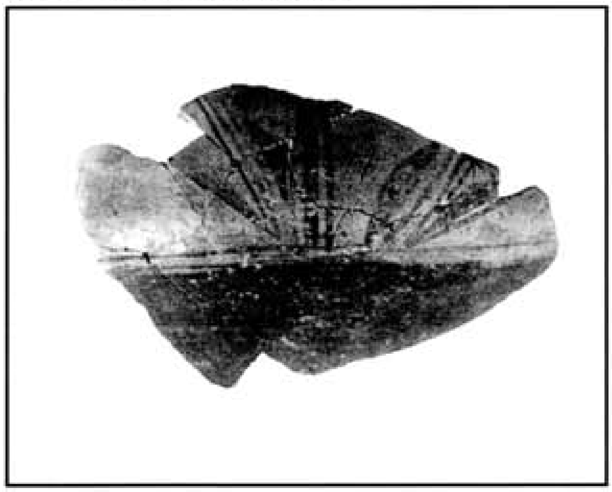

Figure 32. Acomita Polychrome olla (Vessel 4, FS 113-32).

Other sherds are probably from polychrome vessels exhibiting similar western pastes but do not have designs warranting their placement into specific types (Fig. 34). Categories into which such sherds were places included *western-area matte painted undifferentiated, western-area (unpainted), western-area mineral-on-white, western-area red rim white slip, western-area red slip unpainted*, and *unknown yellow polychrome*.

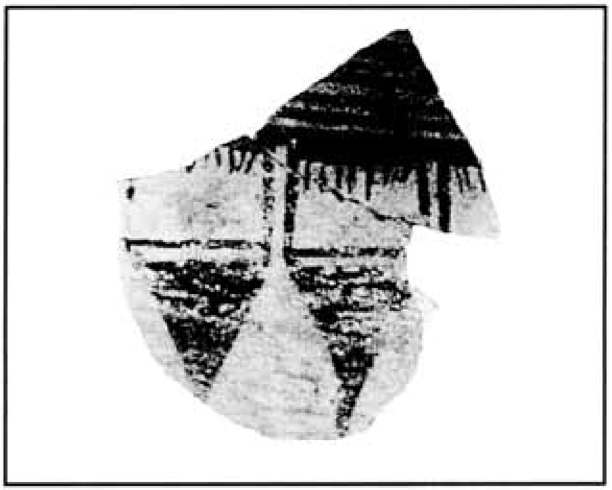

Figure 33. Acomita Polychrome olla (FS 112-21).

Figure 34. Western-area polychromes (FS 112-37, 167-76); Acomita Polychrome (FS 155-2).

One sherd has black-on-red mineral polychrome on a yellow surface. The paste and decoration are similar to that of Jeddito Yellow Ware, produced historically on the Hopi Mesa. This sherd, however, is tempered with large igneous rock fragments distinct from that found in Jeddito Yellow Ware. Thus, this sherd was assigned to *unknown yellow polychrome*. Still, the basic technology appears to have been strongly influenced by potters to the west.

Ceramic Dating

Ceramic types from LA 67321 indicate material derived from two widely separated periods. The earliest of these is represented by scattered early utility ware (12 sherds), white ware (40 sherds), and a few glaze ware sherds. The Aqua Fria Glaze-on-red and Heshotauthla Glaze-on-red sherds appear to overlap temporally with vious investigations of this site (Franklin 1997). Dated prehistoric types from this site include corrugated forms, Las Lunas Smudged, Reserve Smudged, Kwahe'e Black-on-white, Puerco/Escavada Black-on-white, Tularosa Black-on-white, Socorro Black-on-white, Santa Fe Black-on-white, Galisteo Black-on-white, and Aqua Fria Glaze-on-red. This combination of prehistoric types is from components dating between A.D. 1150 and 1350. Sherds representing early types are scattered throughout various stratigraphic units. The total frequency of these early sherds is extremely low for all contexts, suggesting their presence is a result of secondary deposition from nearby sites. Components dating to this time are well represented at nearby Valencia Pueblo (LA 935), where a major occupation dominated by Glaze A and associated types is represented (Franklin 1997). Secondary deposition of pottery from Valencia Pueblo and similar sites is not surprising, because LA 67321 was regularly exposed to extensive floodplain wash and plowing.

There seems to be a general absence of pottery types dating between A.D. 1400 and 1680. A possible exception is the glaze ware types, which include types made from A.D. 1325 to the early 1700s (Franklin 1997; Kidder and Shepard 1936; Lambert 1954; Mera 1933; Shepard 1942; Warren 1979). Most of the glaze ware sherds identified during the present study, however, represent forms produced very early or late in the glaze sequence, and, in general, a long gap in deposition is indicated. Thus, Aqua Fria Glaze-on-red represents pottery associated with the prehistoric component, sometime in the late thirteenth and early fourteenth century. Much of the remaining glaze pottery displays a very drippy and bubbly surface commonly associated with the latest glaze forms. A single sherd classified as Biscuit B could also date to the period between the two occupations, although it is possible this sherd may have been derived from a Tewa Polychrome vessel associated with the historic occupation.

The dominance of late Spanish Colonial and early Territorial period ceramics at LA 67321 is certainly supported by historical records. Documents from the period confirm that three large land grants were made in the area in the early 1700s, but these areas do not include LA 67321. The great majority of native pottery types indicate a historic Hispanic occupation dating from sometime during the eighteenth century to the first half of the nineteenth century, and evidence in the form of historical records and artifacts indicate that the main use of this site occurred between 1770 and 1830. However, the presence of late glaze ware types could indicate an occupation sometime in the very early part of the eighteenth century. The great majority of the pottery from Valencia represents utility types such as Carnue Plain utility and Isleta Red-on-tan, made by Hispanics or Pueblos residing in the area or at the nearby Pueblo of Isleta. Dick (1968) estimates that Carnue Plain utility dates from 1700 to the late nineteenth century. Isleta Red-on-tan is dated from about 1700 into the early twentieth century (Batkin 1987; Franklin 1997). A similar temporal span is represented by other utility types from this assemblage, such as Kapo Smudged and Micaceous Plain utility. Although sherds from local slipped white ware were noted, the general lack of Isleta Polychrome suggests this component was abandoned prior to the production of this type in 1870 (Batkin 1987).

Intrusive polychrome pottery is represented by the types associated with a number of areal traditions, including Ogapoge Polychrome, Powhoge Polychrome, Puname Polychrome, and Acomita Polychrome. Similar combinations of pottery have been noted at Hispanic sites spanning much of the middle Rio Grande region (Bargman 1997; Brody and Colburg 1966; Carrillo 1997; Dick 1968; Ferg 1984; Hurt 1996; Hurt and Dick 1946; Marshal and Walt 1984; Mensel and Wilson in prep.). The general absence of later tourist decorated forms produced after the coming of the railroads in the late 1880s further suggests that the historic occupation dates prior to this time, although one would not necessarily expect such forms to have been commonly traded to the inhabitants of a Hispanic village. An ending date prior to the Territorial period is further supported by the sparseness of European pottery relative to native types, because this material increases with the beginning of the Santa Fe Trail and becomes even more predominate with the coming of the railroads. Snow (1973b) notes Pueblo pottery sherds comprise 78 percent of the total from Hispanic sites occupied between 1800 to 1850 and about 39 percent at sites occupied between 1850 to 1900. The very low frequency of European pottery, when combined with native pottery (1.9 percent), supports a date in the late eighteenth or early in the nineteenth century for LA 67321.

While similar ceramic types are associated with the entire historic occupation of this site, the recovery of large amounts of pottery from two distinct stratigraphic levels allows for the examination of short-term changes in pottery frequencies associated with this occupation. Ceramic distributions for the 2,020 sherds from the stratigraphically higher east upper cultural stratum (Stratum 3) and the 1,827 sherds from the east gleyed stratum (Stratum 6) units were compared. During initial interpretations of ceramics in these units, there was some question of which layer was earlier, since the upper material was deposited in alluvium. Tables 24 and 25 illustrate the distribution of ceramic types and groups in the proveniences.

While assemblages associated with the east upper cultural and east gleyed units are similar, some interesting differences were noted in the frequencies of associated ceramics. The overall frequency of prehistoric utility and prehistoric white ware types is almost identical in the two different stratigraphic units. In contrast, the frequency of glaze wares in the east gleyed unit is almost three times higher than noted in the east upper cultural unit, although given the small sample size, this difference is not very significant. A higher frequency of the glaze forms from the lower unit have runny and poorly executed glaze paint, common in later glaze ware vessels. This indicates that the lower level is earlier, rather than that the stratigraphy is reversed. If this is the case, other differences may be interpreted in terms of changes from the earlier lower to later upper units. The ceramics from the latest-dating portion of the site, the south area, are more similar to and thus support a later date for the east upper cultural unit.

In the sample of local plain ware types, there is a slightly higher frequency of Carnue Utility in the east gleyed unit and higher frequency of buff/tan utility in the east upper cultural unit. Even more dramatic are differences in local slipped types. The frequency of slipped white wares (Valencia White) is much higher in the lower units, and the frequency of red slipped (Isleta Red-on-tan) is over twice as high in the east upper cultural unit.

Differences were also noted in the frequency of types associated with different polychrome traditions in assemblages from the two main stratigraphic units. The frequency of organic-painted "Tewa" polychrome sherds from the east gleyed unit is four times higher than that noted for the east upper cultural unit. The frequency of sherds assigned to western polychrome types from the east upper cultural unit was almost three times higher than those in the east gleyed unit. Thus, a decrease in the number of Tewa polychromes and increase in western polychromes are found in these two units.

Ceramic Patterns of Historic Occupations

For the sample of historic native pottery types, ceramic distributions are used to examine patterns reflecting ethnicity, resource use, production, and exchange. Attempts are made to present data in a manner allowing the examination of trends and relationships between behaviors associated with various phenomenon. For example, perceptions of ethnic identity may influence both the choice to make pottery in a given setting and the technological and decorative conventions employed. These choices are also influenced by the availability, quantity, working qualities, and constraints of local clay, temper, and pigment sources. Another factor influencing forms of pottery produced are economically related functional requirements of vessels forms employed in daily activities. The desirability or need for vessel forms produced elsewhere may also have contributed to the movement of pottery between groups, and the nature of this interaction may be further influenced by social or ethnic perceptions.

Ethnicity and Production

Issues of local pottery production and ethnicity of the potters are closely related and may be partly addressed through a characterization of the 93.4 percent of the pottery from LA 67321 assigned to one of six "local" plain ware types. It is a very basic yet tricky problem to determine whether or not pottery was produced by the local "Hispanic" occupants of eighteenth- and early nineteenth-century settlements in central and northern New Mexico. While it is generally agreed that vessels produced by Pueblo potters in various regions were widely traded into Hispanic communities, there is a considerable range of opinion as to whether non-Indian potters produced significant amounts of pottery during the eighteenth and nineteenth centuries (Carrillo 1997; Dick 1968; Ferg 1984; Franklin 1997; Hurt and Dick 1946; Levine 1990; Snow 1984; Warren 1979).

Production of vessels representing several utility ware types is postulated to have taken place at non-Indian communities along the Rio Grande from El Paso, Texas, to the New Mexico border (Carrillo 1997; Dick 1968). Pottery thought to have been produced by "Hispanic" individuals residing in various settlements include unpolished utility ware, red-on-tan/brown, polished smudged, and micaceous types (Carrillo 1997; Dick 1968; Levine 1990). Much of the disagreement concerning the clarification of certain pottery as Hispanic in origin hinges on their definitions. For example, while acknowledging there is evidence that pottery was made at Hispanic settlements, Snow (1984) notes that the low status of pottery production associated with class distinctions prevented most Hispanics from taking up pottery making. He feels that pottery made at such villages in Spanish Colonial New Mexico was almost always made by Indians residing in Hispanic settlements or by poor Hispanic women temporarily supplementing their income. Snow feels that documented cases of pottery making by Hispanic potters represents the temporary adoption of Pueblo technologies to supplement incomes, and he does not believe such incidence represents a true pottery tradition passed from one generation of potters to the next. The majority of pottery produced at settlements considered Hispanic is assumed to have been produced by Indian servants or hispanicized Indians that made up many of the settlements along the southern and northern frontiers of areas of Spanish Colonial New Mexico (Dozier 1970). Regardless of the ethnic identity of these potters, it very likely that significant amounts of pottery were produced in non-Indian settlements throughout most of Spanish Colonial New Mexico, particularly in areas of the middle Rio Grande abandoned after the Pueblo Revolt. It is also clear that regardless of the ethnicity of individuals making this pottery, the pottery produced at various communities was manufactured to fulfill the needs of non-Puebloan settlers, including those that may have been considered Hispanic, Indian, or *genízaros*.

Pottery produced at Hispanic settlements appears to have become more important during the late Spanish Colonial period. While pre-existing pueblos appear to have supplied almost all of the pottery needs of the first wave of Spanish colonists into New Mexico, intermarriage and acculturation eventually resulted in pottery making becoming an integral part of Hispanic subsistence (Levine 1990). The pottery traditions practiced at various Hispanic settlements were introduced by Puebloan potters and technologically best considered a part of a greater historic Puebloan-derived pottery tradition.

One pottery making technology that has been documented at a number of Hispanic settlements in the Rio Abajo has been described in the terms of a Carnue tradition (Marshall and Marshall 1992; Marshall and Walt 1984). This tradition is reflected in a complex of related pottery types assigned during the present study to various “local” plain ware types, including Carnue utility, Isleta Red-on-tan (or Casitas Red-on-brown), and Valencia White. Plain wares of this tradition are represented by sherds derived from a wide range of types. Thus, plain wares would have been used for the full range of activities for which pottery was required, and in general, there appears to be very little relationship between ware group and vessel form. The definition of this tradition is of particular interest because it seems to encompass a range of plain ware types similar to those noted at LA 67321 and may indicate a common tradition shared by individuals in Hispanic and Pueblo settlements in areas of the middle or lower Rio Grande Valley.

While most of the pottery types associated with this complex are similar to those produced at various Keres and Tewa pueblos to the north, the overall combination of pottery forms associated with this complex is distinct. One unique aspect of this complex appears to be the absence of locally produced Pueblo polychrome vessels. In addition, pottery assigned to Valencia White during the present study appears to be distinct from any contemporaneous forms produced at these Keresan or Tewa pueblos. In contrast to Puebloan decorated forms, Valencia White is dominated by soup-plate and bowl forms, and very few jars are represented. Forms associated with Valencia White, however, closely resemble those noted in majolica forms produced in the Valley of Mexico (Lister and Lister 1982). There is a particularly strong resemblance between Valencia Slipped White and majolica categorized as Mexico City white ware (Lister and Lister 1982). Mexico City white ware was produced concurrent with the finer-grade decorated majolica types and represents the production of less varied and not as well made dishes for poorer customers (Lister and Lister 1982). This type is characterized by a white glazed surface with either no or limited decoration. Some illustrated examples of Mexico white ware (Lister and Lister 1982:25-26) exhibit broad decorative bands near the rim, like Valencia White and Tewa Polychrome.

Thus, Valencia White appears to have been inspired by the undecorated forms of majolica produced in Mexico City. The acquisition of this effect required the very simple addition of white clay, which was probably locally available, though scarce, for local Pueblo-derived technological forms. This simple addition of a white slip on bowls and soup plates would have certainly been desirable to individuals unable to obtain satisfactory amounts of higher-status majolica. These trends do tend to support a ceramic tradition of Pueblo origin that was subsequently modified to meet the needs of non-Puebloan individuals of various ethnicities for whom goods of Spanish origin or association may have been of particular value. Thus, Valencia White could be considered the ultimate “poor man's majolica” and was probably aimed at a market of poor Hispanics. Ceramic distributions from the two main stratigraphic deposits indicate that Valencia White is much more common in the earlier deposits. This may indicate that the production of this form of pottery declined through time and disappeared by the late nineteenth century. The decline of Valencia White corresponds directly with a dramatic increase in the total frequency of Isleta Red-on-tan and may indicate that white-slipped vessels were gradually replaced by red-on-tan forms. Pastes, vessel forms, and even location of slipped areas of red-on-tan vessels continued to be similar to those occurring on earlier slipped white vessels, so that this shift simply reflects a change in the type of slip used. Red-slipped forms such as Isleta Red-on-tan, San Juan Red-on-tan, and Casitas Red-on-brown continued to be produced by both Pueblo and Hispanic potters over much of New Mexico during the nineteenth century and were probably used for the same tasks for which white-slipped vessels had been used previously.

The assignment of a Hispanic tradition to the pottery from LA 67321 is complicated by the production of similar pottery at the nearby Pueblo of Isleta (Batkin

1987; Ellis 1979; 1983; Parsons 1928). During his examination of pottery from LA 67321, Franklin (1997) attempted to deal with issues of ethnicity and production by ascribing the production of Carnue Utility to Hispanic potters and that of Isleta Red-on-tan to Tiwa-speaking potters at Isleta Pueblo, located 8 km away (Franklin 1997). Differences in the paste and temper in these two pottery forms were interpreted as evidence of production by distinct groups in different locations. It is also possible, however, that vessels representing these two types were produced by the same potters. Pottery described by Ellis (1979, 1983) as produced at Isleta Pueblo includes forms resembling both Carnue Utility and Isleta Red-on-tan, as described during the present study. In addition, the common occurrence of Carnue Utility and Casitas Red-on-brown at Hispanic sites in the Rio Abajo, a significant distance from contemporaneous pueblos (Marshall and Marshall 1992; Marshall and Walt 1984), can be assumed to reflect the production of similar plain utility and red-on-brown (tan) forms by potters residing in Hispanic settlements. The rejection of the idea of ceramic production at Hispanic communities implies that the tremendous amounts of utility ware pottery used at Hispanic sites in areas south of Albuquerque in the Rio Abajo district were produced at Isleta Pueblo or another pueblo where similar pottery was made. There is, however, no evidence of such a role for Isleta Pueblo during the historic period. It is more likely that similar plain unpolished gray ware and red-on-tan vessels were produced by potters in Hispanic communities and at Isleta Pueblo. Thus, potters residing at both Isleta Pueblo and Hispanic settlements along the Rio Grande between Albuquerque and Socorro produced similar forms of pottery and represent closely related pottery traditions.

Sharing a similar pottery tradition between different ethnic groups is not that surprising. Similar situations have been noted for other southwestern peoples, including the production of similar polychromes at the Pueblos of Laguna, Acoma, and Zuni and of similar yellow wares at the Hopi Pueblos and Hano. One of the most striking examples of similar pottery produced by distinct groups is reflected by the production of micaceous utility wares by Taos Pueblo and Jicarilla Apache potters. Both groups occupied areas of the Taos Valley from about 1700 into the first decades of the nineteenth century (Woosley and Olinger 1990). It appears that Jicarilla Apaches first learned pottery making from Taos potters living among them sometime between 1600 and 1700. By 1700 Jicarilla Apache potters began producing significant amounts of micaceous pottery vessels (Woosley and Olinger 1990). Soon after that, potters in Taos modified their ceramic technology and began producing similar micaceous vessels. Archaeologists have long noted the similarities between micaceous wares assumed to have been produced by Apachean and Puebloan potters and have struggled to differentiated pottery produced by the two groups (Brugge 1982; Opler 1971; Snow 1984; Woosley and Olinger 1990).

Thus, the previous example indicates that ethnic or language differences were often not a barrier to the transfer of ceramic technology from one group to the next. Both archaeological and ethnographic evidence indicates that similarities in ceramic types produced by groups is more the result of availability of similar resources such as those shared by the Pueblos of Acoma and Zuni, the Hopi Pueblos and Hano, and the Jicarilla Apache and Taos Pueblo. Information relating to pottery production would have easily been transferred though trading or marriage partners belonging to different ethnic groups. Such interaction would have been advantageous to the diverse groups residing at the margins of the Rio Grande settlements, where the sharing of common resources and defense was critical.

Likewise, groups residing at Hispanic settlements and Isleta Pueblo along the middle Rio Grande floodplain had access to very similar sandy clays. These similarities in resources would have encouraged the spread of a similar Carnue ceramic tradition adapted to the clays and temper sources occurring along the middle Rio Grande floodplains. These sources consist of high-iron clays with silt and sand inclusions. Both the coarse and fine sand common in local pottery types would have been available locally as sediments derived from sandbars in the Rio Grande and inclusions in alluvial clays. It likely that pottery assigned here to Carnue Utility and Isleta Red-on-tan could have been produced by potters residing at Valencia and nearby Hispanic settlements as well as at Isleta Pueblo. Differences in wares may reflect the use of slightly different sources in the production of pottery types used for different purposes. Minor variation in local clay and sand resources found along these floodplains may be reflected in the differences in sand size and paste color noted between Carnue Utility and Isleta Red-on-tan. The only difference in pottery produced by these two groups may be the production of Valencia White at Hispanic settlements.

Exchange

The utility wares and polychrome types associated with various regional traditions may also be used to examine issues relating to exchange and interaction with pueblos other than Isleta. Nonlocal plain utility ware types represent 1.6 percent of the sherds from this site. These include Kapo Black ceramics produced in the Tewa Basin or at other pueblos influenced by this technology. The micaceous utility wares are very distinctive and represent vessels probably produced by Apaches or Tewa pueblos.

Sherds derived from polychrome vessels are represented by a number of types belonging to three distinct traditions. The most common polychrome group has tuff temper, buff and red slips, and decorations in organic paint characteristic of Tewa Polychrome and related southern traditions. A total of 2.0 percent of all sherds or 58 percent of all polychrome sherds from LA 67321 were assigned to Tewa-style polychrome types. While types assigned to Tewa-style polychromes were initially assumed to have been produced at Tewa pueblos north of Santa Fe, variation in this pottery probably indicates origins in several distinct locations. While some of the Tewa Polychrome types examined during the present study do exhibit pastes and treatments identical to those found in pottery produced at the northern Tewa pueblos, other examples exhibit pastes, unusual painted decorations, and thin smeared slip treatments that tend to be rare at sites from the northern Tewa area. Some of the sherds exhibiting these characteristics were assigned to a Tewa Polychrome southern variety category. It is likely that many of these represent sherds from Kiua vessels produced by potters at the eastern Keresan pueblos of Cochiti or Santo Domingo. My confidence in such assignments varies greatly from sherd to sherd. While it is impossible to determine the frequency of sherds from organic paint polychrome vessels produced by northern Tewa versus eastern Keresan potters, a comparison of the Tewa-style polychrome pottery from LA 67321 to those from contemporaneous sites indicates it is very likely that pottery derived from vessels produced at both eastern Keresan and northern Tewa pueblos are represented. Based on such comparisons, my guess is that the majority of sherds assigned to these types were probably from vessels produced at Keresan pueblos.

The next most common group represented by sherds from polychrome vessels are those assigned to western polychrome types. These were identified by white paste, sherds temper, and designs executed in red and black paint and include pottery that was produced at Laguna, Acoma, and Zuni Pueblos. A total of 1.0 percent of all sherds or 31.5 percent of all polychrome sherds were assigned to western Pueblo types. Characteristics of some of these sherds, particularly those assigned to Acomita Polychrome, indicate they probably originated at the Keresan villages of Acoma or Laguna rather than Zuni.

The other polychrome group is represented by sherds of the Puname tradition produced at the Keresan pueblos of Santa Ana and Zia. A total of 0.3 percent of all sherds or 9.9 percent of all pueblo polychrome sherds were assigned to western Pueblo types. Ceramics associated with this tradition are characterized by red paste clays covered by a white slightly polished slip and painted decorations in black and red designs in Puname style. Pottery thought to have originated from Zia Pueblo is distinguished from those probably produced at Santa Ana Pueblo by the presence of basalt versus sand temper.

Pottery frequencies in the two main stratigraphic units at LA 67321 indicate a shift in exchange patterns. The great majority of the polychrome sherds from the earlier unit represent Tewa or Tewa-like types from eastern Keresan or northern Tewa pueblos, while the majority of polychrome pottery in later units are western Pueblo types. Frequencies of Puname polychromes are similarly low in both units. Thus, there appears to have been shift in areas from which polychrome vessels were acquired: first from eastern Keresan or northern Tewa pueblos, and later from western Keresan or Zuni pueblos to the west.

Conclusions

In summary, ceramic data from LA 67321, for the large part, supports previous archaeological and historical assessments of this site. A very low proportion of the ceramics is prehistoric, probably dating to the thirteenth century. This pottery appears to be very similar and contemporaneous with pottery associated with the earliest use of the site area (Franklin 1997).

The great majority of pottery from LA 67321 appears to be associated with a late Spanish Colonial period Hispanic occupation dating to the late eighteenth to early nineteenth century. Determining the area of origin and ethnic groups associated with this pottery was very difficult. It appears that most of the pottery was produced by local Hispanic or nearby Isleta potters, although pottery produced by northern Tewa, western Pueblo, and Apache groups was also identified. The recognition of a slipped white ware reflecting pottery produced by or for the Hispanic occupants at LA 67321 resulted in the definition of a new type referred here and Valencia White. This type appears to have gradually been replaced by red-on-tan pottery that may have been produced at Isleta Pueblo. Examination of frequencies of various polychrome types also appear to indicate a shift in trade that was first dominated by eastern Keresan or southern Tewa groups to the north to one dominated by western Pueblo groups.

Partially Reconstructed Vessels

While previous discussions focus on distributions of sherds, a total of seven partially reconstructed vessels were recovered. Data recorded from these vessels provides some information concerning basic form and style of the pottery vessels represented.

Vessel 1 (Fig. 18) is of two separate portions of a glaze-on-red olla. The exterior of the vessel and a portion of the interior below the rim has a dark red slip. The exterior slip is thicker, and the interior slip is streaky. This vessel is decorated with a glaze paint that varies from clear to greenish brown. The paint is very thick, bubbly, and runny. Decorations consist of a series of thick lines, including a single line near the rim that encircles the vessel. Low on the vessel are a series of nested parallel triangular lines. The rim is thick and slightly everted. Vessel wall thickness is consistent, about 6 mm. The paste cross section is red on the outside and dark gray on the inside. Recovered rim sherds measure 120 degrees in arc and 8 cm in radius. Temper consists of crushed hornblende latite.

Vessel 2 (Fig. 30) is a historic polychrome bowl possibly of eastern Keresan origin. Decoration consists of organic paint over a well-polished tan interior surface. A single line circles the rim. The main design is a large bold solid element that resembles a rounded flower. On the exterior surface, a red slip is limited to the top 4 cm from the rim. A few small fire clouds were noted. Two separate portions of the vessel constitute 125 degrees of rim arc. This vessel represents a relatively small bowl with a radius of 8 cm. Paste is tan on the exterior and gray at the core. Temper consists of sand and pumice (tuff).

Vessel 3 (Fig. 33) probably should not have been considered a partial vessel since no dimensions could be recorded. It consists of body sherds from an Acomita Polychrome vessel. Decorations are in red and brownish black mineral paint over a buff or cream polished exterior surface. The design consists of a band framed by a series of parallel brown black lines. Also incorporated into this design are a red ticked line and a series of triangles. The interior of the vessel is unpolished but smoothed. The cross section shows a buff exterior and a gray core, indicating the use of low-iron clays. Temper consists of sherd and igneous rock.

Vessel 4 (Fig. 32) is part of an Acomita Polychrome olla. Decorations consist of designs in a red and black mineral paint on a cream-colored polished exterior surface. The exterior vessel surface has red-slipped areas that frame the design. Designs are a complex series of elements framed by the slip and a single painted line. Elements include lines and triangles. Paste cross sections have a buff exterior and a gray core, indicating the use of low-iron clays. Temper consists of sherd and igneous rock.

Vessel 5 (Fig. 22) represents an unpainted unslipped Carnue Utility bowl. Most of the upper surface is dark gray in color, although some of the upper exterior surface is red. Much of the interior and exterior surface is sooted. Rim sherds constitute a 40 degree arc. The bowl is relatively small with a 13 cm radius. The paste is black and vitrified. Temper consists of an angular sandstone.

Vessel 6 (Fig. 26) is a buff to brown soup bowl with a very faint white-slipped band near the rim interior. While this sherd was originally assigned to buff/tan utility, it actually represents a Valencia White sherd. Most of the interior and exterior are unslipped. Vessel walls are 5 mm thick. Temper consists of sandstone. Paste is buff with a thick dark gray core.

Vessel 7 is a bowl with red slip and indeterminate paint. Red slip occurs on a broad band on the upper part of the interior. The remains of a black-painted design are limited to diffuse gray brown pigment probably representing the remnants of a mineral paint. The rim is highly worn. The temper is a black basalt, indicating it was produced in the Zia area. Paste is gray with an orange oxidized interior. The vessel wall thickness is 4 mm.

ANALYSIS OF THE CHIPPED STONE ARTIFACT ASSEMBLAGE

James L. Moore

A total of 181 chipped stone artifacts were recovered during this examination of LA 67321. Previous research at this site and the nearby Valencia Pueblo (LA 935) provide good data for comparison with our results (Brown and Vierra 1997). Assemblages from other Hispanic sites in northern New Mexico also provide information on chipped stone assemblages that can be compared and contrasted with our materials. Chipped stone artifacts are common at Hispanic sites in the Southwest and tend to reflect an array of activities, including fire-making, hunting/warfare, and the manufacture and maintenance of tools made from perishable materials (Moore 1992).

The ubiquity of this artifact class at Hispanic sites dating from the early Spanish Colonial period (1600 to 1680) through the American Territorial period (1846 to 1912) is evidence that chipped stone artifacts are not necessarily indicative of historic Pueblo or Plains Indian occupation, nor is their presence in so many assemblages evidence of earlier occupations or contamination from nearby prehistoric sites. The association of chipped stone artifacts with Hispanic occupations is demonstrated by the presence of tool types indicative of fire-making activities mixed with debitage, cores, and occasional formal tools in stratified deposits at confirmed Hispanic residences. Sites that fall into this category include the La Fonda Parking Lot (LA 54000) in Santa Fe, the Pedro Sánchez site (LA 65005) near San Ildefonso, and the sites of La Puente (LA 54313) and the Trujillo House (LA 59659) near Abiquiu (Moore in prep. a, in prep. b).

However, the potential for mixing with both earlier and later materials truly exists for the chipped stone assemblage from LA 67321. While the previously excavated part of the site was dominated by historic materials, evidence of a small prehistoric component was also found (Brown and Vierra 1997). During the present study, the upper strata contained a mixture of materials dating from the 1700s to nearly the present, as well as artifacts that were apparently moved by colluviation to where they were found. The ceramic assemblage contains prehistoric sherds, and it is unclear whether they were washed in and therefore represent contamination from an earlier component or were collected elsewhere and discarded at the site by its Hispanic residents. Thus, some care must be used in attributing the chipped stone assemblage from these excavations to a single historic Hispanic occupation.

In addition to chipped stone artifacts, our assemblage contains both prehistoric and historic Pueblo ceramics and Euroamerican and other imported materials. The presence of a large number of historic Pueblo sherds is no surprise, since this artifact class usually comprises the bulk of assemblages from Hispanic sites occupied during the early and late Spanish Colonial periods (1600 to 1680; 1693 to 1821), and is common in Mexican and American Territorial period assemblages as well (1821 to 1846; 1846 to 1912) (Moore in prep. b). But with both prehistoric sherds and more recent Euroamerican artifacts in the assemblage, we must exert caution in assigning chipped stone artifacts to a specific period. Before we can discuss the chipped stone assemblage we must examine the distribution of other artifact classes in order to determine how much of the chipped stone is directly attributable to the historic Hispanic occupation and how much might represent contamination from other sources.

Distribution of Other Artifact Classes

By examining the distribution of Pueblo ceramics and Euroamerican and other imported artifacts at LA 67321, it may be possible to better determine how much of the chipped stone assemblage is attributable to the historic Hispanic occupation. Six major strata were defined during excavation. Two represent the surface and uppermost soil deposits that have been disturbed by modern activities: Stratum 1 was the surface unit on the east side of NM 47, and Stratum 2 was the surface unit on the west side of the road. Both strata were disturbed by previous road work and agricultural activities. In addition, modern trash and road gravel were mixed with earlier materials in these units. The latter is of particular concern to this analysis because road gravel can often resemble chipped stone artifacts, rendering much of the chipped stone from these strata suspect.

Strata 3 through 6 are cultural deposits derived from historic Hispanic use of the area for trash disposal. The main artifact-containing deposits on the east side of NM 47 are Strata 3 and 6. Stratum 3 might represent materials that were washed into the area and therefore may not be directly associated with other historic deposits. Stratum 6 is a gleyed deposit that contained two trash pits (Features 1 and 3) and a burned pit (Feature 2) and may represent materials dumped into a marsh. Deposits from and around Feature 1 were assigned to Stratum 5. Stratum 4 represents the upper level of cultural deposits on the west side of NM 47 and is analogous to Stratum 3 on the east side of the road.

Thus, it is possible that only Strata 5 and 6 represent undisturbed deposits. Strata 3 and 4 may have developed in situ, but it is also possible that they represent colluvially washed materials from upslope. If so, they may contain a mixture of materials from earlier as well as modern uses of the area. These strata can therefore be divided into three gross units including the upper disturbed deposits (Strata 1 and 2), possible colluvial deposits (Strata 3 and 4), and intact eighteenth-century deposits (Strata 5 and 6).

A total of 5,389 Pueblo or locally made sherds of both prehistoric and historic derivation was recovered from this part of the site. While most of the historic ceramic assemblage is composed of types manufactured by Pueblos, at least one type--Casitas Red-on-brown--is believed to have been made by New Mexico Hispanics (Carrillo 1997). Thus, referring to the entire earthenware assemblage as Pueblo may be inaccurate, and the terms "locally made" or "native" are substituted to separate this assemblage from materials moved commercially into the Southwest over the Chihuahua or Santa Fe Trails. In this context, "native" simply denotes manufacture in the area by an indigenous population.

Numerous native pottery types were identified during analysis (see Wilson, this volume). Unfortunately, many types are absent from one or more strata, creating too many empty cells in a cross tabulation for statistical analysis. This problem was corrected by collapsing ceramic types into five broad categories including prehistoric wares, historic decorated wares, polished black wares, historic micaceous wares, and historic plain wares (Table 21). In turn, the six strata defined at LA 67321 are combined into the three categories discussed above: disturbed, colluvial, and gleyed (intact) deposits.

Unfortunately, one of the combined ceramic categories--historic micaceous wares–contains only 22 specimens. Thus, this type was combined with other historic plain wares. Chi-square analysis of the distribution of the combined types suggests that different populations are represented at the 99 percent confidence level (chi-square=21.75, DF=6, significance=.0013). However, with a Cramer's V of .045, these results are very weak, with little difference between observed and expected values. Examination of standardized chi-square residuals indicated that most of the variation is attributable to the polished black wares, which comprise only 3.4 percent of the assemblage.

When only the colluvial and gleyed deposits are compared, the relationship remains much the same (chi-square=17.81, DF=3, significance=<.0005, Cramer's V=.062). Again, examination of standardized chi-square residuals indicated that the polished black wares are responsible for most of the variance. Thus, that type was also combined with the historic plain wares and the distribution was reexamined. The results of this analysis suggest that the three groups of strata may represent a single population (chi-square=4.32, DF=4, significance=.365, Cramer's V=.02).

Comparing assemblages for only the colluvial and gleyed deposits yields a slightly stronger relationship (chi-square=1.81, DF=2, significance=.404, phi=.02). The relationship between the disturbed and colluvial deposits is weaker (chi-square=3.87, DF=2, significance=.143, phi=.035), but still significant. In contrast, the relationship between the disturbed and gleyed deposits is the strongest of all (chi-square=.0.915, DF=2, significance=.633, phi=.018). Thus, there is a fairly high degree of correspondence between ceramic groups in these three sets of strata, which suggests that they may represent the same population. This possibility can be at least partly checked by examining assemblages of nonlocal artifacts from the same strata.

Table 27 shows the distribution of Euroamerican and other imported artifacts by broad material classes for each stratigraphic group. The upper disturbed strata contain slightly more than 80 percent of this assemblage, while the two lower stratigraphic groups contain about 10 percent apiece. This distribution alone indicates that great differences exist between layers. The presence of empty cells in this table suggests that some classes should be collapsed if statistical analysis is to be used to examine the relationship between assemblages in greater detail. Thus, plastic/rubber and slag are combined with the "other" category. Chi-square analysis rather strongly suggests that different populations are represented (chi-square=494.607, DF=6, significance=<.0005, Cramer's V=.562).

Removing obviously recent materials (plastic and rubber, nonmold-made glass) from the assemblage yields similar results (chi-square=129.784, DF=6, significance=<.0005, Cramer's V=.494). Since the upper disturbed strata contain most of the Euroamerican assemblage and much of this material may be indicative of fairly recent trash disposal, those deposits were dropped from consideration. Even so, chi-square analysis strongly indicates that the colluvial and gleyed deposits still represent different populations (chi-square=46.558, DF=3, significance=<.0005, phi=.567).

Standardized residuals indicate that most variance between the colluvial and gleyed deposits results from higher percentages of ceramics in the intact/gleyed deposits and glass in the colluvial deposits. These assemblage characteristics could be indicative of variation in access to different arrays of manufactured goods, temporal variation in discard patterns, or material mixing through bioturbation or colluvial wash. Glass may be the best evidence of mixing through bioturbation, yet with this material class removed, different populations continue to be represented at the 99 percent confidence level (chi-square=11.237, DF=2, significance=.004, Cramer's V=.309).

Differences between native ceramic and Euroamerican assemblages cannot be rectified at this level of analysis. While there are some indications that native sherds from all three stratigraphic groups belong to the same population, this is not verified by the assemblage of Euroamerican and other imported artifacts. However, the comparatively small size of the latter could have resulted in sample error that has adversely affected our analytic results.

Fortunately, the array of dateable artifacts from the colluvial and gleyed deposits indicate that there is some temporal correspondence between these materials. The character and structure of the native ceramic assemblage suggests deposition before the opening of the Santa Fe Trail. Though most of the data used to differentiate between economic periods comes from sites in the Rio Arriba, it is likely that similar ceramic trends prevailed in the Rio Abajo.

An examination of the distribution of ceramic groups from numerous Hispanic sites occupied between the early Spanish Colonial period (1600 to 1680) and early Railroad period (1890 to present) was conducted in conjunction with analysis of remains from a mid-eighteenth century Hispanic site near San Ildefonso (Moore in prep. c). This study indicates that polished red wares steadily declined in popularity through time, while polished black wares and micaceous wares comprised fairly small percentages of assemblages before the Santa Fe Trail was opened. After this event, both types increased dramatically in popularity, together comprising over half the average assemblage. While both micaceous wares and polished black wares are comparatively uncommon in the LA 67321 assemblage, so are polished red wares. The former characteristic argues for an early date, while the latter is more indicative of a later date. However, the presence of 18 Chinese porcelain sherds in the gleyed deposits along with Majolica sherds in all three deposits argues for a Spanish Colonial affinity. The lack of polished red wares could be attributable to differences in ceramic availability between the Rio Abajo and the Rio Arriba, or could be a result of varying analytic methods.

Though not entirely conclusive, this discussion suggests that chipped stone artifacts from all three types of deposit may be related to use during the same economic period. Even though quite a number of more recent Euroamerican artifacts were mixed into the disturbed strata, the native pottery assemblage seems to belong to the same population as the ceramics from the colluvial and gleyed deposits. Since most of the more recent Euroamerican materials probably derive from periods when native ceramics and chipped stone artifacts were rarely used, those artifact classes may not represent widely varying periods of occupation. Thus, it may be instructive to compare all three chipped stone assemblages to determine whether there is any correspondence between them.

Description of the Chipped Stone Assemblage

Artifact types identified in the chipped stone assemblage are shown in Table 28. Interestingly, very similar distributions of artifact types were recovered from all three stratigraphic groups. Indeed, chi-square analysis suggests that the artifact types from these deposits represent a single population (chi-square=14.0, DF=14, significance=.450 Cramer's V=.197). However, a large number of empty cells in this cross tabulation casts doubt on the reliability of these results. Thus, artifact types were combined until there were no empty cells. Strike-a-light flakes and flints were combined because the former are parts of the latter, and tools and cores were lumped together. Analysis of the resulting distribution still suggests that a single population is represented by the three stratigraphic groups (chi-square=6.564, DF=6, significance=.363, Cramer's V=.135).

Debris related to chipped stone reduction dominates each assemblage, comprising 91 percent of the materials from disturbed deposits, 81 percent of those from colluvial deposits, and 80 percent of the gleyed deposit assemblage. Neither formal tools nor cores occur in the disturbed assemblage, but it is uncertain whether this represents a significant temporally related departure or sample error. However, when the disturbed deposits are dropped and formal tools and cores are again placed in separate categories, there is an extremely high correspondence in artifact type makeup between the colluvial and gleyed deposits (chi-square=.481 DF=4, significance=.975, Cramer's V=.062). Thus, even though artifact type categories from all three stratigraphic groups seem to represent the same population, there is a greater correspondence between materials from the colluvial and gleyed deposits. The disturbed assemblage differs primarily in a lack of formal tools and cores and a correspondingly higher percentage of reduction debris.

Variables Related to Material Selection

Material Type

Material types contained by each stratigraphic group are shown in Table 29. All three assemblages are dominated by sedimentary materials comprised of microcrystalline quartz, which include undifferentiated cherts, Pedernal chert, chalcedony, and silicified wood. Following Luedtke (1992:5), these materials are classified as chert in the rest of this discussion unless otherwise noted. Overall, chert comprises over 70 percent of each assemblage (75.4 percent of disturbed, 73.0 percent of colluvial, and 71.7 percent of gleyed). Except for rhyolite, other materials make up less than 10 percent of each assemblage and usually less than 2 percent. Again, there seems to be a great deal of correspondence between assemblages, but the number of empty cells in a cross tabulation renders this observation suspect. In order to remove the empty cells, materials were regrouped into more inclusive categories: chert, obsidian, basalt, rhyolite/andesite, and other. The latter includes limestone, quartzite, and massive quartz, each of which were represented by only two to three examples.

Analysis of these material groups suggests that the three assemblages represent a single population (chi-square=6.957, DF=8, significance=.541, Cramer's V=.139). Surprisingly, when the disturbed assemblage is dropped, a significant relationship between the lower strata remains but is a bit smaller than that derived for all three assemblages (chi-square=3.843, DF=4, significance=.428, phi=.176). When the disturbed and colluvial assemblages are compared, there is a slightly higher level of correspondence (chi-square=3.240, DF=4, significance=.518, phi=.164).

Two potentially exotic materials were identified in these assemblages: Pedernal chert and obsidian. Pedernal chert outcrops in the Chama Valley, while the nearest obsidian source is the Jemez Mountains. However, not only are these materials available in outcrops, they also occur in terraces flanking streams that drain the regions in which they outcrop and along the rivers into which those streams flow. One feature shared by both the Chama Valley and Jemez Mountains is that they are drained by rivers that are tributary to the Rio Grande, which flows to the west of LA 67321. This complicates discussions of material source. Simply identifying where materials outcrop does not mean that they were obtained there, since they could have been transported far from those outcrops by natural processes. The type of cortex on artifacts provides a better indication of origin. Waterworn cortex indicates that a material was obtained from stream deposits some distance from the location in which it outcrops, while nonwaterworn cortex implies procurement at or near an outcrop. Both of our potentially exotic materials are available in Rio Grande gravel at least as far south as Las Cruces. Were the Pedernal chert and obsidian used at LA 67321 obtained at their sources or from local gravel?

Only waterworn cortex was identified on chipped stone artifacts from LA 67321, including six pieces of Pedernal chert (50 percent) and four of obsidian (57.1 percent). Since half or more of these materials have waterworn cortex, it is likely that all were obtained from nearby gravel deposits. Similarly, the total absence of nonwaterworn cortex in the remaining assemblage suggests that the other chipped stone materials were procured from the same source.

Material Texture

Different materials are suited to different tasks (Chapman 1977). While obsidian is eminently suited to the production of cutting tools because it is easily flaked and has sharp edges, it is too fragile to be used for heavy-duty jobs like chopping. Conversely, while basalt and quartzite have duller edges and are less efficient as cutting tools, they are good for heavy-duty pounding and chopping tasks because they are more resistant to shattering. The suitability of materials for specific jobs also varies according to texture. Fine-grained materials produce sharper edges than coarse materials and are better for formal tool manufacture because they are easily and predictably flaked. For example, fine-grained basalt produces nearly as good a cutting edge as obsidian or chert, while coarse-grained basalt does not and may only be suitable for chopping or battering tasks. Thus, the texture of materials selected for reduction can provide an indication of the uses to which they were put.

Material textures are shown for combined material types in Table 30. The material combinations consist of chert, obsidian, nonaphanitic igneous (basalt, andesite, and rhyolite), aphanitic igneous (rhyolites), limestone, and materials comprised of large, visible quartz crystals (massive quartz and quartzite). Fine-grained materials dominate the assemblages, with much smaller proportions of glassy and medium-grained materials occurring. No coarse-grained specimens were noted. This suggests that most materials were selected for their ability to provide sharp cutting edges.

Obsidian is by definition a glassy material. Since glassy and fine-grained materials are well suited to the production of sharp cutting edges, they can be combined, and the distribution of fine-grained/glassy and medium-grained materials can be examined by stratigraphic group. This distribution is shown in Table 31. Fine-grained/glassy materials dominate each assemblage, but to a lesser extent in the gleyed deposits. Overall, there is little correspondence between assemblages for this characteristic at the 99 percent confidence level (chi-square=10.323, DF=2, significance=.006, phi=.239). With the disturbed assemblage removed, there is a very small chance that materials from the colluvial and gleyed deposits represent a single population (chi-square=6.222, DF=2, significance=.013, phi=.224). However, when the disturbed and colluvial assemblages are compared, it is very likely that they represent a single population (chi-square=.054, DF=2, significance=.817, phi=.021).

This relationship is similar to that seen in the comparison of material categories. Though there was a fairly high level of similarity between material categories for all three assemblages, there were also indications that the colluvial assemblage was more similar to the disturbed assemblage than it was to the gleyed assemblage. Though there are weak indications that all three assemblages represent a single population when material quality is considered, the colluvial assemblage is much more similar to the disturbed assemblage than it is to the gleyed assemblage. This may be indicative of variation in the array of tasks materials were selected for, so that fewer materials, best suited to cutting activities, were selected when the gleyed deposits were forming.

In order to test this possibility, materials were divided into two groups: those that would produce the sharpest cutting edges and those that are suited to activities requiring a durable edge. The former includes chert, obsidian, and aphanitic rhyolite, while the durable material category contains basalt, nonaphanitic rhyolites, limestone, quartzite, and massive quartz. This distribution is shown in Table 32, and there is a significant level of similarity between all three assemblages (chi-square=1.880, DF=significance=.390, phi=.102). Again, the colluvial and gleyed assemblages have a significant level of similarity that is smaller than the statistical correspondence between all three assemblages (chi-square=1.141, DF=2, significance=.286, phi=.096), while the disturbed and colluvial assemblages have a much higher degree of statistical similarity (chi-square=.043, DF=2, significance=.836, phi=.019).

While all three assemblages appear to represent a single population in terms of both material type and quality, clearly the disturbed and colluvial assemblages are more similar to one another than are the colluvial and gleyed assemblages. This subtle distinction could be indicative of important temporal variation, and it is addressed in more detail in a later section.

Variables Related to Reduction Strategy

There are two aspects to the reduction process: strategy and technique. While strategy is mostly a mental process, technique is physical. The strategy used to reduce a nodule depended on several factors, including material availability, nodule size, and mobility. When desirable materials were rare or difficult to acquire, they could be efficiently reduced to maximize return. Conversely, when materials were locally abundant, a more inefficient reduction strategy could be used, with no attempt being made to conserve material. There was also a connection between level of mobility and reduction strategy. An efficient strategy was characteristic of mobile hunter-gatherers in the Southwest, while sedentary farmers mostly employed an expedient strategy. However, there was no firm line demarcating the use of these strategies. Hunter-gatherers simply tended to be more dependent on an efficient reduction strategy, while sedentary farmers were more dependent on an expedient strategy. Nodule size was sometimes an important factor in determining how reduction proceeded. Expedient reduction may have been the only option when materials occurred as small nodules, because more efficient reduction was impossible.

Reduction technique refers to the physical methods used to remove material from a core or tool. Two techniques were used in the Southwest: percussion and pressure. Percussion flaking involved the striking of a core or blank with a hammer to remove flakes. Both hard and soft hammers were used, and flakes produced by these methods can often be distinguished from one another. Pressure flaking involved the use of a tool to press flakes off the edge of an artifact. In general, hard hammers were used for core reduction while soft hammers and pressure flaking were used to make tools. However, use of these techniques often overlapped, and hard hammers were sometimes used for initial tool manufacture or soft hammers to reduce cores.

No real evidence for efficient reduction has been found in earlier examinations of Hispanic chipped stone assemblages (Levine et al. 1985; Moore 1992, in prep. a, in prep. b). Nearly all reduction was performed using an expedient strategy. While some small formal tools were made by pressure flaking (primarily projectile points and gunflints), evidence of platform modification to facilitate flake removal tends to be rare or nonexistent. Though tools are common in Hispanic assemblages, they are mostly informally used debitage rather than carefully crafted formal tools. Deviations from this pattern could indicate that there is a significant amount of contamination from earlier assemblages.

Dorsal Cortex and Reduction Stage

Cortical surfaces are rarely suitable for flaking or tool use. Further, the outer sections of nodules that were transported by water often contain microcracks created by cobbles striking against one another, producing a zone with unpredictable flaking characteristics. For these reasons cortical surfaces are typically removed and discarded early in the reduction process, and flakes have progressively less dorsal cortex as reduction proceeds. Thus, cortical coverage can be used to examine reduction stages. The early stages are characterized by large percentages of flakes with lots of dorsal cortex, and the later stages by flakes with mostly noncortical surfaces.

Reduction can be divided into two stages: core reduction and tool manufacture. Flakes are struck for use or modification during core reduction. *Primary* core reduction includes initial core platform preparation and removal of cortex. *Secondary* core reduction is the removal of flakes from core interiors. This difference is rarely as obvious as it may seem. Both processes often occur simultaneously, and rarely is all cortex removed before secondary reduction begins. In essence, they represent opposite ends of a continuum, and it is difficult to determine where one stops and the other begins. In our analysis, primary core flakes are those with 50 percent or more of their dorsal surfaces covered by cortex, and secondary core flakes are those with less than 50 percent dorsal cortex. These categories can provide data on the condition of cores reduced at a site. For example, a lack of primary flakes may suggest that initial reduction occurred elsewhere, while the presence of few secondary flakes may indicate that cores were carried off for further reduction at another location. Tool manufacture refers to the purposeful modification of debitage into specific forms. Primary core flakes represent the early stages of reduction, while secondary core flakes and biface flakes represent the later stages.

Overall, 40.6 percent of the debitage assemblage displays cortex, including seven flakes with cortical platforms but no dorsal cortex. Only primary and secondary core flakes were recovered from this part of the site; no debitage attributable to formal tool manufacture were identified. Of the flake assemblage, 34.8 percent have dorsal cortex, and 6.0 percent have cortical platforms, yielding a percentage that is almost identical to that of the entire debitage assemblage. Because of this, and since angular debris represent unintentional removals from cores, only flakes are further considered.

Cortex was recorded in 10 percent increments, so the distribution is not continuous. In addition, numerous cells were empty when each percentage interval was considered. Therefore, with the exception of the 0 percent category, dorsal cortex intervals were combined to form larger groups, as shown in Table 33. Statistical analysis suggests that the three assemblages represent a single population (chi-square=4.588, DF=10, significance=.917, Cramer's V=.141). As opposed to the results of our examination of material types and quality, the colluvial assemblage is not more similar to the disturbed assemblage (chi-square=2.706, DF=5, significance=.745, phi=.184) than it is to the gleyed assemblage (chi-square=2.427, DF=5, significance=.788, phi=.176).

Primary core flakes make up 19 percent of the assemblage, while the remaining 81 percent are secondary core flakes. When the distribution of dorsal cortex percentages in Table 33 is examined, it appears that some initial core reduction occurred in each assemblage. Fairly high percentages of flakes that lack or have small amounts of dorsal cortex suggest that secondary core reduction dominated. However, when individual materials are considered, a different picture emerges. As shown in Table 34, not every material is represented by primary core flakes. Indeed, there is no evidence for the primary reduction of Pedernal chert, chalcedony, silicified wood, obsidian, basalt, yellow aphanitic rhyolite, limestone, quartzite, or massive quartz. Of course, it should be kept in mind that we are examining only a sample of the materials present at the site and not the entire population. Still, the occurrence of high percentages of primary core flakes in only three material types (red rhyolite and andesite excepted because of small sample size) may indicate that much of the debitage was either obtained from earlier sites for use at this location, or many cores came onto the site in an already reduced condition.

Debitage Type and Condition

Types of debitage recovered are shown in Table 28 for each assemblage. By comparing the ratio of flakes to angular debris, it is often possible to derive information on reduction strategy. Since tool manufacture is usually more controlled than core reduction, it produces fewer pieces of angular debris. This suggests that a high ratio of flakes to angular debris should be indicative of tool manufacture, while a low flake to angular debris ratio indicates core reduction. Unfortunately, this is a bit simplistic because the production of angular debris also depends upon the type of material being worked, the technique used to remove flakes, and the amount of force applied. Brittle materials shatter more easily than elastic materials, and hard hammer percussion tends to produce more recoverable pieces of angular debris than soft hammer percussion or pressure flaking. Even so, as reduction proceeds the ratio of flakes to angular debris tends to increase, and late stage core reduction as well as tool manufacture should produce a fairly high ratio.

Each assemblage from LA 67321 contains core flakes and angular debris, but only the colluvial assemblage contains strike-a-light flakes, which are debitage struck from strike-a-light flints during use. Strike-a-light flakes are not desired byproducts of reduction and are therefore not considered in calculating ratios. Flake to angular debris ratios are 2.25:1 for the disturbed assemblage, 2.85:1 for the colluvial assemblage, and 2.54:1 for the gleyed assemblage. Overall, the ratio is 2.52:1, and there is little variance in flake to angular debris ratios for the three assemblages. These ratios are consistent with an expedient core-flake reduction trajectory and fall into the range derived for residential pueblo sites near Taos (Moore 1994). They are higher than a ratio of 1.14 from a late Spanish Colonial site near San Ildefonso (Moore in prep. d) but fall into the range of 1.90 to 5.50 derived for five Hispanic components from the Abiquiu area and Santa Fe (Moore in prep. b).

Table 35 shows the distribution of flake portions for each assemblage. Few whole flakes occur in the disturbed assemblage, while they comprise close to half of the others. While the proportion of proximal and distal fragments is fairly well balanced in the gleyed assemblage, proximal fragments dominate the colluvial assemblage, and distal are more common in the disturbed assemblage. But are these differences meaningful? Chi-square analysis suggests they are not, and that all three assemblages belong to the same population (chi-square=13.43, DF=8, significance=.098, Cramer's V=.241). When individual assemblages are compared, there appears to be a closer relationship between the colluvial and gleyed assemblages (chi-square=4.052, DF=4, significance=.399, phi=.228). While there is a significant relationship between the disturbed and colluvial assemblages, the probability that they represent the same population is low (chi-square=11.376, DF=4, significance=.023, phi=.377). However, when the disturbed and gleyed assemblages are compared, there is again a high level of correspondence (chi-square=4.836, DF=4, significance=.305, phi=.256).

There are three general ways in which flakes can break: during removal, after removal, and during use. Breaks often occur during manufacture because of secondary compression, where outward bending exceeds the tensile strength of a material, and a flake fractures before it completely detaches from the parent rock (Sollberger 1986). This often produces an identifiable break pattern (Moore 1994). Postremoval breakage includes such impacts as trampling or erosional movement and is especially common if an assemblage was exposed on the surface for a long period of time. The pressure exerted on flakes during use can also cause them to snap, but this type of break is nearly impossible to distinguish from postremoval breakage, so those categories are combined.

Two categories of break were defined in this assemblage: manufacturing breaks and snap fractures. Manufacturing breaks possess characteristics indicative of fracture due to secondary compression. Breaks lacking those characteristics are snap fractures and are nondiagnostic because they can occur during core reduction as well as after removal. A very high percentage of manufacturing breaks is generally indicative of biface manufacture, since flakes removed during tool production tend to be thin and therefore prone to breakage by secondary compression. A very high percentage of snap fractures seems to indicate that an assemblage has suffered considerable postremoval breakage. Break types are fairly evenly distributed in the overall flake assemblage from LA 67321, and preliminary experimental data (Moore in prep. d) suggest that the distribution of manufacturing breaks (44.1) and snap fractures (55.9) seen in this assemblage is probably attributable to breakage during core reduction.

A smaller percentage of whole flakes in the disturbed assemblage could indicate a higher degree of postreduction breakage because of plow damage and trampling of surface artifacts. However, the amount of manufacturing breakage in that assemblage seems to contradict this possibility. Fracturing during manufacture accounts for 48.3 percent of breaks in the disturbed assemblage versus 42.1 percent in the colluvial assemblage and 40.0 in the gleyed assemblage. Since chi-square analysis suggests that all three assemblages belong to the same population, the lower percentage of whole flakes in the disturbed assemblage is probably accounted for by sample error rather than postreduction breakage.

Flake Platforms

Table 36 shows the distribution of flake platforms. Definable platforms are present on only 45.2 percent of the 116 flakes recovered from this part of the site. The remaining platforms are either missing or obscured. Most platforms are simple types that would be expected in core reduction. Cortical platforms represent flakes struck from cortical surfaces and can occur with or without corresponding cortex on the dorsal surface. Indeed, most flakes with this type of platform (63.6 percent) exhibit no dorsal cortex. Single facet platforms are the most common type overall, followed by multifacet platforms. The latter are removals from edges that had more than one flake struck from them before they were used as platforms and may be indicative of intensive core reduction.

The removal of flakes from a core or tool can be facilitated by modifying platforms to prevent crushing or shattering. A platform edge is usually sharp and fragile; modification by abrasion increases its angle and strengthens the edge so it can better withstand the force applied to it. Platform modification is most common during tool manufacture, though core platforms are sometimes also modified. Only one platform from LA 67321 evidences modification to facilitate removal, and is retouched.

Platforms can be obscured in several ways. Collapse occurs when the amount of force applied causes the point of impact to detach separately from the body of the flake, often leaving behind a small fragment of the original platform and a diagnostic scar. Collapsed platforms are common in this assemblage, mostly occurring in the disturbed and colluvial deposits. At times the amount of force used to remove a flake is great enough to shatter the platform but not cause it to detach separately. These are crushed platforms, which are rather rare in this assemblage, occurring only in the disturbed deposits. Platforms can also be obscured by use or natural damage. Three platforms fall into this category, and all represent damage incurred through use as informal tools. Platforms may be missing because of flake breakage, occurring either during removal or through incidental damage at some time after removal.

There are too many empty cells in Table 36 to allow reliable statistical evaluation of the correspondence between assemblages, so the absent and obscured categories were combined to allow chi-square analysis to be performed. At the 99 percent confidence level, there is a small chance that the assemblages represent a single population (chi-square=16.727, DF=8, significance=.033, Cramer's V=.269). Since only one flake has a modified platform, this creates two empty cells. To remove them the retouched platform was temporarily dropped from consideration, yielding a slightly smaller significant association (chi-square=14.971, DF=6, significance=.021, Cramer's V=.255). Standard residuals suggest that most of the variance comes from a high number of cortical platforms in the gleyed assemblage, multifacet platforms in the colluvial assemblage, and collapsed and absent platforms in the disturbed assemblage.

When the disturbed assemblage is eliminated, there is a much higher level of resemblance between the colluvial and gleyed assemblages (chi-square=3.903, DF=4, significance=.419, phi=.224). A very weak relationship exists between the disturbed and colluvial assemblages (chi=square=14.088, DF=4, significance=.007, phi=.420), and there is a somewhat stronger correspondence between the disturbed and gleyed assemblages (chi-square=5.644, DF=3, significance=.130, phi=.276). The main reason for the difference between the disturbed and colluvial assemblages is a much lower percentage of missing and obscured platforms in the latter.

Besides platform type, platform width can be an important variable in examining reduction strategy. In general, platforms become narrower as reduction proceeds. Experiments suggest that flake mass is controlled by the width of the platform and the angle between the dorsal surface and platform (Pelcin 1997a:749; Whittaker 1994:91). Pelcin (1997a:755) suggests there is no direct relationship between flake length and thickness and platform width; those variables are more influenced by core surface morphology. However, experiments by Whittaker (1994:91) suggest that flake length and especially thickness *are* partly controlled by platform width. In general, the wider the platform, the larger the flake that results.

Experiments also show that flake initiation and termination are strongly associated with platform width and exterior platform angle (Pelcin 1997b:1111). As platform width increases, so does interior platform angle (angle between ventral surface and platform). If the exterior platform angle decreases at the same time, there is an increased chance that a bending rather than conchoidal break will occur. This produces a short, squat flake similar in shape (and probably origin) to edge bites, which occur when a wide platform is struck on a biface and a wedge-shaped piece breaks out of the edge. Other experiments show that the closer the exterior platform angle is to 90 degrees, the longer the flake that results (Whittaker 1994:91). However, flakes could no longer be struck when 90 degrees was reached. Thus, flake length and thickness are controlled by a combination of platform width and exterior platform angle, which are measurable archaeologically, and the angle and force of the blow used to detach a flake, which are not (Whittaker 1994:91).

Variation in platform width should occur in different types of reduction. Core flake platforms should be rather wide, because flakes with comparatively large masses are usually the goal of that process. Biface flakes should have smaller platform widths because flakes with large masses are not desired in that process. Because biface flakes usually have rather low exterior platform angles, wide platforms would also tend to produce short squat flakes rather than the long thin flakes desired. Since no biface flakes were found in this assemblage, we expect to find comparatively wide platforms in most cases.

A total of 50 platforms are available for this examination; no measurements were possible on collapsed, crushed, obscured, or missing platforms. Overall, platform widths range between 0.5 and 12.0 mm, with a mean of 4.35 mm. Table 37 shows mean widths for each platform and flake type. There are only single examples of strike-a-light flakes in each platform category, and their platform widths fall within the first standard deviation range for core flake platform widths in the same categories, suggesting that they are not significantly different.

There are interesting differences in mean platform width that may be related to reduction sequence. Flakes with cortical platforms usually are indicative of early stage core reduction and in this case have a much larger mean width than other platform types. Single facet and multifacet platforms evidence the removal of one or more flakes from a surface before it was used as a platform. As Table 37 shows, these categories have similar mean widths, perhaps indicating that they were struck during the same phase of core reduction. While the only retouched platform was considerably narrower than the mean of any other platform type, it falls within the first standard deviation range for all others. Lacking more examples of this type, little can be said concerning the significance of this measurement.

In order to determine whether there was any relationship between platform width and whole flake dimensions, linear regressions were run on platform width by flake length and artifact mass. Significant relationships were found in both cases (platform width by flake length: F=34.173, significance of F=<.0005; platform width by flake mass: F=44.068, significance of F=<.0005). Lacking measurements of exterior platform angles, we cannot assess these findings in light of Pelcin's (1997a, 1997b) experiments. Considering his results, though, we expected to find no relationship between platform width and flake length, yet we did. However, this does correspond to Whittaker's (1994) experimental findings. A relationship between platform width and flake mass was expected and may suggest that exterior platform angles cluster within a small range. Thus, flake size appears to be related to platform width in this assemblage, and larger platform widths are indicative of earlier stages of reduction.

Other Indicators

Several other attributes are indicative of reduction strategy as well as technique. Unfortunately, both the small sizes of the stratigraphic assemblages and the fact that this part of the site was sampled rather than completely excavated reduce their usefulness. Platform lipping can be used as an indicator of reduction technique, since this characteristic tends to occur when soft hammer percussion or pressure is used to remove a flake (Crabtree 1972). However, platform lips occasionally form when hard hammer percussion is used and do not always occur when flakes are removed by soft hammers or pressure, so this is not an absolute indicator. No lipped platforms were noted in the assemblage, suggesting that hard hammer percussion was the predominant technique used to reduce cores.

The presence of opposing dorsal scars at the distal end of flakes is indicative of reduction from opposing platforms. This is often used as evidence of biface manufacture but can also occur during core reduction, especially when cores were extensively reduced. Opposing dorsal scars occur on only six flakes (5.2 percent), of which five are core flakes and one is a bipolar flake. Opposing dorsal scars are characteristic of the latter, since this morphological type represents part of a nodule that was impacted at one end by a hammerstone and at the other by an anvil. No core flakes with opposing dorsal scars exhibit platform modification, so it is unlikely that any represent early stage biface reduction flakes. Thus, this characteristic indicates that some cores were extensively reduced.

Only four cores were recovered, two each from the colluvial and gleyed deposits, including a multidirectional core and a unidirectional core in each assemblage. The multidirectional cores were reduced to a much greater extent than the unidirectional type, and the mean size of the former (19.4 cm3) was less than a third that of the latter (76.7 cm3). The small size and general configuration of the multidirectional variety are indicative of extensive reduction, similar to that displayed by the few flakes with opposing dorsal scars. While one multidirectional core is obsidian and the other is rhyolite, all five core flakes with opposing dorsal scars are chert, and the bipolar flake is obsidian. Thus, chert and obsidian cores may have been reduced to a greater extent than were other materials.

Whole flake lengths partly support this possibility. Whole chert and obsidian flakes tend to be smaller than those of other materials, with mean lengths of 16.8 and 14.0 mm, respectively. Mean whole flake lengths for other materials are 34.5 mm for basalt, 24.7 mm for rhyolite, and 41.0 mm for quartzite. Unfortunately, the number of whole flakes in any one category is small. While there are 37 whole chert flakes in the assemblage, there are only 2 obsidian, 2 basalt, 6 rhyolite, and 1 quartzite. Thus, the utility of this comparison is questionable, especially considering the paucity of cores. Chert and obsidian may have been reduced to a greater extent than other materials because they were more desirable, or their smaller sizes could simply mean that available nodules were smaller.

Thermal Alteration

The flaking qualities of materials like cherts, chalcedonies, flints, and silicified woods can often be improved by thermal treatment, while the flaking characteristics of metamorphic and igneous rocks cannot be improved in the same manner. This is because the latter formed under more heat and pressure than can be generated by camp fires, which do provide enough heat to cause desirable alterations in cherts (Luedtke 1992:92).

Many changes can occur during thermal alteration including loss of moisture, alteration of impurities, burning out of organic compounds, and oxidation of iron and sulphur compounds (Luedtke 1992:92-93). While this process causes little change in the basic geochemistry of chert, visible changes in color, translucency, and luster can occur. However, the most important change noted is an alteration of fracture quality (Luedtke 1992:95). Although there are two competing models that account for this change, Luedtke (1992:96) feels that a model suggesting that heating increases the number of microcracks and/or distributes them more evenly in a rock seems best supported by the data. She feels that the microcracks should be within grains rather than between them to produce the cross-grain fracturing that seems typical of heat-treated cherts (Luedtke 1992:96). The other model suggests that quartz microcrystals become more tightly connected in heat-treated cherts, pores become filled in, and the material becomes more homogenous and glass-like (Luedtke 1992:95). However, the processes included in each model are not necessarily mutually exclusive and could occur at the same time or in different varieties of chert (Luedtke 1992:96). Whatever the ultimate cause, it is certain that heating improves the flaking characteristics of most cherts and that longer flakes can often be removed with less force after thermal alteration (Bleed and Meier 1980; Crabtree and Butler 1964; Flenniken and Garrison 1975).

Unfortunately, incorrect thermal alteration can have an adverse effect on materials. Fluctuations in temperature can cause crazing or potlidding (Crabtree and Butler 1964; Flenniken and Garrison 1975). It is possible that crazing results from overly high temperatures, and potlids from overly rapid heating and cooling (Luedtke 1992:97). Fractures that cannot be seen from the surface also form sometimes. Such incipient fractures can cause unanticipated breaks during tool manufacture, producing a diagnostic break (Johnson 1979). When cherts are incidentally burned, they often evidence smoke blackening, crazing, and potlids, and can become white and brittle (Luedtke 1992).

In addition to these signs of incorrect thermal alteration, proper heat treatment can also sometimes be identified, providing the analyst knows the original color ranges and surface textures of a material. Hematitic inclusions may oxidize when heat is applied, changing in color from brown or black to red or orange. This type of color change is common in Pedernal chert. Thermal alteration nearly always produces a waxy or glossy luster, though the exact reason for this remains uncertain (Luedtke 1992:95). Unfortunately, some materials are naturally waxy, so all cherts with a waxy luster are not necessarily heat-treated. Microcrystalline changes occur on the interior of materials being heated, and their surfaces do not display the resulting change (Luedtke 1992:95; Whittaker 1994:73). Thus, variation in luster between surfaces or between flaked and unflaked parts of a surface are also evidence of successful thermal alteration.

Only three pieces of angular debris from this part of LA 67321 are thermally altered. None were used as informal tools or appear to have been meant for formal tool manufacture. Using length as a relative measure of size, angular debris range from 10 to 59 mm long, with a mean of 23.92 mm and standard deviation of 9.41. With thermally altered specimens removed, the mean is 23.72 mm, and standard deviation is 9.37--fairly minor changes. Two of three thermally altered specimens fall within the first standard deviation for length. The third is in the second standard deviation and is the second longest specimen recovered. Both others fall near the mean--one below and one above. Thus, there is no evidence of conscious selection of large pieces of angular debris for heat treatment, and it is unlikely that they were altered to improve them as cores.

Thermal alteration seems to have been incidental in these cases. All three specimens are crazed, and one also displays potlid fractures. As noted earlier, these characteristics are evidence of temperature fluctuation during heating and may be indicative of inadvertent alteration. This is supported by the fact that none were later used as informal tools or cores, nor were they knapped into formal tools. The absence of evidence of successful heat treatment elsewhere in the assemblage suggests that this process was not used to improve flaking quality.

Comparison of the Assemblages

An important question mentioned several times thus far is whether or not temporal differences exist between the disturbed, colluvial, or gleyed assemblages. Such differences should occur as significant variation between assemblages, indicating changes in material selection, reduction strategy, or tool-use patterns. If such variation exists, it may indicate that assemblages were deposited during more than one period. Differences indicative of such temporal variation have been found in ceramic and Euroamerican artifact assemblages from sites in northern New Mexico (Moore in prep. c) and are tied to changes in local economy. Whether similar variation occurred in chipped stone assemblages is currently undetermined. During this analysis we have repeatedly compared the assemblages. It is now time to summarize those findings and search for meaningful patterns.

Artifact Type Comparisons

All three assemblages seemed to represent the same population when artifact types were combined into more inclusive groups. However, stronger results were obtained when only the colluvial and gleyed assemblages were compared. These assemblages demonstrated a high degree of comparability (significance level of

.975), indicative of a single population. Thus, in terms of artifact type, there were weak indications that all three assemblages represent a single population and very strong indications that the two deeper assemblages are the same population. However, the main difference between the disturbed assemblage and the others was the absence of cores and formal tools in the former and their presence in the others.

Material Type and Quality Comparisons

Overall, material type comparisons suggested that all three assemblages belong to the same population. However, analysis of material texture provided different results, and at the 99 percent confidence level there appeared to be little chance that all three assemblages are from the same population. We found a somewhat larger probability that the colluvial and gleyed assemblages represent the same population. When the disturbed and colluvial assemblages were compared, there was an even higher correspondence. Thus, the two uppermost assemblages may represent the same population as far as this attribute is concerned, while there is only a small chance that the gleyed and colluvial assemblages are from the same population.

When material type and quality were combined into materials producing sharp cutting edges and durable edges, we found a moderate chance that all three assemblages represent the same population. However, once again the disturbed and colluvial assemblages displayed the highest correspondence. These analyses led us to conclude that while all three assemblages may represent a single population in terms of material type and quality, the disturbed and colluvial assemblages are clearly more similar to one another than are the colluvial and gleyed assemblages. This subtle distinction could be indicative of temporal variation. Chipped stone may have been used in the performance of some tasks during the earliest period of occupation and replaced by better or more efficient tools after the gleyed materials were deposited. If so, there should be analogous distinctions between deposits when other attributes are considered.

Attributes Related to Chipped Stone Reduction

Dorsal cortex on flakes was the next attribute used to compare assemblages. It was necessary to combine categories in 20 percent increments to eliminate too large a number of empty cells. Analysis of this attribute found a high degree of correspondence, suggesting that all three assemblages belong to the same population. Interestingly, this analysis did not suggest that the colluvial assemblage was more similar to the disturbed assemblage.

Variable but very interesting results were obtained by comparing the distribution of platform types for flakes. It was again necessary to combine categories to eliminate empty cells. This analysis suggested that there is a small probability that all three assemblages belong to the same population. A fairly high degree of correspondence was found between the colluvial and gleyed deposits, while there was no significant relationship between the disturbed and colluvial deposits. Interestingly, we found a moderately high possibility that the disturbed and gleyed assemblages also represent the same population.

The only other variable containing a large enough population for statistical examination was flake portion. Our examination of this variable suggested that there is a fairly high chance that all three assemblages belong to the same population. Again, there was not as high a degree of correspondence between the disturbed and colluvial assemblages as there were for other combinations.

Analysis of variables related to reduction strategy and technique also provided somewhat different results than material selection characteristics. Again, the examination of these variables suggested that all three assemblages may represent a single population. However, there was no evidence that the disturbed and colluvial assemblages were more similar to one another than were the colluvial and gleyed assemblages. In fact, some analyses suggested that the disturbed and gleyed assemblages were more similar to one another.

In short, no definite evidence of temporal differentiation between assemblages was found. Most analyses suggest that a single population of artifacts is represented, though in several cases the level of probability is low. Thus, this discussion suggests two possibilities: economic changes caused little or no corresponding shift in chipped stone material selection parameters or reduction techniques; or all three sets of deposits reflect occupation during a single economic period.

Informal Tools

A total of 33 informal tools were identified in the LA 67321 assemblage (Table 38). Because strike-a-light flints were modified through use rather than purposely to achieve a desired edge shape or angle, they are classified as informal tools. In addition, flakes from strike-a-light flints are considered tool fragments. Thus, the overall tool assemblage is dominated by informal tools, and formal tools comprise only 8.4 percent. Strike-a-light flints dominate both the overall and informal tool assemblages. Informally utilized debitage, the second most common tool type, were found in the colluvial and gleyed assemblages.

The lack of informal tools in the disturbed deposits may be a function of analytic technique. Damaged edges from surface or near-surface deposits were subjected to stricter standards than were those from deeper deposits. This is because artifacts found on and near the surface were more susceptible to incidental damage by trampling and plowing. Thus, unless edge damage on debitage from disturbed deposits was conclusively cultural in nature, it was considered incidental damage, and the artifact was not classified as an informal tool. While this undoubtedly resulted in the elimination of a few actual informal tools, it also prevented the inclusion of questionable specimens.

Informally Used Debitage

Informally used debitage that were not classified as strike-a-light flints include three chert core flakes, one chert angular debris, one obsidian core flake, one obsidian angular debris, and one rhyolite core flake. Usually only one utilized edge was noted on each specimen, though a chert core flake has two. The most common use pattern is unidirectional wear, in which a series of scars less than 2 mm long occur along an edge. Five edges on three chert and one obsidian core flakes exhibit this pattern. The second most common pattern combines unidirectional retouch and wear, with scars both longer and shorter than 2 mm occurring along an edge. Two edges on one chert and one obsidian angular debris exhibit this pattern. The last utilized edge, on a rhyolite flake, combined unidirectional retouch and battering.

With one exception it is likely that damage on these edges is attributable to use in activities other than fire-making. The exception is the chert angular debris with unidirectional retouch and wear on one edge. The extent of damage on this edge suggests that this specimen represents a marginally used strike-a-light flint. The most extensively damaged edge, on a rhyolite flake, combines battering and unidirectional retouch. This type of wear on chert would almost certainly be classified as strike-a-light-flint use. However, examination of chipped stone assemblages from numerous Hispanic sites suggests that only cherts were used for this task and that rhyolite does not have the requisite characteristics for such use.

The types of scars that occur on a utilized edge vary with the way it was used, the material it was used against, and the type of material from which it was made. Experiments by Vaughan (1985:20) showed that cutting caused mostly bidirectional scarring on 65 percent of his specimens, while 17 percent evidenced unidirectional scars. Scraping or whittling produced bidirectional scars on 46 percent of his specimens and unidirectional scarring on 54 percent. Thus, it is difficult to assign a specific function to either pattern, since there is a significant overlap in the type of wear pattern produced.

Several of our specimens exhibit longer attritional scars that were classified as retouch rather than wear. While retouch may represent an attempt to resharpen an edge dulled by use, this is unlikely in most cases. Most informal tools were undoubtedly discarded and replaced as they dulled because resharpening required more effort. The longer scars classified as retouch may be evidence of the greater friability of certain materials, or of more strenuous use.

Material hardness of the object being processed and the tool can be important factors in edge scarring. Vaughan's (1985:22) experiments showed that consistent scarring is almost always the result of contact with a hard material. However, nearly half of the edges used on hard materials and 80 percent of those used on medium-hard materials in his experiments were not consistently scarred. These findings are similar to those reported by Schutt (1980), who found that consistent edge scarring occurs only when hard materials are contacted.

Scarring also varies with the type of material used as a tool. Fragile materials like obsidian scar more easily than tough materials like chert and basalt. Scars are also easier to define on glassy and fine-grained materials than on coarse-grained rocks. For instance, Foix and Bradley (1985) conducted use-wear experiments on rhyolite and found that evidence of wear was almost invisible, and coarse-grained varieties exhibited more resistance to wear than fine-grained types. Toll (1978) conducted similar experiments on quartzite with much the same result: wear patterns were difficult or impossible to discern. Thus, a much higher percentage of chert and obsidian were expected to show use as informal tools.

Material texture was also an important parameter in the selection of an informal tool. Tasks like cutting and scraping require materials that possess sharp cutting edges. Glassy and fine-grained materials have the sharpest cutting edges and are expected to have been selected for these tasks. In contrast, they are not suitable for pounding or chopping activities and would quickly splinter and fragment when used in such tasks. Coarse-grained materials produce durable edges that last longer and do not splinter as rapidly or often when used for pounding and chopping. Edge angle was another important factor in selecting informal tools. Most of the edges in Schutt's (1980) experiments that measured over 40 degrees were found to be poorly suited for cutting. Thus, we assume that edge angles smaller than 40 degrees were best for cutting, while those larger than 40 degrees were better for scraping.

With all of this in mind, there is no good evidence for chopping or pounding activities in the informal tool assemblage. All of the informal tools that were defined are glassy or fine-grained in texture and more suitable for cutting or scraping tasks. Only two utilized edges are smaller than 40 degrees; both measure 37 degrees and exhibit unidirectional wear. While it is possible that these tools reflect cutting activities, this is impossible to determine for certain. The remaining edges measure more than 40 degrees (46 to 74 degrees) and exhibit unidirectional use patterns. While this may signify scraping or whittling, again we cannot state this for certain. However, we can suggest that the types of materials used as informal tools, the range of edge angles, and the patterns of use seen suggest that unmodified debitage was used in tasks that involved the scraping or cutting of hard or medium-hard materials like wood, bone, or antler.

Only 4 percent of the debitage (excluding strike-a-light flints) exhibits evidence of informal tool use. While this is a fairly low percentage, it should be remembered that Vaughan's (1985) and Schutt's (1980) experiments showed that consistent edge scarring does not always occur when hard materials are encountered, and it may be impossible to discern when soft materials are worked. Thus, the small number of informal tools is indicative of certain types of use but certainly does not represent the full range of such tools in the assemblage.

Strike-a-Light Flints

Fire-making has been an important activity in human societies since the days when *Homo erectus* walked the earth. A variety of methods were used to light fires before the invention of the safety match and Zippo lighter. The use of flint and steel was one of these, and evidence of this method is common at LA 67321. This fire-making system consisted of three components: a steel (*chispa*, or strike-a-light), flint, and tinder. While steels were comparatively valuable and rarely found in archaeological assemblages, and tinder does not tend to preserve, strike-a-light flints were discarded when no longer serviceable. They are common in historic Hispanic assemblages.

Proper strike-a-light use produces sparks, which are tiny grains of steel sheared off the chispa by the sharp edge of a flint and ignited by the force of impact (Ripplinger 1984). Experiments show that several processes occur simultaneously. As the force of impact removes and ignites shavings from the chispa, it also damages the edge of the flint. Continued use often results in retouch on the edge of the flint, producing a steeper edge angle. Since the steeper edge is stronger than the original, it is more resistant to breakage and eventually becomes dull and stops producing sparks. Retouching often produces a concave edge outline, similar in shape to a spokeshave. Edges can be heavily abraded by this type of use, and stepped or feathered microflakes are usually removed from one or both faces. Metal shavings sometimes adhere to the edge or surface of the flint, melting onto the stone.

With the addition of the probable marginally used strike-a-light flint identified among the utilized debitage, 27 strike-a light flints or flakes were found in the assemblage (Figs. 35-37). The disturbed deposits contained 5, and there were 11 each in the colluvial and gleyed deposits. All are chert: 24 (88.9 percent) are of various undifferentiated cherts, and 3 (11.1 percent) are Pedernal chert. As discussed earlier, it is likely that these materials were procured from local gravel terraces flanking the Rio Grande. The assemblage of strike-a-light flints includes 10 flakes (37.0 percent), 8 pieces of angular debris (29.6 percent), 2 flakes struck from tools during use (7.4 percent), and 1 small pebble that was

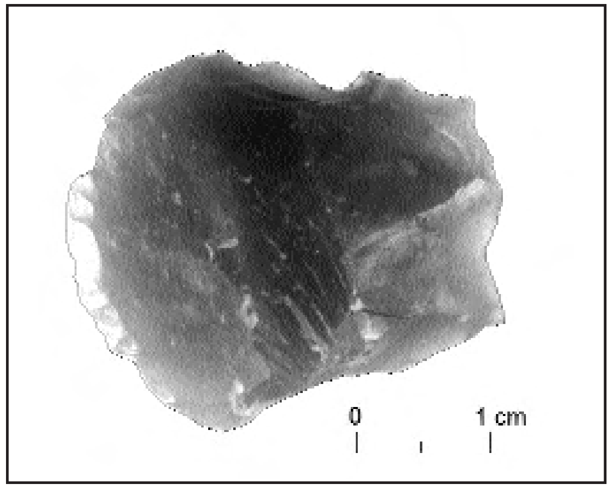

Figure 35. Strike-a-light flint (Stratum 3, FS 112).

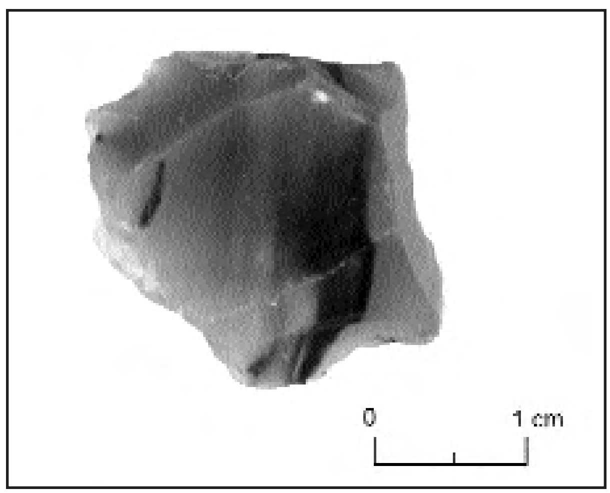

Figure 36. Strike-a-light flint (Feature 1, FS 163).

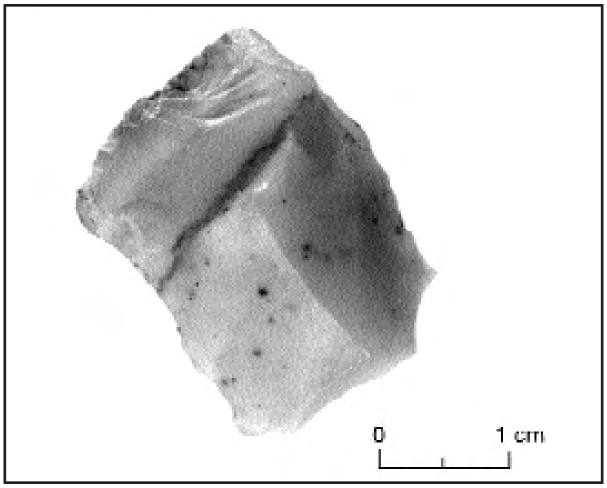

Figure 37. Strike-a-light flint (Feature 2, FS 183).

otherwise unworked (3.7 percent). The six remaining specimens (22.2 percent) were so altered by use that their original forms could not be determined.

Between one and five edges on each artifact exhibit damage attributable to strike-a-light flint use. With the exception of the strike-a-light flakes, six specimens have one utilized edge, seven have two, nine have three, two have four, and one has five. While it was impossible to determine how many utilized edges the parent tool had for the strike-a-light flakes, one exhibits the intersection of two damaged edges, indicating that at least that many edges were used on the parent tool. There are an average of 2.4 utilized edges per strike-a-light flint in the assemblage. Continuing analysis of historic chipped stone assemblages currently provides data on 292 additional strike-a-light flints from 11 Hispanic sites in New Mexico. Table 39 contains basic information on this assemblage. In all, there are 636 utilized edges in the data base, yielding an average of 2.2 edges per strike-a-light flint. This is fairly consistent with the average for LA 67321. Not including the strike-a-light flakes, the average number of edges per tool with LA 67321 added to the data base remains at 2.2.

The average angle of utilized edges for LA 67321 is 71.3 degrees. The most common edge shape is concave, followed by straight, convex, concave-convex, straight-concave, irregular, and no shape definable (Table 40). The latter category contains the strike-a-light flakes, whose platforms represent only a small section of edge. Concave edges dominate the assemblage and have wear concentrated in one or more concavities. A single concavity is most common (59.1 percent), followed by two (22.7 percent), three (13.6 percent), and more than three (4.5 percent). Some edges combine concave and convex segments (6; 9.7 percent). Generally, these shapes include one or more concavities at the end of a convex edge segment, with evidence of use on all segments. Similarly, straight-concave edges combine segments with those shapes. Irregular edges were so badly damaged by use that they can not be fit into any other category.

The most common wear pattern on strike-a-light flint edges from LA 67321 is unidirectional retouch and wear, followed by unidirectional retouch with bidirectional wear, unidirectional wear, minimal use, bidirectional retouch and wear, bidirectional retouch with bidirectional wear, and bidirectional wear (Table 41). As discussed earlier, the difference between retouch and wear scars is one of length--the former are longer than 2 mm, and the latter are shorter than 2 mm. The minimal use category generally includes edges exhibiting some battering but lacking consistent attrition scars.

The largest edge angles occur with bidirectional wear, minimal use, and unidirectional wear (Table 42). Bidirectional retouch patterns have the next largest angles, and the smallest tend to occur with unidirectional retouch. While abrasion was seen on 66.7 percent of the edges, metal adhesions occur on only 18.3 percent.

By combining data from the other 11 Hispanic sites we can compare the strike-a-light flints from LA 67321 to average values. Material types are quite comparable between assemblages. Various cherts dominate the combined assemblage, comprising 98 percent of the total, and silicified wood makes up the remaining 2 percent. This compares favorably with LA 67321, where all strike-a-light flints and flakes are chert. The mean strike-a-light flint edge angle at LA 67321 is somewhat steeper than the mean for the combined sites, which is 64.6 degrees. With the LA 67321 assemblage combined with the rest, the mean edge angle is increased by .6 degrees to 65.2 degrees.

Tables 40 through 42 provide attribute data for LA 67321 and the combined assemblage, and allow us to see how this small data base compares with mean values for the much larger population. Table 40 compares edge shape classes, and few differences between the data sets are visible. Indeed, chi-square analysis suggests that both belong to the same population (chi-square=3.775, DF=6, significance=.707, phi=.074). Table 41 compares the distribution of wear patterns between data sets. In this case there appear to be important differences, which chi-square analysis suggests are significant (chi-square=38.417, DF=6, significance=<.0005, phi=.236). While both sets are dominated by unidirectional retouch and wear, there are large differences between several categories, including unidirectional retouch with bidirectional wear, unidirectional wear, and bidirectional wear.

Table 42 presents mean edge angles for each wear type. Interestingly, in most cases where large differences are visible (for example, bidirectional retouch and wear), few cases were recorded for LA 67321. This suggests that much, if not most, of the variation between data sets for this attribute is caused by sample error. The same culprit may be responsible for the lack of correspondence in Table 41.

Comparisons of abrasion and metal adhesions on edges yield similar inconsistencies. Abrasion was noted on 66.7 percent of strike-a-light flint edges for LA 67321 versus 77.4 percent for the combined sites. Chi-square analysis suggests that there is a small chance that they represent the same population for this attribute (chi-square=3.516, DF=1, significance=.061, phi=.071). Metal adhesions occur on 18.3 percent of edges from LA 67321 versus 60.5 percent from the combined sites. This distribution does not represent the same population (chi-square=39.735, DF=1, significance=<.0005, phi=.240).

In general, the population of strike-a-light flints from LA 67321 resembles the larger data set. Most of the important differences appear to be related to sample error. Thus, by combining the two data sets it should be possible to examine certain attributes in even more depth.

Moore (in prep. b) indicates that edge angle, edge shape, and (perhaps) tool use-life are related. Steep edge angles are less prone to flaking during use and are therefore more stable. However, the incidental removal of flakes from a shallow edge during use tends to refresh the edge and prolong the life of the tool. As flakes are struck from an edge it tends to steepen, eventually reaching a point of relative stability where continued use results in dulling and eventual discard. Figure 38 graphs edge angles in 5 degree intervals for the entire assemblage of edges. The distribution is fairly normal, though skewed a bit to the right. Small drops occur in two places, suggesting that there may be several minor modes including 20 through 39 degrees, 40 through 69 degrees, and 70 through 114 degrees. If these smaller groups are real, they may be related to wear patterns.

Overall, few examples occur in the first interval group (20 to 39 degrees) for all wear patterns, and in only three cases does this category comprise over 10 percent of a wear pattern--bidirectional retouch and wear (16.1 percent), bidirectional retouch and unidirectional wear (18.2 percent), and bidirectional wear (12.5 percent). The remaining patterns are predominantly unidirectional and contain less than 10 percent in the first interval group. Interestingly, the unidirectional pattern with the highest percentage of edges in this interval group combines unidirectional retouch with bidirectional wear.

This suggests that there may be important differences in the distribution of edge angle intervals for more inclusive wear categories. Thus, wear patterns were combined into unidirectionally retouched, bidirectionally retouched, and minimal (no retouch) (Table 43). While bidirectional retouch is fairly rare, this category tends to have the shallowest edge angles. Unidirectional retouch is fairly well balanced between the two larger interval groups, while minimal use is skewed toward the largest interval group. While there is no direct correspondence between wear patterns and edge angle intervals, there appears to be real differences in the distribution of edge angles by wear pattern categories.

How do wear patterns and edge shapes correspond? Table 44 shows the distribution of edge shapes by the same wear pattern categories defined for Table 43. There seems to be little correspondence between wear pattern and edge shape. The unidirectional and bidirectional retouch categories are both dominated by concave edges, while straight edges dominate the minimal use category. This order is reversed when the second most common edge shape is considered for the same categories--straight for unidirectional and bidirectional retouch and concave for minimal use. Indeed, chi-square analysis suggests that different populations are represented (chi-square=48.70, DF=10, significance=<.0005, Cramer's V=.188). However, comparing only unidirectional and bidirectional retouch patterns, we find that there is a good probability that they represent a single population (chi-square=3.843, DF=5, significance=.572, phi=.091). When bidirectional retouch and minimal wear patterns are compared, there is a slight chance that they also represent the same population (chi-square=9.085, DF=5, significance=.106, phi=.184). However, when minimal and unidirectional retouch patterns are compared, there appears to be no chance that they represent the same population (chi-square=44.677, DF=5, significance=<.0005, phi=.263).

While overall there is a significant difference between the three populations, the distribution of edge shapes for unidirectional and bidirectional retouch patterns have a significantly similar distribution. There are also some similarities in the distribution of edge shapes for the bidirectional retouch and minimal wear patterns, though it is less marked. Most variation is accounted for by differences in the distribution of straight and concave edges among the three categories. In essence, the minimal wear category is more different from the unidirectional and bidirectional retouch patterns than they are from each other.

Table 45 shows the distribution of average edge angles for each wear pattern and edge shape. The straight-concave-convex edge shape category contains only two examples and is therefore combined with the concavities category. Straight and convex edges tend to have the highest mean angles, while irregular and concave edges have the lowest; otherwise, percentages

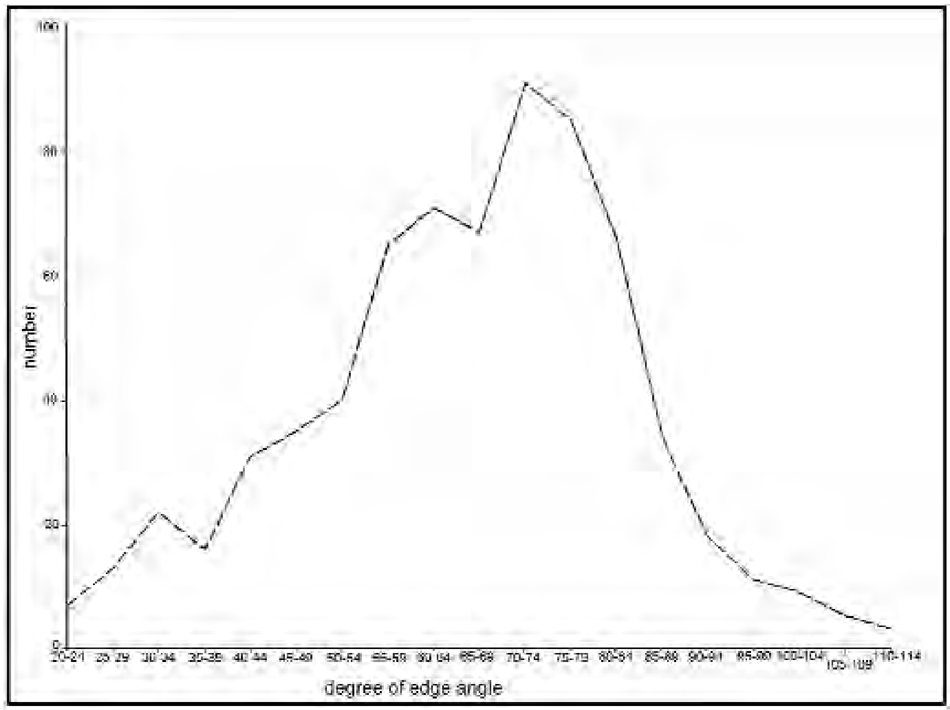

Figure 38. Graph of edge angles for strike-a-light flints in five-degree intervals.

seem to be all over the place. Wear patterns are again combined into more inclusive categories in Table 46. Examination of these distributions suggests that a single population is represented (chi-square=3.216, DF=10, significance=.976, Cramer's V=.038). Thus, there are no statistically significant differences in the distribution of edge angles by edge shapes for the three wear pattern categories.

Similar analyses were conducted to determine whether or not edge angle, edge shape, and wear pattern type played any role in the presence or absence of abrasion and metal adhesions along edges. When mean edge angle was examined by presence or absence of abrasion for each edge shape, analysis weakly suggested that a single population might be represented at the 99 percent confidence level (chi-square=12.786, DF=5, significance=.026, phi=.136). Conversely, when the same distribution was examined for presence or absence of metal adhesions, there was a strong likelihood that a single population was represented (chi-square=.691, DF=5, significance=.984, phi=.030). Examination of mean edge angles for wear pattern category by presence or absence of abrasion yielded similarly strong results (chi-square=.046, DF=2, significance=.977, phi=.011), as did the same examination for presence or absence of metal adhesions along edges (chi-square=.508, DF=2, significance=.776, phi=.037). Thus, there does not appear to be any interaction between edge angle and wear pattern or edge shape when the presence or absence of abrasion and metal adhesions is considered.

What does this tell us about strike-a-light flints? First, as indicated earlier, only chert was used for these tools. There is no evidence of any intentional shaping or sharpening on strike-a-light flint edges; all such alterations are a consequence of use. While overall the use of only one edge per tool is the most common pattern (38.8 percent), strike-a-light flints often exhibit multiple used edges and average 2.2 per tool. The presence of one or more concavities is the most common edge shape (43.9 percent), though straight edges are also common (27.5 percent).

There appears to be a relationship between edge angle and wear pattern, with bidirectionally retouched edges exhibiting a smaller mean than the unidirectionally retouched and marginally used categories. This is probably a function of the way in which these edges were selected and struck. Marginally used edges appear to have begun their use-lives with steep angles, probably not much different from the mean derived for this class of edges (68.5 degrees). Unidirectionally and bidirectionally retouched edges probably began their use-lives with much shallower angles than they ended up with. As flakes were inadvertently struck from these edges during use, they grew steeper. Unidirectional edges appear to have stabilized at an angle only slightly smaller than the mean for minimally used edges (64.8 degrees). Around this measurement, edges seem to dull during use rather than undergo continual resharpening by incidental flaking. Bidirectionally retouched edges appear to have stabilized at a lower edge angle (57.7

degrees). This angle was attained by inadvertent bidirectional retouch during use, apparently creating an edge that was stronger and more resistant to splintering at a lower angle.

There is some correspondence between edge shape and wear pattern, but it may not be highly significant. In particular, straight edges tend to display much higher percentages of minimal wear, though both unidirectional and bidirectional retouch also occur. Otherwise, there is little evidence that these variables are correlated. No single edge shape is indicative of a certain wear pattern and vice versa.

No correspondence between the presence or absence of abrasion or metal adhesions and the mean angles of the various edge shapes and wear pattern categories was found. Abrasion is probably more determined by the amount of use a strike-a-light flint received after the edge stabilized than the angle of the edge. It is likely that there is no good relationship between any of these variables and the presence of metal adhesions along edges. Metal adhesions appear to occur randomly, depending on the direction taken by fragments of ignited metal as they were struck from chispas. If some were directed back at the strike-a-light flint, there was a chance that one or more would hit the surface of the tool and adhere.

Strike-a-light flints are common at Hispanic sites in New Mexico. Their final shapes and edge angles appear to have been determined both by their original edge angles and the amount of use they were subjected to. Wear patterns tend to be distinct and are different enough from those indicative of scraper or spokeshave use to allow this class of tool to be easily distinguished from similar forms.

Formal Tools

Only three formal tools were recovered during this study of LA 67321--one from the colluvial deposits, and two from the gleyed deposits (Table 38). The tool form is a very early stage obsidian biface (Fig. 39). The original source of this material is undetermined, but it was probably the Jemez Mountains. While at first glance this artifact appears to be fragmentary, closer examination indicates that it was made on part of a flake that broke during removal from a core. Retouch is sporadic and uneven, confined to edge margins. Most retouch scars occur on the dorsal side of the original flake. While a few retouch flakes were removed from the other surface, no attempt was made to create a consistent pattern of retouch. The retouched edge is heavily worn and rounded, as is a second unretouched edge. The type and non-patterned appearance of retouch on this tool and the presence of a second utilized but unretouched edge suggest that edge modifications were aimed strictly at improving functionality, with no concern for symmetry or appearance.

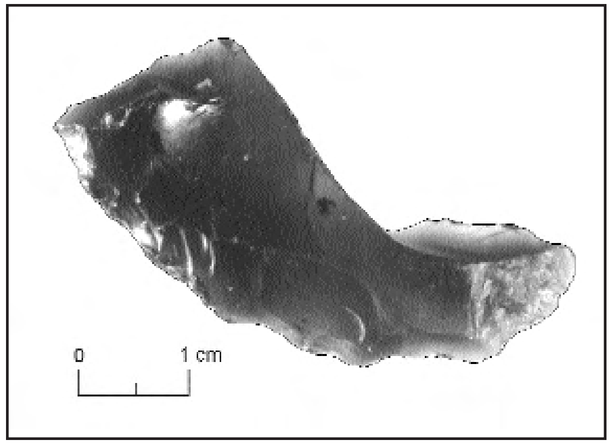

Figure 39. Biface (Stratum 3, FS 176).

The two remaining formal tools were found in the gleyed deposits and include a drill shaft fragment (Fig. 40) and a gunflint (Fig. 41). With a width of 1.2 cm, the drill shaft is very large for this class of tool. It would have been used to bore holes with that diameter. The edges of the shaft are heavily rounded, indicating that it was extensively used. In contrast with the biface, flaking on the drill is very fine and consistent along both edges and on both surfaces. Flake scars are regular in shape, width, and length; they also tend to run parallel to one another and perpendicular to the long axis of the tool. This contrasts with flaking on the biface where scars are variable in shape, width, and length and have a very irregular pattern.

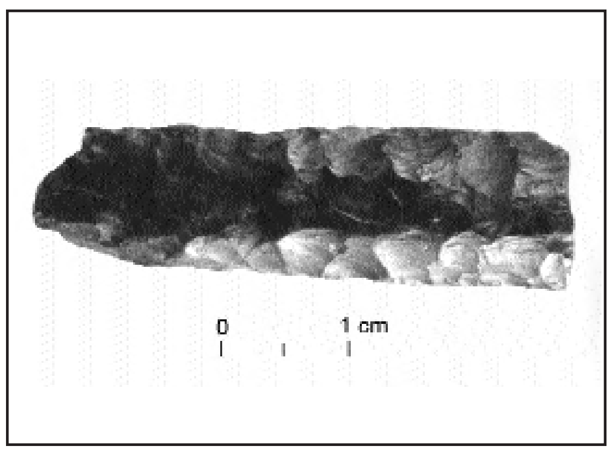

Figure 40. Drill fragment (Feature 2, FS 183).

The flaking on the gunflint is similar to that of the biface. Retouch is confined to the margins of the tool, creating very steep edges (65, 91, and 92 degrees). Retouch scars are generally parallel to one another along an edge but are quite variable in size and shape and are inconsistently spaced. Two edges on this tool are mostly unifacially flaked, with few retouch scars on the opposing surface; the third edge is flaked on both surfaces. The edge thus created is irregular and off the midline in all three cases. A lack of battering on the retouched edges indicates that this tool was never used and was lost or discarded as unsuitable.

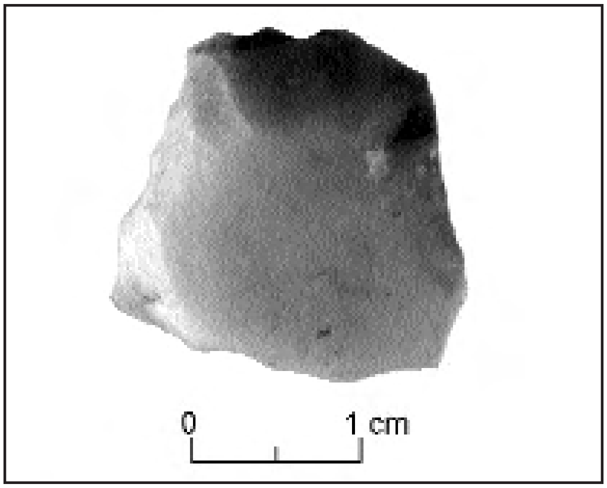

Figure 41. Gunflint (Stratum 6, FS 179).

Flaking Patterns on Formal Tools and Aesthetics

As this discussion indicates, the flaking style varied from tool to tool. The biface and gunflint were generally similar in style, but the drill fragment was quite different. Applying aesthetic values, one could say that the drill fragment was finely flaked by an experienced craftsman, while the biface and gunflint display crude flaking that could be associated with very expedient manufacture or a flintknapper who lacked experience.

Similar dichotomies are visible in the array of projectile points recovered from Hispanic sites in the Southwest. While some are finely flaked and may represent prehistoric manufacture, others evidence expedient production, similar to that on our biface and gunflint (Moore in prep. b). A point from the Alamo is triangular with shallow side-notches and a concave base; workmanship is crude, and only edge margins are flaked (Fox et al. 1976). Two similar points were found at the Presidio of Tucson--one is nicely flaked from green bottle glass and differs in shape from historic Papago points (Olson 1985:265). The second is chert, has the same general shape, and appears to have been flaked only along edge margins (Olson 1985:287). One group of points from Tubac Presidio have shallow side-notches and concave bases. A second type is similar in form, with straight or shallow concave bases but no notches (Shenk and Teague 1975:77). Technologically, these points are crude, with retouch confined to edge margins. Both types also occur at historic Indian sites in southern Arizona.

Projectile points from Hispanic sites in New Mexico are generally similar to these. Three points were found at La Puente (LA 54313), one at Santa Rosa de Lima de Abiquiu (LA 806), and two at the La Fonda Parking Lot (LA 54000). One of the latter is a reused Archaic point, but the second is similar to those from the other sites. These points display crude and marginal flaking and tend to be shallowly side-notched with straight or concave bases. Flaking patterns are similar to those seen on gunflints from La Puente, the Torreon site, the La Fonda Parking Lot, and LA 16769. In each case, retouch is marginal and does not extend across artifact faces.

The relative crudity of these tools could indicate that they were made by people who were unskilled or unfamiliar with the process. Conversely, it is possible that they were only interested in the functionality of finished tools and not in their appearance. While similar projectile points occur at some historic Indian sites in southern Arizona, they were also found at a large array of Hispanic sites. It is possible that the New Mexican points were obtained in trade from local Indians. However, it is more likely that they were made by the Hispanic residents of these sites themselves. Comparison with projectile points from the Feldman site (LA 76138), a seventeenth-century pueblo fieldhouse near Pecos, finds distinct differences in manufacturing techniques. Points from the Feldman site tend to be finely made, with patterned flaking that extends entirely across surfaces. Those from Hispanic sites look crude and unaesthetic by comparison.

Similarities between retouch patterns on projectile points and gunflints at Hispanic sites suggest they were made using the same manufacturing techniques. Marginal retouch was used to produce the desired shape, but the general steepness of the resulting edge, lack of aesthetically pleasing flake scars that extend across surfaces, and regular shapes that fall into specific categories were apparently unimportant. Rather than unfamiliarity with flintknapping techniques, this suggests an emphasis on functionality in chipped stone tool manufacture. Indeed, production and use of gunflints and strike-a-light flints in traditional European culture suggest a widespread familiarity with flintknapping technology. In New Mexico this technology was extended to the manufacture of replacements for metal tools that were both costly and difficult to acquire on the Hispanic colonial frontier (Moore 1992, in prep. b). Functionality was stressed because these tools were unimportant, both economically and symbolically. They were simply means to an end, rather than representing a cultural system. As long as they worked they were fine. Craftsmanship in chipped stone tool manufacture appears to have retained fairly high standards in pueblos until metal tool availability reached the point that flintknapping began to die out. Formal tools probably retained their traditional forms and were made to be aesthetically pleasing and to carry symbolic information.

The level of craftsmanship seen in the drill fragment clashes with the lack of refined work on the biface and gunflint. Thus, it is likely that the drill is of Pueblo manufacture, while the other tools were made by Hispanics. These differences are not necessarily indicative of the relative skills of Pueblo versus Hispanic flintknappers; rather, they reflect different philosophies on the place and value of such tools in material culture.

Gunflints

Gunflints were important components in firearm ignition systems from the sixteenth century until the development of the percussion cap in the 1820s (Cadiou and Richard 1977:18). In some areas they remained in use until much later because more advanced weapons were too costly or unreliable. For example, gunflints were still being made and used in parts of Angola and Zambia in the mid-twentieth century, and in the Balkans and Bulgaria as late as the 1880s (Evans 1887; Phillipson 1969).

As discussed by Moore (in prep. b), squared, bifacially flaked gunflints like the one from LA 67321 indicate Hispanic manufacture in the Southwest. This style was replaced in most of northern Europe by the early 1700s (Hamilton 1980), but bifacial gunflints continued to be made in Spain, its colonies in North and Latin America, and other Mediterranean areas, including Portugal, Bosnia, Serbia, Bulgaria, Albania, and North Africa (Evans 1887; Phillipson 1969; Runnels 1982; Witthoft 1966). This is because the type of gunlock popular in much of this area--the miquelet lock–delivered a heavy direct blow to the frizzen and required a flint that could withstand such use. The miquelet lock was similar in this respect to early versions of the flintlock, like the snaphaunce lock, which was developed in the mid-sixteenth century (Peterson 1956; Cadiou and Richard 1977). By the early seventeenth century this style began to be replaced in northern Europe by locks that were built so that the flint grazed the frizzen rather than striking it directly. Flints with more fragile edges could be used in these locks, leading to the manufacture of gunspalls and finally to flints made from prismatic blades.

However, these later types of gunflints were not suitable for early styles of gunlocks. An experiment was conducted using English-style gunflints made from prismatic blades in a replica miquelet lock. Even though the spring in the replica was not as strong as those in Hispanic firearms, the fragile English flints shattered upon impact. Replicas of Hispanic-style squared bifacial gunflints used in the same lock functioned efficiently and without excessive breakage. As shown by the occasional occurrence of unifacial examples of Hispanic gunflints at the Torreon site in New Mexico, and Mission San Juan Capistrano and the Alamo in Texas (Fox et al. 1976; Greer 1967; Schuetz 1969), bifacial flaking was not always necessary as long as the edge was strong enough to survive use. An interesting example of adaptation is shown by an English gunflint collected from the late Spanish Colonial site of LA 16769 by E. Boyd and curated at the Museum of International Folk Art in Santa Fe. Three edges on this tool were reworked to produce bifacial edges suitable for use in a miquelet lock.

The miquelet lock was popular in Spain and its colonies from its development around 1600 until at least the mid-nineteenth century (Brinkerhoff and Chamberlain 1972; Lavin 1965; Peterson 1956). Attempts were made to introduce a French pattern lock into military service in Spain as early as 1728 but were unsuccessful until they became standard in the model 1815 musket (Brinkerhoff and Chamberlain 1972:36). However, while mainline troops were armed with the new weapons, special provisions were made to allow presidial troops and militias in the Southwest to continue using obsolete firearms equipped with the traditional *llave española*, or miquelet lock (Brinkerhoff and Chamberlain 1972:18). Thus, bifacial gunflints which evidence use in miquelet locks occur until at least the mid-1800s in New Mexico (Moore in prep. b). This is important because squared, bifacial gunflints have traditionally been assigned a pre-1700 date in the northeastern United States based on the sequence of gunflint types found in northern Europe (Witthoft 1966). However, these dates are not applicable to the Southwest or, as noted earlier, many parts of southern Europe that border the Mediterranean. Even after the miquelet lock was replaced with French-pattern locks by the Spanish military, they remained in use on the frontier. Thus, we find Spanish-style squared bifacial gunflints occurring before the Pueblo Revolt of 1680 at the La Fonda Parking Lot site (LA 54000) in Santa Fe, and as late as the Santa Fe Trail period (1821 to 1846) at La Puente (LA 54313), near Abiquiu. This style of gunflint is diagnostic of nearly the entire Spanish period of occupation in New Mexico and probably extends into the early American period. Thus, it is not a particularly sensitive temporal indicator.

Earlier Excavations at LA 67321

Analysis of the chipped stone assemblage from the part of LA 67321 excavated by the Office of Contract Archeology (OCA) (Brown and Vierra 1997) is reported by Vierra (1997). The number of artifacts recovered during that phase of work was very similar to the number recovered during the present investigation. Vierra (1997:305) reports 180 historic chipped stone artifacts compared to the 181 recovered by the OAS. It is unfortunate that strata were not consistent between these areas, nor is the level of reporting. Still, using complete assemblages as units of comparison we should be able to determine whether our results are comparable with those of OCA.

Table 47 compares material types from both phases of excavation. Both assemblages are dominated by cherts, though there is a slightly higher percentage in the OAS collection. The second most common material type varied. What may be the same material type was classified as andesite by OCA and rhyolite by OAS. Some of the rhyolites identified in our analysis contain a few dark phenocrysts, which might lead some to classify them as andesite. However, andesite is dominated by dark-colored ferromagnesian phenocrysts (Chesterman 1979:687). Rhyolites are dominated by light-colored phenocrysts of quartz and feldspar, though ferromagnesian minerals can also occur (Chesterman 1979:684). Since light-colored phenocrysts dominate in most of our specimens, they were classified as rhyolite. In the few instances when dark-colored phenocrysts were dominant, specimens were categorized as andesite.

Other materials are comparatively rare and comprise less than 5 percent of each assemblage. The only exception is quartzite, which makes up slightly more than 5 percent of the OCA assemblage. No massive quartz was noted in the OCA assemblage, suggesting that if it occurred in that part of the site, it was probably included with quartzite. Even though quartzite and massive quartz were combined in the OAS assemblage, there is twice as much quartzite in the OCA assemblage.

With most differences accounted for, assemblage percentages for material types are fairly comparable between the two areas of the site, and chi-square analysis suggests that they represent a single population (chi-square=5.853, DF=5, significance=.321, phi=.127). Unfortunately, there is no comparable information on material quality for the OCA assemblage, so we can provide no more detailed comparisons of material selection parameters.

Like the OAS assemblage, all materials identified in the OCA assemblage are available locally. A total of 34.5 percent of the debitage in the OCA assemblage possessed cortical surfaces; 74.5 percent were waterworn, and 25.5 percent were nonwaterworn. This contrasts with the OAS assemblage, which contains 40.6 percent cortical debitage, but all cortex is waterworn. No definite exotic materials were found in either assemblage, and I assume that obsidian and Pedernal chert were obtained locally.

Table 48 compares percentages of artifact types recovered during each excavation phase. The most glaring difference is a much higher percentage of core flakes recovered by OCA. The flake to angular debris ratio for that phase of investigation is 6.57:1, versus 2.52:1 for our study. While the OAS flake to angular debris ratio falls into the range observed at other Hispanic sites in northern New Mexico, the OCA ratio is higher than seen elsewhere. The ratio for both assemblages combined is 3.86:1, which falls into the range of other Hispanic sites. The OCA ratio may simply be a result of sampling error.

The OCA assemblage contains a single biface flake. This artifact may be evidence of biface manufacture during that occupation of the site, but it could also have been collected from an earlier site for potential reuse, or it may represent contamination from the Pueblo component found in this part of the site. Far fewer strike-a-light flints were also found in the OCA assemblage. Since the extreme amount of edge damage confirming such use is hard to miss, this probably represents a real difference between assemblages. More cores were found in the OCA assemblage than in the OAS study, and formal tools were rare in both assemblages, occurring in similar percentages. Differences between artifact type distributions are significant enough to suggest that these assemblages represent separate populations (chi-square=22.858, DF=4, significance=.00014, phi=.252).

Table 49 compares platform assemblages for both studies. Nearly twice as many whole and fragmentary flakes retaining platforms were recovered by OCA than by OAS. Indeed, 89.1 percent of the flakes recovered during the earlier phase had platforms versus 67.6 percent for this phase. The OCA assemblage contains much higher percentages of cortical and single facet platforms, while the OAS assemblage has higher percentages of absent/obscured and collapsed platforms. These assemblages appear to represent different populations (chi-square=46.764, DF=4, significance=<.0005, phi=.435). Even so, they have one important similarity: each is dominated by simple, unmodified platforms. Indeed, only one modified platform was found in either assemblage.

Flakes in the OCA assemblage are somewhat larger than those in the OAS assemblage. The mean size of OCA flakes is 20.2 mm long by 21.0 mm wide by 6.2 mm thick (Vierra 1997:312), while the mean for OAS flakes is 18.9 mm long by 17.5 mm wide by 5.3 mm thick. These differences are not large and may reflect a higher percentage of whole flakes in the OCA assemblage.

There appears to be some comparability between strike-a-light flints in these assemblages. There are 1.9 utilized edges per tool in the OCA assemblage, versus 2.4 per tool in the OAS assemblage. In both cases the average is fairly near the overall mean of 2.2 edges per tool. Concave edges were the most common edge shape in both assemblages, but mean edge angle was quite a bit larger for the OCA assemblage--81.4 degrees, compared to 71.3 degrees for the OAS assemblage. Other than noting that metal was identified on one edge, Vierra (1997:312) does not present comparable data on wear patterns.

The only statistical similarity between these assemblages is in material type selection, where both appear to represent a single population. In both cases, all materials seem to have been obtained locally. Significant differences were found in the distributions of artifact types and platform types, though there are some similarities between strike-a-light flint assemblages. But how important are these differences? Assemblage size is small in both cases, so sample error may be responsible for many of the differences seen. Indeed, if 10 flakes in the OCA assemblage had instead been classified as angular debris, there would be a small chance for both assemblages to represent a single population at the 99-percent level of confidence.

Rather than stressing differences between these assemblages, we should be focusing on similarities. In both cases, only local materials were used for reduction, and cherts dominate each assemblage. Expedient core-flake reduction trajectories are indicated for both, and the most common types of tools recovered were informal and associated with fire-making activities. In neither case was much debitage indicative of formal tool manufacture recovered. However, the presence of a biface and gunflint in the OAS assemblage and a biface flake in the OCA assemblage suggest that some formal tool manufacture did occur.

Differences between these assemblages may be attributable to sample error, at least in part. They may also be attributable to the nature of the deposits investigated during both studies. The extent of deposits and lack of any directly associated residences suggest that they represent community refuse disposal. Thus, we may be seeing variation between different households, or we may be averaging debris from multiple households in both cases. Using data from other Hispanic sites, both individual residences and communities, it may be possible to see how these assemblages fit the larger picture.

Comparison with Other Hispanic Assemblages

Data from 11 other Hispanic sites in New Mexico can be compared to those from LA 67321. Ten of these sites are in northern New Mexico--one is in Santa Fe (LA 54000), three are along the Santa Fe River south of Santa Fe (LA 2, LA 16768, LA 16772), two are near Abiquiu (LA 54313, LA 59658), and the others are near Ojo Caliente (LA 83110), Taos (LA 77861), and Pecos (LA 99029). Besides LA 67321, LA 953, a historic component from the Rio Abajo at Valencia Pueblo, is also available for comparison (Vierra 1997).

Only LA 54000 dates to the early Spanish Colonial period. The site probably represents community trash disposal. Five sites date to the late Spanish Colonial period--a component at LA 2, LA 16768, LA 16772, LA 65005, and LA 83110. These sites represent single-residence deposits, though it is possible that LA 83110 reflects intermittent use as a camp. The assemblages from LA 2 and LA 16772 may contain materials from earlier Pueblo occupations, and they are used with caution. LA 99029 is a single residence dating to the Santa Fe Trail period. Community trash disposal areas at LA 953 and LA 54313 reflect use during the Santa Fe Trail and Railroad periods, while single residence deposits at LA 59658 and LA 77861 reflect use during the Railroad period. Generally, while communities and single residences tend to produce very different material culture profiles (J. Boyer, personal communication, 1998), these differences may not carry over into the chipped stone assemblages.

In order to compare LA 67321 with the other sites, data from the OCA and OAS excavations were combined. Comparative information for all sites is shown in Table 50. Assemblages contain between 14 and 1,488 artifacts, and average 316. Means and standard deviations were computed for each attribute, but because of the large size of several standard deviations, it was felt that the smaller assemblages were skewing our results. Thus, means and standard deviations were recalculated after dropping assemblages of fewer than 100 artifacts. The eight assemblages included in this sample and provide the data used for comparison in this section (Table 50).

Chert comprises a very high percentage of nearly every assemblage, the only exception being the small assemblage from LA 83110. Both Valencia assemblages contain lower percentages of chert than the mean, and both fall outside the first standard deviation range (70.5 to 89.9), though LA 67321 is just barely beyond it. Indeed, when only the OAS assemblage is considered, the percentage of cherts falls into the lower part of the first standard deviation range.

Two of the assemblages that are more than one standard deviation above the mean are LA 59658 and LA 99029. The former dates to the Railroad period and contains the highest percentage of strike-a-light flints, while the latter dates to the Santa Fe Trail period and contains the third highest percentage of strike-a-light flints. In both cases, improved access to goods imported from the United States may have resulted in a reduced need for chipped stone replacements for metal tools. Fire-making may have been the main task in which chipped stone was used at these sites, and few other material types were chipped.

A high standard deviation for strike-a-light flints indicates that there is quite a bit of variability in the percentages of these tools in our assemblages. Four assemblages fall below the first standard deviation range (3.92 to 25.76). Two contain less than 100 artifacts, and the others are LA 2 and LA 953. Mixing with earlier materials may be the cause of this deviation in the latter two assemblages, since they were obtained from multicomponent sites. Sample error is probably responsible in the other two cases, since they are very small assemblages. Two assemblages fall above the first standard deviation range--LA 59658 and LA 77861. That these sites both date to the Railroad period is probably significant, and high percentages of strike-a-light flints probably indicate a stress on fire-making activities, as discussed above. The entire LA 67321 assemblage falls within the first standard deviation range for this attribute, but when only the OAS analysis is considered, the percentage of strike-a-light flints is slightly below the mean.

Flake to angular debris ratios are fairly low, and mostly reflect expedient core-flake reduction. Three assemblages fall below the first standard deviation range (1.69:1 to 4.01:1), and only one is higher. It is possible that the fairly high ratio for LA 54000 is skewing the ratio upward, so the average was recalculated with that assemblage dropped. This yielded a ratio of 2.57:1 with a standard deviation of .96 and first standard deviation range of 1.61 to 3.53. The same three assemblages fall below this range, while three are now above it. Unfortunately, these assemblages do not form any sort of temporal pattern. This is probably because our data base is too small to allow us to confidently assess this attribute, since flake to angular debris ratios are dependent on a number of factors, including the flintknapper's skill, brittleness of materials, and reduction technique. Suffice it to say that Hispanic chipped stone assemblages tend to have low ratios of flakes to angular debris, generally consistent with those for Pueblo residential sites and much lower than ratios for most Archaic sites. LA 67321 falls within the first standard deviation when the larger assemblages are considered and is slightly above it when LA 54000 is dropped from the sample. When only the OAS assemblage is considered, that ratio (2.52:1) is much lower than the mean for the site and is very close to the overall mean.

The percentage of formal tools in each assemblage is also quite variable, though low in every case. One assemblage falls above the first standard deviation range (.55 to 3.37), and three fall below it. LA 67321 is comfortably within the first standard deviation, and slightly below the mean. Much the same result is obtained when only the OAS assemblage is considered.

The last attribute shown in Table 50 is percentage of biface flakes. This attribute may reflect the amount of large biface manufacture occurring at a site, but it could also be a reflection of scavenging for suitable materials at earlier sites. Some material scavenging almost certainly occurred. For instance, LA 54313 contains a large biface fragment reused as a strike-a-light flint. This tool was almost certainly collected from an earlier site and used for a different purpose than originally designed. Another example is the Archaic point from LA 54000, which also appears to have been scavenged from an earlier site. There is no reason to believe that other chipped stone artifacts were not also collected from earlier sites. This is not to say that all such materials originated in that manner--there are enough debitage and cores on most of these sites to suggest in situ reduction. But some classes of artifacts could represent scavenged materials. Most biface flakes may fall into this category, since there is little evidence for the manufacture of that type of tool in Hispanic assemblages.

Because the standard deviation is larger than the mean, and only LA 54000 falls outside the first standard deviation range (0 to 2.65), it is likely that this site is skewing our figures upward. Dropping LA 54000 from consideration yields a mean of .8 and a standard deviation of .57. One site, LA 953, is below the first standard deviation range (.23 to 1.37), and two (LA 59658 and LA 65005) are above it. The exceptions form no discernable temporal pattern. LA 67321 falls just within the first standard deviation range below the mean. No biface flakes were identified in the OAS assemblage.

Considering these attributes, LA 67321 represents an average Hispanic assemblage. The percentage of cherts is just barely outside the first standard deviation range, and within that range when only OAS materials are considered. It fell within the first standard deviation range for flake to angular debris ratios when all the larger assemblages were considered and slightly above it when LA 54000 was dropped. Other attributes for LA 67321 fall comfortably within the first standard deviation.

Table 51 presents data on flake platforms for the same array of Hispanic sites. Large percentages of flakes have missing or obscured platforms. Except for LA 54000 there are also comparatively small percentages of modified platforms. Simple platforms (cortical and single facet) dominate the collections of extant and unobscured platforms in all of the larger assemblages, comprising between 65.1 and 95.6 percent of those totals. Multifacet platforms are fairly common in seven assemblages overall, but in only four of the larger assemblages. Rather than significant differences in reduction technology, this is probably more a result of varying material supply. The presence of fairly large percentages of multifacet platforms may indicate that good materials were not plentiful and cores were extensively reduced.

Both Valencia assemblages contain high percentages of cortical platforms, LA 953 is above the first standard deviation range (8.6 to 17.16), and LA 67321 is near the upper end of the range. Only one of the larger assemblages, LA 59658, falls below the first standard deviation range for this attribute. The OAS assemblage from LA 67321 contains a much smaller percentage of cortical platforms than the OCA assemblage but is still within the first standard deviation range. Both Valencia assemblages also contain high percentages of single facet platforms. Of the larger assemblages, only LA 59658 falls above the first standard deviation range (29.25 to 41.53) and only LA 65005 falls below it. The Valencia assemblages are both near the upper end of the first standard deviation range, with the OAS assemblage from LA 67321 falling significantly below.

Both Valencia assemblages fall within the first standard deviation range for multifacet platforms (2.32 to 18.2). Only LA 54000 falls below it and LA 99029 above it. There is little difference in percentages of multifacet platforms between the OAS, OCA, and overall assemblages from LA 67321.

Only LA 54000 does not fall within the first standard deviation range for modified platforms (.34 to 4.08) and therefore must be skewing the mean upwards. Thus, mean and standard deviation were recalculated, with LA 54000 dropped from consideration. This yielded a mean of 1.58 and a standard deviation of .93. Two sites, LA 54313 and LA 65005, fall above this first standard deviation range (.65 to 2.48), and one, LA 67321, falls below it. The latter is mainly due to the absence of modified platforms in the OCA assemblage from that site. When only the OAS assemblage is considered, it falls within the first standard deviation.

Along with LA 99029, the Valencia assemblages fall below the first standard deviation range for absent/obscured platforms (33.16 to 45.84). Only one larger assemblage, LA 54000, falls above this range. However, when the OCA assemblage is removed, the OAS assemblage from LA 67321 falls above the first standard deviation range, a complete reversal of position.

The Valencia assemblages from LA 953 and LA 67321 can be distinguished from the others when platform types are considered. Both assemblages fall near or above the top end of the first standard deviation range for cortical and single facet platforms, while LA 953 falls below that range for multifacet platforms. They are both near the bottom end of the range for modified platforms and below the first standard deviation range for absent/obscured platforms. For the most part, this is probably just a reflection of higher percentages of whole flakes in these assemblages contributing to higher percentages of cortical and single facet platforms and lower percentages of absent/obscured platforms. However, when only the OAS assemblage from LA 67321 is examined, the percentage of single facet platforms falls below those first standard deviation ranges and the percentage of absent/obscured platforms is above those ranges. The consistency of differences between our analysis and that of OCA suggests that while it is likely that many reflect real variation, some differences must be attributed to analyst bias.

Conclusions

For the most part, the collection of chipped stone artifacts from LA 67321 appears to be typical of Hispanic assemblages. Variations between assemblages can be accounted for by several processes, some related to economic trends, others to raw material availability, and still others to the vagaries of sampling and analysis. Real differences were defined between the assemblages from LA 67321 that were collected by OCA and OAS. We concluded that some may be due to variation in analysis, and others may reflect actual diversity in the total site assemblage. The fact that OCA recovered a much larger percentage of whole flakes than OAS may indicate differences in analytic definitions, or it could reflect sample error. It is interesting that the combined assemblage from this site is more similar to that of the nearby LA 953 than either is on its own. This tends to suggest that most differences in these assemblages are attributable to sample error resulting from internal site variation.

Earlier it was noted that the occurrence of prehistoric ceramics in the area investigated by OAS in addition to the presence of a prehistoric Pueblo component in the area excavated by OCA could suggest that our assemblage is contaminated by earlier materials. The fact that chipped stone assemblages from LA 67321, both as a whole and from the area excavated by OAS, fit a pattern comparable to that of unmixed Hispanic assemblages suggests that any such contamination is probably minimal. One of three formal tools recovered appears to reflect Pueblo or Plains Indian manufacture.

However, there is no way to ascertain whether this tool indicates contamination from an earlier occupation or was used by Hispanic occupants of the site.

The presence of prehistoric sherds could be indicative of colluvially deposited materials reflecting an earlier occupation, or they could have been collected elsewhere by Hispanic site occupants and eventually deposited in their midden. Prehistoric sherds are fairly common in historic Hispanic deposits. It is not known how they were used, but they usually reflect materials collected from earlier sites. This is not to say that this is how the prehistoric materials at LA 67321 originated, only that their presence need not indicate contamination. At this point, all evidence suggests that the chipped stone assemblage is predominantly related to the historic occupation.

As discussed earlier, our excavations at LA 67321 defined three groups of strata: disturbed deposits that were uppermost in the sequence, possible colluvial deposits which underlay them, and gleyed deposits that were lowermost and seemed relatively undisturbed. No good evidence of temporal differentiation was found between the chipped stone assemblages from these groups of strata. Most analyses suggest that they represent a single population of artifacts, though in several cases the level of probability is low. This suggests two possibilities: economic changes caused little or no corresponding shift in chipped stone material selection parameters or reduction techniques, or all three types of deposits reflect occupation during a single economic period.

Comparison of our materials with those from an array of Hispanic sites in New Mexico suggests that a few economic changes may be visible. Excluding assemblages of fewer than 100 artifacts, it appears that higher percentages of chert tend to occur at sites dating after the opening of the Santa Fe Trail. The three assemblages containing the highest chert percentages all date to this period: LA 54313, LA 59658, and LA 99029. As noted earlier, this tendency may reflect a more abundant supply of metal tools and less need for chipped stone substitutes. Consequently, fire-making was the main task for which chipped stone was used. Chipped stone tools were used for more tasks in earlier sites, resulting in a greater range of material types and a generally smaller percentage of chert. The percentage of chert in the OAS assemblage from LA 67321 is comparatively low, suggesting occupation before the opening of the Santa Fe Trail. This agrees with the dates derived from analysis of the native ceramic assemblage.

While certain chipped stone tool types may be temporally sensitive, the small numbers of formal tools in these assemblages makes them rather useless for dating most sites. As discussed earlier, squared, bifacial gunflints were used in New Mexico from the late 1600s to the mid-1800s, limiting their use as temporal indicators. Spaniards also made and used an array of other stone tools, including projectile points. Unfortunately, there has been little research into this aspect of Hispanic chipped stone technology, and it is uncertain whether this class of tool can be used to date sites. However, as suggested by an earlier discussion, there is no evidence to suggest that chipped stone tools were assigned any stylistic or symbolic value by Hispanic people. They only seem to have had a functional value, and outward appearance did not matter as long as they were useful. This attitude does not lend itself to the development of temporally sensitive stylistic groups, and it is unlikely that Hispanic-made projectile points will ultimately be found to be any more temporally sensitive than gunflints.

Continuing analysis of strike-a-light flints is beginning to provide important information on this class of tool. Only cherts were used in fire-making activities, and this is one of the main reasons for comparatively high percentages of this material class in Hispanic sites. The presence of strike-a-light flints is indicative of historic occupation, but there is no good evidence of temporal differences in wear or use patterns that can be used to assign dates to sites based on the array of strike-a-light flints they contain. However, sites dating after the opening of the Santa Fe Trail tend to contain higher percentages of this tool class than earlier sites, which probably covaries with the high percentages of chert seen in most of the same assemblages.

However, the presence of strike-a-light flints is not necessarily indicative of a Hispanic occupation. Analysis of chipped stone artifacts from a seventeenth-century Pueblo farmstead near Pecos encountered several strike-a-light flints (Moore 1995). This was not unexpected, since the use of flint and steel represents an easier and more efficient way of making fire than was available to the Pueblos before the arrival of the Spaniards. Native groups probably adopted this form of fire-making as soon as they could. Whether there is any real difference between Hispanic and Pueblo strike-a-light flint use patterns remains unknown.

The study of Hispanic chipped stone assemblages is still in its infancy. While we have learned quite a bit so far, there are still many questions to be answered. Among them is how Hispanic chipped stone technology differed from that of neighboring Indian groups. One possibility that we have broached is that Hispanics seem to have assigned little or no stylistic or symbolic value to formal chipped stone tools. Thus, it may be possible to accurately separate Hispanic formal tools from those made by Indian groups. Hispanic assemblages also tend to contain very high percentages of chert. While it is uncertain how this compares with Pueblo or Plains Indian assemblages of the same period, it is likely that the latter will demonstrate the use of a wider range of materials for more tasks.

Some variations in Hispanic chipped stone assemblages may be closely linked to economic trends. This is shown by data suggesting that Hispanic chipped stone assemblages became more focused on a single range of tasks when the New Mexican economy was radically altered by the opening of the Santa Fe Trail. These economic changes may not have occurred universally, and some areas may have remained economically disadvantaged because they were distant from the main line of supply and its associated distribution points. While we can conclude that the chipped stone from LA 67321 represents a fairly average Hispanic site assemblage, it may be quite a while before we understand all of the economic ramifications of its variation from the pattern at sites closer to the social and economic core of Santa Fe.

GROUND STONE

Jesse Murrell

Of the six pieces of ground stone recovered from OAS excavations at LA 67321, two exhibit some degree of production input or modification during the artifact's initial manufacture rather than during its later use. The remaining four pieces of locally available basalt and quartzite are more expedient tools lacking any evidence of production input other than use-wear. In other words, 66.7 percent of this assemblage has little or no production cost. The remaining portion of this assemblage was more costly to produce in terms of time and energy and is comprised of a comal fragment and a mano fragment.

Comal

The comal fragment (Fig. 42) was manufactured from a fine-grained sandstone. Preform morphology could not be ascertained because more than half of the artifact's surface was modified by grinding, but on the basis of material type, the raw material form was probably a thin slab. This corner fragment weighs 360.1 g and was probably subrectangular in plan view originally. The two original edges meet at a 90 degree angle with a slightly rounded corner. One edge was shaped by grinding; the other edge is unmodified, or the piece remained in use after a heat fracture because this edge is fire or smoke blackened. Thermal alteration or use is apparent in this blackening or sooting, which ranges in thickness from 1.0 to 6.5 mm. The fragmentary condition of this piece may be due to heat fracture. The other two edges are irregular and unsooted, and they appear heat fractured. The piece is estimated to be subrectangular in transverse cross section and exhibits a moderate amount of furrow striations on its plano use-surface. Zier (1981:14) defines a furrow striation as “a scratch or narrow channel formed by the removal of material by pushing/pulling or microfracturing, and characterized by torn, broken, or shattered margins.” These furrow striations are discontinuous and run both parallel and perpendicular to the ground edge, which is estimated to parallel the longitudinal axis. The striations and entire surface are sooted; therefore, it is assumed that they are the product of initial manufacture rather than use-wear. Comales are generally believed to be a Classic period (A.D. 1325 to 1600) technological adaptation functioning like a griddle set over a fire on which tortillas are cooked. Snow suspects that comales may be associated with the transition to pretreatment of maize with alkali or lime, which may nutritionally enhance corn dough foods (Snow 1990). No comales were recovered during excavations at the nearby site of Valencia Pueblo (LA 953) (Vierra 1997). This piece was recovered from BHT 4.

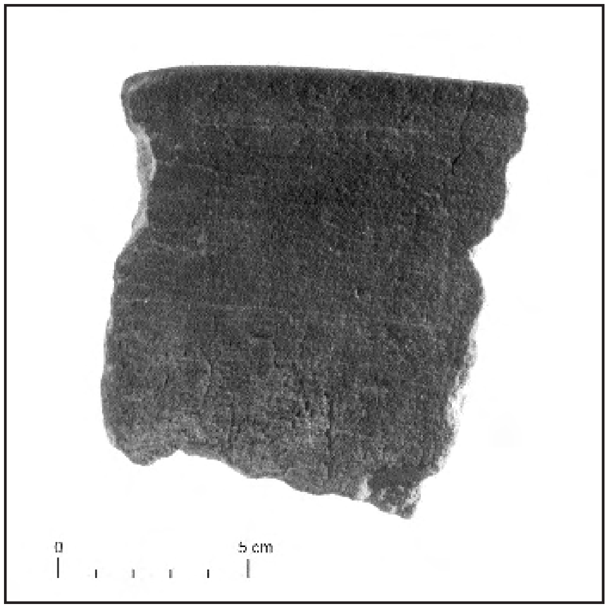

Figure 42. Comal fragment (FS 102).

Mano

The mano (FS 177) was recovered from ALR1, Level 3, and is manufactured from a fine-grained, vesicular basalt of indeterminate preform morphology. This medial fragment weighs 357.9 g. Due to its fragmentary condition, initial shaping, and use-wear, the artifact's original plan view shape cannot be discerned. Over half of its surface was modified by grinding, and wear is evident in the form of very few, discontinuous sleek striations. Zier (1981:14) defines a sleek striation as “a very fine striation having smooth regular margins, formed through plastic deformation or displacement of surface material, and occurring typically on hydrolyzed surfaces in the presence of silica.” Two of the original margins are present, so that a full cross section from margin to margin (length of 11.7 cm) can be discerned. Its form is biconvex. Sleek striations are apparent on both of the slightly convex use-surfaces. On one surface these striations are oriented parallel to the original margins; on the other they are oriented perpendicular to the original margins. The other two margins are irregular and appear fractured. Neither ground surface exhibits sharpening in the form of pitting. Because of its fragmentary condition it is difficult to determine if this piece was a one-handed or a two-handed mano. The differing orientation of striations on the opposing use-surfaces of this piece point to its use or movement back and forth on a metate parallel to either axis and a negligible difference in the length of the longitudinal and the latitudinal axes. Manos and metates are grinding implements used to process wild or domesticate vegetal resources. It is estimated that this mano was used with a slab or trough metate, which may have been part of a multistage grinding technique, to process corn. This assumption is based upon the artifact's material type and the time period that LA 67321 was occupied. The coarse grinding texture of vesicular basalt makes it well suited for grinding corn (Lancaster 1983). It is generally believed that slab and trough metates were used during the late prehistoric and early historic periods in the middle Rio Grande Valley, a time characterized by an increased reliance on corn agriculture.

Other Ground Stone Objects

The remaining portion of the assemblage is comprised of four informal tools, including a possible polishing stone, two pitted pounding stones, and a hammerstone. The polishing stone (FS 112, Stratum 3) is an unshaped, "finger-grip size," flattened cobble of fine-grained, undifferentiated igneous rock. The piece is whole and weighs 90.4 g. It is circular in plan and lenticular in cross section, having two slightly convex use-surfaces. Both use-surfaces exhibit an initial minor polish overlain by a few discontinuous, randomly oriented sleek striations. Following Zier's (1981:14) definition, polish is "a luster or shine caused by abrasion or deposition." This artifact may have functioned in ceramic production to polish vessel surfaces. It is more likely that this piece was used on vessel interiors due to its slightly concave use surfaces.

A pitted pounding stone is defined as a small or hand-sized cobble or slab with a localized pit from pecking and grinding wear on the use-surface (OAS 1994a). Both of the pitted pounding stones are unshaped, flattened cobbles of fine grained nonvesicular basalt. Both are also end fragments that exhibit multiple use-surfaces. One (FS 163, Feature 1) weighs 117.5 grams and is assumed to be oval in plan, and its three use-surfaces are convex in cross section. This artifact has an irregular, fractured margin. A small localized pit (9 by 11 mm) from using this artifact as a hammer is present on the edge or ridge of this cobble. Elsewhere along the edge is an area that is highly polished. A light polish overlain by abundant, randomly oriented sleek striations and furrows is present on both of the opposing use-surfaces.

The other pitted pounder (FS 195, ALR3, Levels 3 and 4) weighs 127.1 g and was probably subrectangular in plan. There is a flattened protuberance on the end of this artifact, making it well suited for use as a hammer. The two edge use-surfaces show a light polish with fairly localized small pits from hammering. One of these surfaces is plano in cross section, and the other is irregular. Another concave use-surface exhibits areas of heavy and light polish overlain by a few randomly oriented sleek striations and furrows and by fairly dispersed small pits from hammering. The remaining use-surface is irregular in cross section and is characterized by the same "micro-stratigraphy" of wear, but without the heavy polish.

The hammerstone (FS 158, Stratum 6) is a cobble of quartzite which shows no evidence of initial production input through shaping. It is oval in plan view, and the use-surface is slightly convex in cross section. It shows marginal battering wear on cobble edges. This whole rounded cobble weighs 245.5 g.

None of the ground stone recovered during OAS excavations at LA 67321 exhibits alterations such as perforations, hafting grooves, thumb grooves, finger holds, or notches. All pieces also lack obvious adhesions such as pigments or other particles.

HISTORIC ARTIFACTS

Natasha Williamson

The historic assemblage at LA 67321 is restricted to glass, ceramics, a few metal pieces, and 15 pieces of slag. The total assemblage consists of 782 artifacts (Table 52). Of these, not counting road trash and a few other obviously unrelated artifacts, such as plastics and rubber, the historic assemblage amounts to 129 artifacts. Of course, virtually the entire faunal assemblage and the native ceramics should be included in the historic artifact counts for a true picture of the site, but this discussion will be limited to the historic goods. Wilson and Akins (this volume) discuss the other classes of artifacts.

From Table 52, it can be inferred that Stratum 1 has been disturbed, Stratum 2 deposits are recent, and Strata 5 and 6 are relatively pure.

Table 53 shows analysis categories by cultural layer and strata. The same pattern is also apparent here. The relatively high numbers of domestic routine and the virtual lack of other categories in Strata 5 and 6 is consistent with a Spanish Colonial provenience. The relatively high percentage of unidentifiable artifacts reflects the slag and unknown material types and the two obviously intrusive articles. Slag is almost always unidentified in our analysis system unless it can clearly be shown as metallurgic in nature. The one piece of copper in Strata 6, while appropriate in a Spanish Colonial setting, is of unknown function, so is categorized as unidentifiable.

Although the deposits contain ash, only a few of the Euroamerican artifacts exhibit burning. This may be because higher temperatures are needed to affect glazed ceramics, or because the ash was generated elsewhere and dumped with the rest of the trash. A few of the ceramics do exhibit the grayed and crackled appearance of burning, but the color is not inconsistent with the use pattern of preheating plates. One Mexican lead glaze ceramic sherd exhibits blackening of the paste and spalling of the surface and may have been burned. This sherd was probably the base of a cooking pot used directly on the fire.

Valencia has had a long but somewhat checkered occupation history from the mid-seventeenth century to the present day. In recent investigations at LA 67321 conducted by OCA, a similar number (n=139) of historic artifacts were recovered (Gerow 1997: 249-258; 271-276), which should allow comparison of the two assemblages, but in fact they are remarkably different. OCA determined that there were two occupations, the late 1700s to mid-1800s, and post-1880 occupation. Our investigations could not document any post-1820 occupation until ca. 1875-1883. We also have tantalizing traces of the seventeenth-century occupation. For instance, one piece of Fig Springs Polychrome majolica was found in Feature 2. Fig Springs is only found in New Mexico in pre-Revolt contexts, that is, from 1598 to 1680. At first it was thought that the piece was anomalously early, perhaps from an heirloom piece, but Feature 2 also held Abo Polychrome, another pre-Revolt majolica type, as well as Glaze F native ceramics (Wilson, this volume). Regardless of the discard date, it is clear that these ceramics were made in the late seventeenth century. There are numerous eighteenth-century artifacts, but there is a gap from ca. 1820 to 1875, when the modern era begins.

Although the analysis is function-based, because of the few material types represented, it is better to focus the discussion on material types, which often bear a functional message of their own.

Glass

All the glass (n=604), with few exceptions, is recent road-generated trash, and the majority of that is beer bottles (n=373). The exceptions are one circa 1875 artifact and four pieces of what has cautiously been identified as Spanish Colonial glass.

Many archaeological reports give very short date ranges for various glass colors, which I have long recognized as invalid. Gerow (1997:253), for instance, working on the OCA analysis of LA 67321 historic artifacts, gives aqua glass a date of 1880 to 1910, which is too narrow even for strictly Territorial period artifacts, and gives clear, red, blue, green, and milk glass a range of 1930 to present. Yet all of these colors are found in Spanish Colonial contexts dating from the seventeenth and eighteenth century (Deagan 1987:127-155). Truly clear glass, with no bubbles or striations, as opposed to natural green glass, is virtually a twentieth-century phenomenon in New Mexico. Colonial glass makers, however, were known to occasionally produce crystalline glass (Deagan 1987) It seems clear that the bias in that direction causes us to neglect or discount clear glass and other colors from pre-Territorial contexts, which may be why Spanish Colonial glass is so rarely reported in New Mexico.

Modern Glass

An analysis of the unidentified glass by color shows a marked paucity of railroad era (1880 to 1920) artifacts. Using all the glass only accentuates the point. Only the purple, or sun-altered, glass could be unequivocally assigned to the 1880-1920 era. White glass is also usually found in New Mexico in post-railroad contexts.

Thick brown/amber glass is also usually associated with mid-nineteenth to twentieth-century occupations, especially as the dominant position in an assemblage.

Unidentified glass at the site included green (n=6), aqua (n=1), blue (n=2), brown (n=41), clear (n=157), purple (n=2), and white (n=2). The one piece of unidentified aqua glass may well belong to the same artifact as the aqua bottle base that bears the mark “CC&Co.” Toulouse (1972:117) assigns the same letters, but in a simplified form, to Carl Conrad and Co., the originator of Budweiser beer. Wilson (1981:4, 114) gives the same monogram found at LA 67321, with the added note that the bottle body carries the inscription “C. Conrad & Co's/ Original/ BUDWEISER/ U.S. PATENT No 6376.” Wilson gives five examples, two of which carry only the monogram, and three of which have a letter below: G, K, or A. The LA 67321 specimen bears the letter B below the monogram. These are probably mold, or other manufacturing detail, designations.

Toulouse (1972) states that Conrad, a St. Louis beer stube owner, contracted with Anheiser Busch to make and bottle Budweiser in the mid-1870s. Budweiser was one of the earliest lagers, a lighter product than the ales, porters, and stouts that had been popular up to that time. In 1883, Conrad declared bankruptcy, and Anheiser Busch, his largest creditor, acquired the Budweiser name. Thus the bottle base here can be dated fairly closely to the 1875-1883 range. This artifact represents a “begin again” date for the deposits at LA 67321.

Interestingly enough, most of the rest of the glass comes from quart-size Budweiser bottles, documenting 120 years of brand loyalty among the beer drinkers of Valencia. The locale may well have been used for similar activities all that time.

The brown glass (n=411) is from beer bottles, with the exception of one set of brown glass shards that seems to be from another type of bottle. The glass is much thinner than beer bottles, and enough of the body is present to show a different shape, but unfortunately, the diagnostic portions are missing.

One other bottle is interesting. An subrectangular medicine bottle, represented by a base and associated body shards, bears the Ball mark on its base and portions of the slogan, “Federal law prohibits sale or reuse of this bottle.” Although that slogan is usually found on whiskey bottles, this bottle is smaller than even a half pint whiskey bottle, so it may have held a narcotic, such as a codeine cough syrup.

Ball, of course, is better known as a manufacturer of fruit and home canning jars. Toulouse (1972), in his history of the Ball brothers' various manufacturing firms, makes no mention of medicine or whiskey bottles. Toulouse states that the script form of the name was in use by the turn of the century, and Ball began operations in 1888. However, the “federal law” inscription dates from 1932, which accords well with the artifact's presence in Stratum 1.

Spanish Colonial Glass

Four pieces of glass may be related to the Spanish Colonial era. Two are very “seedy,” meaning they have numerous small bubbles in the glass, which is a characteristic of early glass, caused by insufficient skimming of the gall--a foam of impurities in the glass mix (Munsey 1970)--or by dipping the blow pipe in at a shallow angle (McDonald, personal communication, February 25, 1999). One small piece, a shoulder sherd 1 mm thick, is a bright blue-green, not a cobalt blue. This piece was probably colored with copper (Munsey 1970). The other is a body sherd of transparent blue glass, but when viewed edge-on is a vivid aquamarine. It also exhibits lovely flow lines. The clear piece is probably from an octagonal or similar multisided bottle. Such forms are known in Spanish Colonial contexts. Clear octagonal bottles thought to be pharmaceutical jars were recovered from the 1724 wreck of the *Guadalupe* (Deagan 1987:133). Octagonal jars are also known in green, blue, and milk glass. Glass from Spanish Colonial sites is rare, but the presence of these two sherds in Stratum 6 bolsters their claim to such an association.

Two other pieces of glass may be Spanish Colonial. They were initially rejected because of their presence in Stratum 1, but of course majolica also occurs in Stratum 1. One is a light olive green, 5 mm thick bottle glass. Deagan notes light olive green “square sectioned” bottles (with threaded necks for taking a pewter cap) in eighteenth-century contexts and olive green vases from the seventeenth century. The surface has developed a patina/weathering pattern that makes it difficult to see seed bubbles. One edge did allow the observation of small narrow seeds. Sometimes it is difficult for an analyst to say why one artifact stands out from the rest, but suffice to say, the entire feel of this glass is different from that of twentieth-century and Territorial-era glass. I am not prepared to say it is Spanish Colonial, but I would be very surprised if it were not pre-1850.

The second piece from Stratum 1 is almost a frosted glass, with an etched scroll element on it. A reference in Deagan (1987:142-142) caused me to remember this piece of glass and reexamine it. The reference is twofold: first, to a post-1650 decline in quality in Catalonian glass, resulting in an “‘ashen' grayish quality”; and second, to diamond point engraving, which was practiced in Spain and Mexico until the adoption of wheel engraving from Germany sometime after 1750. Never having seen either, I cannot say if the “frosted” effect I observed is similar to Deagan's “ashen,” but I did look at the etching under a microscope, where it exhibited none of the precision and regularity of wheel turning. Individual strokes are easily visible, with irregular beginnings and endings, suggesting hand engraving. A pre-1750 date for this artifact would fit well with some of the ceramic assemblage as well. The sherd was probably from a goblet. It has a slightly thickened rim which bulges to the exterior.

Deagan (1987) devotes a chapter to Spanish Colonial glass. Her description of Andalusian glass is “typically green or yellow-green in color, with clumsy and irregular body shapes, thin vessel walls, and great numbers of bubbles in the metal.” She also illustrates several masterworks of the glassblower's art. She further states that Andalusian glass changed little from the Middle Ages to the eighteenth century (Deagan 1987:129; 139). By the early eighteenth century, glass was being imported to Spain and reexported to the American colonies (Deagan 1987:128-129).

Glassblowing had begun in Puebla, Mexico, the center of the Mexican majolica industry, by 1535, and by 1542 the Puebla glassblowers were exporting their wares throughout the Spanish New World (Deagan 1987:129, citing Toussaint 1967). Evidently the Puebla factories could produce a thick but clear glass. Puebla also produced glass table ware, vases, engraved wine bottles, apothecary jars, glass bells to cover images, and globes, presumably for candle lanterns. Puebla is not known to have produced utilitarian bottles.

Glass does show up in the New Mexico Spanish Colonial inventories, increasingly so after 1790. Glass items likely to be imported to New Mexico include medicines, chemicals, liquors, wines, and perfumes. Table wares, including tumblers and goblets, stem ware, pitchers, and decanters were fairly common. Much of the bottle glass reported in Florida or Caribbean contexts is light green and thin (.5 mm to 1.0 mm), and exhibits numerous bubbles and striations (Deagan 1987:130).

As stated, glass from Spanish Colonial contexts is exceedingly rare in New Mexico. One piece of glass was found at LA 20000, a seventeenth-century hacienda south of Santa Fe. One piece was found at the Inn of the Anasazi in downtown Santa Fe, and Spanish Colonial glass was found at the Palace of the Governors. Unfortunately, the Palace of the Governors glass is not included in a recent inventory taken of the Spanish Colonial artifacts (C. T. Snow, personal communication, February 11, 1999), so it was unavailable for comparison. One piece of seventeenth-century Venetian glass and several pieces of copper-based deep turquoise-colored glass were found, however. The presence of copper-based glass at the Palace strengthens the case that the Valencia piece is Spanish Colonial in age.

Ceramics

The Euroamerican (or, more accurately, Sino-Mexican) ceramic assemblage of LA 67321 has three components: Mexican majolica, Mexican lead-glaze earthen wares, and a component of imported wares, virtually all of which is Chinese porcelain. A total of 104 sherds were considered. At LA 67321, the majolica was 1.27 percent of the total ceramic count, which includes a small, obviously prehistoric component as well. Eliminating the background noise of the A.D. 1200 to 1400 time frame, ceramics from the assemblage cause the majolica percentage to increase to 1.29 percent. Considering only the non-Native wares, majolica is 67.6 percent of the total, porcelain is 17.6 percent, and Mexican glaze wares are 13.7 percent. This varies dramatically from the OCA investigations (Table 54), where majolica is 50 percent, porcelain is only 5.7 percent, lead glaze is 8.6 percent, and refined earthen wares and one piece of semiporcelain together total 35.7 percent (Gerow 1997:274).

Chronologically, what is missing from the LA 67321 assemblage is most telling: there is only one small sherd (obviously an intrusive since it comes from Stratum 1) of the refined white earthenware that became freely available in New Mexico sometime after 1850. These wares were advertised for sale in New Mexico by at least 1868 (*Daily New Mexican*, June 9, 1868). Nor are there any printed wares of the stamped or transfer techniques. The banded bowl forms, flow blue, and other wares associated in New Mexico with Anglo use of the Santa Fe Trail (post-1821) are also not present. Nor are there any cream wares. Although the cream wares would overlap the presumed time span of the site, there may have been an economic factor operating, or the deposit is even earlier than the presumed date. There are also none of the majolica imitations of such items as flow blue wares, which became more common after the middle of the eighteenth century (Deagan 1987:84), unless one considers Huejotzingo Banded. Thus, the deposit seems to have been formed prior to the influx of cheap European or American-made goods.

Ceramics are the only historic artifact class both numerous and temporally diagnostic enough to reflect trends. Table 55 attempts to show the relationships graphically. Six strata were identified and, gratifyingly, for the most part the artifacts fall out in the appropriate order and association.

There is a fair amount of mixing upward, increasing toward the surface, but very little mixing downward, leaving the lower cultural unit and south area relatively “pure” deposits. The reversal of numeric order west of

NM 47 was probably caused by sewer construction in that area. The curve here might have been a statistical fluke caused by the small size of the Eurohistoric sample, but the same pattern showed up strongly in the Native ceramic assemblage.

Table 56 shows the distribution of ceramic types by stratigraphic unit. What is interesting here is the association of Mexican glaze ware and Chinese porcelain. The porcelain can, by association, help tie down the date for the Mexican glaze ware, which otherwise has a 400 year production span.

American goods were certainly available anytime after 1821, while some English wares became legally available during the latter decades of the Spanish occupation. The ready availability of the Anglo wares after the Anglo-Mexican trade treaty of 1824 almost killed the Mexican majolica industry, which had flourished from the sixteenth century. In New Mexico, virtually no majolica has been found at sites dating to after 1840 (Snow, personal communication, February 20, 1999).

At this point it would be worth mentioning that the native micaceous slip wares, very much a nineteenth-century phenomenon, are also conspicuous by their paucity (Wilson, this volume). There are 22 micaceous paste sherds of the types made by Tiwa and Tewa pueblos and Jicarilla Apache. According to the 1790 census, there was one Apache living in the area, a 20 year old servant (Olmsted 1975:15-17). Raiding and presumably trading also took place, so the only unusual thing is the small number of micaceous sherds.

Majolica

The majolica from LA 67321 is one of the finest collections ever found in New Mexico, both in number (n=69) and size of the sherds. Between 24 and 30 vessels are represented. It is certainly the largest collection out of a nonarchitectural site, leaving one wondering how rich the main site must have been. Adding artifacts from OCA's investigations (n=35) brings the total to 105. The Mission of San Xavier del Bac in Arizona only yielded 53 majolica sherds. The Palace of the Governors, as might be expected, yielded a much larger collection, 432 majolica sherds, although Seifert (1979:62) is not confident of the identification and analysis of the introduced ceramics. (It is a sad fact that many of the sherds identified as Palace majolica in the H. P. Mera Collections Room at the Laboratory of Anthropology are nineteenth-century transfer wares, porcelain, Mexican glaze wares, and even stone ware. It is not known when the sherds were so labeled.)

At residential sites, numbers are much lower. By contrast, San Antonio de Las Huertas, where an entire house was excavated, yielded only 16 sherds of majolica. LA 6579, where excavations were recently undertaken as part of the Pojoaque Corridor Highway Project, yielded 39 majolica sherds, 36 percent of which were plain white. In this deposit, only about 10 percent of the majolica is plain white. Excavations at the five Spanish Colonial sites in the Cochiti Dam Salvage Project (Snow 1978:Section E) produced a total of 210 majolica sherds, ranging from 2 to 102 (LA 70) per site. Exactly half of the Cochiti sherds are plain white. Only at LA 70 did the level of majolica rise above 1 percent of the total sherd count for the site; at the rest of the sites, the majolica was less than 1 percent. At Valencia, the majolica is 1.29 percent of the assemblage. This is even more astonishing, given that no architecture was found at Valencia.

Majolica is defined as an earthenware covered in an opaque tin glaze. It was adapted to imitate Chinese porcelains. The Spanish and, by extension, Mexican tradition derived from the Muslim ceramic tradition (Lister and Lister 1982) during the Moorish occupation of Spain. Majolica goes by various names--faenze, faience, delftware--depending on country of origin. The pre-nineteenth Mexican majolicas were generally produced in Puebla, which Barber (1911) says had a virtual monopoly for three centuries, a statement that has lately been challenged (Lister and Lister 1982).

In spite of much work, we know very little about the dating of majolica forms manufactured in the New World. Barber (1911), the first scholar in the field, assigns dates that may not hold up in archaeological contexts, while southwestern archaeology can say little beyond the presence or absence at sites hundreds of miles from the point of origin. It is suspected that merchants often unloaded on the frontier settlements wares that had lost their popularity in the cultural core, a practice that affected the dating of styles and forms (Lister and Lister 1982:95). There are, however, a few types that have only been found in New Mexico in pre-Revolt (1680) sites, namely Fig Springs Polychrome; Abo I; Puebla Polychrome I; and perhaps Castillo, otherwise known as Playa, and San Luis, but the latter are rare.

It is difficult to ascribe vessel forms to majolica wares, especially where the largest sherds in the collection measure 57 by 40 mm and 70 by 28 mm. The average is much smaller. Rather than trying to ascribe true majolica forms to the sherds, I classified them as plate, cup or bowl, or unknown vessel. Essentially, this means that the sherd was flat or widely curved, curved, or too small to tell.

The vessel forms characteristic of majolica are the *plato*, a flat-bottomed but deep dish, more like a soup bowl or serving dish than a plate; and the *taza*, a drinking vessel that looks more like a cereal bowl, or the *pocilla*, a taller, narrower version of the *taza*, much like a mug without a handle. The *pocilla* is very much an eighteenth-century form (Lister and Lister n.d.), often used for drinking chocolate. Platos are brimmed and have a foot ring. Both features varied through time (Deagan 1987), but not in a particularly useful way for typing sherds. Two foot ring fragments were found at LA 67321, one from a San Elizario plate and one plain white. *Tazas* and *pocillas* also have foot rings, although the example in this assemblage is missing any of the base. Old World forms are similar, with the exception that the sixteenth-century forms lack a foot ring. Another common form reported in majolica is the *albarelo*, or apothecary jar.

Other vessel forms associated with Hispanic ceramics include the *lebrillo*, a flat-bottomed serving dish with sloping sides; the *bacin*, a shape like a flower pot, either with handles or without; the *vacinilla*, much like a small chamber pot; and the *escudilla*, another cereal bowl–like affair. There are also various jar or olla forms.

Traditionally, majolica has been used by archaeologists to track chronology, socioeconomic status, and trade routes (Seifert 1977). However, virtually all of the majolica in New Mexico arrived over the Camino Real or Chihuahua Trail, so the last consideration is not of importance. Puebla, Mexico, was the primary production center for almost all of the time majolica was being imported into New Mexico and is almost the only type ever encountered in the Spanish borderlands (Seifert 1977:136). Mexico City as a production center was only active in the sixteenth and early seventeenth centuries, while the Oaxacan, Guanajuato/Dolores Hidalgo and Sayula factories are considered nineteenth- and twentieth-century manifestations (Seifert 1977). Very few nineteenth-century types are found in the borderlands, because free trade after Mexican Independence essentially killed the importation of majolica into the northern reaches (Seifert 1977:138). Socioeconomic status is almost a given, considering the exorbitant freight costs to New Mexico, which could double the price of an order. However, majolica became more common over time, and Fray Domínguez noted in 1776 that even the poorest chapel had a Puebla plate to put the cruets on (Lister and Lister 1982:121). Beginning in the early nineteenth century, majolica lost out to imported English and American wares as an indicator of high status (Seifert 1977:163).

During Spanish Colonial times, any considerable amount of majolica is always associated with Hispanic culture in New Mexico, but Hispanic status was ill-defined in New Mexico. The full, elaborate *casta* system never got going in New Mexico to the extent it did in Mexico (Bustamante 1989:65-74), and as time when on, it became more lax. Rather than try to figure out the complex system, many priests, the usual recorders, settled for *color quebrada*, "broken" or mixed color. It was quite possible to be born *mestizo* and die an *español*, as census records make quite clear. The word *español* actually referred to one of *purezada sangría española*, or pure Spanish blood, which became an obsessive concern among Spaniards after the Moors were expelled from Spain. Actually, the *español*, *criollo* (from which comes the word *creole*), and others of European origin were outside the *casta* system, which was designed to keep tabs on the "lower classes."

In the 1790 census, about two-thirds of the inhabitants of Santa Fe were described as *españoles*, which is highly unlikely. Bustamante (1989:74) thinks it possible that some of these people "were actually *mestizos* who had earned enough distinction politically and financially to be promoted." He notes that Fray Domínguez in 1976 also alluded to the practice of upward mobility by mentioning that some New Mexico citizens "passed" for *españoles*. Even more commonly, a *mestiza* who married either up or down took her caste from her husband, so she could become a *genízara* or *española*, or even an *india*, depending on where she took up residence (nor were men exempt from a status change for the same reasons). Socioeconomic status did not necessarily follow genetic status, and one relatively rare artifact class could never distinguish between the various *quebrado* castes. Thus we are left with chronology as the only important factor in the study of majolica in New Mexico.

Archaeologists have attempted to classify majolica by creating type names like those of Native American ceramics, that is, based on place of discovery. This practice is absurd, considering the historically known production areas. The Potters' Guild of Puebla, Mexico, formed in 1653, actually lists only three types: fine, common, and yellow (Barber 1911).

The fine ware was described as "blue finished in black with dots along borders and edges. . . . The coloring should be in imitation of Chinese ware, very blue, finished in the same style and with relief work in blue." For variety, other styles could imitate the styles of Talavera, Spain.

Presumably, the common style would be *camaieu*, the simple blue-on-white without the finishing black touches. Snow (personal communication, March 31, 1997) believes the impasto or relief style of glaze application to be a later form, post-1750, yet here the ordinances of 1653, a full century earlier, recommend the relief work. Barber (1911) gives the "raised solid dark blue designs" a date of 1700-1750.

Berg (1980) notes the impasto style of "heavy raised blue enamel, outlined in black" as an attribute of the Moresque style (1575-1700) and that the use of impasto continued in the Spanish style in what Barber called "silhouette." Perhaps, like many prescriptive ordinances, these were observed less in practice than in theory. Or again, merchants may have shipped out-of-favor wares to the provinces, resulting in a later date for New Mexico occurrences. The question is pertinent to Valencia, because the type is common in the assemblage.

The blue was derived from soda ash and cobalt. Lister and Lister (1982:88) state that the grayed tones of early Mexican wares (sixteenth century) were due to poor refining of the cobalt ores, while the brighter blue of the seventeenth century Puebla types "may have owed their improved quality to refined cobalt, or *zafre*, then coming into Spain from Saxony." However, Mexico also had some cobalt resources.

The glaze used in the Puebla factories for the fine ware was 4.16 parts lead to one part tin, while the common wares were 12.5 parts lead to one part tin (Barber 1911). Since the tin is responsible for the opacity of the glaze, the fine wares would have a much more porcelain-like finish. The lead was incorporated with the tin before the glaze was applied, making it very hard (Barber 1911). Virtually all of the Valencia examples have a glossy thick glaze, and most have black line work and at least some impasto, so it may be safe to assume that the sherds represent a collection of "fine" wares.

The paste or body of most Mexican majolica is very soft, and the whiter clay bodies are almost as soft as chalk. The redder clays are harder, but Barber (1911) declared that the vessel's time in the kiln was the determining factor in the color and hardness of the clay body; with a longer firing, even the white clay goes pink or reddish and will partially vitrify. No one has yet disproved that claim or proved it. Barber also stated that the white clays came from San Bartolo, San Pedro, and San Tomas, hills near the village of Totomehuacan, 5 km from Puebla, and that the red clays came from Loreto and Guadalupe, near Puebla. Following the guild regulations, Barber says the clays were always combined in equal proportions and that "neither can be used alone with satisfactory results."

Snow (personal communication, February 18, 1999) feels that there is a temporal trend toward redder pastes in New Mexico majolica collections. If so, that would bolster the claim that LA 67321 is eighteenth century, because only two sherds, both indeterminate white pieces, exhibit the redder paste. However, examination of the majolica collections from Quarai, Bandelier's Puaray, and the Palace of the Governors indicates that such generalizations should be applied with caution. A shift to distinctively brick red pastes probably represents the appearance on the market of the Guanajuato/Dolores Hidalgo and the other nineteenth-century production centers. A visit to a majolica store in Santa Fe showed that modern wares from Guanajuato have a red paste. Moreover, red pastes were characteristic of sixteenth-century majolicas from Mexico City (Lister and Lister 1982:22).

The pastes in the Valencia assemblage are generally a peachy white to buff, which, viewed under a microscope, seem to get their color from fine inclusions of a rust-red material, probably an iron oxide residual to the clay. The other paste found in the Valencia assemblage is a bright, light brick red, with large chunks of pure white. Some authorities believe these white chunks are calcium carbonate, but they may also be pieces of the white clay. Warren (1976), in her petrographic work on majolica, only looked at one known Puebla sherd and mentions calcite, one of the forms of calcium carbonate, for that sherd. All the Mexican majolica pastes in the assemblage from LA 67321 foam strongly when a drop of hydrochloric acid is placed on a fresh break. The peachy paste, as determined by microscopic examination of the type collections in the H. P. Mera Room at the Laboratory of Anthropology, was also found at Bandelier's Puaray, downtown Santa Fe, and Pecos.

One problem with typing majolica sherds is that the descriptions vary from region to another. For instance, Deagan's description of Fig Springs Polychrome includes a red paste and vessel walls averaging 5 mm thick (Deagan 1987:74). The example from LA 67321 has a pale buff paste, actually one of the lighter pastes in the assemblage, and thickness ranges from 7 to 10 mm. Yet in every other respect, the sherd coincides with the type description. Goggin (1968) allows the lighter paste for Fig Springs. This particular sherd has the advantage of exhibiting the characteristic central palmette in yellow within a blue U-shape. Most of the Fig Springs sherds in the type collection exhibit a bright, true yellow (without microscopic examination, it appears to be a matte paint atop the glaze), but there is one example from Quarai (abandoned in the 1670s) that is the exact yellow of the Valencia example. The type occurs in Mexico from 1575 to 1650 and in Florida from about 1590 to 1650 (Deagan 1987:74), but in New Mexico, it occurs at the earliest Spanish settlement (1598-1610) and throughout pre-Revolt contexts (pre-1680).

According to Barber (1911), by 1800, the Chinese influence had "entirely disappeared," and the "debased polychrome" of latter eighteenth-century Talavera adopted, with new colors, particularly rose, introduced from 1800 to 1860. However, this view totally ignores the yellow and the green wares now known archaeologically to exist from at least the mid-seventeenth century to perhaps the early eighteenth century.

Likewise, Deagan's (1987:79-80) description of Abo Polychrome specifically states that the blue dots are "generally the only design element not outlined in dark brown." Yet a review of the actual Abo cup sherds, from which the type takes its name, clearly shows some blue dots are outlined in brown and some are not. The set of sherds from Valencia does conform in every respect to Goggin's (1968:169-173) description.

Overall, it seems safest to follow Goggin's (1968) descriptions. It has been the standard reference for thirty years, with very little modification. He actually looked at sherds from all areas of the Spanish Empire. There are two distinct drawbacks to his work, however. First, the color classification system he used (*Dictionary of Color*, by Rea Maerz and M. Paul, published by American Color Research Laboratory, 1930) uses such names as Peachblow, Caen Stone, Meadow Green, or, even worse, "approximately Napoleon Blue" or "almost Mesange." Unlike Munsell color names, Maerz and Paul's convey very little or nothing to the reader.

The second problem is his treatment of Puebla Blue-on-white (Goggin 1968:190-195). By any rational classification, his definition of Puebla Blue-on-white is of that of a polychrome. He inherited the problem, since the name Puebla Polychrome had already been used for a particular, seventeenth-century form (Snow 1965). Black accents are defined as a temporal diagnostic, and the rare use of green, yellow, or orange accents are noted. To be fair, Goggin (1968:190, n. 53) recognized the problem and felt that Puebla Blue-on-white "really comprises a great series of forms, many of which eventually will be considered valid types." This has been partially remedied by assigning the name San Elizario Polychrome to his second major category and perhaps by tightening the definition. Goggin noted rim bands sometimes outlined in black. In practice in New Mexico, the black or brown framing lines are de rigueur for a San Elizario Polychrome designation.

Many types have been defined on the basis of variables that are less likely to rest on any meaningful temporal, technological, or geographic reality than they are on artistic whim or the quality of the apprentice mixing the glaze. What archaeologists recognize as "types" may be nothing more than the output of individual factories or even artists.

The majolica found at Valencia is generally of the blue-on-white varieties associated with the Puebla tradition. The "fine" polychrome variant, wherein black or brown accents were added to the basic blue-on-white, are by far the dominant types in the assemblage.

Several variations within the type are recognized: Castillo Polychrome (ca. 1598 to 1725) or its variant, Puaray Polychrome. The former is scarce in New World sites, where Castillo is dated 1680-1710, while the latter is reported mainly in the Southwest, where it dates to the final quarter of the seventeenth century (Goggin 1968; Deagan 1987:82). The description given in Deagan (1987:82) for Puaray is a "blue-and-black polychrome, with Oriental-inspired floral motifs painted in two colors of cobalt blue and outlined or accentuated in black. The paste and background enamel are chalky white and glossy, with the reverse sides of vessels frequently having an encircling row of overlapping arcs."

However, a reexamination of the actual sherds from Puaray showed virtually all of them to be a thin, medium blue outlined in black, much in the manner of "coloring within the lines." Conversely, Castillo has black line work inside the blue, a distinction large enough to be a viable variant. These late seventeenth-century types grade into San Agustin Blue-on-white, an early eighteenth-century type with two blues, but *platos* are the only vessel form known. Several sherds from Valencia have two blues, but the vessel form is a *pocillo*. After San Agustin, Goggin lumps all the blue/black-on-white as Puebla Blue-on-white, noting that the use of "black lines may be more typical of 1700-1750 than later" (Goggin 1968:190), a remark certainly pertinent to the Valencia collection. More recent work by Florence Lister has refined the time range of Puebla Blue-on-white to 1675-1830 (Deagan 1987:84).

There is a real danger in assigning sherds to a type based solely on a written description. Nothing can substitute for seeing the actual sherds. For instance, a written description does not usually convey the texture of a sherd. In the Puaray sherds, the feeling is one of water color wash and ink drawings, whereas the Valencia sherds are more like rich oil paintings.

Dating depends on identification and context. For instance, San Elizario Polychrome, a common type, certainly in the Valencia collection, is dated by Gerow (1997:274), following Barnes and May (1972), to 1750-1800. The problem here is that Barnes and May were working in Arizona, which had an entirely different settlement trajectory. In New Mexico, the type probably dates closer to 1700-1800 (Snow 1965:29). As Snow says (1965:32), the best assurance that types are late is their occurrence with Euroamerican wares of the nineteenth century. The virtual absence of nineteenth-century wares in the OAS Valencia collection suggests that the collection is indeed an eighteenth-century one, with roots in the seventeenth century. The investigation by OCA, on the other hand, shows much more mixing in their area, as evidenced by the large number of refined Euroamerican earthen wares.

Duochromes

Duochrome varieties are moderately represented in the assemblage. Only 14 blue-on-white sherds and one green-on-white were found.

Huejotzingo Banded occasionally occurs in green or yellow variants, but this collection is entirely blue-on-white (Fig. 43). OCA found three sherds of this type (Gerow 1997:272). Deagan describes a single band “at the edge of the vessel rim” (Deagan 1987:83), which neatly sidesteps the issue of whether the band is interior or exterior. Barnes and May (1972:10) follow Goggin (1968:195) in stating that the band falls in both places. There are several variations in the Valencia Huejotzingo component. Three sherds have a thin interior band that barely overlaps to the exterior (Fig. 43). The second variation, represented by one sherd, has a thick interior band that only makes it to the middle of the rim. On the third example, the actual rim is missing, but the band appears to be interior only. Only the second variant has a defined edge and a color approaching true cobalt; the rest are very grayed and washy. At least two and probably three vessels are represented, probably all plates.

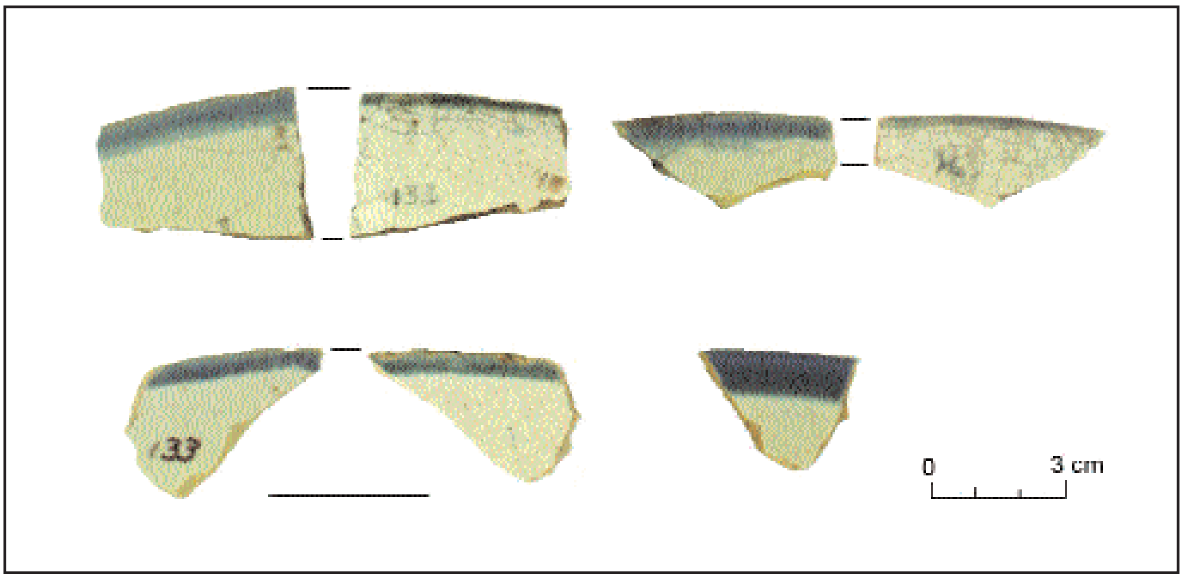

Figure 43. Huejotzingo Banded sherds.

Pastes are a light buff to peach with the usual inclusions, perhaps a bit more numerous and slightly larger than usual. The color variations may be due to the size and number of the red inclusions only. The first variation is the lighter buff, and the third is the peachiest.

Snow (1965) dates Huejotzingo to 1780-1850, but Deagan (1987) in Florida dates it 1700-1850, as do other authorities. May (1972), working in California, dated Huejotzingo 1700 to present, while Barnes (1980) calls its dating “very uncertain.” Lister and Lister (1982:123) note that Huejotzingo is found in association with San Agustin and Puebla Blue-on-white in pre-Revolt contexts, showing a manufactory in the seventeenth century, before its major development in the eighteenth century. Again, this would be a common ware and probably had a very long production life, continuing to the present day, if May is correct.

Puebla Blue-on-white types are represented by several vessels (Fig. 44). The most notable is a partially restorable *taza* or short *pocilla*. This is one of the few even partially restorable majolica vessels ever found in New Mexico. Three sherds fit together to show a cup with one interior band of blue, of a middling darkness, that overlaps onto the exterior. Two more thin bands of light blue are below it on the exterior, perhaps qualifying the vessel as the San Agustin variant. This motif of two lighter bands is repeated at the curve inward to the base, which is missing. Between these two sets of framing lines is a classic Puebla Blue-on-white flower of vaguely iris shape. Deagan (1987:112, Plate 4) illustrates an identical flower in a polychrome variant, picked out in black, which is described as Playa Polychrome. The Florida example has only one blue line on the rim, but the flowers in the Florida and New Mexico specimens are identical enough to have been painted by the same artist. The Valencia example is a very thick impasto, although that does not seem to be the case for the Florida specimen. Perhaps the Valencia example should be called Playa Blue-on-white. Further discussion of Playa Polychrome will be found in the Polychrome section.

Two other rim sherds are from this same vessel or matching ones. There is just enough variation in the banding spacing, thickness, and color intensity to make ascription to a single vessel uncertain.

Puebla Blue-on-white is dated by Goggin (1968) from 1700 to 1850. Lister believes the type overlaps with Puebla Polychrome and gives a date range of 1675-1830 (Deagan 1987:84). Deagan notes that Goggin's attribution of the “late” style to after 1750 is in error,

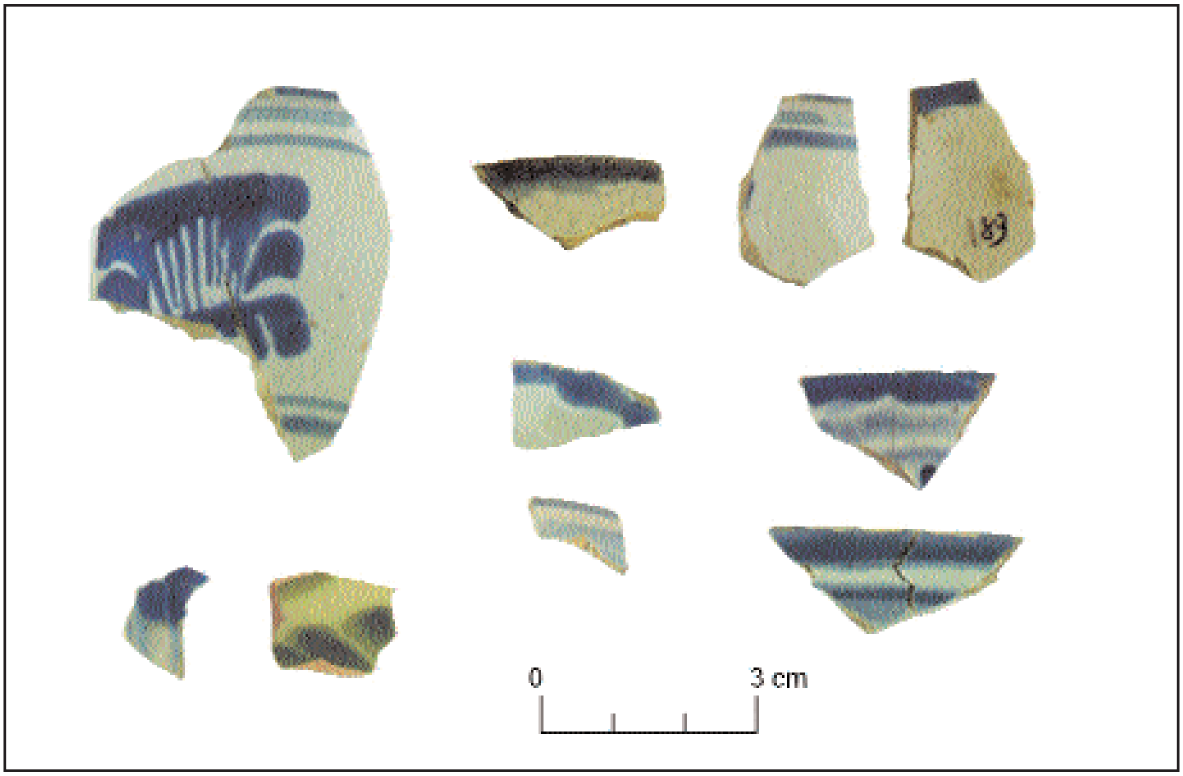

Figure 44. Puebla Blue-on-white and variants.

since the style is most common on the vessels from the 1733 plate fleet wrecks. Snow (1965:28) notes that the type needs to be divided into at least two periods, since these sherds have been found at sites dating from 1598 to 1850, or in other words, the entire time frame of Spanish Colonial New Mexico. OCA (Gerow 1997:257) found only three sherds of Puebla Blue-on-white, which makes it curiously underrepresented in their collection. Gerow (1997:274) cites Snow as dating the type from 1780 to 1850, without noting that he also dates the type from 1598 onward. It occurs in all three of Snow's classifications--early, transition, and late.

Four blue-on-white (n=4) sherds are unidentified. One cup or bowl sherd has overlapping arcs on the exterior, a design motif often mentioned for plate exteriors, but not for cups. This sherd may be a Puaray Polychrome. Goggin notes loops or other simple motifs on the underside of the rim with this type. While most sherds are from brimmed plates, a few cups are known. Other types known to have exterior loops are San Agustin and Castillo Polychrome (overlapping arcades in blue). If the sherd were any of these types, it would be another candidate for a pre-Revolt context. San Agustin Blue-on-white, for instance, is dated from 1700 to 1730-1750 (Barnes and May 1972:7).

Two sherds are interesting because both sides are highly decorated. Usually, only one side is more than minimally decorated. A thin bowl rim, very worn, exhibits two sets of two-toned blue bands, separated by a thin band of white on the interior, and a moderately dark rim band on the outside followed by thin, indeterminate wavy bands of blue over the surface of the vessel, like many of the blue/black-on-white sherds. A small portion of a dark blue floral or dot motif is visible on the lowest part of the sherd. I cannot find any reference to a form like this.

Another sherd shows two colors of blue, one very bright and the other what Goggin might call “glacial,” a very light, but opaque, blue. The dark blue exhibits a modest impasto effect. Again, San Agustin could be suggested as a type, but in the absence of confirmed comparative specimens, it seems best to leave them as “unidentified.” Deagan (1987:82) notes that San Agustin has a chalky white, smooth, and glossy background enamel, as opposed to a more cream-colored and irregular background of Puebla Blue-on-white. While these sherds are certainly smooth, white, and glossy, I cannot follow Deagan in her description of Puebla Blue-on-white. Indeed, she also defines Puebla Blue-on-white entrefino as glossy (Deagan 1987:84). I have found no cream-colored sherds of Puebla Blue-on-white in the New Mexico collections.

The green variant of Puebla Blue-on-white is interesting in that the green color, far from being impasto, actually has sunk into the white glaze, so that looking at the sherd through a microscope is like looking into a pond of shallow clear water. From the side the white glaze is seen both underneath and lapping up onto the green. The color is a rich emerald, very thick, unlike every other green-on-white sherd available for comparison, all of which are washed out and dull. The green-on-white variant is never more than a minor component. One sherd each was found at Valencia, LA 70, and LA 6178 in the Cochiti area. The Pojoaque site has five sherds, probably the record for New Mexico. A true green-on-white was not found at the Palace of the Governors (Seifert 1979). Lister and Lister (1982:94) suggest that the deep copper green was achieved by omitting zinc from a cobalt/copper dioxide/zinc glaze mixture, allowing the copper to come through.

Polychromes

Polychrome varieties are the largest component of the assemblage. Two major varieties are recognized here: the classic blue/black on white and the multicolored varieties. Missing from the collection is the distinctive seventeenth-century Puebla Polychrome, sometimes called Lacy Puebla or Puebla Polychrome I.

how this could be, since Hale Smith wrote three years prior to Goggin.) Deagan further notes that "a similar majolica variety was referred to in the Southwest by the name `Puebla Polychrome II' (Snow 1965:26)." She then goes on to mention that it is "likely that small rim sherds of this type could be confused with San Elizario Polychrome," evidently not realizing that Snow has accepted San Elizario and Puebla Polychrome II as different names for the same type, and has in fact accepted San Elizario as the name for the type. Curiously, Lister and Lister (1982:124), who give San Elizario a ca. 1775 date, note that it is rare in New Mexico, which certainly cannot be proven by the Valencia collection, where it is the dominant type.

Within the San Elizario type, there are also several variations, as shown in Figure 45. This is basically the Pueblo Polychrome II, as defined by Snow (1965), the blue and white having black or brown accents, but without the lacy effects of Puebla Polychrome I. As noted above, it has also been called Playa Polychrome. San Elizario seems to have won out over the years, which is fitting since the type was very popular at presidios, such as San Elizario, Texas. Cohen-Williams (1992:129)

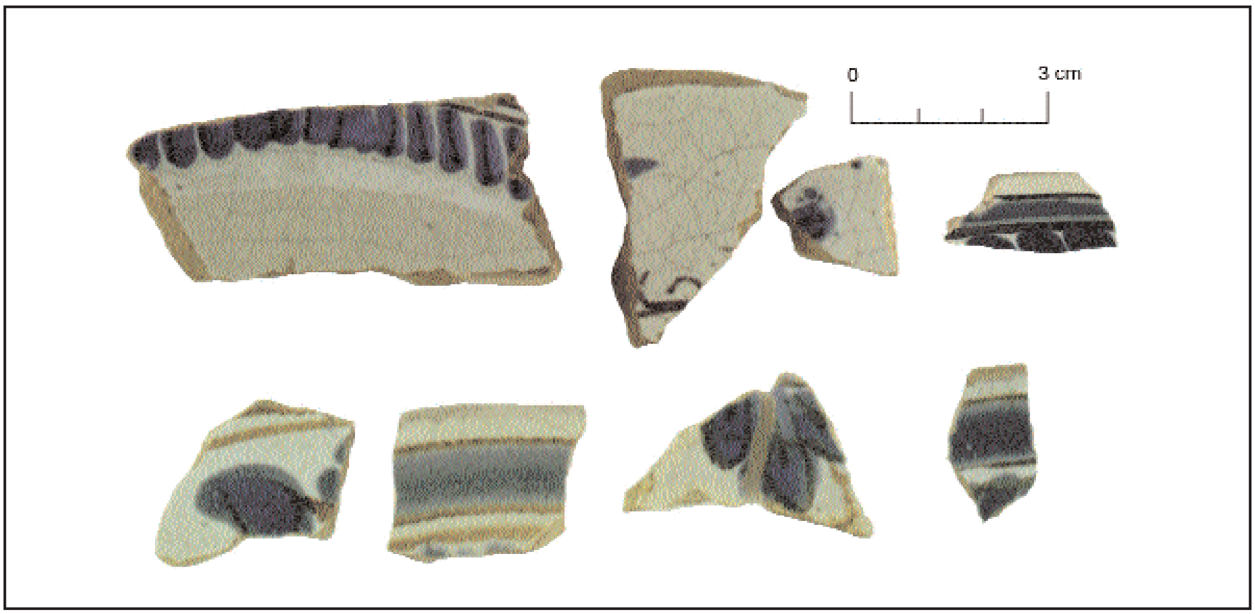

Figure 45. San Elizario variants.

notes but does not reference work that confirms Gerald's (1968) suspicion that the type is not from Puebla. However, most of the pastes in the Valencia collection were microscopically indistinguishable from Puebla paste.

Blue/Black-on-white generates as much confusion as the blue-on-white varieties. Only the lacy or web designs of Puebla Polychrome are universally, and easily, recognized. Puaray is also easily recognized but scarcely ever found. In New Mexico, San Elizario Polychrome seems to be the dominant type name. Another option is Playa Polychrome. Deagan (1987:86-87) identifies Playa Polychrome as Hale Smith's subsequent formalization of Goggin's mention of black line accenting in Puebla Blue-on-white. (It is difficult to see

In this collection, the framing lines range from a glossy black to a light rust brown. Most of the accent lines exhibit varying degrees of discontinuous pigment within the lines, which, following Snow (1965), who also noted the effect, will be referred to as "mottling."

The blue bands are always grayed, but occasionally the pendant petals achieve a true cobalt effect. Again, Deagan's (1987:85-86) categorization of San Elizario Polychrome varies from the accepted New Mexican definition in having a "brownish" band inside the framing lines. All Valencia specimens seem to be from plate forms; they vary from thin to moderately thick. At least seven vessels are represented within the type.

Variant I is the classic New Mexico San Elizario. The actual rim is missing but could be expected to have a black framing line, and a blue band, below which, in this case, are two thin dark brown lines exhibiting moderate mottling. Below the two brown lines are thin grayed, mottled blue pendants with a thin black line accent in all but one of the pendants. (The black is probably the same paint as the framing lines, appearing darker over the blue.) It is a thick plate or very large bowl with a foot ring, crackled glaze, and a moderate amount of impasto in the pendant decoration. The paste is buff, relatively hard and fine grained, with very small inclusions of rust red and black, quartzitic grains, and occasional small mica flecks.

Two other pieces appear to be from the basal portion of this vessel. Of the same thickness, they have bits of the same grayed blue with brown line in a probable floral design and also what appears to be a letter, perhaps a T, in brown. It was not an uncommon practice for the Puebla potters to sign their wares in the center or on the back, especially on Puebla Polychrome, Abo Polychrome, San Agustin Blue-on-white, and Aranama Polychrome (Deagan 1987:78). One of the plain white sherds is suspected of being part of this plate, based on glaze crackle patterns and color. This set was found in the lower cultural unit, Stratum 6.

Variant II has single thick gray-black lines of minimal though variable mottling, framing a grayed blue band. The blue band is a thin streak within a wash of the same blue, as though two strokes were made. Below the bottom line are deep cobalt blue pendants with extremely fine, almost microscopic, black accent lines. The pendants are a much thicker impasto than the banding lines.

The paste is a yellowish, light buff, relatively hard, and fine grained, with very small inclusions. This probable plate rim was also found in Stratum 6, in the same provenience as Variant I. It has the added distinction of having had a hole drilled through it just under the rim. The hole is small and too near the rim for it to have been a spindle whorl blank. The only other explanation is that it is a mend hole. Mending pottery with drilled holes and yucca twine is a native practice of long standing, almost as old as pottery itself in the Southwest. It would be difficult to imagine the original Valencia family using mended table ware, but a servant might, or more likely, the post-Revolt resettlers of Valencia may have used a Native technique to extend the life of their fine ware. Several very small sherds are probably also of this pattern.

Variant III is represented by four sherds, one rim sherd, and the others from just below the rim. The former exhibits the one thin rim framing line above a wide grayed blue band and two thin framing lines below the blue band. In this case the framing lines are a very light, almost rusty brown and mottled. Below the rim is a floral pattern in a slightly darker mottled blue-gray. It also has accents in the rusty brown. These sherds do not exhibit pendant petals, but often the pendant ring is broken by three or four floral motifs. Paste is a yellow buff with slightly larger inclusions.

Variant IV has only one very thin, mottled brown framing line both below and above the rim band. No pendants are present on the four very small sherds. A floral motif with accents of green-brown is found below the framing lines. In addition to the single framing lines, this set varies in that the rim was never glazed. Enough of it is present to show that this was not an accident. The glaze thins out on both sides, so the plate must have been painted in two operations, rather than being dipped (if that characteristic could be observed all around the plate).

Other blue/black sherds are about evenly divided between plate and cup forms (Fig. 46). One large floral element could be from the break of a plate. Two small sherds, one of which exhibits a kiln scar, are probably body sherds from San Elizario plates. The rest are cup forms. The first type has washy blue background lines surrounding dark blue floral elements with black outlining. The interior of both sherds exhibit washy blue bands. These sherds are probably from near the basal portion of the cup.

The fourth sherd in this group is from a cup, probably just below the rim. It exhibits precise blue framing lines both inside (two) and outside (one). Below the exterior lines is a band of bright blue impasto dots with black line work giving the impression of small scales. The effect is much freer than Castillo, and the impasto also seems out of place for that style, but it is also clearly in that line of descent. The black is a true black, not brownish. It also has a pale buff paste like Castillo. Castillo is almost never found in New Mexico, and there are no comparison sherds available, but if the sherd were Castillo, it would be another pre-Revolt form.

Multicolor Polychromes

Fig Springs/San Juan Polychrome was represented by one sherd (Fig. 47). The type has been dated in New Mexico at 1598-1725 (Snow 1965), a generous span, since it is always associated with pre-Revolt sites. Fig

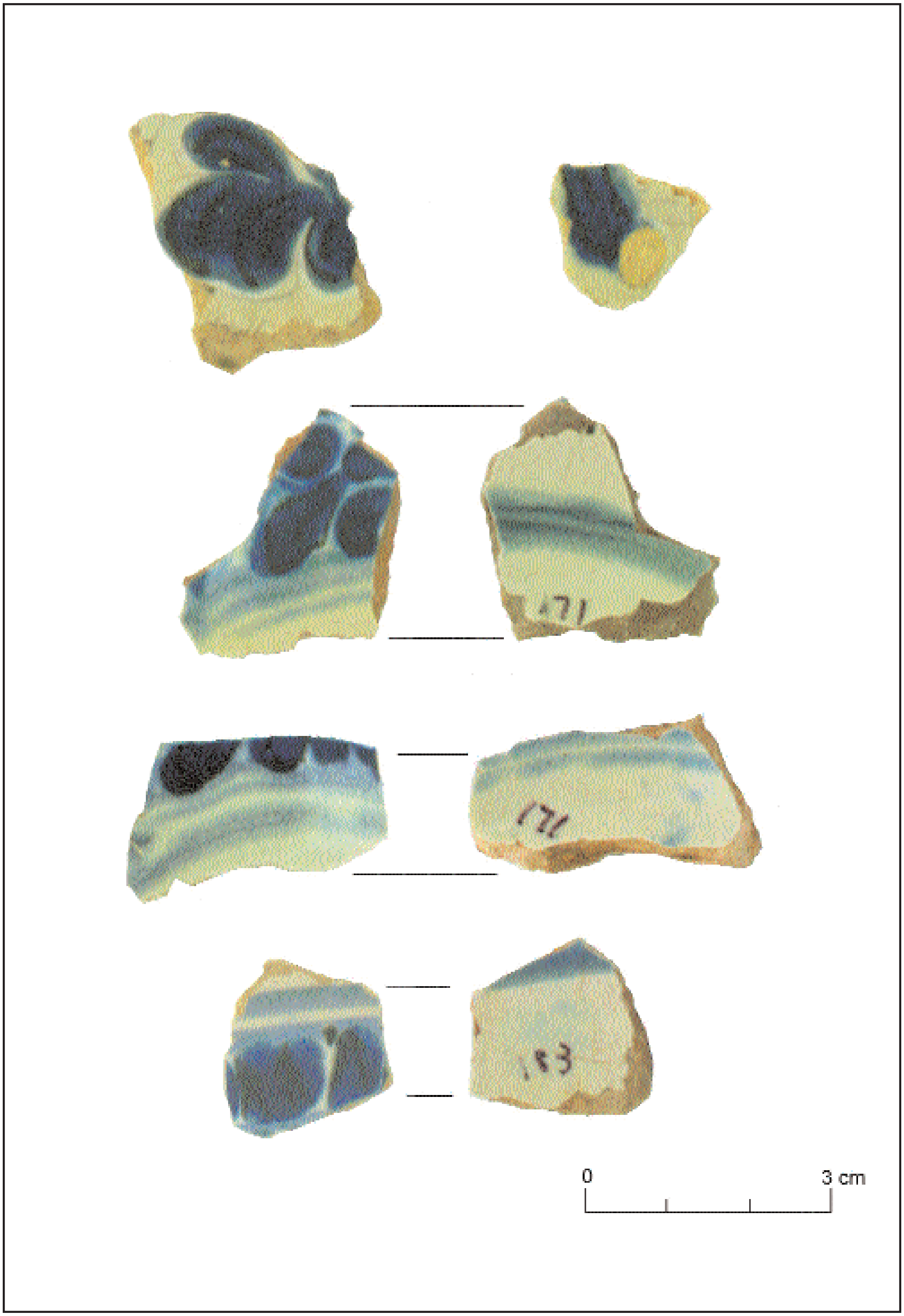

Figure 46. Indeterminate blue/black-on-white sherds.

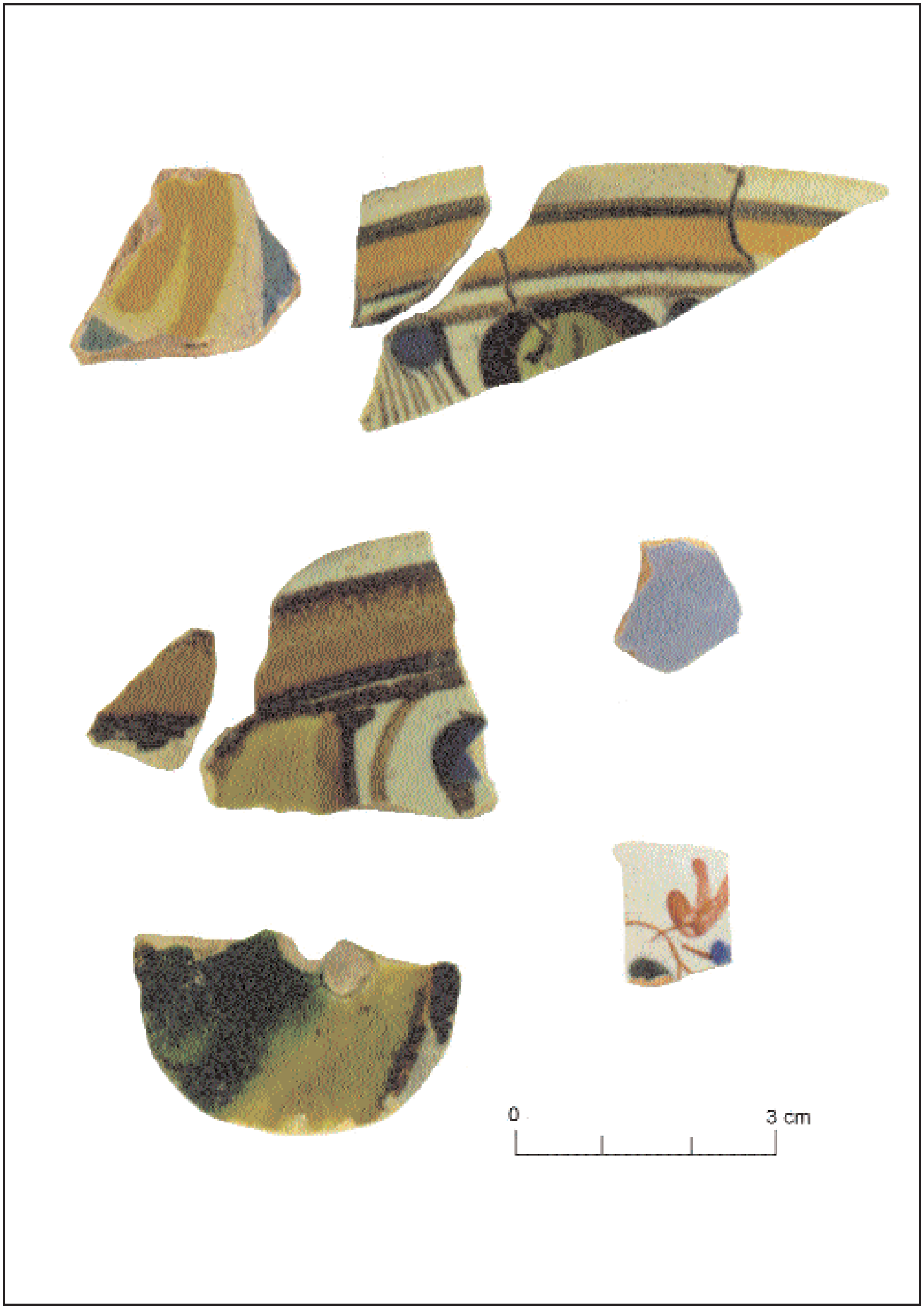

Figure 47. Multicolor polychrome sherds, Fig Springs, Abo I, Abo II, Tumacacori Polychrome, unidentified, and Italian.

Springs, a thick ware with a cream to gray-white background, is distinguished by touches of yellow in the center of a blue basal design, but no black. Goggin (1968) notes that it is one of the few types which are identifiable from plain sherds, because of the off-white background. It is believed to have been made prior to the guild ordinances going into effect (Snow 1965). It was at first thought to be anomalously early, but the Abo Polychrome certainly is contemporaneous.

Abo Polychrome, a type often found with Fig Springs in the Southwest, is represented by four fitted sherds that form the rim of a plate (Fig. 47). This plate fits every point of Goggin's (1968:169-172) description, including a thin vessel with creamy off-white enamel with crackling and the use of five colors. This vessel exhibits four: yellow is missing. Yellow is commonly used as a panel separator. The yellow is a true yellow, more so than the yellow-orange rim band, at least in the Mera collection. The yellow-orange band is "bordered by a brown line on top and two on the bottom." "Blue dots are often spattered in a random distribution," but "a peculiarity of the blue is that it alone forms a raised surface." The yellow and orange paints are opaque with a matte finish. The green (pea to emerald) and blue (generally cobalt) are bright transparent colors. The design is a simple generalized floral motif. The presence of this set of sherds supports the seventeenth-century roots of the wares found in the Valencia deposits. It is a late-seventeenth century form and in New Mexico is associated with pre-Revolt sites.

Abo II was the designation given by David Snow to two sherds of similar description but quite different appearance (Fig. 47). That seems as good a name as any, although from color scheme alone, both Mount Royal (earlier) and Aranama (later) would have to be carefully considered. An ocher rim band is framed with a typical Abo one-above, two-below pattern of framing lines. In addition a lighter yellow element descends from the rim band, much like the Abo yellow panel dividers. This element is also framed in brown. A raised blue dot is surrounded by brown scroll work elements that do not manage to outline the blue. The rim band is very mottled, as is the upper framing line, both blending together in an area where the underlying base enamel can be seen through the mottling. The brown and ocher paints have bubbled. In the lower framing lines, the bubbling can be seen and felt. The yellower paint and a stroke of ocher down its side, as well as the browns, are much closer to a matte effect. In contrast to the Abo sherds, this rim is slightly everted and appears to have not been glazed, like the San Elizario Variant IV. Overall, the effect is one of much freer, larger design elements than those of Abo, except for the ubiquitous blue dot.

It could be argued that this is an Aranama Polychrome, although the sherd is different from Deagan's (1968) color plates of Aranama. Also, the green is outlined in brown, which Goggin (1968:197) says never occurs in Aranama.

Tumacacori Polychrome was represented by one sherd (Fig. 47). This ware differs from the majority of majolica in having an overall blue body color rather than white. Although this sherd exhibits no decoration, the type is so well known that it is instantly recognizable. It is often found in southwestern contexts, usually as a minor part of an assemblage or even an isolate. OCA found five pieces (Gerow 1997:272).

Tumacacori appears to be an imitation of the sixteenth-century forms Ligurian Blue-on-blue and Sevilla Blue-on-blue. The body color and designs are quite similar; and with the addition of other colors to pick out the design, Ligurian is transformed into Tumacacori. There is considerable disagreement about the dating of Tumacacori. Snow (1965) considers it one of the later wares. It dates from 1780 to 1850 (Snow 1965) or is considered a nineteenth-century ware of limited lifetime from ca. 1820 (Goggin 1968). Barnes (1980) sees three phases dating from 1780 to 1860, based on decoration. Its inclusion in this collection seems to argue that Goggin is overly conservative in dating it.

If Tumacacori were as late as 1820, that could explain its usually low frequency. Regardless of any ending dates of 1850 for majolica types, in practice there are almost no majolicas after the wagons began to roll from St. Joseph. The surprise would be that any Tumacacori shows up in New Mexico. I suspect it probably arrived in any given household as a singular object such as a vase or knick-knack, although Barnes states that a wide variety of tableware and other forms were made, and plates and cups were common. It was found at LA 70, an eighteenth-century site, and its presence in this deposit certainly argues for a pre-1820 beginning date, since that is the effective cutoff date of this deposit.

Unknown polychrome is a class that contains two very different artifacts. The first is half of a spindle whorl, shaped from a large flat thick plate (Fig. 47). The artifact was wheel thrown and exhibits a kiln scar on the decorated surface. The colors are green and yellow, freely applied, with brown line accents. The curious thing about this sherd, however, is the background enamel. It is gray and has numerous small black inclusions ranging from microscopic to easily visible with the naked eye. I have read no description that mentions such a glaze. It may represent a new type, or simply an off day at the factory.

The other piece of unknown polychrome majolica stands out from the collection in every way (Fig. 47). It is thin (3 mm), with a very hard and fine red paste with

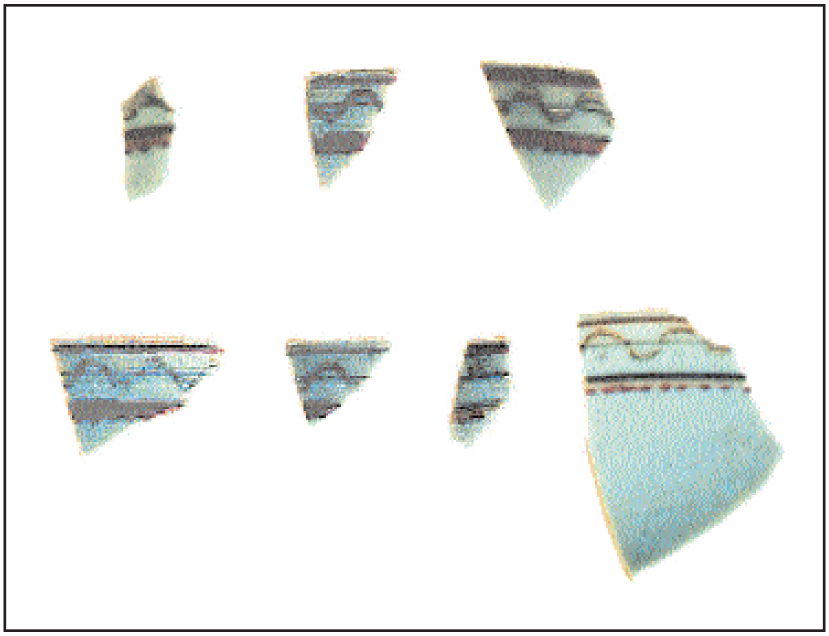

Figure 48. Chinese porcelain.

an uncrazed glaze. The design appears to have been overpainted after the glaze had been fired, because the line work is delicate and precise. The sherd is from the neck area of a vessel, implying a vase or other, nondomestic form. The thick, smooth, extra fine glaze suggests an imported ware. The floral pattern suggests Italian (Lister and Lister 1982) or even French wares. The paste is totally unlike the other majolicas, not only in appearance, but also in its response to hydrochloric acid. A drop of HCl applied to a fresh break merely sinks into the surface, without a single bubble. This sherd may be an Old World import.

Plain White

Plain white sherds constituted 17.4 percent of the collection (n=12). Most are thumbnail size or smaller and are probably body sherds of other types. No rim sherds were found, bolstering the assumption that little or no plain white as a type is present, since rim sherds were very common in the rest of the assemblage. Lister and Lister (1982:22) defined Mexico City White as a seventeenth-century type; its utility in New Mexico is doubtful. Variant I has a brick-red or terracotta paste and thick, shiny, cream-colored glaze, which could describe many of the Valencia plain sherds. Moreover, most of the redder pastes occur in the plain white sherds. However, Snow's assertion that these may be later could reflect a different origin as well. The nineteenth-century production center of Dolores Hidalgo produced majolica exhibiting a hard red paste, for instance. One sherd is large enough to be identified as to form; it is a plate foot ring and is certainly from a type without a basal ring decoration.

Porcelain

The Valencia porcelain appears to have been a matched set, with variations (Fig. 48). Both designs are variations on a combination of painted gray and orange lines, with what at first glance appears to be the remains of a decal of interlaced ribands. However, after analysis was complete, a second, microscopic examination was undertaken of the entire porcelain assemblage as a whole. What appeared to be decal ghosts, which would have dated the artifacts to after 1839, are actually the remains of overglaze gilding. Chinese manufacturers quickly adapted to Western tastes and began making export wares specifically for the Western market (Hill, personal communication, December 30, 1998; Mudge 1980). Overglaze elements began to appear, usually gold or red. All overglaze elements of Chinese porcelain found in Spanish Colonial proveniences date to the first half of the eighteenth century and can be identified by the iridescent “tracks” (Deagan 1987:100-101), which, without microscopic examination, can be mistaken for decal ghosts. Their common occurrence in shipwrecks has allowed close dating.

In spite of their thinness, there is very little translucency in these sherds. It takes a very strong light to discern the shadow of a finger through the material. When placed on white paper, the body appears gray, a characteristic of English bone porcelain (Berg 1980) or even Japanese Imari porcelain (Deagan 1987:102-103). There is a slightly grainy surface texture to at least one of the vessels, again, a Japanese trait (Deagan 1987:103). The very restrained “English” or Federal design elements are not uncommon in Chinese porcelain, however (Mudge 1980). Hill (personal communication, July 5, 1999) stated that as the export porcelain production centers in China became victims of their own success, quality dropped radically.

Regardless of the country of origin, the message is the same. This set arrived in the New World on a ship and was hauled at great expense overland. Fournier (1997:204) notes that Chinese porcelain and European white wares were both high-status goods. Chinese porcelain was about 10 times the cost of Mexican majolica; European porcelain was 3.5 to 9 times as expensive. She also notes that French porcelains replaced Far Eastern wares as status items from 1770 to the late 1800s. However, Lister and Lister (1982:78-79) state that as the quantity of porcelain increased, the price dropped to the point where it threatened the majolica industry. Finding this set of porcelain in conjunction with the Mexican lead glaze wares suggests that porcelain had replaced majolica as the fancy ware in that particular household.

Variation A has the major design on the exterior of the vessel, plus an interior minor component of a band of leaf-like shapes under the rim. Variation B has the same major design, but it is found on the interior of the vessel, with no ornamentation on the exterior. There is some indication that Variation A may have up to three vessels represented. One piece has a considerably thicker rim, while the two largest sheds have the interior band at different distances from the rim and also exhibit different curvatures. One is a simple curve up to the rim, while the other straightens out into a slight eversion. This may represent a cup and a bowl in the same pattern.

It is unlikely that more than two to four vessels are represented in the porcelain. Both A and B are on cups or bowls. All rims, in both A and B, are gilded, which is discernible only under a microscope.

Mexican Lead-Glazed Earthen Wares

Also present is a small component of Mexican lead glaze earthenware (Fig. 49). There are two major varieties even here. One is slipped before glazing; the other is not. Paste color ranges from Munsel 5YR 5/4-5/6 to 7.5YR 5/4-5/8, although one sherd is much whiter and very similar to a majolica paste. Deagan (198747-53), in her discussion of lead-glazed wares, notes at least one very early (pre-1550) form that was decorated on a majolica-like paste with an amber-colored glaze, so the type certainly has a long lineage. Pastes do not exhibit foaming when challenged with hydrochloric acid. Temper seems to be crushed igneous rock, with perhaps a preference given to white quartz veins. In one variety, the paste body is then slipped with a coarse white slip, sometimes painted with a not very well mixed yellow to green wash, then covered in a transparent yellow glaze. A handle and one associated sherd, probably from a mug or small pitcher, also received a slip of the paste clay, used as a drawing element, before the transparent glaze was applied. The body sherd has no interior slip but was glazed directly over the clay body, resulting in a rich brown color.

The three sherds that are glazed only are each different. One is unique in that it displays iridescence. It is glazed inside with a brown transparent glaze and outside with a green transparent glaze that exhibits the iridescence. Although there is a very early Mexican iridescent ware (Lister and Lister 1982), it seems unlikely that an early sixteenth-century ware would have found its way to New Mexico. The sherd is burned, which is not likely to have affected the glaze, unless the fire was hotter than the original firing.

One truly burned sherd is actually a polychrome. The interior is reddish, perhaps just a clear glaze over the natural clay body. The exterior bottom is a brown glaze, rising on the vessel wall to a dull green glaze. This sherd was burned severely enough to cause spalling on the exterior and a dark carbon color through most of the paste. It is probably from a cooking pot. The third glazed-only sherd is green with brown spatters on both sides. The sherd is so small that interior/exterior is undeterminable. It displays a whitish paste unlike that of any of the other glaze wares.

There are four or five vessels represented in the Mexican lead-glaze ware. The practice of slipping and/or glazing only part of the vessel forces one to proceed with caution in determining vessel counts. Paste color has also been taken into account. Three pieces of a probable thin plate have a green glaze over a very thin white slip interiorly, but a red matte finish exteriorly. The clay body is reddish, with a subtle buff streak in the core.

Another set of glaze ware sherds has an interior washy green glaze over the slip in loosely concentric circles, which was then given a clear glaze inside and out, causing the white slip to appear yellow, and the natural clay body reddish-brown. This vessel has a flat bottom and a foot ring. A third variation on the swirly green has only the white slip, glazed, on the exterior. All three variations could be part of the same vessel, or two vessels.

While many of the these lead-glaze wares can be bought today, few people realize the time depth of the tradition, which goes back into the sixteenth century. Many workers consider them “modern,” as indeed they can be, but such wares almost always appear with majolica as a portion of the assemblage. Very little work has been done with them, perhaps because of their insensitivity as a temporal indicator. Barnes (1980) and Fournier (1997) are the major exceptions.

The percentage of glaze wares varies considerably from site to site. The ware was cheap, much more so than majolica, and roughly the same as Native American ceramics (Fournier 1997). At the Palace of the Governors, 98 Mexican earthenware sherds were found, but only 30 of them were lead glazed (Seifert 1979)--only 5.35 percent of the total imported wares. Such a low frequency is surprising, even at the Palace, unless the lower classes did not eat or cook there. By way of contrast, at the Presidio of San Elizario, a late eighteenth- and early nineteenth-century community, Mexican glaze wares constitute 62.4 percent of the

Figure 49. Mexican glaze wares.

Mexican ceramics. Both presidios (the Palace was also a presidio) had access to Native American wares. It may be that the glaze wares were too cheap to be worth importing as far as New Mexico unless brought as personal effects. Certainly Native American ceramics would have been plentiful and cheap here, perhaps more so than at San Elizario.

At San Elizario, Fournier established a number of provisional types of Mexican glaze wares, based first on paste color, then on glaze colors. Most of her types are nineteenth century, and there seems little point in trying to fit these few sherds into her types. Barnes (1980) discussed lead-glaze wares in purely arbitrary 100-year periods, but most of his types are decorated only with the glaze. Slips under the glaze are mentioned only for Tonala and Galera polychrome. The former is considered an inferior ware, with poorly handled glaze, which does not fit the description of these sherds. Galera is a darker paste with a strong brown slip, which is not accurate for these sherds, but the type does occur with San Elizario Polychrome. Suffice to say, their presence in an eighteenth-century deposit is perfectly acceptable.

Based solely on paste type of an unrefined earthenware, one olive jar sherd is included in the Mexican glaze wares, even though the interior green glaze on the sherd is so washy as to barely qualify as a glaze. This slipped exterior, very thin interior glaze is most typical of what Goggin (1968) calls “Early Style” olive jars. Unfortunately, the 1500-1575 date he assigns to the Early Style is simply too early for New Mexico. But olive jars were reused until they broke and almost constitute the “cardboard box” of their time. Later olive jars could also have a thin washy glaze, so this sherd is truly indeterminate temporally, even though obvious as to type.

The final glaze ware is a partial miniature vessel. It has a black-brown to black-green glaze both inside and outside and measures 24.85 mm high with a maximum diameter of 21.57 mm and a minimum diameter of 19.15 mm. Walls are thin, 2.36 mm for the body and 2.22 mm at the rim. Traces of a small handle are present. It burned after breaking, so the paste color could not be observed without breaking the vessel.

Metal

The metal artifacts (Table 52) are from the disturbed deposits and, for the most part, are undatable or seem to postdate the ceramics by a good bit--a common state of affairs in historic analysis. One can may have been lined or japanned, and one had a latex type seam compound--very much a twentieth-century object.

There were also two pieces of copper sheet scrap, a fairly common occurrence at Spanish Colonial sites. OCA (Gerow 1997:275)) also recovered two pieces of copper, one a piece of roughly triangular shape, the other a square with clipped corners. Gerow placed the latter artifact in the personal effects category and the former in architecture/construction. I placed the two pieces of scrap found in OAS's investigations in the unidentified category.

Two objects that are entirely unusual and clearly Spanish Colonial in character are a small cast gold button and a cross of unknown metal (pewter?) washed with gold (Fig. 50). The cross arms are rounded, coming to a knobbed point. The top arm is flattened and serrated in a manner reminiscent of a crown, below which is an indentation, presumably the hole it was strung from.

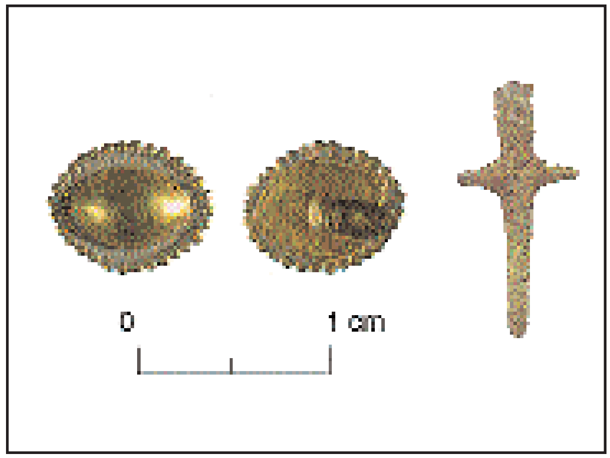

Figure 50. Gold button (FS 163) and cross (FS 162).

A well-worn silver serving spoon was found during OAS testing of LA 67321. Of Spanish Colonial manufacture, judging by the ridge down the bowl back, it may also have had a band of gold wash decoration on the handle. If so, it undoubtedly came from a very well-to-do household, perhaps even the original Valencia family. “It has been remarked that the Mexican dandy of the 18th and early 19th century might not have a peso in his pocket, but his hat and clothes were profusely decorated with silver and gold, thus creating the impression that the wearer was a man of wealth and substance” (Arthur Woodward in Boylan 1974:63).

Discussion

Previous excavations at LA 67321 (Brown and Vierra 1997) have also produced evidence of two historic deposits, but they consider the first to be slightly later, from the late 1700s to the mid-1800s, followed by post-railroad deposits. While we have a few tantalizing traces of the pre-Pueblo Revolt era, the major deposit uncovered by our work began sometime in the eighteenth century but was clearly sealed by ca. 1820, because no Santa Fe Trail artifacts occur in it. Only one Euroamerican artifact, the Conrad beer bottle, can be firmly associated with the Santa Fe Trail. Following a hiatus, or a change in land use, a second period of use lasted until well after the railroad came in around 1880.

One can only analyze the artifacts one is presented with, and there are significant differences in the two assemblages. Most notably, OCA found the post-1850 ceramic styles missing from our assemblage. This is not too surprising, since the area has been occupied continuously throughout the last two centuries at least.

The other difference is in the relative frequencies of the majolica types. Gerow (1997) noted six types. The major difference is that Gerow called seven sherds (the largest component) Aranama. It would be interesting to compare her Aranama with our Abo and Abo II sherds, as confusion often arises between the two types, which are actually more a continuation of an ongoing polychrome tradition. Tumacacori Polychrome was the second largest component, with five pieces. Puebla Blue-on-white and San Elizario Polychrome together had only five specimens. Gerow uses only Barnes's 1750 date for San Elizario and only recognizes Snow's late date (1780-1850) for Puebla Blue-on-white, which would certainly skew the dating of the assemblage.

As can be seen from Table 57, LA 67321 fits comfortably into the majolica associations of the eighteenth century, with a seventeenth-century component. The list of types was taken from the Cochiti work.

The ceramics clearly show an eighteenth-century occupation with roots extending back into the seventeenth century. What is unusual is that the other material types, metal and glass, also back up the ceramics. Another similarity with LA 70 is the piece of silver-washed jewelry found there. The absence of any Santa Fe Trail era or later goods implies that this deposit was sealed by 1820 or 1825 at the latest. Since New Mexico was abandoned between 1680 and 1692 by the Spaniards, the presence of the seventeenth-century wares could represent goods removed during the exodus and subsequently brought back, personal effects brought in by returning settlers, or detritus from cleanup operations upon reoccupation of the area.

Living as Hispanics, a lifestyle heavily encouraged by both church and state powers, meant using Hispanic artifacts. One of the easiest ways to advertise Hispanic status would be to acquire Hispanic status goods like majolica. Unfortunately, we know little about the status of the post-Revolt settlers. We cannot assume that majolica was out of reach of anyone, especially in later days, when it was falling out of favor with the upper classes. It may well have fallen into a “middle class” of affordability while still carrying a cachet of “Hispanicness” to satisfy the desire of lower class persons to appear *español*.

What the assemblage does *not* do is perpetuate any stereotypes of “poor New Mexico,” although it is difficult to say which dishes belonged to which set of occupants. It may be that more of the majolicas are seventeenth century than we believe, or the later trash deposits are indistinguishable from the aristocratic Valenicas. Whichever, the residents of Valencia set their table with quality majolica and engraved stem ware. They drank from porcelain or majolica cups and enjoyed objects like the “Italian” vase for beauty alone. They sported gold buttons on their presumably silk or fine wool clothing. They may have made their living in the wool trade, but they were definitely not poor shepherds. Which is not to say they actually had any cash money on hand, either. The exigencies of a barter economy often meant that hard money was in short supply. In fact the term *hard money* comes from *pesos duros*, pesos that were acceptable to the Chihuahua merchants, as opposed to New Mexico pesos, which were scorned and discounted by the merchants. But in spite of hardships, the New Mexican actively pursued the luxuries of life, and even here, in this place “remote beyond compare,” he found them. Considering the extra freight he had to pay and the discount his money received from the suppliers, every luxury cost him thrice over and represented an enormous investment of time and resources.

FAUNA

Significant collections of fauna have been recovered from LA 67321 on two other occasions. OCA excavations to the north of the current project area recovered and analyzed 7,833 specimens (Brown and Brown 1997a:323). Taxa identified included small numbers of fish, toad, turtle, crane, jackrabbit, horse or burro, and chicken specimens, with larger amounts of pig, sheep/goat, and cow (Brown and Brown 1997a:412). OCA's overall conclusion for the Spanish Colonial component of this and nearby LA 953 (Valencia Pueblo) was that the assemblages are dominated by sheep, goat, pig, and chicken, with less emphasis on cattle, turkey, and fish (Brown and Brown 1997a:436).

OAS testing recovered a relatively small sample of bone and egg shell (n=163) comprised of a grab sample collected from the backhoe trenches and material found in auger tests (Akins 1996:69). The main difference in taxonomic composition between the testing sample and the larger OCA assemblage is in the presence of dog, which comprised 27.6 percent of the OAS testing assemblage. Parts of two dogs, one much larger than the other and considerably larger than the typical Pueblo Indian dog, are probably from dog burials. The small size of the sheep/goat remains in the testing sample suggests these represent an early variety, or churros, while the presence of regular-sized and large bovid remains could indicate the use of bison or a very large variety of cow/oxen (Akins 1996:70).

The current project recovered 6,616 specimens, with a greater variety of taxa than reported in the OCA sample, at least 17 as opposed to 10 species, as well as different proportions of the major taxa. More of this assemblage was identifiable beyond the size of the animal (36 percent compared to 15 percent), and it contains proportionately larger amounts sheep/goat and cow and less pig and chicken. Differences in the two assemblages could indicate that the deposits represent slightly different time periods, that the refuse is from households with different access to animal resources or dietary preferences, that the assemblages represent different kinds of trash (culinary versus butchering debris) or types of deposition (primary deposition versus washed or sheet trash), or a combination of several factors.

The primary goals of this analysis are to establish what kinds of animals were used, how these animals were processed, what this choice and process tells us about settlement and subsistence in the Valencia area, and how this assemblage compares with others from the same time period.

Background

In the period following the Reconquest, residents were more concerned with making a living than following the ideal settlement configurations as defined by the Spaniards (Pratt and Snow 1988:67). In 1776 the dominant settlement pattern was one of scattered *ranchos* with a few communities built around plazas (Pratt and Snow 1988:220).

The two "plazas" at Valencia were more like clusters of *ranchos* and lacked formal plazas (Adams and Chavez 1956:153). *Rancho* inhabitants were often intrusive owners who, if they survived Indian attacks and prospered, applied for formal grants to their land. Information on the small-scale agriculture and stock-raising economies of these *rancho* communities is generally lacking (Pratt and Snow 1988:233). By 1790, census takers identified two distinct plazas with economies based on raising wheat, cotton, and livestock and producing woven goods for trade on the Chihuahua Trail or Camino Real. Sheep, oxen, mantas, cotton, hides, and piñon nuts moved south along the Camino Real (Scurlock 1997:23).

The 1790 census reported that 15 families comprised the northern plaza and 10 the other. Heads of household listed in the census for the northern plaza include eight farmers, two sheep herders, three weavers, and two widows, and six farmers and four ranchers for the southern area (Olmsted 1975:17-19). The predominance of farmers and ranchers suggests a scattered settlement with households situated adjacent to small subsistence-level farms.

In the late 1830s merchant-traders in the Valencia area exported mules, livestock, and pelts in exchange for metal, cloth, candy, sugar, and chocolate (Scurlock 1997:25). By 1860, 247 persons were recorded living at Valencia. Almost all spoke Spanish, and most were farmers or laborers with rare occupations of gardener, silversmith, carpenter, merchant, or clerk. Drought, floods, and Indian raids in the intervening ten years did not slow down growth: 581 persons were reported in the 1870 census. The area remained predominantly agricultural, and a few Anglos had moved into the area (Scurlock 1997:29).

Sheep were the primary livestock during the Spanish Colonial and following period. Hearty churros, the common breed in southern Spain, lacked the long staple wool suited to the hand-processing techniques used in the area but readily adapted to the semiarid pastures of the Southwest. Churros substitute dew and succulent plants for water and can better withstand droughts and drives than cattle (Baxter 1987:20). It was not until the *partido* system took hold in the 1740s that herds increased greatly, and by 1750 sheep ranching was

New Mexico's most important industry. Sheep were the medium of exchange in an area short of capital (Baxter 1987:28-31). In the early 1770s, the governors banned exports of wool and livestock to prevent depletion of resources needed in the province. As flocks slowly grew, some outside sales were allowed (Baxter 1993:109). By 1785, sheep were exported south, and wool production had increased. Enormous herds were assembled in Sevilleta, traveling south in August after the rains had filled water holes and grazing conditions improved (Baxter 1993:109). In 1803, Governor Fernando de Chacón reported to his superior in Chihuahua that sheep were the most abundant domestic animal, oxen were sufficient for farming, pigs were scarce, and Indian raids discouraged horse and mule breeding (Baxter 1987:61, 69; Simmons 1985:81, 85). Peak years for sheep exports were between 1821 and 1846, when sheep were used as food for miners in Mexico. Churros were the predominant variety (Baxter 1987:90-91; Pratt and Snow 1988:377). Between 1819 and 1833, Bartólome Baca of Tomé grazed 40,000 sheep, 900 cattle, and 300 mares on his pastures in the Manzano Mountains (Tainter and Levine 1987:111). These numbers seem high, since an 1827 report states that the villa of Albuquerque, its *alcaldías* (mayoralties), and pueblos had 2,550 head of cattle, 155,000 sheep and goats, 192 horses, 868 mules, 105 mares, and 1,165 *caballadas* (Carroll and Haggard 1942:43).

The U.S. conquest abruptly ended commerce with Mexico, and the sheep trade remained dormant until the discovery of gold in California opened new markets (Baxter 1987:112). Exports of primarily churros continued until the Civil War, and Indian raids stopped the trade (Baxter 1987:125,148). Rio Grande ranchers soon found a new market--selling wool to the U.S. government. By 1868, ranchers were importing merino rams, a breed with kinky high-yielding fleece and accustomed to long seasonal drives between mountain and plain environs. The market changed from mutton to wool production (Baxter 1987:20, 149). Crossbreeding the churro and merino was a slow process in New Mexico. By 1880, only 40 percent of sheep was comprised of the improved variety. Crossbreeds produced over twice the wool yet remained hardy, prolific, and savory (Carlson 1969:33). With the establishment of the railroad, cattle could compete with sheep. Degradation of pastures eventually led to control of the public range, the passing of the *partido* system, private ownership of watering places and homesteads, and turned the sheep industry into one of sedentary husbandry (Carlson 1969:37-39).

This background, the artifact assemblage, and the radiocarbon dates for the site suggest that the deposits at LA 67321 could represent refuse from an informal *rancho* community. Given the amount and density of trash, Scurlock's (1997:40) identification of the area as the remains of a Southern Tiwa or Spanish Colonial camp or activity area is undoubtedly incorrect.

Methods

Variables recorded for each faunal specimen provide the information to address a number of issues. These include those that identify the animal and body part represented, how the animal and part was processed for consumption or other purposes, and what taphonomic or environmental conditions have affected the specimen.

Each specimen (piece of bone, eggshell, or mollusk shell) was identified and recorded using the OAS faunal recording format. Variables that were computer coded and analyzed using SPSS/PC version 4.0 include the field specimen (FS) number, the lot or specimen number for that item, number of items that fit this description, an indication of uncertain identification, the taxon, whether the element was part of an articulation or pieces that fit together with an old break, the element or body part represented, element side, element completeness, portion of the element represented, the age of the animal, criteria for aging, environmental alteration and degree, animal alteration and location, burning degree and location, rounding, processing type and location, and whether the specimen is a tool, ornament, or manufacturing debris.

Taxonomic identifications are as specific as possible. Specimens that could not be identified to the species or family level were assigned to a range of indeterminate categories based on the size of the animal and whether it is a mammal, bird, other animal, or could not be determined. Comparative collections at OAS and the Museum of Southwest Biology, Mammal and Herp Divisions, University of New Mexico, were used to make the identifications. Each specimen was counted only once, even when broken into a number of pieces by the archaeologist. If the break occurred prehistorically, the pieces were counted separately and their union noted in a separate variable.

Taxa Recovered

Although the bulk of the assemblage is comprised of domestic animals, especially sheep or goat, there is a variety of other taxa (Table 58). Most occur in small numbers, suggesting occasional use or accidental inclusion in the refuse rather than systematic utilization. Counts are given for each taxon along with the common name or description, the percent of the assemblage, and the minimum number of individuals (MNI). The MNI considers the entire assemblage as the unit of analysis for determining the number of individuals represented.

The maximum number of individuals treats each of the provenience divisions used in the later discussions (disturbed east, disturbed west, upper cultural east, upper cultural west, lower cultural, and the south area) as a separate unit of analysis and adds the totals.

Unknown Taxa

The unidentifiable fragments that often constitute much of an assemblage are rarely given much attention. Here, the unknowns were assigned to one of the following categories: unknown small, small mammal/medium to large bird, small mammal, small to medium mammal, medium mammal, medium to large mammal, large mammal, or very large mammal. In addition, if the bone is consistent with the artiodactyls in size, shape, and texture, they were placed in a general artiodactyl, small artiodactyl, or large artiodactyl taxon. By identifying these as precisely as possible, the information can be used to supplement that from the identified taxa.

Indeterminate mammals of all sizes comprise 83.3 percent of the OCA collection (Brown and Brown 1997a:412), compared to 53.0 percent of this collection. The largest group in this assemblage is the medium to large mammal (29.5 percent), while indeterminate size mammal (51.8 percent) dominates the OCA assemblage. This suggests that the OCA assemblage is much more fragmented and difficult to identify, and/or there are methodological differences in the assignment of an unknown taxon between the analysts.

Rodents

Only four specimens from rodents were recovered. Since quarter-inch mesh was used for screening, rodent remains were probably more common than suggested by the counts but not collected by the screen size. Those found are from the same provenience and are burned, suggesting they are from the same rodent. Elements include parts of a humerus, a cranium, a mandible, and an unidentified long bone shaft fragment. While definitely part of the cultural deposits, this small rodent is an unlikely dietary item. It was more likely deposited in a fire along with other trash. No rodents were found in the OCA assemblage.

Three species of *Perognathus* inhabit Valencia county near the Rio Grande. The silky pocket mouse (*Perognathus flavus*) is ubiquitous in loose friable soils in grasslands and deserts and occurs in open juniper woodlands. The plains pocket mouse (*Perognathus flavescens*) has the same range as the silky pocket mouse but seems to be restricted to areas with sandy soil. The third species, the rock pocket mouse (*Perognathus intermedius*), is confined to lower grasslands and desert in the vicinity of rocky outcrops (Findley et al. 1975:159-168).

Rabbits

Rabbit remains are only slightly more common than rodents. Cottontail rabbit is represented by a single femur fragment and jackrabbit by two scapula fragments, two metatarsal fragments, and a phalanx. None are burned or have definite evidence of human processing. One is rounded and could have been boiled or digested. The jackrabbit was found in three different FS numbers, but are all are from the eastern upper cultural provenience. Two are from adjacent levels and could represent the same rabbit. The other is sufficiently distant that a separate rabbit is possible.

Two species of cottontail rabbit are found in the vicinity. *Sylvilagus nuttalli* lives in mountainous areas including the Manzano Mountains and could have been procured during a hunting expedition. *Sylvilagus audubonii* occurs in areas of piñon-juniper woodland and below and would have been present in the area (Findley et al. 1975:83,87). The only species of jackrabbit in the area is *Lepus californicus*, the black-tailed jackrabbit, which is found throughout the state below ponderosa forests (Findley et al. 1975:93).

Rabbits were common components of the prehistoric diet, but the same is not true of the periods represented at this site. The OCA analysis identified two elements as rabbit and eight as black-tailed jackrabbit (Brown and Brown 1997a:412). Lacking evidence of human processing, these could have entered the archaeological record as carnivore scatt or by other means. They could also represent what seems to be a rare event, either hunting or disposing of garden pests.

Carnivores

Only two specimens were identified as carnivore. The canid element, a femur shaft, is from an immature individual the size of a dog or coyote. It is burned, suggesting it was food scrap or part of an animal tossed into a fire as refuse. Either species is possible. Dog (*Canis familiaris*) parts comprise a fairly large proportion of the testing assemblage (27.6 percent, Akins 1996:67) but are absent from the OCA collection. Coyotes, *Canis latrans*, are most common in grasslands but inhabit all parts of the state (Findley et al. 1975:281).

Spotted skunks (*Spilogale gracilis*) live in rocky and brushy areas of woodlands, grasslands, and the desert (Findley et al. 1975:310). The specimen here, a sacral vertebra, is complete and has no evidence of processing. Skunks are unlikely food items, and this one may have found its way into the deposits through nonhuman agents.

Bos and Bison

Distinguishing large cow or oxen from bison is difficult. The OAS comparative collection contains a range of cattle, from modern Navajo stock to early historic plains varieties, as well as a modern bison from Fort Wingate. Specimens were first compared with cattle, then, if large, with the bison. Those elements that have published ranges of measurements were measured following Speth (1983) and compared to his ranges for bison. Specimens that are shaped more like cow but with measurements falling within the range for bison were labeled *Bos/Bison*. The one specimen tentatively identified as bison is the base of a horn that is considerably larger than the cattle in the OAS collection or at the Museum of Southwest Biology. Regardless of the presence of bison, more than one variety of cattle is represented in the assemblage. Some may have been food animals and others draft animals.

As noted in the introduction, cattle arrived with Hispanic settlers from Mexico and were an integral part of the subsistence economy at the end of the seventeenth century (Baydo 1971:12, 16). Livestock remained scarce into the early 1700 and increased slowly. By 1739 Diego Padilla of Los Padillas (south of Albuquerque) left 1,700 sheep and 141 cattle, as well as horses, mules, and oxen, to his heirs (Baxter 1987:21). By 1800, cattle were an essential food source and becoming increasingly valuable (Baydo 1971:32).

Cattle introduced into the New World were probably of a breed known as Criollos, a meat and draft variety of Iberian origin and a mix of Spanish and Portuguese types. Selection for color or behavior did not begin until after 1750. Early New World cattle had twisted handlebar-shaped horns and were docile, making transport in ships possible (Porter 1991:308-309). In the 1800s, ox carts were the most common vehicle. Two oxen pulled a wagon for ordinary domestic purposes, while four or six were used for long trips (Hallenbeck 1950: 340).

Bison were found prehistorically both in the Estancia Basin and between the Rio Grande and Manzano Mountains (Akins 1987:166-167). While it is unlikely any survived along the river in historic times, there are accounts of Hispanics going on short hunts after crops were planted and again after the harvest. Bulls were hunted in June and cows in October. Lances, arrows, and rifles were used. The meat was jerked (Carroll and Haggard 1942:101; Kenner 1969:103). As late as 1832, Antonio José Otero, from the Valencia area, transported mainly buffalo skins in a caravan to Chihuahua (Sandoval 1978:100). Thus, the presence of bison remains at LA 67321 is not that unusual. The cranial fragment from this site has an a chop on the posterior aspect.

The *Bos/Bison* specimens include a mandibular condyle, a ramus fragment, portions of an axis, an atlas and another cervical vertebra, two humerus fragments, an ulna fragment, and a scapula fragment. All but two have some sort of butchering marks, most often chops. One specimen is from an immature individual (less than two-thirds grown), and another is from a fully grown but not yet mature individual.

In the OCA assemblage (Brown and Brown 1997a:412), cow remains (1.6 percent) and indeterminate cow-sized mammal remains are relatively sparse (4.1 percent), about half that found here (2.1 percent cow, 4.2 percent large artiodactyl, and 2.8 percent very large mammal). The number of individuals represented in each is fairly high relative to the number of specimens of that species (OCA 1:10.2, OAS 1:15.4), indicating that cow parts are widely dispersed compared to those from sheep/goats (OCA 1:22.7, OAS 1:34.3).

Ovis/Capra

Sheep or goat is the most numerous of the identified taxa, comprising almost 20 percent of the assemblage. These two species (*Ovis aries* and *Capra hircus*) are notoriously difficult to distinguish (Boessneck 1969:331; Lyman 1980:1322), especially the varieties found in the New World. The OAS comparative specimens--a rather large modern sheep (undoubtedly not a churro), specimens from excavations at the Santa Fe Penitentiary, and a modern goat, remarkably similar to the archaeological elements in size--were used to identify this taxon in the LA 67321 assemblage. Those identified as sheep are all cranial pieces. The goat elements are horn and much of an innominate. Ideally, measurements of long bones would distinguish the sheep and goat and any sheep that may be merino crosses. Unfortunately, few elements were even close to complete, and the majority (67 percent) comprised less than 25 percent of the element. Thus, the lack of published measurements distinguishing the two varieties of sheep as well as goat and paucity of measurable elements made this impossible. However, the sheep should all be churros, because merino rams were not imported until about 1868 (Baxter 1987:149), postdating LA 67321.

Historic accounts, such as one from 1697, indicate that the colonists received more than 4,000 sheep but only 170 goats (Baxter 1987:16). Female goats produce large amounts of milk, which was processed into cheese and butter. Male goats are better flock leaders than rams. Lead goats warn of approaching predators, respond better to herders and dogs, and do not lead the flock into danger. Goats were also used to thresh grain and beans and even to clear land of woody plants (Scurlock 1998b:8-9).

Evidence of butchering is relatively common and ages range from neonate to mature, suggesting sheep were raised in the vicinity and were a primary food source. Sheep and goat percentages in the OCA assemblage (9.0 percent) are less than half of those found here (19.5 percent), and only one specimen was classified as an indeterminate sheep-sized ungulate (Brown and Brown 1997a:412).

Pig

Columbus brought eight pigs (*Sus scrofa*) to the New World (Cuba) in 1493. In 1524, Cortez introduced pigs to Mexico (Bennett 1970:230), where they multiplied rapidly, adapting well to new environments. The breed introduced by the Spaniards were Iberians, a small (50 to 150 kg) lean pig with heavy shoulders, long legs, a long narrow snout, small erect ears, and an uncurled tail (Gade 1987:36).

In the LA 67321 assemblage, pig specimens are sparse (n=12, 0.2 percent) and found primarily in the upper fill (n=10). A variety of parts are present, but most are front limb elements (humerus, radius, ulna) and hind feet. Only age differences indicate that more than one individual is represented, and given the few and clustered parts, only portions of animals may have been procured or used by those who used the area as a dump. The scarcity of pig remains is consistent with Chacon's 1803 observation that hogs were scarce (Baxter 1987:69). Nor had things changed by 1849, when de Escudero stated that raising hogs was completely neglected (Carroll and Haggard 1942:103).

The OCA assemblage contained a greater proportion of pig elements (1.4 percent) and more parts. Cranial elements were fairly common (Brown and Brown 1997a:415-423), but otherwise the distribution appears similar to that found here, largely front limbs and hind feet.

Horse

Two elements, a mandibular molar and a metatarsal fragment, are consistent with a comparative horse in size and morphology. The two specimens are from different proveniences, suggesting at least two horses. The metatarsal has an impact fracture, suggesting it was processed.

Horses arrived with the Spaniards but were so attractive to raiding Indians that breeding was difficult, and horses were imported into the 1800s (Baxter 1987:69). Attacks in the area by Apaches, Navajos, and Comanches are documented from the mid-1700s until at least 1870 (Scurlock 1997:45-49). It is unlikely that the small subsistence farmers and herders in this area had many horses. Mules were the most common form of transportation in the eighteenth century. They were not used as draft animals. Mules were used as beasts of burden in heavy pack trains, hauling goods along the Camino Real and carrying ore out of mines. In the 1700s and early 1800s, demand for mules became so great that haciendas began raising mules and importing animals from Spain and the United States to increase their size. The Asiatic donkey or burro came into use late, probably not before 1830. It supplanted the mule (Baxter 1993:106; Hallenbeck 1950:340).

Unidentified Birds

Several bird elements were identified only as medium bird (n=8), medium to large bird (n=6), or Galliformes (chicken and quail family) (n=3). These are primarily small fragments that could not be confidently assigned to a more definite taxon. At least one small galliform other than chicken (e.g., quail, grouse, or prairie chicken) is present but could not be identified. Two species of quail were found in the OCA assemblage from LA 953: *Callipepla squamata* (scaled quail) and *Callipepla gambelii* (Gambel's quail) (Brown and Brown 1997a:328).

Ducks

One duck element (a wing digit) could not be identified beyond general duck. Several species of wild duck inhabit the area at least seasonally (Hubbard 1978:7-12). No ducks were identified in the OCA assemblage from this site; however, *Anas platyrhyncos* (mallard), *Anas strepera* (gadwall), *Anas crecca* (green-winged teal), *Anas discors* (blue-winged teal), *Anas cyanoptera* (cinnamon teal), *Aythya affinis* (lesser scaup), and *Oxyura jamaicensis* (ruddy duck) were found in the LA 953 (Valencia Pueblo) assemblage (Brown and Brown 1997a:327).

Falcon

Two elements from a large falcon (a tibiotarsus and a fibula) are about 20 percent larger than those from a comparative prairie falcon (*Falco mexicana*), the largest falcon that inhabits the area. Arctic gyrfalcons (*Falco rusticolus*) are larger but are rare winter visitors to the northern United States (Clark and Wheeler 1987:111) and an unlikely alternative. Peregrine falcon (*Falco peregrinus*), slightly smaller than prairie falcons, was identified at LA 953 (Brown and Brown 1997a:327).

Chickens

The domestic chicken (*Gallus gallus*) is relatively common (n=67 specimens), representing at least four birds. Egg shell, a range of ages from hatchlings to mature birds, and a wide variety of parts indicate that chickens were raised in the area. Few are burned or have evidence of butchering, so little processing may have been required to prepare them for consumption.

New World chickens are descendants of the Old World red jungle fowl (Hargrave 1972:5). They were probably brought to the Southwest by Oñate in 1598 (Brown and Brown 1997a:344).

Turtles

Three pieces of turtle shell were recovered from two proveniences. One is from a painted turtle (*Chrysemys picata*). The others are too fragmentary for further identification. Populations of painted turtles are found in the Pecos, Rio Grande, and San Juan river systems as well as in lakes and ponds. They live in the permanent waters of slow-moving portions of rivers, lakes, marshes, and ponds and are occasionally found in semi-permanent waters of irrigation ponds and ditches that are short distances from permanent water (Degenhardt et al. 1996:100). Two of the pieces are discolored, either scorched or stained by the gley in the lower cultural unit. OCA recovered painted turtle, slider, and box turtle from LA 953 and painted or slider and box turtle from LA 67321 (Brown and Brown 1997a:327).

Snake

A single vertebra from a snake was recovered. It is unprocessed and probably intrusive. It was found in the upper cultural layer west of the road. Numerous snakes inhabit the area. Colubrid snakes and vipers were found at LA 953 (Brown and Brown 1997a:327).

Fish

Two cranial pieces of a smallmouth buffalofish (*Itiobus bubalus*) were recovered. Both are heavily burned, suggesting they were thrown into the fire during processing or after consumption. A member of the sucker family, the smallmouth buffalofish is found in the lower portions of the Pecos, Rio Grande, and adjacent ponds. Its diet consists of small crustaceans, snails, and vegetation. Adults weight between 5 and 15 pounds (2.3 to 6.8 kg) but can get much larger. It is one of the better suckers for eating (Koster 1957:40).

OCA identified a number of fish species in the LA 953 collection, including the smallmouth buffalofish. The only fish from this site was a catfish (Ictaluridae sp.) (Brown and Brown 1997a:327).

Invertebrates

A small land snail and a fragment of a bivalve were collected but not identified further. The snail is from the upper cultural layer west of the road. The bivalve is fragmentary and from the deep fill on the east side. It could represent food or scrap from manufacturing items such as shell buttons.

Provenience Divisions

For discussion, the assemblage is divided into the six general proveniences units at the site (Table 59). These consist of the material near the surface on the east side of the road, where there is a mix of modern trash, road gravel, and cultural material in a disturbed context. A similar deposit on the west side contains quite a bit of recent bottle glass and road debris along with cultural material brought to the surface by the digging of a utility trench. Both sides of the road are former fields that were leveled and plowed over the years. Material deposited in alluvium underlying the disturbance on the east side is referred to as the upper cultural unit. It is mainly material that could have washed into this location or was deposited but probably moved somewhat by water. The same upper cultural layer is found on the west side of the road. Beneath the washed cultural material on the east side is gleyed soil with dense trash and a burned pit that presumably represents trash disposal and burning in a marshy area. No corresponding unit was found west of the road, and the gley disappears within a few meters of NM 47. The final unit is a small isolated pocket of trash encountered at the south end of the site. There is a distinct pit as well as very sparse material found in the vicinity. A gold button and silver cross as well as other relatively unique material make this an interesting unit.

Most of the assemblage is from east of the road, particularly the upper and lower cultural deposits. Unidentifiable specimens are distributed about as expected. More from the top disturbed unit are unidentifiable than from the lower units (west: 55.3, then 43.2 percent; east: 66.1, 55.7, then 53.9 percent), due, at least in part, to the effects of weathering on bone. Checked and exfoliated bone follows this same pattern (Table 60). A larger proportion of the disturbed bone exhibits this condition than in the upper and lower cultural layers.

Smaller forms (rodents, rabbits, and carnivores) are mostly from the east side, where the sample sizes are larger. The upper cultural layer produced only jackrabbit bone, while the lower cultural layer has more variety, with rodent, cottontail, and canid remains. Greater proportions of the west side assemblages are sheep/goat, which is also true for artiodactyls in general. Chicken is found only in the east side assemblage, while egg shell also occurs in the upper cultural layer on the west side. Egg shell is especially abundant in the south area, comprising 45.1 percent of that assemblage. With the exception of the snake vertebra and land snail, the small non-mammal forms are from the east side. Carnivore damage and digestion are found at low levels in all provenience grouping and does not appear to affect one more than another.

The overall distributions are similar enough that much of the observed variation could be caused by sample size, differential preservation, and other natural processes. Only the egg shell in the south area greatly affects the proportions in that sample, and even there, the 184 pieces of shell could have come from the same egg.

Utilization and Processing

Except for the domestic animals, especially sheep/goat and Bos/bison, numbers are too small to establish patterns of processing and utilization. All of the information pertinent to the less represented taxa is presented in the following tables, but the discussion focuses on the better-represented taxa.

Taxa that are small, intrusive, or unlikely food items are more likely to occur in larger pieces (Table 61). Few specimens from the larger food animals (pig, sheep/goat, and cow) are complete or nearly so, and those are often small compact bones, especially foot parts. Most were broken up into small pieces, probably during processing activities that rendered the animal into pot-sized pieces.

Ages found in the assemblage (Table 62) suggest that, minimally, chickens, sheep/goat, and probably cows were raised in the vicinity. These taxa have newborn or young animals that died natural deaths or were culled from the household stock early on and are unlikely market purchases. The percentages suggest that cows were more likely to be utilized when less than mature than sheep. Pigs and chickens have smaller percentages of mature elements, possibly indicating these species were routinely consumed before reaching maturity.

Burning was problematic for this site. As Table 63 shows, the lower cultural deposit has especially large numbers of bones recorded as scorched. Much of this is due to the gley, which stained the bone a brown color, often indistinguishable from a light scorch. If the scorched bone in this provenience is disregarded, percentages are similar to the rest of the assemblage. After scorching, charred or blackened bone is the most common, with lesser amounts that are calcined (white) or have a range of burning intensity. None of these burning types are indicative of cooking processes, yet there is some variability between proveniences and the different animals. Bones from sheep/goats and small artiodactyls tend to be burned more often than those of cows and large artiodactyls. No explanation for this is evident.

The distribution of body parts (Table 64) varies little between the Upper and Lower Cultural fill units, suggesting no change in species use or deposition patterns between these deposits. There are differences in proportions for the sheep/goat and cow. Some result from the identifiability of parts but others may result from different processing techniques. For example, cranial parts and both unidentified long and flat bone pieces are more common for sheep/goats than for cows. Axial parts (vertebrae and ribs) are more common for cows while hindlimbs and feet are slightly more common for cows than sheep/goats. Only the front limbs are represented in fairly equivalent percentages. More small unidentifiable pieces of long and flat bones suggest that sheep/goats were processed more completely than larger animals like cows. Given that cattle are considerably larger than sheep, butchering and consuming a cow could have involved more than an individual household. Drying meat from larger animals may also have resulted in less destruction of individual elements.

Actual evidence of processing in the form of butchering marks was observed on a good proportion of the assemblage (Tables 65 and 66). Cuts and chops are relatively common indicating that knives and axes or cleavers were the primary tools used. While present, saw cuts are rare indicating a lack of this tool or that few market cuts are represented. Greater incidences of chops and impact breaks also suggest that an axe or clever was more often used on larger forms like cows than on smaller forms.

When broken down by body part (Tables 67 and 68), a few patterns emerge. Crania from both cow and sheep/goat were obviously processed. Chops and cuts on the cervical vertebra indicate the head was detached and the mandible removed, probably to get at the tongue. Enough vertebra of all kinds have chops and cuts to suggest the spine was cut into segments. Ribs, which frequently display cuts, were cut into segments, more often at the proximal end and midshaft. A common processing mode was to cut through one table of the bone (often from the inside) and snap the other. Cuts and chops are more frequent on the scapula than the proximal humerus. Either the later did not survive, or butchering tended to separate the front leg just above the joint capsule. Similarly, innominate damage is more common than for proximal femora. Lower limb and foot elements have relatively little evidence of processing. The few pig elements do not suggest a radical change in pattern (Table 69).

The variety of processing types combined with the similarity in processing patterns and lack of saw cuts suggest that butchering was done at the household level and little, if any, of the assemblage results from market purchases. A similar process is described for sites along Alameda Boulevard. Chops were more common, but the pattern and conclusions the same--home butchering, with the aim to remove strips of meat for drying (M. Brown 1997:247-253).

Other Spanish Colonial Assemblages

Few Spanish Colonial sites in the middle Rio Grande area have sample sizes and the detailed analyses for meaningful comparisons. Differences in basic methodology and reporting make larger assemblages comparable only at a basic level.

Spanish Colonial deposits at Valencia Pueblo (LA 953), again trash deposits without structural remains, contained largely sheep or goat (14.3 percent) or deer-sized animals (22.4 percent), with lesser amounts of cow (4.3 percent) or cow-sized animals (5.3 percent), pig (0.0 percent), horse or burro (0.3 percent), and chicken (0.1 percent). A variety of fish, turtles, birds, and carnivores were also found (Brown and Brown 1997a:386).

During excavations at the Spanish Colonial plaza of San Antonio de los Poblanos, in the north valley of Albuquerque, a trash pit was found dating between 1710 and 1830. Fauna was similar to the Valencia assemblage, comprised mainly of sheep or goat, along with cow, pig, chicken, turkey, and deer. A heavy reliance on sheep and other domestic animals is evident. The 726 pieces of fauna are reported only as MNIs (Rudecoff and Carrillo 1987:52-53).

Middens at Old Alameda Plaza dating from the 1700s into the Territorial period (Brown and Brown 1997c:83) also recovered primarily sheep and goat (8.3 percent) or sheep-sized (31.2 percent) remains, along with lesser amounts of cow (2.2 percent) or cow-sized (6.7 percent), horse (0.0 percent), pig (0.0 percent), and chicken (0.6 percent), along with a small number of wild animals including fish, turtles, birds, rabbits, and canids (M. Brown 1997:232-233). Butchering patterns suggest home butchering, which is typical of Spanish Colonial sites (M. Brown 1997:253).

All of the assemblages agree with accounts from the early 1800s, which suggest that hunting rabbits, quail, wild birds, and turkeys was of little importance. Large animals, especially bison, were more important, but still rare (Carroll and Haggard 1942:99). Sheep is the dominant species throughout, and home butchering was practiced exclusively. Another interesting similarity is the deposits themselves. All are midden or trash deposits without evidence of structural remains in the immediate vicinity.

Conclusions

The Valencia faunal assemblage is dominated by domestic animals. Virtually none (less than 0.5 percent) are identifiable as native wild animals, and many of these are not necessarily culinary or intentionally deposited in the midden. Like many Spanish Colonial sites, the midden material at LA 67321 indicates that domestic animals provided the bulk of the animal protein, with little use of native species. Rabbits, bison, ducks, turtles, and fish may have been hunted on occasion. However, their overall paucity in the assemblage suggests no more than occasional use.

Relative proportions of domestic animals support historic descriptions that document growth of the sheep ranching industry from the 1740s until about 1850 (Baxter 1987:28-31, 112) and 1790 census records of a community comprised of sheep herders, weavers, ranchers, and farmers. The sheep/goat percentage was over eight times that of cattle (almost six times when the small and large artiodactyl counts are included) (Table 58). Relative proportions of sheep/goats overall and in relation to cattle are remarkably similar between the upper and lower cultural strata (Table 59), suggesting continuity rather than radical changes in the population inhabiting the area and similar access to resources among the households responsible for the deposits. Small counts for pig and chicken occur in both the upper and lower cultural units, with more pig in the upper and more chicken in the lower. Horse is found only in the upper cultural unit. This, too, agrees with historic accounts that report oxen were sufficient for farming, pigs were scarce, and keeping horses and mules was discouraged by Indian raids (Baxter 1987:61,69; Simmons 1985:81,85).

Processing of animals at Valencia, especially sheep/goat, was characteristic of household consumption and deposition. Virtually all parts of the animal are represented, and the location and types of processing indicate similar methods overall. Cattle, because of their larger size, may have been shared between households, but they were processed in a similar manner.

RESULTS OF FLOTATION AND MACROBOTANICAL SAMPLE ANALYSIS

Pamela J. McBride

Flotation and macrobotanical samples were analyzed from two cultural layers and the southern area of LA 67321 at the historic site of Valencia along NM 47. The lower cultural layer could date to as early as A.D. 1750, when church records note there were some residents in the Tomé and Valencia area, but a more likely date is shortly before 1776, when Fray Domínguez documented 17 local Hispanic households. The floral assemblage from LA 67321 adds to our knowledge of the range of European and indigenous plants used by communities in the middle Rio Grande Valley during the eighteenth and early nineteenth centuries. Previous investigations at Valencia Pueblo, less than a mile north of the current project area, identified prehistoric and early nineteenth-century Hispanic occupation of the area (Brown and Vierra 1997). Many of the same domesticated plants identified at the sixteenth-century Abó Mission, near Bernardo, New Mexico (Jones 1949), were also present in the early nineteenth-century deposits at Valencia Pueblo. The floral assemblage from Valencia offers an additional opportunity to compare these two projects to see if a similar pattern of domesticated plant use can be discerned.

Extensive construction and overgrazing in the area has changed what once was a Plains and Great Basin grassland (Brown 1994) into a mosaic of introduced species with a few surviving native plants. A brief vegetation survey conducted during the Valencia Pueblo project (about a half a mile north of Valencia) found that the area in the immediate vicinity of the site was devoid of any native vegetation with the exception of mustard, Rio Grande cottonwood (*Populus fremontii* var. *wislizenii*), deadly nightshade (*Solanum elaeagnifolium*), and sunflower (*Helianthus* sp.) (McBride 1997a). Summer cypress (*Kochia* sp.), an invasive weed introduced from Eurasia, was the dominant vegetation growing in the disturbed ground along the roadside. Russian olive (*Eleagnus angustifolia*), juniper (*Juniperus* sp.), pine (*Pinus ponderosa*), and various trees in the Leguminosae family had been introduced as ornamentals in the yards of homes surrounding the site.

The Rio Grande River is approximately 1 km west of the Valencia Pueblo site. The most visible members of the riparian plant community are Rio Grande cottonwood, salt cedar (*Tamarisk petandra*), Russian olive, willow (*Salix* sp.), common reedgrass (*Phragmites communis*), ground cherry (*Physallis* sp.), purple aster (*Aster* sp.), Indian rice grass, dropseed grass (*Sporobolus* sp.), and possibly Canada wild rye (*Elymus canadensis*).

Sagebrush and four-wing saltbush are the dominant shrubs growing on the first gravel terrace, approximately 1 km east of Valencia and Valencia Pueblo. Snakeweed (*Gutierrezia* sp.), Russian thistle (*Salsola kali*), dropseed grass, Indian rice grass (*Oryzopsis hymenoides*), and purple asters also occur.

Methods

Flotation Processing

The 12 soil samples collected during excavation were processed at the Museum of New Mexico's Office of Archeological Studies by the simplified bucket version of flotation (see Bohrer and Adams 1977). Flotation soil samples averaged 1.6 liters in volume, ranging in size from 0.85 to 1.8 liters. Each sample was immersed in a bucket of water, and a 30-40 second interval allowed for settling out of heavy particles. The solution was then poured through a fine screen (about 0.35-mm mesh) lined with a square of “chiffon” fabric, catching organic materials floating or in suspension. The squares of fabric were lifted out and laid flat on coarse-mesh screen trays until the recovered material had dried.

Full-Sort Analysis

Each sample was sorted using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh) and reviewed under a binocular microscope at 7-45x. Charred and uncharred reproductive plant parts like seeds and fruits were identified and counted. The actual number of reproductive plant parts encountered in each sample is recorded in Tables 70-72. Nonreproductive plant parts such as pine needles and grass stems were also identified and recorded as an estimated number per liter of soil processed.

To aid the reader in sorting out botanical occurrences of cultural significance from the considerable noise of postoccupational intrusion, data in tables are sorted into categories of cultural (all carbonized remains), possibly cultural (unburned, economically useful taxa), and noncultural (unburned materials, especially when of taxa not economically useful and when found in disturbed contexts together with modern roots, insect parts, scats, or other signs of recent biological activity).

Charcoal from the 4 mm and 2 mm screens of flotation samples was identified up to a maximum of 10 pieces from each screen size. Charcoal was examined by snapping each piece to expose a fresh transverse section and identified at 45x. Identified charcoal from each taxon was weighed on a top-loading digital balance to the nearest 0.1 g and placed in labeled plastic bags. Low-power, incident-light identification of wood specimens does not often allow species- or even genus-level precision, but it can provide reliable information useful in distinguishing broad patterns of utilization of a major resource class.

Results

Upper Cultural Layer

Cultural plant remains recovered from the upper cultural layer consist primarily of domesticates, including squash rind and seed fragments, maize kernels and cupules, chili seeds, and a bean fragment (Table 70). Charred wild edible seeds were restricted to goosefoot and groundcherry. Weedy annuals like goosefoot have the adaptive advantage of proliferating in the disturbed ground around habitation sites, agricultural fields, and middens, making them a readily available resource. Their seeds have been recovered from a wide array of prehistoric assemblages. A partially charred nightshade family seed that was recovered could be from an edible member of the family or from a deadly variety. Cocklebur fruit fragments were recovered from two samples. Cocklebur is a widespread weed with spiny fruits that easily attach themselves to clothing and animals. Cocklebur was used medicinally to help sore eyes or to extract cactus spines, as a blood tonic, and as a remedy for diarrhea and vomiting (see Reagan 1928, Russell 1908, Stevenson 1915). Stevenson also notes that the seeds were ground and mixed with cornmeal, made into cakes or balls, and steamed (Stevenson 1915:71-2). Stevenson says this was a common dish among the poorer class of the Zuni in 1879. The fruits show up at many historic sites (see Jones 1949 and McBride 1997a, 1997b for three examples), and although cockleburs have several ethnobotanical uses, the fruits most likely hitch a ride and end up in the archaeobotanical record or are burned during field-clearing and become part of the site debris.

Tobacco seeds were identified in this upper layer and could be cultural, but they are uncharred, and so their cultural affiliation is equivocal. However, many charred tobacco seeds were recovered from the lower cultural layer.

Flotation wood charcoal was almost entirely composed of the riparian cottonwood/willow category, with trace amounts of possible box elder, pine, and juniper (Table 71). Cottonwood and willow are not ideal fuel woods because they burn rapidly and have a tendency to produce more smoke than fire.

Uncharred noncultural plant remains consist largely of conifer duff and the seeds of weedy annuals and unpalatable plants. Although the seeds of several members of the sedge family were utilized occasionally, the presence of a single uncharred seed precludes inferring cultural use of the plant.

South Area

Charred purslane seeds and a maize kernel, embryo, and cupules comprise the cultural floral assemblage from the south area of the site (Table 72). Uncharred intrusive seeds consisted of weedy annuals and two undetermined seeds. The two samples analyzed were collected from Feature 1, a trash pit where a gold button and cross were found along with Chinese porcelain. A conventional radiocarbon date of A.D. 1830 was obtained from the feature. The wood charcoal assemblage from the south area was the most diverse, including juniper, pine, oak, rose family, cottonwood/willow, and unknown nonconifers (Table 73). Juniper was the dominant wood taxon, followed by rose family and cottonwood/willow. The most that can be said about the plant remains from this area is that maize and perhaps purslane were components of the diet during the occupation of Valencia in the 1800s.

Lower Cultural Layer

Samples examined from the oldest cultural layer were much more productive, yielding seven weedy annual taxa, eight domesticates, and five other identifiable taxa (Table 74). The sample from the base of the Feature 2 burned pit contained the most diverse array of plant remains. Charred pigweed, cheno-am, sunflower, tobacco, groundcherry, and purslane seeds were identified, along with chili, watermelon (Fig. 51), cantaloupe

Figure 51. Citrullus (watermelon) seeds.

Figure 52. Cucumis (cantaloupe) seeds.

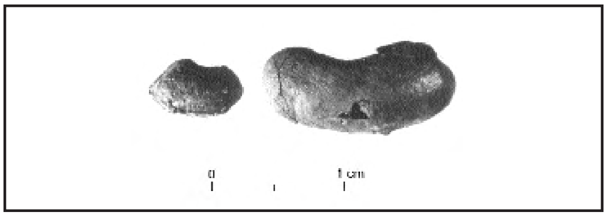

Figure 53. Beans (Phaseolus sp. and Phaseolus vulgaris).

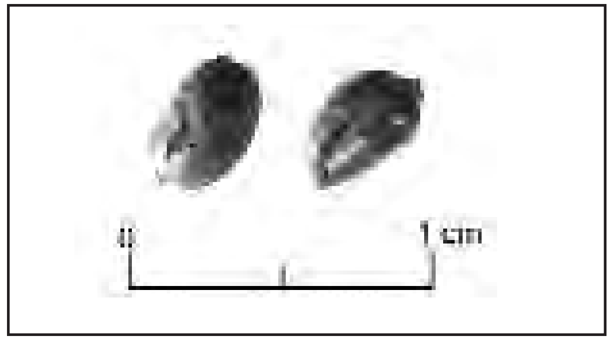

Figure 54. Triticum (wheat).

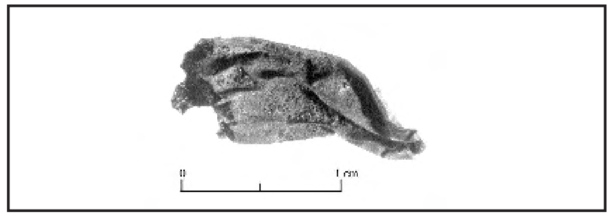

Figure 55. Chile pod (Capsicum).

(Fig. 52), coriander, squash, beans, wheat, and maize remains. Sedge family, grass, and spiderling seeds were also present. The oil-rich seeds of the sunflower were an important source of food and oil. The ground seeds could be boiled until the oil rose to the surface and then be skimmed off. The seeds were parched and eaten whole, hull and all, or ground into a meal (Harrington 1967:314). The bulrush is one member of the sedge family that was used for food, and the leaves were used for matting. The roots can be eaten raw, baked, dried, or ground into flour. The seeds can be eaten raw, parched, orground into a mush (Kirk1970:175-6). Ethnobotanical accounts of the sticky leafed spiderling are limited to one reference in Hough (1897) to the practice of hanging the plants in houses to catch flies. Given that only one seed was recovered, and reference to its use is extremely rare, the seed was probably charred accidentally and was not associated with cultural activity.

Charred squash seeds from FS 174 were identified as possible pumpkin type seeds. Most of the seeds were missing their seed coats and were not measured, but a few retained margin remnants, and these, along with the shape and general size, compared favorably to *Cucurbita pepo* types. One whole bean (Fig. 53) could be identified to species by examining the hilum and caruncle. Characteristics of these structures closely resembled *Phaseolus vulgaris*, or the common bean. The other beans were broken, and vestiges of leaves were absent, so a positive identification to species was not possible, although measurements (Table 75) fall within the range of those given for *Phaseolus vulgaris* by Kaplan (1956:Table III).

Besides the measurements for beans, measurements of cantaloupe, peaches, watermelon, and wheat (Fig. 54) recovered from the lower cultural layer are reported in Table 75. The average watermelon seed length and width of the Valencia specimens seem to be much smaller than the average measurements of two seeds recovered from the eighteenth- to nineteenth-century room at the Yamutewa house at Zuni (Toll 1987). Of the two Zuni specimens, one is 14.4 mm long, or 2.4 mm longer than any of the Valencia seeds. The average width of the Zuni seeds is 7.6 mm--1.1 mm wider than the average at Valencia, but 0.3 mm less than the widest seed measured from Valencia. The differences in width and length may be a product of sample size differences. The longer length of the one seed from Zuni may be an anomaly, rather than the norm.

Usually it is impossible to distinguish between chili and sweet pepper seeds, but the fortuitous preservation of the tip of a chili pod with a seed still attached (Fig. 55) allows for a more positive assertion that the fiery pepper was in use at Valencia. At Zuni, boiled groundcherry fruits were part of a salsa made of onions, chili, and coriander seeds (Castetter 1935:40). Perhaps a similar recipe was used at Valencia, since all the ingredients except onion are represented in the archaeobotanical record. Thirty charred chili seeds (Fig. 56) were measured. They have an average length of 3.9 mm and an average width of 2.9 mm.

Most of the tobacco seeds from Valencia are charred, and many are fused together into clumps (Fig. 57). Some show signs of incomplete charring, perhaps having been dumped out and then smothered with dirt,

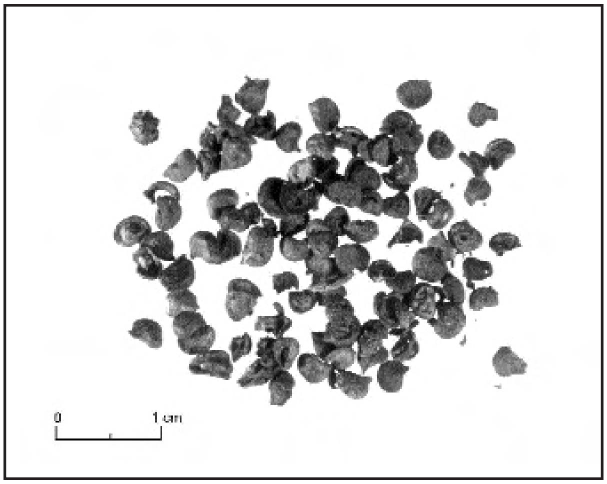

Figure 56. Chile seeds (Capsicum).

rapidly putting an end to the charring process. Seeds that could be measured range from 0.8 to 1.4 mm long, averaging 1.08 mm. Width ranges from 0.6 to 0.9 mm and averages 0.8 mm. Building on a study by Adams (1990), Hammett (1993) measured the length and width of 275 prehistoric and 87 Euroamerican tobacco seeds from the Transwestern Pipeline Expansion Project. The measurements of the historic specimens from the mining town of Gold Road, near Kingman, Arizona, compared most favorably with *Nicotiana glauca*, a relatively small-seeded species, native to South America. The Valencia seeds are much larger. The average length and width of the charred Valencia tobacco seeds fall within the range for charred *Nicotiana rustica* (see Hammett 1993: Fig. 51). The width of some uncharred modern *Nicotiana attenuata* in Hammett's data fall within the 0.8 mm width range, but that is the maximum width for *N. attenuata*. The charred seeds from the lower cultural layer at Valencia could represent a domesticated variety of *N. rustica* introduced by the Spaniards that apparently had its origins in Peru (Heiser 1987:177) and eventually made its way into Mexico.

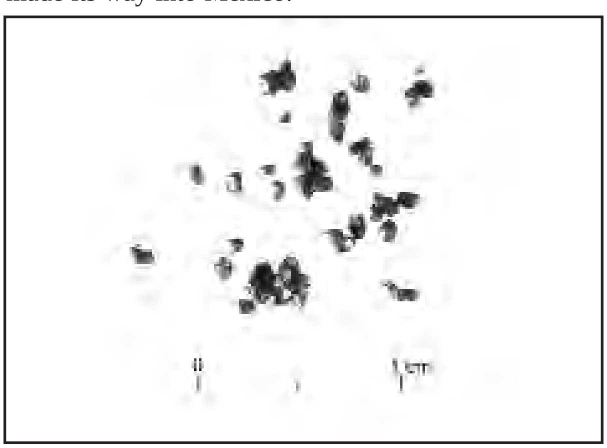

Figure 57. Nicotiana (tobacco seeds).

The flotation wood charcoal from the lower cultural layer resembles that from the upper cultural layer in that the majority of wood identified was cottonwood/willow (Table 76). Only one piece of unknown nonconifer was present.

Uncharred plant remains consists of conifer duff and weedy annual, grass, sedge family, spurge, and prickly pear cactus seeds. Most of these are important economic plants, but because of the context and their uncharred state, it cannot be determined unequivocally that their presence represents debris from food or fuel use.

Macrobotanical Sample Analysis Results

Two pieces of saltbush/greasewood wood were the only macrobotanical remains from the upper layer that were not recovered in flotation samples (Table 77). A half of a peach pit was recovered from the fill above the upper cultural layer. The provenience of the pit fragment is questionable and could be of recent historic origin. A charred peach pit fragment and a whole peach pit were part of the macrobotanical specimens from the lower cultural layer (Table 78). Measurements for both pits are presented in Table 75. The thickness of the pit half from the fill above the upper cultural layer was estimated by multiplying by two. The Valencia peach pits are comparable in size to roughly contemporaneous specimens from the Tijeras Canyon area (Toll 1997) and further afield at Zuni (Toll 1987) (Table 79). More diminutive pits are found at higher elevations in northern New Mexico, at an Anglo lumber worker's home in Cerrososo Canyon (Toll 1984), at a late nineteenth- to early twentieth-century homestead in Talpa (Toll 1994), and a Hispanic farmstead in the Chama Valley (Toll 1986). Relatively recent collections from Navajo sites in the Four Corners area show considerable variability. While some of this variability is reasonably attributed to drier and more difficult growing conditions, genetic diversity is also a factor. One site assemblage from a 1940s habitation on NIIP Blocks VI-VII includes a group of distinctly smaller pits (average length 18.0 mm, range 15.3 to 19.6 mm) with less rugose surface patterns on the stony endocarp (Toll and Donaldson 1981:28).

The most remarkable macrobotanical specimen from the lower cultural layer was an uncharred squash seed that preserved fused to a metal object (Fig. 58). The funicular attachment was missing from the seed, so it was not possible to measure it. Seventeen measurable cobs were also part of the macrobotanical assemblage from the lower cultural layer.

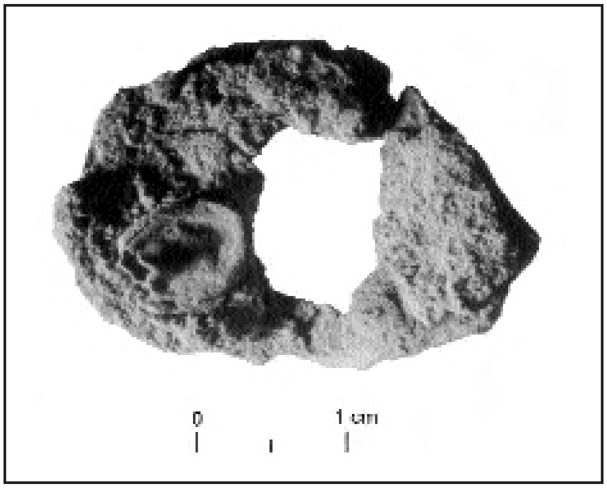

Figure 58. Cucurbita (squash) seed on metal object.

Discussion

Intrasite Variation at LA 67321

When the Spaniards settled in New Mexico in the late sixteenth century, they brought Old World cultigens like watermelon, coriander, and wheat and introduced native Mexican crops such as chili, cultivated tobacco, and new varieties of maize and beans (Wozniak 1995:30). The use of Old World domesticates mixed with domesticates and wild plants of the New World is most evident in the floral assemblage from the lower cultural layer. Wheat, cantaloupe, and watermelon were present, along with maize, beans, and wild sunflower, pigweed, and other important weedy annuals. This level was the richest in floral remains, yielding 22 charred taxa as opposed to seven charred taxa from the upper cultural layer, where the same number of samples were examined. Only two charred taxa were recovered from the south area, but sample size could be a factor (two samples were analyzed, versus five from each of the other two layers). The higher number of cultural remains from the lower layer may indicate better preservation at the deeper level of cultural strata, where damage from road work is less likely.

Wood Use

Two very distinct differences can be seen in the flotation wood analysis results. Wood from the upper and lower cultural layers is predominately cottonwood/willow (Tables 80 and 76), while the wood from the south area is predominately juniper (Table 73). In fact, conifer is entirely absent from the record in the lower cultural layer, and only trace amounts (<1 percent) were recovered from a single sample (FS 167) from the upper cultural layer. The south area wood assemblage was also much more diverse than the two cultural layers, yielding six taxa: juniper, pine, cottonwood/willow, oak, rose family, and unknown nonconifer. Results from radiocarbon wood analysis reinforce the data from flotation (Table 80). The more recent (upper cultural) and the oldest deposits (lower cultural), then, display a similarity in wood assemblages, while the wood from the isolated trash pit is quite different. Perhaps the trash in the south area (that includes gold artifacts) represents debris from an upper class household whose occupants could afford to acquire dense, slow-burning wood, rather than making do with cottonwood, willow, and the occasional conifer.

Comparison of LA 67321 with Other Sites of the Middle Rio Grande Valley

Several studies, including the Alameda Boulevard Expansion Project and the prior work at LA 67321, add to our knowledge of historic subsistence in the middle Rio Grande valley since Jones's (1949) study at Abó mission. At LA 54147, a sixteenth-century Spanish campsite, the majority of remains are maize, beans, and cotton. The close correspondence in morphometrics of specimens from the pueblos of Kuaua and Puaray and those of LA 54147 suggested to Toll (1989) that the Spanish soldiers who occupied the campsite extorted their supplies from nearby Indian pueblos. An array of domesticated plants similar to that recovered from Valencia was recovered from the early nineteenth-century deposits at Valencia Pueblo (McBride 1997a). Coriander, beans, wheat, cantaloupe, pepper, maize, watermelon, and possible squash were identified. Positive identification of squash was not made because *Cucurbita* seeds were not present in the assemblage, and the thickness of the *Cucurbita* rind from the project prohibited differentiation between wild gourd and squash. Materials recovered from the seventeenth-century deposits at Abó Mission included watermelon, cantaloupe, plum, pumpkin, maize, wheat, Old World grape, chili, and coriander (Jones 1949).

Samples from the Alameda Boulevard project came from contexts that were compromised by previous road construction or from historic contexts with a wide range in dates (e.g., LA 50240 deposits date to A.D. 1710-1903). However dubious the possibility of tying dates to specific contexts, evidence of beans, maize, grapes, peppers, watermelon, tobacco, wheat, and peaches was present (McBride and Brown 1997).

Governor Fernando de Chacón wrote a report in 1803 on the status of New Mexico's agriculture, industry, manual arts, and trade in which he observes that tobacco was cultivated by all of the citizenry in general

(Simmons 1985:84). Tobacco was not as ubiquitous as a statement like this might lead one to expect. It was present at Alameda and Valencia and absent from the floral assemblages from the other sites.

Coriander was listed among the supplies sent by Juan Guerra de Resa to Don Juan de Oñate in the provinces of New Mexico between 1595 and 1628 (Hammond and Rey 1953:539). Watermelon was grown in the Rio Grande Valley before Oñate's expedition. In a letter dated March 2, 1599, Oñate lists melons, grapes, watermelons, and Castillian plums as some of the many crops grown in the region (Hammond and Rey 1953:484). Lopinot (1986) says that Oñate and his colonizers were the first to grow wheat in the Rio Grande Valley. In another letter by Oñate dated March 22, 1601, he says, “Our wheat has been sown and harvested, and it does extremely well in that land” (Hammond and Rey 1953:619). Benavides provides a general description of crops grown in the early seventeenth century in New Mexico, including maize, wheat, kidney beans, lentils, chick-peas, lima beans, vetches, pumpkins, watermelons, cantaloupes, cucumbers, cabbage, lettuce, carrots, artichokes, garlic, onions, plums, apricots, peaches, “and many other things which I omit lest I seem unduly wordy” (Benavides 1954:39). It is generally accepted that chili from Mexico was introduced by the Spaniards. However, exactly when this took place is debatable. Although Castaño de Sosa mentions that chili was stored in houses at Pecos Pueblo in 1591 in his *Memoria*, whether he refers to the wild chiltepin from the south or the cultivated species is not known (Lopinot 1986:64-65).

Morphometrics of the seventeen cobs from the lower cultural layer along with four cobs from the FS 186 flotation sample are presented in Table 81. The row number of the majority of cobs was 14 or more. Most have straight rows and large size (average 16.9 mm). The cob measurements and row numbers compared in Table 82 are interesting in that the assemblages from the two Hispanic contexts are quite close, with similar average row number and cob diameter and equal rachis segment lengths, indicating a similar variety may have been grown in the two communities.

In contrast, the maize from the eighteenth- to twentieth-century room at the Yamutewa house is primarily 12-rowed and larger in diameter. However, the problem with comparing the Zuni specimen diameters with Valencia and San Antonio specimens is that the Zuni cobs were uncarbonized, and those from the other two projects are carbonized. In an experiment conducted by King (1987) in which four maize cobs of different types were measured before and after carbonization, the average shrinkage percentage of the rachis diameter was 17.3 percent. So it is more useful to look at row number than cob diameter. Eight-rowed cobs are present in the Zuni assemblage and absent from Valencia and San Antonio, and the 14-rowed cobs that are dominant at the other two sites are absent from Zuni, demonstrating a large difference between Hispanic maize and Zuni maize.

This pattern is similar to that found in cob populations from Medanales, maize grown by modern-day Spanish Americans in the Chama Valley, and twentieth-century maize from Walpi (Toll 1986; Ford 1978:57; Gasser 1980). Like those from Valencia, the cobs have a higher average row number than cobs from Zuni, and few or no 8-rowed cobs are present.

Floral data from the historic sites excavated along the middle Rio Grande corridor support the contention that a similar suite of domesticates was cultivated in the district starting in the late seventeenth century and extending into the early twentieth century. From the ethnohistoric documents, we could expect the same to be true of sites dating to the late sixteenth and early seventeenth centuries.

Summary

Flotation samples analyzed from the historic site of Valencia provide evidence for the cultivation of a mixture of New World and Old World domesticates, including maize, beans, squash, coriander, watermelon, cantaloupe, wheat, chili, and possibly tobacco. The majority of these were recovered from the lowest cultural layer, which may date to as early as 1750. Wild plant taxa recovered include pigweed, goosefoot, sunflower, groundcherry, and purslane seeds, probably used to some extent by the Hispanic residents of Valencia. The upper cultural layer did have remains of maize, beans, chili, and squash, along with three charred wild plants, but the diversity and abundance of floral remains seen in the lower cultural layer were not present. Archaeobotanical remains from a pit probably associated with household trash deposited sometime in the 1830s are sparse and consist of charred maize and purslane.

The wood assemblages from the upper and lower cultural layers are virtually identical in the presence of little or no conifer wood and the predominance of cottonwood/willow wood. The assemblage from the south area trash pit is very different: juniper is the dominant wood taxon, and a more diverse array of species is present, including cottonwood/willow, rose family, oak, and pine. A variance in economic status or simply a contrast in wood preferences could explain the difference between the assemblages.

The Valencia residents continued to use a spectrum of domesticated plants nearly identical to those identified from the seventeenth century Abó mission to the southeast. The Valencia floral assemblage has added to our knowledge of "the specific taxa introduced in the Spanish Colonial era and the history in time and space of their social and economic integration in the multiethnic Rio Grande Valley" (Toll 1992:54).

CHRONOLOGY

Dating of the deposits at LA 67321 can be approached from several perspectives, not all of which agree. Proximity to Valencia Pueblo (LA 953), flooding, and its location on or near the Camino Real make any interpretation of dates less than straightforward. The following section reviews each potential source of dates.

Historical Accounts

Hispanic reoccupation of the Rio Abajo spread in a southerly direction. Albuquerque was settled and relatively secure in 1705, and Isleta resettled in 1710 (Montoya 1978:22). It was reported that nothing but ruined *ranchos* remained in Valencia in 1726 (Scurlock 1997:43). Grants were made for settlements at Gracia Real or Cañada in 1937, Los Chavez in 1739, Tomé in 1739, and Belen in 1740, after which settlement shifted closer to Bernalillo and Albuquerque (Hackett 1937:400; Wozniak 1987:39-40, 43). There may have been settlers in the Valencia area as early as 1746 to 1748, when 50 "Spanish" families or 212 persons were reported in the Valencia and Tomé area (Tjarks 1978:53-54). The 1750 census (Olmsted 1981) and 1752 census summary (reproduced in Lopopolo n.d.a:28) do not treat Valencia as a separate community. In 1776, Fray Francisco Atanasio Domínguez reports that the community of Valencia was comprised of 17 families with 90 persons (Adams and Chávez 1956:153). By 1790, Valencia was comprised of two plazas or groups of scattered *ranchos*, one with 15 households and the other with 10 households (Olmsted 1975:17-19). In 1797, 10 of these households purchased land at Peralta (Indian Claims Commission 1959:627) and had relocated by 1814 (Spanish American Archive 1278, New Mexico State Records Center and Archives).

Valencia itself is still occupied, but at some point, refuse was no longer deposited at the project area. Severe flooding in 1828 and 1862 (Scurlock 1997:46, 49) could have removed any standing structures and discouraged rebuilding. Vincent Lujan, an uncle of the current owner, was on the land by 1860 and received a patent in 1910 (Scurlock 1997:40, 50). In 1932, the only structure in the immediate area was a hacienda/mercantile operated by Lujan, south and west of the OAS project area.

Radiocarbon Dates

Results of the radiocarbon analyses are summarized in Table 83. Two of the dates are reasonable. The third (Beta-107681) conventional date is too early. It was recovered at a slightly lower elevation than the origin of Feature 2 (by 15 to 20 cm) but should be fairly comparable in date. It is possible that more old wood comprised the Strata 6 sample, producing an older date.

Oxidizable Carbon Ratio Dates

OCR dating, a relatively new technique introduced to improve the interpretability of radiocarbon data, provides an independent means of dating charcoal in soil (Frink 1994:17). It is based on the principal that charcoal undergoes biochemical alterations that are detectable though chemical procedures. Variability depends on environmental factors such as rainfall, temperature, soil texture, pH, and depth of the sample below the surface. The chemical analysis determines the total percent of carbon and that of the readily oxidizable carbon in the same. The results are converted to a ratio, which is then factored into an environmentally based contextual formula and results in an estimated age (Frink 1994:21).

Greene (Appendix 2) submitted three samples for OCR dating. Taken from a stratigraphic profiles (see Greene, Fig. 1, for sample locations), these date Strata 3 (A.D. 1841) and 6 (A.D. 1803). Two are within the time frame indicated by the radiocarbon and artifact assemblages. The third (A.D. 1885) is somewhat late, but given the colluvial/alluvial nature of Stratum 3 and rodent disturbance, it could accurately reflect that particular charcoal pocket.

Ceramic Dates

Native ceramics span a broad temporal range from the prehistoric until the mid-1800s. Prehistoric utility and white wares dating between A.D. 1050 and 1300 make up 0.9 percent of the ceramic assemblage with, and early and late glaze ware types are rare. Types dating between A.D. 1400 and 1680 are virtually absent, with the possible exceptions of a biscuit ware sherd and the late glazes. Most wares date to the Late Spanish Colonial and Early Territorial period, with an absence of wares from the 1870s or 1880s (Wilson, this volume).

Franklin reports similar results in his analysis. Valencia Pueblo had a few sherds from the A.D. 1050 to 1300 period and few glaze ware sherds dating after 1500. Most of the assemblage represented a Glaze A through C occupation (A.D. 1300 to 1500) and a reoccupation in the early to mid-1700s (Franklin 1997:150). Notably absent are ceramics from the pre-Revolt period, when either Juan or Francisco Valencia purportedly occupied a hacienda at that location. For LA 67321, ceramic wares represent the A.D. 1200 to 1300 period for the prehistoric deposition and 1750 to 1850 for the historic deposits. Isleta Polychrome, with a beginning date of 1870, is absent in both and indicates the occupation ended before that time (Franklin 1997:245).

Historic Artifact Dates

The most chronologically sensitive historic artifacts are the ceramics. Majolica, although still not well dated, was made in Mexico by 1550. A special guild governed the specifications of production by 1653. After about 1800, the quality declined. Later types were characterized by runny glazes, smeared and bubbly paint, and a sloppy appearance (Snow 1965:25-26). Snow (1965:26) divides Mexican majolica into four categories: early (1799-1725), transitional (1725 to 1780), late (1780 to 1850), and those still made today (1850 on). If we take only those wares that are identified to a type in the Valencia assemblage and ignore Puebla Blue-on-white, since it was found throughout the time span, that leaves 4 or 5 that could be early, 14 transitional to late (assuming San Elizario is transitional to late), and 6 late. While all of the potentially early wares came from the lower cultural layer, the oldest unit at the site, so do half of the transitional to late wares, but none of the late wares. Thus, the majolica indicates the bulk, if not all, of the deposits date to at least the transitional period and into the late period. Heirlooms, trading out-of-fashion wares to the provinces, and collecting colorful early sherds from the pre-Revolt haciendas in the valley and in the Salinas area could easily account for the early sherds. Few artifacts suggest any deposition between about 1820 and 1875. Euroamerican wares commonly available after 1850 are absent (Williamson, this volume).

OCA's excavations produced a somewhat different assemblage, with dates from the late 1700s to the mid-1800s. Majolica was from the transitional to late period, while refined earthen wares, dating from the mid-1800s, are almost as numerous as majolica (n=24 and 35) (Gerow 1997:272-275). This suggests that the LA 67321 area continued to be utilized but that trash deposition shifted away from the OAS project area, possibly as a result of Vincent Lujan's movement into the immediate area.

Summary

The dating methods reviewed indicate that the bulk of the deposits at LA 67321 date between about 1750 at the earliest to 1820-1840 at the latest. Some earlier and later dating materials were recovered, but these are too scarce to extend the primary occupation.

DISCUSSION

The data recovery plan outlined three basic objectives: a more definitive determination of occupation dates; second, a more specific determination of site structure and function; and finally, confirming that the deposits were related in space and/or time to the deposits investigated by OCA (Mensel 1996:82). Along with these basic goals, issues to be addressed include identifying the probable settlement patterns and site function, determining whether LA 67321 was a "buffer" community and the economic consequences of such a status, and looking at cultural interaction and trade, particularly as it relates to the presence of the Camino Real (Mensel 1996:82-88).

Settlement Pattern and Site Structure

The post-Revolt policy of promoting self-sufficient farming and herding communities favored a pattern of scattered *ranchos* in which one or more households were located on or near farm and orchard land (Pratt and Snow 1988:220-223; Wozniak 1987:23-24). Fields were allotted to maximize access to bottomland and irrigation systems and to achieve the numbers necessary for defense (Scurlock 1998a:94; Wozniak 1987:23-24). While, in theory, all land belonged to the Spanish Crown, and it was illegal to settle land that was not granted, at least a fifth of all households occupied ungranted tracts of land in 1765 (Westphall 1983:12). When Valencia was settled, private grants were made to prominent men or in the form of small holdings for a *rancho* or community. Even community grants were often manifest as scattered *ranchos* rather than formal plazas and served primarily to place people in more marginal resource areas, where they were needed for defense (Pratt and Snow 1988:220, 224; Scurlock 1998a:110; Wozniak 1995:33).

Since no documents record the granting of Valencia to individuals or a community, it is quite likely that the initial settlers were family groups who simply occupied the area. As suggested in the site history, this is supported by the relocation of at least 10 of the 25 households recorded in the 1790 census to land purchased at Peralta. If they held good title, there would be little incentive to relocate at this early date.

A scattered rancho community would have been housed in structures typical of the time and place. Reviewing architectural data for early houses, Pratt and Snow (1988:240-253) found that houses averaged two to six rooms, and three to four rooms was the most common (n=190). The largest house had 20 rooms. Several from the general Valencia area are described. One at Tomé in 1758 had five rooms and a corral. Another in 1766 was an adobe with four rooms, a long hall, an inside room, and porch. Poplar lumber was used for doors and windows. In Los Lunas in 1786, a house had four rooms, one without a roof. Another house, presumably belonging to the same individual but located on the plaza, had three rooms of adobe.

In 1844, Josiah Gregg described houses in New Mexico as mostly adobe brick. Wood was seldom used. Wealthier residents built rambling, flat-roofed homes in a plan resembling defensive plazas: a single tier of rooms arranged around a plaza (Tainter and Levine 1987:111). Houses at Tomé in the mid-1800s were constructed of bottomland sod cut in *terrones* and used for building blocks. Volcanic boulders from Cerro Tomé were used in the foundation to protect from periodic overflows of the Rio Grande (Ellis 1955:104).

While the deposits investigated at Valencia cannot tell us the exact form of the houses, bits of burned adobe indicate it was a primary building material. The prevalence of cottonwood or willow in the macrobotanical samples affirms the use of the most available wood source for fuel and perhaps as a building material. Rock and cobbles were extremely rare, but this may simply reflect the nature of the fill. The presence of dense trash does suggest the population was large enough to dispose of and even burn trash in designated areas. Similar patterns of trash deposition were observed at Valencia Pueblo, where a swampy area was used as a dump during the nineteenth-century occupation (Brown 1997a:489), in middens at Old Alameda during the Spanish Colonial through Territorial period (Brown and Brown 1997c:83), and at San Antonio de Padua (Akins in prep.). In one of the few instances where both a residence and trash were located, an early nineteenth-century homestead near Placitas with a three-room house had a trash mound 15.2 m (50 feet) from the house (Brody and Colberg 1966:13-14).

Buffer Community Status and Economy

Settlement at Valencia was part of a gradual expansion down the Rio Grande Valley. Once an area was secure, another community would be established farther south, and the area between would fill in. Albuquerque was secure by 1705, Isleta was reoccupied in 1710, and grants were made to areas around San Clemente in 1716, Peralta in 1718, Cañada in 1737, Tomé in 1739, and Belen in 1740 (Hackett 1937:400; Scurlock 1998a:146-147; Wozniak 1987:36-40). While all settlers were exposed to attack by nomadic Indians, Tomé was especially vulnerable to attacks from Comanches coming through Comanche Canyon to the east as early as 1744 (Chavez 1972:54).

Buffer communities were located at all the major natural avenues to the center of the province. Some were occupied by *genízaros*, some by settlers, others by Pueblo Indians. Settlements were voluntary, and the residents were willing to risk Indian attacks to acquire farms and grazing land. These communities were an essential part of the Spanish government's defensive strategy (Horvath 1979:164-165). As the first line of defense against Indian raids on the Rio Grande Valley, settlers, such as those at Tomé, had an obligation to explore the country in pursuit of Indians. These communities bore the brunt of many Indian raids (Ivey 1988:239).

While Valencia cannot be considered a buffer community per se, its residents certainly served as passive buffers and part of the Rio Grande defense system. The Spanish government encouraged setters to concentrate in fortified plazas for defense, because virtually every settlement in the Rio Grande Valley was exposed to raids by nomadic Indians. But Hispanic settlers generally ignored the government directives, building near their fields or spread out along roads or acequias (Wozniak 1987:26). With sufficient warning, fortified plazas were most valuable against large forces. Most deaths and losses were to small, fast-moving groups such as shepherds and travelers (Horvath 1979:169-170).

It is doubtful that the economy at Valencia differed from those of the actual buffer communities along the Rio Grande. Losses to drought, flooding, and raiding affected all residents of the area. There is little evidence that any of the Valencia residents took advantage of jobs in the military, which could provide wealth in the form of spoils of war and settler privileges (e.g., Horvath 1979:116-117). Only one Valencia resident, Lorenzo Aragón, the son of Manuel Aragón and Marie Ballegos, is listed in the Spanish Enlistment papers (Olmsted 1979). Rather, subsistence farming and herding were the primary livelihoods.

Camino Real Influence

Proximity to the main trade route of the time probably influenced the local economy. Residents could barter livestock and livestock products for goods moved up and down the trail. Valencia became the home base and port of entry for several renowned traders of the 1821 to 1848 era: Vincent Otero, Jacinto Sánches, Miguel Aragón, and Antonio José Otero (Sandoval 1978:103-104). These families intermarried and became almost a feudal hierarchy of merchants and ricos (Sandoval 1978:76). Normal trade items--sheep, raw wool, buffalo hides, piñon nuts, salt, Indian blankets, occasional captives, and minerals--were exchanged for ironware, cloth, shoes, clothing, paper, ink, tobacco, liqueur, candy, sugar, and chocolate (Moorhead 1958:49; Sandoval 1978:104). Antonio José Otero, described as a merchant who possessed considerable land and numerous sheep, became a major producer of flour in the 1850s (Frazer 1972:226).

Goods that were rare or even unavailable to those further north may have found their way into households along the Camino Real at the southern reaches of settlement. While the proportion of majolica may seem high compared to other New Mexico sites (Williams, this volume), it is comparable to collections from the presidios of Tubac (1750 to 1850) and Tucson (1776 to 1821). Native ceramics comprised 91 and 97 percent of these two assemblages (98 percent at LA 67321), majolica 2.9 and 1.9 percent (1.3 percent at LA 67321), lead-glazed wares 4.6 and 0.4 percent (0.2 percent at LA 67321), and Chinese porcelain less than one percent at all three (Williams 1992:15). Williams (1992:17, 13) interprets the documentary and archaeological data as simply confirming the basic self-sufficiency of the presidio settlements combined with their status as major centers of commerce.

The presence of several active merchants would have brought goods as well as wealth to the community. It could also have controlled the direction of trade. Native ceramic trade wares in the earlier deposits at LA 67321 were dominated by wares from the eastern Keresan or southern Tewas groups to the north, while those in the later deposits are mostly from the western pueblos (Wilson, this volume). Perhaps, this too was related to changes in the direction of trade and the presence of traders. During the Mexican Territorial period, more open markets increased trade from the north along the Camino Real (Moorhead 1958:72). This trade was drastically reduced when routes shifted to the east and Santa Fe was replaced by El Paso as the main port of entry into Mexico (Tainter and Levine 1987:114). Local traders may have sought western markets as part of this process.

Ricos

Several authorities assign a rico status to the merchants of Valencia (Frazer 1972:226; Moorehead 1958:111; Sandoval 1978:76), which is evident from the burial records for the area (Baca and Baca 1993). In addition to the use of the titles “Don” and “Doña” for some individuals, these records include comments such as “10/26/1824--Maria Antonia, adult Navajo Indian left at the household of Don Vincent Otero (Baca and Baca 1993:29); 2/24/1826--María Josefa, Navajo Indian bought by or for Don Francisco Otero; 2/24/1826--Anna Maria, child left at the house of Don Miguel Aragon; 2/26/1826--Maria Domingo, child left at the house of

Don Juan Aragon; and 3/1/1826--Maria, adult Navajo Indian servant of Don Francisco Antonio Otero." These records indicate large households with servants where poor families left children they could not care for.

Espinosa and Chavez (1976:191-192) provide a 1846 description of a rico house at Los Padillas. The home of the widow of Don Mariano Chávez, described as a man of immense wealth, was very large and well furnished with Brussels carpet, crimson worsted curtains with gilded rings and cornices, white marble slab tables, hair and crimson worsted chairs, candelabra, framed pictures, and large mirrors. Early American travelers (after 1820) were impressed by the solid silver table services in New Mexico. These were mostly likely imported from Mexico, since the profession of silversmith is not mentioned in historical records until 1867 (Baylan 1974:17-19).

Thus, the gold button, cross, and other material associated with Feature 1 at LA 67321 accords with the rico status of the Valencia merchants. By the early Spanish Colonial period, gold objects had reached a high state of beauty and craftsmanship in both Spain and Mexico. Men wore gold buttons on their uniforms, and both gold and silver were plentiful after 1575, when trade was opened up with the Philippines (Davis and Pack 1963:48, 53-55). In the eighteenth century, silver was plentiful enough for table use, while the rich preferred gold for personal jewelry. After the Mexican Revolution (1921), Mexican goldsmiths could duplicate any object from Europe (Davis and Pack 1963:60-62).

The gold button (Fig. 50) is 17.60 mm long, 14.32 mm wide, and 3.54 mm high without the loop and 7.17 mm with the loop. The beaded edge may have been short strings of half-balls (each 1.40 mm in diameter) that were applied to the edge. The fastener is a loop of gold wire sweated to the back. The cross is a dark gray metal with a light wash of gold. It measures 27.59 mm high, 13.03 mm wide at the arms, and varies in thickness: 1.51 mm at the top, 3.75 mm where the arms meet the cross, and 2.37 mm at the base.

Chinese porcelain was a prestigious luxury in New Mexico. While in eighteenth- and nineteenth-century estates, majolica was valued at an average of only 3 reales a piece, and Chinese porcelain was worth an average of 2 pesos, 1 real (Snow 1993:143). To put this into perspective, in 1778 a bushel of corn or wheat cost 12 reales, a string of chile or onions 2 reales, a 25-pound lot of wool 2 pesos, a bunch of tobacco 4 reales, a sheep 1 peso, a cow, horse, or pig 3 pesos, and a chicken 1 real (Simmons 1977:22-23).

It is difficult, as well as fruitless, to propose scenarios that would explain the presence of the button, cross, porcelain, and other unusual items in a pit along with hearth sweepings, local ceramics, and the usual array of fauna. Luxury items such as these were available to wealthy households of this era, yet because of their value and scarcity, few are recovered archaeologically.

Summary

OAS excavations at LA 67321 encountered trash deposits dating between about 1750 and 1840. Recovered materials reveal a pattern typical of scattered households dependent on subsistence farming and raising livestock. Ceramic vessels for cooking and serving were almost all locally made, and the population relied on domestic plants and animals, probably from the immediate area. Largely self-sufficient, their location along the Camino Real provided access to trade goods and luxury items bartered from travelers and traders in exchange for livestock and other locally produced items, but there was no extraordinary wealth. Historical accounts document the presence of several wealthy merchant-traders in Valencia toward the end of the period represented by the deposits. Luxury items were confined to a small pit at the south end of the project area.

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APPENDIX 2: THE PHYSICAL STRATIGRAPHY OF LA 67321

Glen S. Greene

The physical stratigraphy of LA 67321, Valencia County, New Mexico, was observed and documented in December 1996 during ongoing excavations. Observations were made and oxidizable carbon ratio samples were taken.

Stratigraphic Description

This stratigraphic description and assessment was taken from 190N 210E in the main north-south trench running through the site (Fig. A2). Please note that I designate the section units by stratigraphic numbers rather than horizontal designations. As will be explained below, the soils here are entisols, which means that they have little or no horizontal development. Hence, stratigraphic designations are more useful than horizontal designations in this particular context. References to horizonization, where it was observed, are made in the discussions, however.

Stratum 1 (0-12 cm)

A pea gravel deposit in a fine white (7.5 YR 8/Od) sand matrix, the result of modern road improvement activities.

Stratum 2 (10-55 cm)

Weak red (10 R 5/3m) silty clay; moderate fine to medium angular blocky; friable, sticky, plastic; common moderately thick to thick argillans on ped faces; violently effervescent; abrupt smooth boundary.

This stratum is a remnant of a weak B horizon that has been capped by modern road building gravel (Stratum 1). Rather than this being a paleosol remnant, the upper part of this stratum might also be part of modern road improvement activities. There was enough stability and noninundation by the Rio Grande for the last 100 to 150 years for some minor soil genesis to have occurred, at least in the lower portion. OCR Sample 3 was taken from Stratum 2. Strong acid reaction is typical for this region and this long-standing climatic regime.

Stratum 3 (55080 cm)

Few fine to medium distinct reddish yellow (7.5YR 6/6m) to pinkish white mottled (7.5 YR 8/2m) silt loam; weak fine to medium subangular blocky; loose, noncoherent to soft, very friable, slightly sticky, slightly plastic; thin clay bridges; slightly effervescent; abrupt wavy boundary.

This stratum contains a few scattered charcoal chunks in small lenticular bodies. These small bodies are the residue of small brush or grass fires. A few of the burnt striae may be hearth areas. A few nonburned striae are visible. These are alluvial, very small, very shallow anastomosing washes and micro-eddies that occurred and may still be seen after heavy precipitation. These are linear and oriented west toward the Rio Grande. Some high energy deposition is represented because gleying is absent and microstratigraphy is more evident. OCR Sample 2 was taken from Stratum 3.

Stratum 4 (80-130 cm)

Many fine to medium prominent dark gray (5 Y 4/1m), light gray (2.5 Y 7/2m), strong brown (7.5 YR 5/6m) mottled loamy coarse to very coarse sand; very weak fine to medium subangular blocky; very friable, nonsticky, nonplastic; few thin colloid stains on mineral grains; slightly effervescent.

This stratum is dipping to the north and west. It contains no striae that indicate micro-channeling. This is the oldest exposed stratum in the trenches, is traceable in all exposures, and when examined was moist. Gleization is moderate with some FeMn staining, indicating the very earliest stages of stability. OCR Sample 1 was taken from Stratum 4.

Oxidizable Carbon Rations (OCR) Dates

Three OCR samples were collected. These were processed and analyzed by Archaeology Consulting Team in Essex Junction, Vermont. OCR Sample 3 was taken from the bottom of Stratum 2. It is 109 years BP (A.D. 1841). OCR Sample 2 was taken from Stratum 3. It is 65 years BP (A.D. 1885). OCR Sample 1 was taken from Stratum 4. It is 147 years BP (A.D. 1803).

Stratum 2 is a weakly developed B horizon of recent age. It may be the result of flood or drainage control measures in late historic times that created enough stability for an incipient B horizon to have originated. If so, the OCR date of 1841 may be accurate.

Alluvial mixing or some physiochemical factor effecting this dating method may have occurred in Stratum 3 because the OCR date of 1885 is clearly in superpositional error. The deposits do not appear to be mixed or stratigraphically reversed anywhere in the profile.

Although the date from Stratum 4 is the earliest in the OCR samples, it may also be spurious. Douglas

Frink (personal communication) has discovered that when gleization occurs, that is, an atmosphere of reduction is introduced, dating by OCR becomes suspect. Some slight gleization is evident in Stratum 4.

Classification

Most of the soils in the vicinity of the excavations lie in the classification *Typic torrifluvent* (Pease 1975:117). The order classification is entisol, which means that they are recently formed soils. They have little or no evidence of development of dedogenic horizons. “These soils are on land surfaces that are very young, wet, dry or are underlain by very resistant initial material” (Buol et al. 1989:333). In the suborder, *fluvent* soils are clayey or loamy alluvial soils that possess very simple profiles, if they possess profiles at all. Due to the fluvial (stream-laid) genesis of these sediments, stratification is more common than horizonization (1989:339).

The great group classification *torrifluvent* implies a torric soil moisture regime that is both warm and dry most often during the year. Typic is a subgroup classification that elaborates the central concepts of the torrifluvent classification. In sum, we are presented with a riverine deposit with minimal horizon development dominated by a warm and dry climatic regime. Surfaces are annually rejuvenated so that horizon development is retarded. Historic flood controls interrupted this annual cycle.

Family classification characteristics that occur with frequency are *calcareous* and *clayey-loamy overlying sands*, both of which apply to the floodplain sediments of the excavation area (Pease 1975:117). Calcareous properties refer to the various salts that arise through the sedimentary deposits in this type of arid floodplain environment. Clayey loams indeed overlie alluvial sands in these floodplain deposits. *Thermic* is also a part of the family classification. In this case, this soil temperature regime is a mean annual temperature of between 15 to 22 degrees C (59 and 72 degrees F).

Discussion

Based on observations of the profile, augmented by the OCR dates, the stratigraphic section examined is of recent origin and dates to historic times. The upper portion of the profile is clearly the result of road building activity. This is underlain by sediments that may have been laid as a result of flood control or drainage measures. Even though the deepest sediments do not reflect historic activity, and even though the OCR date has been affected by gleization, the proximity to the Rio Grande and frequency of overbank flooding suggests that this deposit may also date to the nineteenth century. This is further indicated by the soils classification of the deposit; that is, it is a fluvent.

With the exception of the upper portion of the profile, all of the deposits are alluvial. All contain a percentage of sand, the result of Rio Grande deposition. Clayey deposits are mixed with sands, suggesting that medium- to low-energy deposition has taken place. Flood controls were probably imposed late so that the upper part of the section, a modern solum, was forming the earlier sediments. Free-standing groundwater was sufficient to begin a gleization process in the lower part of the section.

Stratum 1 is a remnant of modern road-building activities and signals recent disturbance. It dates to the twentieth century.

There are two plausible explanations for the characteristics of Stratum 2. First, the upper 10 cm may be soils imported for road construction. Rich in clay, they may have been laid to provide a base for the overlying gravel of Stratum 1. Secondly, the entirety of Stratum 2 may be a remnant of the most recent of soil-forming processes, that is, the B horizon of the modern preroad construction solum. In this century, and possibly earlier, flood control measures may have stopped the annual floodplain cycle long enough for a visible weak solum to form. Road construction may have taken out the A and A/E horizon(s), leaving only remnant B.

In the lower part of Stratum 2 was a lenticular charcoal body consisting of a conglomerate of charcoal flecks that seemed suitable for an OCR date. If the upper part is a remnant of road construction, OCR Sample 3 is sufficiently deep to be disassociated with it. Thus, an accurate date is probable. In this lower member of Stratum 2, clay rich sediments give way to medium sands that are probably alluvial material deposited by the river in annual depositional cycles or occasional flooding.

The Stratum 3 silt loam has a large number of lenticular charcoal bodies and large charcoal chunks. This is a clay rich stratum that denotes a period of low-energy stability even though there is micro-stratigraphy present in the form of small striae that are alluvial in nature. These are probably the result of very small streamlets flowing toward the river after a heavy rainfall. Alluvial mixing or some physiochemical error is evident here because the OCR date assay is clearly in superpositional error. There are no soil horizon characteristics in Stratum 3. It appears to be an alluvial deposit and probably predated flood control measures that appear to be reflected in Stratum 2. The OCR date is problematical and may be in error.

Stratum 4 is a thick deposit of sand with some loamy sand present in the lower portions. Faint gleyed characteristics are present in the form of FeMn concentrations. These indicate some degree of past standing water on at least a semiannual basis.

APPENDIX 3: PETROGRAPHIC ANALYSIS OF SELECTED CERAMICS FROM LA 67321

David V. Hill

A sample of 35 sherds was recovered from excavations at LA 67321. The ceramics are related to the late eighteenth- and early nineteenth-century occupation of the site. Analysis was conducted to examine the question of local production of ceramics as opposed to importation.

Methodology

The ceramics were analyzed with a Nikon Optiphot-2 petrographic microscope. The sizes of natural inclusions and tempering agents are described in terms of the Wentworth Scale, a standard method of characterizing particle size in sedimentology. These sizes were derived from measuring a series of grains using a graduated reticle built into one of the microscopes optics. The percentages of inclusions in the ceramics and clay samples were estimated using comparative charts (Matthew et al. 1991; Terry and Chilingar 1955). Particle sorting criteria for sand grains were derived from a chart first published by Pettijohn et al. (1972) and reproduced in Scholle (1979).

Analysis was conducted by first going through the ceramic collection and generating a brief description of each of the sherds. A second phase consisted of creating classification groups based on the similarity of the paste and temper of those sherds. This process also allowed for the examination of the variability within each grouping. Additional comments about the composition of individual sherds were made at this time.

Analysis of the Petrographic Sample

Glaze-on-red

FS-158-68, Vessel 1. The paste of this sherd ranges from a reddish tan to gray. It contains inclusions from crushed hornblende latite, like that observed in sherd 158-71 (Isleta Red-on-tan). The rock fragments range from medium to very coarse in size and constitute about 10 percent of the paste.

Glaze-on-yellow

FS-158-77. The paste of this sherd is a light brownish yellow and it is tempered with medium to coarse-sized ophitic basalt. This is the same type of basalt as that observed in sherd 165-43 (Puname Polychrome). The basalt fragments make up about 15 percent of the paste.

Smudged Black Ware

FS-162-30. The paste of this sherd is a light golden brown and contains abundant silt-sized rounded sand. A few rounded argillaceous inclusions are present. These inclusions do not contrast strongly with the paste. Two size categories of sand are present in the sherd. One class is fine in size, well sorted, and rounded. These grains may be a natural inclusion in the paste. These fine grains make up less than 3 percent of the ceramic matrix. Well rounded, well sorted, coarse-sized sands include fragments of granite and fine-grained trachyitic basalt. One highly altered rhyolitic tuff grain is also present. The paste of this sherd closely resembles sherd 159-20 (Carnue Utility) and most likely was made using similar materials.

Carnue Utility

FS-126-46. The paste of this sherd is a brownish red. Few silt-sized sandy inclusions were observed in the clay. A sparse amount of silt-sized to fine black inclusions are also present. Three very coarse-sized rounded reddish argillaceous inclusions are present in the paste.

The paste is tempered using a moderately sorted medium to coarse sand. The sand grains constitute about 7 percent of the clay matrix. The grains are well rounded. The predominate mineral present in the sand is quartz followed, in order of abundance, by orthoclase, plagioclase, microcline, and volcanic rock fragments. The quartz displays undulose extinction. The feldspars display a continuous range of alteration from fresh to highly altered to sericite. The volcanic rock fragments consist primarily of fine-grained basalt with trachyitic texture. The composition of the basalts is variable. The most common ground mass is microcrystalline and contains andesine plagioclase and magnetite fragments. A few other pieces of basalt have a reddish glass for a ground mass, porphyritic andesine, plagioclase, and sparse magnetite. A few fragments of tuff are present in the paste as well. The tuff fragments are gray and highly weathered. One pumice fragment is also present. It is slightly compacted and displays elongated vesicles.

FS-142-2, Vessel 6. The paste of this sherd is yellowish brown and contains silt-sized quartz. In terms of paste color and the size, and type and amount of sands present, this sherd is quite similar to 182-16, also Carnue Utility. In addition to the well-sorted sand, a single medium-sized grain of fine-grained basalt is also present.

FS-159-20. The paste of this sherd is a light yellowish brown. A few medium to coarse voids are surrounded by carbonaceous halos. These voids result from the combustion of plant materials naturally present in the ceramic clay.

The paste contains well-rounded, well-sorted, coarse sand that make up about 7 percent of the paste. These sand grains are similar in size and contain fine-grained volcanic rocks observed in other Carnue Utility sherds: 126-46, 167-30, and 162-22. A coarse, rounded grain consisting of quartz and orthoclase was also present. The difference in color of the paste between this sherd and the other sherds with the same temper may reflect differences in firing regimen.

FS-159-110. The paste of this sherd is a dark grayish brown and contains moderately well-sorted, well-rounded sands. Sand grains range in size from medium to very coarse, and ubiquity in the matrix deceases with size. The major mineral in the sand is quartz, with highly altered feldspars making up about a quarter of the sand grains. No volcanic rock fragments were observed.

FS-162-22. The paste of this sherd is a dark reddish brown color. A single gray, very-coarse rounded opaque argillaceous inclusion is present. The paste contains about 7 percent moderately sorted medium to coarse sand similar to the sand observed in samples 126-46 and 167-30. The sand is dominated by quartz with trace amounts of feldspar and rounded grains of fine-grained trachyitic basalt. One basalt grain has an ophitic texture with plagioclase enclosing augite. Magnetite cubes are also present in this basalt fragment.

FS-167-30. The paste of this sherd is similar in clay color and type of inclusions to sherd 126-46. The paste is brownish red and contains moderately sorted medium to coarse sand. In this sherd, the amount of sand approaches 10 percent of the matrix. The sand consists predominately of quartz, with sparse amounts of orthoclase, microcline, and plagioclase. One coarse-sized rounded sand grain is a quartzite. Another medium-sized grain is a fine-grained sandstone. Fine-grained trachyitic basalt grains are present in the sand in trace amounts. A single course welded tuff fragment is also present.

FS-177-27. The paste of this sherd is a reddish brown color. Temper is medium to coarse-sized sand grains. The paste is similar to sherd 159-20 in terms of the size and amount of sand present, about 10 percent, and the presence of sparse amounts of rhyolitic tuff fragments and fine-grained basalts with trachyitic texture. Also present are a few fragments of granite. The granite is characterized by aggregate masses containing quartz, plagioclase, and orthoclase and/or microcline. In addition to the quartz grains in the sand, about 20 percent of the sand is made up of plagioclase, orthoclase, and microcline.

FS-182-16. The paste of this sherd is a light brown and contains abundant silt-sized brown biotite and quartz. The paste contains subangular quartz, orthoclase, and sanidine and trace amounts of plagioclase. These isolated mineral grains make up about 10 percent of the paste.

FS-196-18. The paste of this sherd is a dark reddish brown. Three very coarse-sized areas of poorly wedged clay or argillaceous inclusions are present. The paste contains subrounded moderately well-sorted sand. The sand ranges in size from medium to coarse and makes up about 7 percent of the ceramic matrix. Quartz makes up the majority of the sand grains, occurring mostly as isolated grains; however, a few grains contain quartz and orthoclase. Weathered feldspars make up the rest of the isolated grains. Sparse fragments of fine-grained trachyitic basalt and two grains of weathered tuff make up the balance of the inclusions. Paste color and size, amount, and type of sand present in this sherd are very similar to sherd 162-22.

FS-202-1. The paste of this sherd is a light brown and slightly birefringent. A few fine black opaque inclusions are also present. The paste contains well sorted subangular to angular sand derived from a granitic source. The sand constitutes about 15 percent of the paste and ranges from medium to coarse. Several rock fragments are present, but in trace amounts. Fragments of granite consisting of masses of quartz, orthoclase, and microcline are the most common combinations of minerals found as aggregate masses. Quartz, plagioclase, and orthoclase are the most common minerals observed as isolated grains. Also present are three rounded pieces of a fine-grained trachyitic basalt.

Buff/tan Utility

FS-126-42. The paste of this sherd is a dark brownish gray with fine to medium-sized well-sorted sands. These sands make up about 30 percent of the ceramic matrix. While quartz is the predominate mineral observed, feldspars are also present. The feldspars are highly altered through sericitization to the point of opacity. A few fresh feldspar grains are also present.

FS-162-12. The paste of this sherd is a light yellowish brown. It may not have been tempered in the traditional sense, but rather the vessel was formed using a sandy clay. The sands are well sorted and account for about 25 percent of the clay body. The sands range from silt-sized to fine with a few medium-sized grains present. The sands are subrounded to rounded and consist of predominantly quartz with sparse orthoclase and plagioclase. Sparse brown biotite is also present in the paste.

FS-162-17. The paste of this sherd is a light reddish brown color, and it contains well-sorted very fine to fine sand. These sand grains make up about 25 percent of the ceramic body. Quartz dominates the sand, but untwinned feldspars make up about 30 percent of the sand. Sparse fine flakes of brown biotite are also present. Feldspars, usually altered to sericite, are also present. Sparse black very fine inclusions are also present. Two very coarse rounded argillaceous inclusions are also present.

FS-167-16. The paste of this sherd is a golden brown. It contains well-rounded, well-sorted fine to medium sand that accounts for about 15 percent of the ceramics matrix. The paste of this sherd is quite similar to sherd 162-17 in terms of paste color, particle size, and amount.

FS-183-46. The paste of this sherd is a light yellowish brown. Fine, well-rounded sand makes up about 20 percent of the matrix of this sherd. A few sparse flakes of brown biotite are also present. About 5 percent of the paste contains angular fragments of glassy pumice.

Valencia White

FS-159-54. The paste of this sherd is a golden brown and contains abundant silt-sized sands. In addition to the silt-sized sand grains, the paste contains very fine to fine moderately well-sorted rounded sand. These larger sand grains make up about 5 percent of the paste. The predominant mineral in the sand is quartz, but about a quarter of the grains consist of highly weathered feldspars.

FS-159-124. The paste of this sherd is a reddish brown. It resembles that of sherd 126-46 (Carnue Utility) with coarse well-sorted rounded sand grains. These sand grains make up about 10 percent of the paste. More than 90 percent of the grains are quartz; however, sparse grains of fine-grained trachyitic basalt and rhyolitic tuff are also present. One very coarse grain of an andesite porphyry is also present.

FS-183-5. The paste of this sherd is a dark brownish gray. The sand temper is moderately well sorted and well rounded and ranges from very fine to medium. The sand grains make up about 20 percent of the ceramic paste. While the predominant mineral observed in the sand is quartz, some highly weathered feldspars are also present. A trace amount of very fine-grained calcareous inclusions was also present. Some of these fragments may represent pieces of caliche. The source of the long thin inclusions is unknown. They may represent some type of secondary calcareous deposit around a sand grain that was later dislodged.

Isleta Red-on-tan

FS-132-10. The paste of this sherd is a light brownish gray and strongly resembles sherd 159-20 (Carnue Utility) and 162-30 (smudged black ware) in terms of the bimodal size distribution of sand grains and the presence of fine-grained basalt and rhyolitic tuff grains. The paste contains well-sorted, well-rounded sand grains that account for about 10 percent of the paste.

FS-158-71. The paste of this sherd is a brownish red color. Because of the size range and abundance of materials, natural inclusions could not be recognized in the ceramic body. The paste contains a combination of rock fragments and isolated mineral grains that range from medium to very coarse. The rock fragments are characterized by a microcrystalline to glassy ground mass containing andesine plagioclase, green brown pleiochroic hornblende, and occasional magnetite cubes porphyritically. These rock fragments have been classified as a hornblende latite. They range in size from medium to coarse and make up about 10 percent of the paste.

The isolated mineral grains consist of the same minerals observed in the rock fragments. In order of abundance these minerals include andesine plagioclase, green brown hornblende, and black opaque spots. These black spots have hematitic rims suggesting a weathered mineral containing iron, possibly hornblende, ferromanganese grains, or possibly biotite, although none was observed in a unaltered state. Isolated minerals make up about 5 percent of the paste.

FS-158-87. The reddish brown paste color and rounded sand grains, including fragments of fine-grained trachyitic basalt are similar to that of Carnue Utility sherds 126-46, 162-22, and 167-30. A rounded grain of andesite porphyry was also observed. This rock fragment contains andesine plagioclase and brown hornblende in a fine-grained mass made up of plagioclase and magnetite. About 15 percent of the matrix of this sherd contains well-sorted sand, a greater amount than observed in the previous samples.

FS-182-14. The paste of this sherd is a light gray color. Several voids are surrounded by carbonaceous halos. These halos result from the combustion of organic material that were naturally present in the ceramic paste. The paste also contains well-rounded, well-sorted sand grains. These grains are medium- sized and make up about 10 percent of the clay body. The predominate mineral in the grains is quartz, although a few highly altered feldspars are also present. Also present are a few highly weathered fragments of rhyolitic tuff. These tuff fragments are dark gray or brown and contain sanidine porphyritically. One tuff fragment also contains brown biotite.

FS-183-4. The paste of this sherd is a dark brownish gray that contains sparse silt-sized inclusions. Poorly sorted, well-rounded sands make up about 15 percent of the ceramic body. The predominant mineral present in the sand is quartz. Feldspars are fresh to highly weathered.

FS-191-3. The paste of this sherd is a reddish tan with sparse silt-sized sand and black opaque inclusions in the paste. The paste is almost identical to that of sherd 158-87. The sand is well-rounded, well-sorted, and coarse. Sand accounts for about 7 percent of the ceramic paste. A few grains of fine-grained trachyitic basalt were also present. A 1 mm void has a carbonaceous halo from burning out part of a plant that was accidently present in the clay body.

Plain Micaceous Utility

FS-158-61. The paste of this sherd is dark brown and highly micaceous. The ceramic body appears to have been made with micaceous clay derived from weathered gneiss or quartz mica schist. Mica gneiss and quartz particles, along with mica books, make up most of the body of the sherd. With the exception of the mica particles, the gneissic fragments and quartz grains range in size from coarse to very coarse. Angular quartz particles alone make up about 15 percent of the paste.

Tewa Polychrome, Southern Variety

FS-146-4, Vessel 7. The paste of this sherd is tan. The temper is ophitic basalt like that observed in sherd 165-43, Powhoge-style polychrome. The basalt grains range from medium to coarse and make up about 25 percent of the paste.

FS-159-19. The paste of this sherd is golden brown and contains well-sorted, well-rounded fine sand. Sand makes up about 7 percent of the ceramic matrix. A trace amount of brown biotite is also present. Medium-sized fragments of welded weathered glassy pumice were also present and made up about 5 percent of the ceramic matrix.

FS-183-11. The paste of this sherd is a grayish brown and contains about 10 percent silt-sized to fine sand. The sand is most likely natural inclusions in the paste. Added to the paste is crushed glassy pumice. Fragments of vesicles and welded pumice make up about 10 percent of the ceramic body. The pumice makes up about 10 percent of the clay body. The pumice particles range from very fine to fine.

Powhoge-Style Polychrome

FS-160-24. The paste of this sherd is a light brownish yellow color. It contains sparse fine rounded sand grains and sparse flakes of brown biotite. The paste is abundantly tempered with glassy pumice. The pumice occurs primarily as glass shards, although some welded fragments are also present. The pumice fragments range in size from very fine to medium and make up about 15 percent of the paste.

Puname Polychrome

FS-165-43. The paste of this sherd is a light yellowish brown. Because of the size range of the added temper, natural inclusions could not be discerned. The paste contains fine to coarse fragments of an ophitic basalt. The basalt grains constitute about 15 percent of the matrix of the sherd and consist of laths of andesine plagioclase enclosing primarily pleiochroic augite. Trace amounts of pale yellow olivine and brown glass are also present between the plagioclase laths. Less than 5 percent of the basalt contains ferro-manganese grains. Some of the augite has altered to hematite and clay minerals.

Acomita Polychrome

FS-112-22. The paste of this sherd is a light yellowish gray. Two dark gray argillaceous inclusions are present. The ceramic clay contains rounded, well-sorted sand and a trace of volcanic rock fragments. These inclusions make up about 35 percent of the ceramic body. The vast majority of the sand is quartz; however, a trace amount of altered feldspars was also observed. One medium-sized piece of ophitic basalt and another basalt grain with a brown glassy matrix and andesine plagioclase laths are also present.

FS-113-32 & 33. The paste of this sherd is nearly identical to sherd 112-22 in terms of the paste color and the size and amount of quartz sand. A single piece of very coarse and two medium pieces of ophitic basalt are present along with a very fine-grained latite that contains highly altered biotite and sparse plagioclase. Three argillaceous inclusions are also present.

Discussion

The most commonly observed inclusion in the ceramic sample from LA 67321 was sand. Without analysis of clays and sediments from the local area, the source of the sand cannot be directly identified. It also cannot be confirmed whether the sands observed in the ceramics represent natural inclusions in the ceramic clay or were an added material. However, based on the present analysis and a previous petrographic study of ceramics from LA 67321, the ubiquity of different pastes within the site collection can be assessed.

The most common class of inclusions within the present sample are a group of thirteen sherds that contain coarse sand. Sand makes up between 7 and 10 percent of the paste. Also present in the sand that comprise this group are sparse rounded fragments of fine-grained trachyitic basalt and, occasionally, volcanic tuff. The paste of these sherds was reddish or yellowish brown. The color differences observed in the paste could be the result of variation in firing regimens rather than compositional differences in the ceramic clay. Sherd 158-87, Isleta Red-on-tan, has 15 percent sand but otherwise matches the rest of the compositional criteria for the coarse sand class.

Within the coarse sand class—sherds 177-27, Carnue Utility; 159-20, Carnue Utility; 162-30, smudged black ware, and 132-10, Isleta Red-on-tan—have the same paste color and also contain sparse silt-sized quartz grains and appear to have the same sources of raw material.

Sherd 183-4, Isleta Red-on-tan, contains about 15 percent coarse sand with some volcanic rock fragments present, similar to the coarse sand group. This sherd has a gray paste not shared by the other coarse-sand ceramics.

The next most common class of ceramics in the LA 67321 petrographic sample are ceramics containing between 15 and 25 percent fine sand or made using a naturally sandy clay. The fired paste is a yellowish brown color. Eight sherds with a yellowish sandy paste were analyzed. Sherds 162-12 and 162-17, both buff/tan utility, have very similar pastes to one another and were probably made using the same materials. Sherds 182-16 and 142-2, both Carnue Utility, have similar enough pastes to have been made using the same resources as well.

Both coarse and fine sand would have been available locally either as sediments derived from sandbars in the Rio Grande and in alluvial clays. Volcanic and granitic rock fragments are present in sediments of both types (Kelly 1977; personal observations, Albuquerque area, 1992-1997). Ethnographic information indicates that some clays were derived from the Rio Grande and that sand and volcanic scoria were commonly used ceramic tempers at Isleta Pueblo (Ellis 1983).

Pumice was observed in five sherds: 182-14, Isleta Red-on-tan; 183-11, Tewa Polychrome, southern variety; 159-19, Tewa Polychrome, southern variety; 183-46, buff/tan utility; and 160-24, Powhoge-style polychrome. Sherd 182-14 also contains sparse sand in addition to welded pumice fragments. Sherds 159-19, 183-46, and 160-24 contain about 5 percent angular welded pumice fragments in a golden brown paste that is unique to these three sherds. The limited amount of pumice in these sherds suggests that this material may not have been intentionally selected for as a tempering agent but was naturally present in the source clay. The devitrified appearance of most of the pumice fragments also suggests that they may be natural inclusions. Pumice is present in the Ceja member of the Santa Fe formation, which forms part of the Rio Grande terrace system and is available at the surface in the Las Lunas area (Kelly 1977; Kelly and Kudo 1978). It is also possible that these tuff fragments reflect the use of locally available material found at a hill near the site.

Sherd 183-11, Tewa Polychrome, southern variety, contains pumice as both welded fragments and as abundant glass shards and few sand grains. Ceramics containing pumice have most commonly been reported from the Española Basin where pumice deposits from the Jemez caldera were used in both prehistoric and historic ceramics. Based on the abundance of pumice in sherd 183-11, it is likely that this sherd was produced in the Española Basin.

Sherd 202-1, Carnue Utility, contains sand derived from a granitic source. Since granitic rocks are abundant in the nearby Manzano Mountains and would have served as a source of sediments on the eastern side of the Rio Grande Valley, it is likely that this sherd represents the use of locally available material (Stark 1956).

Other locally available materials, gneiss and mica schist, would have been available in the nearby Sandia and Manzano Mountains and on the pediment surfaces. These materials were present in sherd 158-61, plain micaceous utility. Schists and gneisses have been reported previously in plain utility wares recovered from San Antonio Pueblo (LA 24) and were likely to have been produced there (Hill in prep.; Warren 1980).

The Acomita Polychrome sherds contain about 30 percent fine sand in an tan body. Also present in the sand of both sherds was one fragment of ophitic basalt, a constituent of ceramics produced in the Zia Pueblo/Puname area (Shepard 1942). Unfortunately, there is currently no petrographic database of Santa Ana area ceramics, nor is the distribution of ophitic basalts known.

The previous petrographic study of Isleta Red-on-tan ceramics from LA 953 reported sand within the size range of the present analysis. No fragments of volcanic or other rock types were reported. However, these rock types are present in trace amounts in the present sample.

Plain wares examined during the previous analysis project reported that in a sample of 10 sherds, the temper was andesite in four cases, fast cooled igneous rock in five cases, and metadiabase in one sherd (Garrett 1997). The red-on-tan ceramics previously examined are similar to those analyzed in the current study. The differences in the two plain ware samples is striking and likely the result of different selection criteria used in choosing the samples for the previous petrographic study.

Sherds 165-43 (Puname Polychrome), 158-77 (glaze-on-yellow), and 146-4 (Tewa Polychrome, southern variety), are tempered using ophitic basalt. Ophitic basalt was used throughout the time of glaze ware production and into the historic era in the Zia/Puname area (Shepard 1942; Warren 1976, 1979).

Sherds 158-71 (Isleta Red-on-tan) and 158-68 and 158-69 (glaze-on-red) were tempered using crushed hornblende latite. Sherds tempered using hornblende latite are traditionally thought to have been produced at Tonque Pueblo (Warren 1976). However, hornblende latite is available elsewhere in the Galisteo Basin and was used for temper at other pueblos in the area as well (Disbrow and Stoll 1957; Warren 1979). The presence of hornblende latite in a reddish brown paste in the two current examples, as opposed to the light yellowish paste identified for Tonque Pueblo, provides additional evidence of the use of this material at other pueblos within the Galisteo Basin.

The majority of the ceramics examined during this study contain sand and are likely the products of a "local" industry. However, without examining the quality of locally available resources, confirmation is not possible. Based on the ubiquity of sand temper in the present and past ceramic collections from LA 67321 and LA 953 and its use in ethnographic contexts at Isleta Pueblo, the presence of sand is likely to represent the use of a local resource. It is also possible that the four sherds that, in addition to sand, contain sparse weathered pumice represent locally produced vessels.

Limited evidence of ceramic trade was also observed within the ceramic sample. One organic painted polychrome sherd represents a vessel produced in the Española Basin. Two sherds tempered with hornblende latite represent vessels produced in the Galisteo Basin. The Zia/Puname area produced both glaze wares and matte paint ceramics, recovered from LA 67321. The gneiss/mica schist tempered plain ware sherd represents a vessel that could have been produced at San Antonio (LA 24) or at a closer location.

APPENDIX 4: CHIPPED STONE ANALYTIC METHODS

James L. Moore

All chipped stone artifacts were examined using a standardized analysis format developed by the Office of Archaeological Studies (OAS 1994b). These methods were developed to increase comparability between projects completed across the state. Hopefully, this will eventually allow analysts to investigate specific problems with a much larger data base representing sites distributed through both time and space. The OAS chipped stone analysis format includes a series of mandatory attributes that describe material, artifact type and condition, cortex, striking platforms, and dimensions. In addition, several optional attributes have been developed that are useful for examining specific questions. This analysis included both mandatory and optional attributes.

The primary areas the analysis format was designed to explore include material selection, reduction technology, and tool use. These topics provide information about ties to other regions, mobility patterns, and site function. While material selection studies cannot reveal *how* materials were obtained, they can usually provide some indication of *where* they were procured. By examining the type of cortex present on artifacts, it is possible to determine whether a material was obtained from the primary source or from secondary deposits. By studying the reduction strategy employed at a site, it is possible to compare how different cultural groups approached the problem of producing useable chipped stone tools from raw materials, and how the level of residential mobility affects reduction strategies. The types of tools present on a site can be used to help assign a function, particularly with artifact scatters lacking features. Tools can also be used to help assess the range of activities that occurred at a locale. In some cases chipped stone tools provide temporal data, but unfortunately, they are usually less time-sensitive than artifact classes like pottery and wood.

Each chipped stone artifact was examined using a binocular microscope to aid in defining morphology and material type, examine platforms, and determine whether it was used as a tool. The level of magnification varied between 15x and 80x. Higher magnification was used for wear-pattern analysis and identification of platform modifications. Utilized and modified edge angles were measured with a goniometer; other dimensions were measured with a sliding caliper. Analytic results were entered into a computerized data base using the *Statistical Package for the Social Sciences Data Entry* program (version 4.0.1).

General Chipped Stone Analytic Methods

Four classes of chipped stone artifacts were recognized: flakes, angular debris, cores, and formal tools. Flakes are debitage exhibiting one or more of the following characteristics: definable dorsal and ventral surfaces, bulb of percussion, and striking platform. Angular debris are debitage that lack these characteristics. Cores are nodules from which debitage have been struck and on which three or more negative flake scars originating from one or more platforms are visible. Formal tools are artifacts that were intentionally altered to produce specific shapes or edge angles. Alterations take the form of unifacial or bifacial retouch, and artifacts are considered intentionally shaped when retouch scars obscure their original shape or significantly alter the angle of at least one edge. Informal tools are debitage that were used in various tasks without being purposely altered to produce specific shapes or edge angles. This class of tool is defined by the presence of marginal attrition caused by use. Evidence of informal use is divided into two general categories: wear and retouch. Retouch scars are 2 mm long or longer, while wear scars are less than 2 mm long.

Attributes

Attributes recorded on all artifacts include material type and quality, artifact morphology and function, amount of surface covered by cortex, portion, evidence of thermal alteration, edge damage, and dimensions. Platform information was recorded for flakes only.

Material type. This attribute was coded by gross category unless specific sources were identified. Codes are arranged so that major material groups fall into specific sequences of numbers, progressing from general material groups to specific named materials with known sources. The latter are given individual codes.

Material texture and quality. Texture is a subjective measure of grain size *within* rather than *across* material types. Within most materials, texture is scaled from fine to coarse. Fine materials exhibit the smallest grain sizes, and coarse the largest. Obsidian is classified as glassy by default, and this category is applied to no other material. Quality records the presence of flaws that can affect flakeability, including crystalline inclusions, fossils, visible cracks (also called incipient fracture planes), and voids. Inclusions that would not affect flakeability, such as specks of different-colored material or dendrites, are not considered flaws. These attributes were recorded together.

Artifact morphology and function. Two attributes are used to provide information about artifact form and use. The first is morphology, which categorizes artifacts by general form. The second is function, which categorizes artifacts by inferred use. These attributes were coded separately.

Cortex. Cortex is the chemically or mechanically weathered outer rind on nodules. It is often brittle and chalky and does not flake with the ease or predictability of unweathered material. For each artifact, the amount of cortical coverage was estimated and recorded in 10 percent increments.

Cortex type. The type of cortex present on an artifact can be a clue to its origin. Waterworn cortex indicates that a nodule was transported by water and that its source was probably a gravel or cobble bed. Nonwaterworn cortex suggests that a material was obtained where it outcrops naturally. Cortex type was identified, when possible, for any artifacts on which it was present.

Portion. All artifacts were coded as whole or fragmentary. When broken, the portion was recorded if it could be identified.

Flake platform. This attribute records the shape and any alterations to the striking platform on whole flakes and proximal fragments.

Thermal alteration. Cherts can be modified by heating at high temperatures. This process can cause a realignment of the crystalline structure and sometimes heals minor flaws like microcracks. Heat treatment can be difficult to detect unless mistakes are made. When present, the type and location of evidence for thermal alteration was recorded to determine whether an artifact was purposely altered.

Wear patterns. Use of a piece of debitage or core as an informal tool can result in edge damage, producing patterns of scars suggestive of the way in which it was used. Cultural edge damage denoting use as an informal tool was recorded and described when present on debitage. A separate series of codes was used to describe formal tool edges, allowing measurements for both categories of tools to be separated.

Edge angles. The angles of all modified informal and formal tool edges were measured; edges lacking cultural damage were not measured.

Dimensions. Maximum length, width, and thickness were measured for all artifacts. On angular debris and cores, length was the largest measurement, width was the longest dimension perpendicular to the length, and thickness, the smallest measurement, was perpendicular to the width. On flakes and formal tools, length was the distance between the platform (proximal end) and termination (distal end), width was the distance between edges paralleling the length, and thickness was the distance between dorsal and ventral surfaces.

Flake Categories

Several types of flakes may be present in an assemblage, and one of the goals of this analysis was to distinguish between major varieties of this debitage category. Those varieties can include core flakes, biface flakes, resharpening flakes, notching flakes, bipolar flakes, blades, hammerstone flakes, channel flakes, potlids, and strike-a-light flakes. With the exception of core and biface flakes, most categories are usually rare or absent in assemblages. Thus, distinguishing between core and biface flakes is a critical analytic need.

Flakes were divided into removals from cores and bifaces using a polythetic set of variables (Table 84). A polythetic framework is one in which fulfilling a majority of conditions is both necessary and sufficient for inclusion in a class (Beckner 1959). The polythetic set contains an array of conditions, and rather than requiring an artifact to meet all of them, only a set percentage in any combination need be fulfilled. This array of conditions models an idealized biface flake and includes data on platform morphology, shape, and earlier removals. The polythetic set used here was adapted from Acklen et al. (1983). In keeping with that model, when a flake met 70 percent of the listed conditions it was considered a removal from a biface. Those that did not were classified as core flakes. This percentage is high enough to isolate flakes produced during the later stages of biface production from those removed from cores, while at the same time it is low enough to permit flakes removed from a biface that do not fulfill the entire set of conditions to be properly identified. While not all flakes removed from bifaces could be distinguished, those that were can be considered definite evidence of biface reduction. Instead of rigid definitions, the polythetic set provides a flexible means of categorizing flakes and helps account for some of the variability seen during experiments.

Other flake types were identified by characteristics that allowed them to be distinguished. Notching flakes are produced when the hafting element of bifaces are notched. They generally exhibit a recessed, U-shaped platform and a deep, semicircular scallop at the juncture of the striking platform and dorsal flake surface. Bipolar flakes are evidence of nodule smashing and usually exhibit evidence of being struck at one end and crushed against an anvil at the other. Blades are long, narrow removals from specially prepared cores and are rare in the Southwest after the Paleoindian period. Likewise, channel flakes were removed during the process of fluting Paleoindian dart or spear points and do not occur in later sites.

Other flake categories are evidence of removals from formal or informal tools or indicate inadvertent damage during thermal processing. Resharpening flakes were removed from formal tool edges that became dull from use and usually fit the polythetic set for biface flakes. They are often impossible to separate from other biface flakes but can sometimes be distinguished by an extraordinary amount of damage on the platform and on the portion of dorsal surface adjacent to the platform. Hammerstone flakes are debitage that were detached from a hammerstone by use. Similarly, strike-a-light flakes were detached from strike-a-light flints during use and exhibit damage on their platforms diagnostic of such use. Finally, potlids are debitage that were blown off the surface of a chipped stone artifact during thermal alteration.

APPENDIX 5: TABLES

Table 1. Households recorded in the 1790 census (Olmsted 1975:15-17)

Head	Occupation	Age/ Ethnicity	Spouse	Age/ Ethnicity	Other Household Members: Age/Ethnicity
Plaza I					
Ignacio Vallejos	farmer	59/S	María de Luna	42/S	sons: 6, 4 daughters: 16, 12 female servant: 15/C
Barbara de Luna	widow	30/S			sons: 14, 9, 4, 2 daughter: 7 female servant: 19/C
Phelipe Gallego	sheepherder	25/S	Juana García	25/S	
Miguel Molina	farmer	28/S	Gertrudis Gallego	25/S	son:2 daughter: 5
*Francosco García	weaver	30/S	*Anna María Molina	20/S	sons: 6, 4, 1 daughters: 3, 2 widowed sister: 15/S and sons: 2, 1
Simón Sedillo	farmer	30/S	Francisca Molina	28/S	sons: 11, 10, 4 daughters: 6, 1 niece: 5/S
*Juan Cruz Yturrieta	sheepherder	30/C	María Mora	26/S	sons: 8, 7, 4 daughter: 3
Francisco Estevan Mora	farmer	36/S	Bernarda Vallejos	35/S	son: 18 daughter: 19 niece: 8/S
José Antonio Montoya	weaver	33/S	Manuela Molina	25/S	sons: 10, 8 daughters: 7, 5, 3
*Phellipe Montoya	farmer	22/S	*Manuela García	19/S	son: 1
Andres Montoya	farmer	27/S	María Perea	24/M	daughters: 6, 4, 2
Santiago Serna	weaver	30/M	Anna María García	25/M	sons: 8, 5 daughter: 1 sister in law: 8/M
José Manuel Serna	farmer	28/M	Bernardina Sedillo	25/M	Maria Torres: mother-in-law 50/M
José Antonio Montoya	farmer	38/S	Gertrudis Serna	28/M	son: 8 daughters: 9, 6, 4, 3, 1
Tomaza Vallejos	widow	48/S			granddaughter: 7 male orphans: 15/S, 8/C female servant: 20/Ute
Plaza II					
*Vincent Cháves	farmer	40/S	*Juana Aragón	25/S	sons: 9, 6, 4, 1 daughter: 2 female servant: 20/C
*Manuel Aragón	rancher	61/S	*María Vallejos	50/S	sons: 15, 12, 8

Head	Occupation	Age/ Ethnicity	Spouse	Age/ Ethnicity	Other Household Members: Age/Ethnicity
**Bartholo Baca	farmer	23/S	**María de la Luz Cháves	15/S	
José Aragón	farmer	40/S	Alfonsa Vallejos	20/S	son: 8 daughter: 6
Francisco Xavier Aragón	farmer	45/S	*María Eduarda Baca	35/S	sons: 9, 2 daughters: 18, 15, 7, 4
*?Juan Aragón	rancher	33/S	María Antonia Montoya	40/S	daughters: 15, 6 female servant: 20/Apache
Francisco Aragón	farmer	20/S	María Ignacia Baca	21/S	son: 1
*Manuel Antonio Aragón	rancher	23/S	*Mariana Antonia Sánches	17/S	
Domingo Cháves	rancher	28/S	María Gertrudis Aragón	28/S	sons: 8, 6, 5 daughter: 1 female orphan: 20/S
Phelipe Vegil	farmer	25/S	María Barthola Aragón	24/S	sons: 5, 1, 1 daughter: 8 female orphan: 14/S

S=Spanish
M=Mestizo
C=Coyote
* in Valencia 1802; ** in Tomé in 1802

Table 2. New individuals in an 1802 list of settlers and residents of La Sangre de Cristo, Puesto de Valencia, Villa de Albuquerque (Olmsted 1981:135)

Males	Spouse/Females
Miguel Antonio Aragón	Antonia Rita Chávez
Jose Agustin Cháves	María Barvara Aragón
Alexandro Chávez	María Josefa Aragón
José García	María Margarita Aragón
Santiago Zamora	
	María Barvara Molina
José Ygnacio Molina	Ana María Obrero
Juan Domingo Maldonado	María Manuela Aragón

Table 3. Fill from west-side auger tests

Auger Test	Depth below Ground Surface (cm)	Description
AT1	0-8	tan/brown sand
	8-20	grass covered by fill and darker A horizon gray brown sand; bottle glass
	20-35	clean red sand
	35-40	clayier red sand with white precipitates
	40-50	overbank deposits of red brown sand and lumps of gray clayey silt; gray ware sherd near base
	50-62	cultural layer, grayish sandy clay
	62-100	darker gray sandy clay with much charcoal and some rust; red-on-tan ceramic at 95 cm
	101-120	clean large-grained gray sand with rust
	120-125+	dark purplish gray clay, probably gleyed
AT2	0-25	disturbed red silty sand with charcoal flecks and white clay inclusions; brown bottle glass
	25-30	fine red sand
	30-40	gray sandy clay with charcoal; plain gray sherd
	40-45	red clayey sand; smudged red ware sherd
	45-56+	clean red overbank silt
AT3	0-25	red silty sand with precipitates
	25-38	grayer, clean soil with charcoal flecks
	38-65	gray clayey sand with moderate amounts of charcoal; tan sherd at 60 cm, black sherd at 63 cm
	65-76	clean gray sand with rust
	76-83+	clean red overbank silt

Table 4. East side comparative layer and elevation information (m below site datum)

Fill Type Excavation Unit	Disturbed Strata	Upper Cultural Layer (Alluvial)	Lower Cultural Layer (Gleyed)	Sterile Natural Fill below Cultural Fill
Greene profile	Strata 1 & 2 .15 bd	Stratum 3 .65 bd	Stratum 4 1.10+ bd	
Intersection BHT4 and BHT5	Layers 1-3 .15 bd	Layer 5 .50 bd	Layer 6 1.20+ bd	Layers 7-10
BHT6	Layer 1 .50 bd	Layers 2-3 1.05 bd	Layer 4? 1.10 bd	Layers 5-9
186-187N 209E	Layers 1-2 .30 bd	Layer 3 .45 bd		Layer 4
166N 200E	Layers 1-3 .40 bd	Layer 4 .90	Layer 5 1.05 bd	Layer 6
185N 203-204E	Layers 1-2 .30 bd	Layer 3 .65 bd	Layers 6-7 1.60 bd	Layer 8
180N 206E			Layer 6 1.50 bd	
ALR3	Layers 1-2 .40 bd	Layer 3 .60 bd		Layers 4-5

Table 5. Artifact counts for analytic units

Material	Disturbed		Upper Cultural		South Area (St. 5)	Lower Cultural (St. 6)
	East (St. 1)	West (St. 2)	East (St. 3)	West (St. 4)		
Native Ceramics: Prehistoric wares	4	2	21	5	1	19
Glaze wares	9		7	1	2	14
Local historic plain	592	148	1956	348	316	1674
Other historic plain	12	4	37	6	7	23
Local polychrome						1
Tewa-style polychrome	9		15			82
Puname region polychrome	2	3	5	1	1	6
Western polychrome	9	1	30	2	8	9
Total Native Ceramics	634 11.8%	158 2.9%	2071 38.4%	363 6.7%	335 6.2%	1828 33.9%
Chipped Stone: Debitage	47	5	42	8	1	44
Cores			2			3
Strike-a-light	5		11		3	7
Gunflint						1
Drill and Biface			1			1

Material	Disturbed		Upper Cultural		South Area (St. 5)	Lower Cultural (St. 6)
	East (St. 1)	West (St. 2)	East (St. 3)	West (St. 4)		
Total Chipped Stone	52 28.7%	5 2.8%	56 30.9%	8 4.4%	4 2.2%	56 30.9%
Ground Stone	1 12.5%	1 12.5%	2 25.0%	1 12.5%	1 12.5%	2 25.0%
Historic Artifacts: Recent Glass Old Glass	 4 2	 563	 4	 28		 1 2
Majolica	7	4	19	4	8	28
Mexican Glaze Ware		1			12	1
Porcelain					18	
Other ceramic	2					
Ferrous metal		24	2			
Other metal	1		5		2	1
Slag		3	8			4
Other		4				6
Total Historic: % without recent glass and cans	17 (13) 9.1%	612 (12) 8.4%	38 (32) 22.4%	32 (4) 2.8%	40 (40) 28.0%	43 (42) 29.4%
Fauna: Unidentified	 76	 68	 983	 127	 145	 2106
Small-medium mammal		5	1			6
Artiodactyl	38	55	740	147	79	1701
Bird	1		28	1	2	56
Eggshell			7	16	184	36
Other			3	2		3
Total Fauna	115 1.8%	123 1.9%	1766 26.7%	294 4.4%	410 6.2%	3908 59.1%

Table 6. Ceramic ware groups

Ware	Number	Percent
Prehistoric utility ware	12	.2
Prehistoric white ware	40	.7
Glaze ware	33	.6
Local historic plain ware	5034	93.4
Other historic plain ware	89	1.7
Local polychrome	1	
Tewa-style polychrome	105	1.9
Puname-region polychrome	18	.3
Western polychrome	57	1.1
Total	5389	

Table 7. Ceramic types

Type	Number	Percent
Corrugated	6	.1
Corrugated banded	1	
Los Lunas Smudged	2	
Reserve Smudged	1	
Plain corrugated (Mogollon)	2	
Kwahe'e Black-on-white	2	
Puerco/Escavada Black-on-white	1	
Tularosa Black-on-white	1	
Scocorro Black-on-white	4	
Santa Fe Black-on-white	5	.1
Galisteo Black-on-white	1	
Unpainted white ware	12	.2
White ware indeterminate paint	3	.1
Mineral on white	6	.1
Organic on white	5	.1
Glaze-on-red	9	.2
Agua Fria Glaze-on-red	1	
Heshotauthla Glaze-on-red	3	.1
Glaze-on-yellow	13	.2
Glaze-on-brown-tan	1	
Glaze-on-red and red matte	1	
Glaze-on-brown and red matte	1	
Glaze-on-red and white with red matte	1	
Western glaze paint indeterminate	2	
Pinnawa Glaze	1	
Historic plain (Carnue) utility	2969	55.1
Carnue Plain Striated	1	
Isleta Red-on-tan	594	11.0
Buff/tan utility	1058	19.6
Smudged black ware	118	2.2
Valencia White Slipped	294	5.5

Type	Number	Percent
Plain micaceus utility	22	.4
Kapo Black	67	1.2
Western-style local paste	1	
Biscuit B	1	
Ogapoge Polychrome	4	.1
Powhoge Polychrome	6	.1
Powhoge-style polychrome	20	.4
Tewa Polychrome series, undfferentiated	41	.8
Tewa Polychrome, southern variety	33	.6
Puname area polychrome	6	.1
Puname Polychrome	5	.
Puname basalt, western paste	1	
Santa Ana area polychrome	6	.1
Western-area matte-painted undifferentiated	9	.2
Acomita Polychrome	22	.4
Western area (unpainted)	14	.3
Western-area mineral-on-white	2	
Western-area red rim white slip	1	
Western-area red slip unpainted	7	.1
Western-area red rim white slip	1	
Unknown yellow polychrome	1	
Total	5389	

Table 8. Temper of prehistoric utility ware types

Temper	Plain Corrugated Mogollon	Reserve Smudged	Corrugated	Los Lunas Smudged	Corrugated Banded
Sandstone	2 100.0%	1 100.0%	5 83.3%		
Sherd			1 16.7%		
Igneous rock and sand					1 100.0%
Quartz sand and sherd				1 50.0%	
Sandstone and gold mica				1 50.0%	
Totals	2 100.0%	1 100.0%	6 100.0%	2 100.0%	1 100.0%

Table 9. Vessel form of prehistoric utility ware types

Form	Plain Corrugated Mogollon	Reserve Smudged	Corrugated	Los Lunas Smudged	Corrugated Banded
Bowl body			6 100.0%		
Jar body	1 50.0%				
Bowl or jar body	1 50.0%	1 100.0%		2 100.0%	1 100.0%
Totals	2 100.0%	1 100.0%	6 100.0%	2 100.0%	1 100.0%

Table 10. Temper of prehistoric white ware types

Type	Indeter-minate	Sand	Sherd	Igneous, sand, sherd	Quartz sand, sherd	Igneous, sherd, blocky paste	Pumice, tuff, sand, fine paste	Pumice, tuff	Granite, white opaque crystals	Totals
Puerco/Escavada Black-on-white					1 100.0%					1 100.0 %
Socorro Black-on-white			2 50.0%		2 50.0%					4 100.0 %
Tularosa Black-on-white			1 100.0%							1 100.0 %
Unpainted white	1 8.3%	1 8.3%	8 66.7%	1 8.3%		1 8.3%				12 100.0 %
Mineral-on-white			5 83.3%		1 16.7%					6 100.0 %
White ware, indeterminate			2 66.7%		1 33.3%					3 100.0 %
Kwahe'e Black-on-white					1 50.0%	1 50.0%				2 100.0 %
Organic-on-white						1 20.0%	1 20.0%	2 40.0%	1 20.0%	5 100.0 %
Santa Fe Black-on-white			4 80.0%					1 20.0%		5 100.0 %
Galisteo Black-on-white			1 100.0%							1 100.0 %

Table 11. Vessel form of prehistoric white ware types

Type	Bowl Rim	Bowl Body	Cooking/ Storage Jar Neck	Jar Body	Bowl or Jar Body	Bowl or Jar Rim	Totals
Puerco/Escavada Black-on-white		1 100.0%					1 100.0%
Socorro Black-on-white		2 50.0%		2 50.0%			4 100.0%
Tularosa Black-on-white		1 100.0%					1 100.0%
Unpainted white		4 33.3%		6 50.0%	1 8.3%	1 8.3%	12 100.0%
Mineral-on-white		2 33.3%		3 50.0%	1 16.7%		6 100.0%
White ware, indeterminate		2 66.7%	1 33.3%				3 100.0%
Kwahe'e Black-on-white				2 100.0%			2 100.0%
Organic-on-white	1 20.0%	3 60.0%		1 20.0%			5 100.0%
Santa Fe Black-on-white		5 100.0%					5 100.0%
Galisteo Black-on-white	1 100.0%						1 100.0%

Table 12. Temper of glaze ware types

Temper	Pinnawa Polychrome	Western Glaze	Glaze-on-red	Glaze-on-yellow	Glaze-on-brown/tan	Glaze-on-red, red matte	Glaze-on-brown, red matte	Heshotauthla Glaze-on-red	Agua Fria Glaze-on-red
Indeterminate				1 7.7%					
Sandstone			2 20.0%		1 100.0%				
Sherd		2 100.0%							
Igneous, sand, sherd			1 10.0%						
Quartz sand and sherd				2 15.4%					
Igneous and sherd, blocky paste				2 15.4%			1 100.0%		
Pumice and tuff				1 7.7%					
Black basalt				1 7.7%					1 100.0%
Sand, blocky paste						1 100.0%			
Granite, white opaque and crystals				4 30.8%				3 100.0%	
Andesite/diorite				1 7.7%					
Sandstone and sherd	1 100.0%			1 7.7%					
Igneous			7 70.0%						
Totals	1 100.0%	2 100.0%	10 100.0%	13 100.0%	1 100.0%	1 100.0%	1 100.0%	3 100.0%	1 100.0%

Table 13. Vessel form of prehistoric glaze ware types

Temper	Pinnawa Polychrome	Western Glaze	Glaze-on-red	Glaze-on-yellow	Glaze-on-brown/tan	Glaze-on-red, red matte	Glaze-on-brown, red matte	Heshotauthla Glaze-on-red	Agua Fria Glaze-on red
Bowl rim		1 50.0%		1 7.7%					1 100.0%
Bowl body	1 100.0%	1 50.0%	1 10.0%	2 15.4%			1 100.0%	3 100.0%	
Cooking/ storage jar rim			2 20%						
Cooking/ storage jar neck			1 10%						
Jar body			6 60%	10 76.9%	1 100.0%	1 100.0%			
Total	1 100.0%	2 100.0%	10 100.0%	13 100.0%	1 100.0%	1 100.0%	1 100.0%	3 100.0%	1 100.0%

Table 14. Temper of local plain ware types

Temper	Smudged Black	Camue Plain Striated	Camue Utility	Buff/tan Utility	Valencia White	Isleta Red-on-tan
Indeterminate			4 .1%	5 .5%		1 .2%
None			1 .0%			
Sand with white particles			19 .6%	16 1.5%	2 .7%	2 .3%
Quartz sand with tuff spicules	3 2.5%					
Sand	24 20.3%		799 26.9%	197 18.6%	76 25.9%	109 18.4%
Self-tempered, silty	2 1.7%	1 100.0%	49 1.7%	41 3.9%	1 .3%	19 3.2%
Sandstone	53 44.9%		1094 36.9%	342 32.3%	120 40.8%	125 21.0%
Sherd			8 .3%	1 .1%	5 1.7%	6 1.0%
Igneous and sand	4 3.4%		81 2.7%	20 1.9%	2 .7%	11 1.9%
Igneous, sand, sherd			25 .8%	12 1.1%	2 .7%	8 1.3%
Quartz sand and sherd	2 1.7%		68 2.3%	29 2.7%	3 1.0%	22 3.7%
Igneous and sherd, blocky paste			1 .0%	2 .2%		5 .8%

Temper	Smudged Black	Carnue Plain Striated	Carnue Utility	Buff/tan Utility	Valencia White	Isleta Red-on-tan
Pumice, tuff, and sand, fine paste	4 3.4%		69 2.3%	150 14.2%	13 4.4%	110 18.5%
Pumice and tuff	9 7.6%		40 1.3%	134 12.7%	7 2.4%	112 18.9%
Black basalt			9 .3%	5 .5%	4 1.4%	2 .3%
Sand with shale	1 .8%		1 .0%	1 .1%		
Sand, blocky paste	2 1.7%		51 1.7%	9 .8%	6 2.0%	
Granite, white opaque and crystals	9 7.6%		539 18.2%	58 5.5%	49 16.7%	42 7.1%
Volcanic tuff crystals with sand			36 1.2%	7 .7%		4 .7%
Sand/crystals (?) in dark brown paste	3 2.5%		46 1.5%	2 .2%		
Andesite/diorite						1 .2%
Sand, sherd (?) in melted brown paste			4 .1%			
Sand and mica	1 .8%		10 .3%	19 1.8%	3 1.0%	5 .8%
Sandstone and sherd			5 .3%	2 .2%		1 .2%
Pumice, tuff, sherd				1 .1%	1 .3%	
Quartz sand and tuff			1 .0%	1 .1%		1 .2%
Sand and scoria	1 .8%		1 .0%			1 .2%
Pumice/tuff and mica			1 .0%	4 .4%		5 .8%
Sand and shell				1 .1%		
Igneous			2 .1%			2 .3%
Sandstone and gold mica			4 .1%			
Totals	118 100.0%	1 100.0%	2968 100.0%	1059 100.0%	294 100.0%	594 100.0%

Table 15. Vessel form of local plain ware types

Form	Smudged Black	Carnue Plain Striated	Carnue Utility	Buff/tan Utility	Valencia White	Isleta Red-on-tan
Indeterminate			5 .2%	2 .2%		
Bowl rim	11 9.3%		125 4.2%	95 9.0%	23 7.8%	166 27.9%
Bowl body	24 20.3%		1664 56.1%	787 74.3%	155 52.7%	222 37.4%
Seed jar rim			2 .1%			
Cooking/storage jar rim	9 7.6%		119 4.0%	8 .8%	2 .7%	11 1.9%
Cooking/storage jar neck	1 .8%		24 .8%	5 .5%	5 1.7%	15 2.5%
Ringed base			1 .0%			
Jar body	64 54.2%		857 28.9%	116 11.0%	69 23.5%	134 22.6%
Jar base			1 .0%			
Bowl or jar body	7 5.9%		113 3.8%	22 2.1%	38 12.9%	10 1.7%
Open gourd dipper	1 .8%					
Candlestick holder				1 .1%		9 1.5%
Soup bowl body				2 .2%	1 .3%	
Pinch pit/no coils			7 .2%	1 .1%		
Bowl base & wall				1 .1%		
Pinch pot rim			1 .0%			
Jar with handle stub						1 .2%
Shallow bowl w flared rim			1 .0%			
Candlestick holder rim?			1 .0%			
Pitcher handle						1 .2%
Indeterminate base			1 .0%			

Form	Smudged Black	Camue Plain Striated	Camue Utility	Buff/tan Utility	Valencia White	Isleta Red-on-tan
Tray base and sides			2 .1%			
Indeterminate handle stub			1 .0%			
Bowl or jar rim	1 .8%		35 1.2%	13 1.2%	1 .3%	11 .9%
Soup bowl rim		1 100.0%	1 .0%	4 .4%		13 2.2%
Cylindrical base			1 .0%	1 .1%		
Miniature bowl rim			4 .1%	1 .1%		1 .2%
Miniature olla/jar neck			2 .1%			
Totals	118 100.0%	1 100.0%	2968 100.0%	1059 100.0%	294 100.0%	594 100.0%

Table 16. Temper of other historic utility ware types

Temper	Plain Micaceous Utility	Kapo Black
Sand with white particles		1 1.5%
Sand		10 14.9%
Self-tempered, silty		4 6.0%
Sandstone		6 8.9%
Igneous and sand	2 9.0%	2 3.0%
Quartz sand and sherd		1 1.5%
Igneous and sherd, blocky paste		1 1.5%
Pumice, tuff, sand, fine paste		22 32.8%
Pumice and tuff		14 21.0%
Granite, white opaque and crystals		4 6.0%
Mica schist	20 90.9%	
Sand and mica		1 1.5%
Pumice/tuff and mica		1 1.5%
Totals	22 100.0%	67 100.0%

Table 17. Vessel form of other historic utility ware types

Form	Plain Micaceous Utility	Kapo Black
Bowl rim		4 6.0%
Bowl body	4 18.2%	11 16.4%
Cooking/storage jar neck		1 1.5%
Jar body	11 50.0%	49 73.1%
Bowl or jar body	7 31.8%	1 1.5%
Pitcher handle		1 1.5%
Totals	22 100.0%	67 100.0%

Table 18. Temper of Tewa Polychrome types

Temper	Biscuit B	Kiua Polychrome	Tewa Polychrome, southern	Ogapoge Polychrome	Powhoge Polychrome	Powhoge-Style Polychrome	Tewa Polychrome series
Sand							3 7.3%
Sandstone	1 100.0%						4 9.8%
Igneous and sand							1 2.4%
Igneous, sand, sherd			2 6.1%				
Pumice, tuff, sand, fine paste			4 12.1%		1 16.7%		10 24.4%
Pumice and tuff		1 100.0%	19 57.6%	4 100.0%	5 83.3%	17 85.0%	22 53.7%
Black Basalt			2 6.1%				
Granite, white opaque and crystals			1 3.0%				
Pumice/tuff and mica			5 15.2%			3 15.0%	1 2.4%
Totals	1 100.0%	1 100.0%	33 100.0%	4 100.0%	6 100.0%	20 100.0%	41 100.0%

Table 19. Vessel form of Tewa Polychrome types

Temper	Biscuit B	Kiua Polychrome	Tewa Polychrome, southern	Ogapoge Polychrome	Powhoge Polychrome	Powhoge-Style Polychrome	Tewa Polychrome series
Bowl rim			13 39.4%	3 75.0%	1 16.7%	7 35.0%	14 34.1%
Bowl body	1 100.0%		12 36.4%		4 66.7%	4 20.0%	17 41.5%
Cooking/storage jar rim						1 5.0%	
Cooking/storage jar neck							1 2.4%
Jar body		1 100.0%	8 24.2%		1 16.7%	5 25.0%	7 17.1%
Bowl or jar body							1 2.4%
Shouldered bowl body						1 5.0%	
Soup bowl body						2 10.0%	
Soup bowl rim				1 25.0%			1 2.4%
Totals	1 100.0%	1 100.0%	33 100.0%	4 100.0%	6 100.0%	20 100.0%	41 100.0%

Table 20. Temper of Puname-area types

Temper	Santa Ana-Area Polychrome	Puname-Area Polychrome	Puname Polychrome	Puname, Western Paste
Sand	1 16.7%			
Sandstone	3 50.0%			
Pumice, tuff, sand, fine paste		1 16.7%		
Black basalt		5 83.3%	5 100.0%	1 100.0%
Granite, white opaque and crystals	1 16.7%			
Sand and mica	1 16.7%			
Totals	6 100.0%	6 100.0%	5 100.0%	1 100.0%

Table 21. Vessel form of Puname-area types

Form	Santa Ana-Area Polychrome	Puname-Area Polychrome	Puname Polychrome	Puname, Western Paste
Bowl rim	1 16.7%			
Bowl body	3 50.0%	2 33.3%		
Cooking/storage jar neck	1 16.7%			
Jar body	1 16.7%	4 66.7%	5 100.0%	1 100.0%
Totals	6 100.0%	6 100.0%	5 100.0%	1 100.0%

Table 22. Temper of western polychrome types

Temper	Western Matte Painted	Acomita Polychrome	Western Unpainted	Western Mineral-on-white	Western Red Rim White Slip	Western Red Slip Unpainted	Yellow Ware
Sand	3 33.3%						
Sandstone	1 11.1%		1 7.1%				
Sherd	3 33.3%		7 50.0%			5 71.4%	
Igneous, sand, sherd			1 7.1%				
Quartz sand and sherd	2 22.2%	21 95.5%	4 28.6%		1 100.0%	2 28.6%	
Igneous and sherd, blocky paste		1 4.5%					
Black basalt							1 100.0%
Volcanic tuff crystals with sand				1 50.0%			
Sand/crystals (?) in dark brown paste				1 50.0%			
Sandstone and sherd			1 7.1%				
Totals	9 100.0%	22 100.0%	14 100.0%	2 100.0%	1 100.0%	7 100.0%	1 100.0%

Table 23. Distribution of vessel forms for western polychrome types

Form	Western Matte Painted	Acomita Polychrome	Western Unpainted	Western Mineral-on-white	Western Red Rim White Slip	Western Red Slip Unpainted	Yellow Ware
Bowl rim	1 11.1%		1 7.1%		1 100.0%		1 100.0%
Bowl body	1 11.1%		6 42.9%	1 50.0%		2 28.6%	
Cooking/storage jar rim	1 11.1%	2 9.1%		1 50.0%			
Cooking/storage jar neck		1 4.5%				3 42.9%	
Jar body	5 55.6%	19 86.4%	7 50.0%			2 28.6%	
Bowl or jar body	1 11.1%						
Total	9 100.0%	22 100.0%	14 100.0%	2 100.0%	1 100.0%	7 100.0%	1 100.0%

Table 24. Comparison of ceramic types by stratum

Type	Disturbed		Upper Cultural		South Area/ Feature 1	Lower Cultural
	East	West	East	West		
Plain corrugated (Mogollon)			1 .0%			1 .1%
Reserve Smudged			1 .0%			
Corrugated			4 .2%			2 .1%
Los Lunas Smudged				1 .3%		1 .1%
Corrugated banded						1 .1%
Puerco/Escavada Black-on-white						1 .1%
Socorro Black-on-white			2 .1%	1 .3%		1 .1%
Tularosa Black-on-white						1 .1%
Unpainted white ware			7 .3%	1 .3%		4 .2%
Mineral-on-white		1 .6%	2 .1%	2 .6%		1 .1%
White ware, indeterminate						3 .2%

Type	Disturbed		Upper Cultural		South Area/ Feature 1	Lower Cultural
	East	West	East	West		
Kwahe'e Black-on-white			1 .0%			1 .1%
Organic-on-white			2 .1%		1 .3%	2 .1%
Santa Fe Black-on-white	4 .6%		1 .0%			
Galisteo Black-on-white		1 .6%				
Pinnawa Glaze Polychrome				1 .3%		
Western glaze paint			1 .0%		1 .3%	
Glaze-on-red			1 .0%			9 .5%
Glaze-on-yellow	6 .9%		2 .1%			5 .3%
Glaze-on-brown/tan			1 .0%			
Glaze-on-red with Red Matte			1 .0%			
Glaze-on-brown with Red Matte			1 .0%			
Heshotauthla Glaze-on-red	3 .5%					
Agua Fria Glaze-on-red					1 .3%	
Smudged black ware	11 1.7%	2 1.3%	64 3.1%	7 1.9%	10 3.0%	24 1.3%
Carnue Plain Striated						1 .1%
Carnue Utility	321 50.6%	96 60.8%	1034 49.9%	217 59.8%	184 54.9%	1116 61.1%
Buff/tan utility	130 20.5%	30 19.0%	503 24.3%	71 19.6%	59 17.6%	266 14.6%
Valencia White	66 10.4%	2 1.3%	56 2.7%	6 1.7%	1 .3%	163 8.9%
Isleta Red-on-tan	64 10.0%	18 11.4%	299 14.4%	47 12.9%	62 18.5%	104 5.7%
Plain micaceous utility	6 .9%	1 .6%		2 .6%		13 .7%
Kapo Black	6 .9%	3 1.9%	37 1.8%	4 1.1%	7 2.1%	10 .5%
Western-style local paste						1 .1%

Type	Disturbed		Upper Cultural		South Area/ Feature 1	Lower Cultural
	East	West	East	West		
Biscuit B	1 .2%					
Kiua Polychrome						1 .1%
Tewa Polychrome (southern variety)	1 .2%		4 .2%			28 1.5%
Ogapoge Polychrome	1 .2%					3 .2%
Powhoge Polychrome			1 .0%			5 .3%
Powhoge-style Polychrome	2 .3%					18 1.0%
Tewa Polychrome series	4 .6%		10 .5%			27 1.5%
Santa Ana-area Polychrome	1 .2%		2 .1%	1 .3%	1 .3%	1 .1%
Puname-area Polychrome	1 .2%	3 1.9%	1 .0%			1 .1%
Puname Polychrome			1 .0%			4 .2%
Puname basalt, western paste			1 .0%			
Western-area matte-painted	2 .3%		4 .2%		1 .3%	2 .1%
Acomita Polychrome			21 1.0%			1 .1%
Western area (unpainted)	1 .2%	1 .6%	3 .1%	2 .6%	5 1.5%	2 .1%
Western-area mineral-on-white					2 .6%	
Western-area red rim white slip						1 .1%
Western-area red slip unpainted	2 .3%		2 .1%			3 .2%
Yellow polychrome	1 .2%					
Totals % total sherds	634 11.8%	158 2.9%	2071 38.4%	363 6.7%	335 6.2%	1828 33.9%

Table 25. Comparison of ceramic group by stratum

Type	Disturbed		Upper Cultural		South Area, Feature 1	Lower Cultural
	East	West	East	West		
Prehistoric utility wares			6 .3%	1 .3%		5 .3%
Prehistoric white wares	4 .6%	2 1.3%	15 .7%	4 1.1%	1 .3%	14 .8%
Glaze wares	9 1.4%		7 .3%	1 .3%	2 .6%	14 .8%
Local historic plain wares	592 93.4%	148 93.7%	1956 94.4%	348 95.9%	316 94.3%	1674 91.6%
Other historic plain wares	12 1.9%	4 2.5%	37 1.8%	6 1.7%	7 2.1%	23 1.3%
Local polychromes						1 .1%
Tewa-style polychromes	9 1.4%		15 .7%			82 4.5%
Puname-area polychromes	2 .3%	3 1.9%	5 .2%	1 .3%	1 .3%	6 .3%
Western polychromes	9 .9%	1 .6%	30 1.4%	2 .6%	8 2.4%	9 .5%
Totals % of sherds	634 11.8%	158 2.9%	2071 38.4	363 6.7%	335 6.2%	1828 33.9%

Table 26. Ceramic categories by stratum type (frequencies and column percentages)

Ceramic Category	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Prehistoric wares	15 1.9	34 1.4	36 1.7	85 1.6
Historic decorated wares	171 21.6	461 18.9	437 20.2	1,069 19.8
Polished black wares	22 2.8	112 4.6	51 2.4	185 3.4
Historic micaceous wares	7 0.9	2 0.1	13 0.6	22 0.4
Historic plain wares	577 72.9	1,825 75.0	1,626 75.9	4,028 74.7
Totals Percent	792 14.7	2,434 45.2	2,163 40.1	5,389 100.0

Table 27. Material by stratum type, Euroamerican and other imported artifacts (frequencies and column percentages)

Material Class	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Ceramic	14 2.2	23 32.9	67 80.7	104 13.3
Glass	569 90.5	32 45.7	3 3.6	604 77.2
Metal	39 6.2	7 10.0	2 2.4	48 6.1
Plastic/rubber	2 0.3	0 0.0	2 2.4	4 0.5
Slag	3 0.5	8 11.4	4 4.8	15 1.9
Other	2 0.3	0 0.0	5 6.0	7 0.9
Totals Percent	629 80.4	70 9.0	83 10.6	782 100.0

Table 28. Chipped stone artifacts by stratum type (frequencies and column percentages)

Artifact Type	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Angular debris	16 28.1	13 20.3	13 21.7	42 23.2
Flakes	36 63.2	37 57.8	33 55.0	106 58.6
Strike-a-light flakes	0 0.0	2 3.1	0 0.0	2 1.1
Strike-a-light flints	5 8.8	9 14.1	10 16.7	24 13.3
Cores	0 0.0	2 3.1	2 3.3	4 2.2
Drills	0 0.0	0 0.0	1 1.7	1 0.6
Gunflints	0 0.0	0 0.0	1 1.7	1 0.6
Bifaces	0 0.0	1 1.6	0 0.0	1 0.6
Totals Percent	57 31.5	64 35.4	60 33.1	181 100.0

Table 29. Chipped stone materials by stratum type (frequencies and column percentages)

Material Type	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Chert	39 68.4	42 65.6	34 56.7	115 63.5
Pedernal chert	4 7.0	2 3.1	6 10.0	12 6.6
Chalcedony	0 0.0	0 0.0	1 1.7	1 0.6
Silicified wood	0 0.0	2 3.1	2 3.3	4 2.2
Obsidian	1 1.8	5 7.8	1 1.7	7 3.9
Basalt	1 1.8	2 3.1	1 1.7	4 2.2
Rhyolite	9 15.8	9 14.1	10 16.7	28 15.5
Andesite	2 3.5	0 0.0	1 1.7	3 1.7
Limestone	0 0.0	1 1.6	1 1.7	2 1.1
Quartzite	1 1.8	0 0.0	2 3.3	3 1.7
Massive quartz	0 0.0	1 1.6	1 1.7	2 1.1
Totals Percent	57 31.5	64 35.4	60 33.1	181 100.0

Table 30. Chipped stone material texture by material type (frequencies and row percentages)

Material type	Glassy	Fine-grained	Medium-grained	Totals
Chert	0 0.0	129 97.7	3 2.3	132 72.9
Obsidian	7 100.0	0 0.0	0 0.0	7 3.9
Nonaphanitic igneous	0 0.0	17 60.7	12 42.9	29 16.2
Aphanitic igneous	0 0.0	6 100.0	0 0.0	6 3.3
Limestone	0 0.0	1 50.0	1 50.0	2 1.1
Crystalline quartz	0 0.0	1 20.0	4 80.0	5 2.8
Totals Percent	7 3.9	154 85.1	20 11.0	181 100.0

Table 31. Material texture by stratum type (frequencies and column percentages)

Material Quality	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Fine-grained/glassy	54 94.7	60 93.8	47 78.3	161 89.0
Medium-grained	3 5.3	4 6.3	13 21.7	20 11.0
Totals Percent	57 31.5	64 35.4	60 33.1	181 100.0

Table 32. Material quality by stratum type (frequencies and column percentages)

Material Quality	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Sharp cutting edges	48 84.2	53 82.8	45 75.0	146 80.7
Durable	9 15.8	11 17.2	15 25.0	35 19.3

Table 33. Dorsal cortex on flakes by stratum type (frequencies and column percentages)

Cortex Percentage Range	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
0 percent	25 65.8	30 71.4	21 58.3	76 65.5
1 to 20 percent	4 10.5	2 4.8	5 13.9	11 9.5
21 to 40 percent	1 2.6	3 7.1	3 8.3	7 6.0
41 to 60 percent	1 2.6	2 4.8	2 5.6	5 4.3
61 to 80 percent	2 5.3	1 2.4	1 2.8	4 3.4
81 to 100 percent	5 13.2	4 9.5	4 11.1	13 11.2
Totals Percent	38 32.8	42 36.2	36 31.0	116 100.0

Table 34. Dorsal cortex on flakes by material type (frequencies and row percentages)

Material Type	0% Cortex	1-49% Cortex	50-100% Cortex
Chert	49 66.2	11 14.9	14 18.9
Pedernal chert	7 87.5	1 12.5	0 0.0
Chalcedony	1 100.0	0 0.0	0 0.0
Silicified wood	2 100.0	0 0.0	0 0.0
Obsidian	1 50.0	1 50.0	0 0.0
Basalt	1 33.3	2 66.7	0 0.0
Red rhyolite	1 50.0	0 0.0	1 50.0
Gray rhyolite	8 61.5	1 7.7	4 30.8
Gray aphanitic rhyolite	1 33.3	0 0.0	2 66.7
Yellow aphanitic rhyolite	2 100.0	0 0.0	0 0.0
Andesite	1 33.3	0 0.0	2 66.7
Limestone	1 100.0	0 0.0	0 0.0
Quartzite	0 0.0	1 100.0	0 0.0
Massive quartz	1 100.0	0 0.0	0 0.0

Table 35. Flake portion by stratum (frequencies and column percentages)

Portion	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Whole	9 23.7	25 56.8	16 44.4	50 42.4
Proximal	8 21.1	10 22.7	5 13.9	23 19.5
Medial	6 15.8	3 6.8	5 13.9	14 11.9
Distal	12 31.6	4 9.1	6 16.7	22 18.6
Lateral	3 7.9	2 4.5	4 11.1	9 7.6
Totals Percent	38 32.2	44 37.3	36 30.5	118 100.0

Table 36. Platform type on flakes by stratum (frequencies and column percentages)

Platform Type	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Cortical	3 7.9	3 70.1	5 13.9	11 9.5
Single facet	4 10.5	11 26.2	8 22.2	23 19.8
Multifacet	2 5.3	11 26.2	5 13.9	18 15.5
Retouched	0 0.0	1 2.4	0 0.0	1 0.9
Collapsed	7 18.4	8 19.0	3 8.3	18 15.5
Crushed	3 7.9	0 0.0	0 0.0	3 2.6
Absent	10 26.3	3 7.1	9 25.0	22 19.0
Broken in manufacture	9 23.7	4 9.5	4 11.1	17 14.7
Obscured	0 0.0	1 2.4	2 5.6	3 2.6
Totals Percent	38 32.8	42 36.2	36 31.0	116 100.0

Table 37. Average platform widths for core flakes and strike-a-light flakes by platform type

Platform Type	Core Flakes	Strike-a-light Flakes
Cortical	6.76	
Single facet	3.78	3.4
Multifacet	3.70	4.3
Retouched	1.40	

Table 38. Distribution of formal and informal tools by stratum (frequencies and column percentages)

Tool Type	Disturbed Deposits	Colluvial Deposits	Gleyed Deposits	Totals
Informal debitage tools	0 0.0	3 20.0	4 25.0	7 19.4
Strike-a-light flints	5 100.0	11 73.3	10 62.5	26 72.2
Drills	0 0.0	0 0.0	1 6.3	1 2.8
Gunflints	0 0.0	0 0.0	1 6.3	1 2.8
Bifaces	0 0.0	1 6.7	0 0.0	1 2.8
Totals Percent	5 13.9	15 41.7	16 44.4	36 100.0

Table 39. Information on comparative data base for strike-a-light flint analysis

Site	Location	No. of Specimens
Agua Fria Schoolhouse (LA 2)	Santa Fe River site	5
Santa Rosa de Lima (LA 806)	Abiquiu area	2
LA 16768	Santa Fe River site	2
La Fonda Parking Lot site (LA 54000)	Santa Fe	19
La Puente (LA 54313)	Abiquiu area	120
Trujillo House (LA 59658)	Abiquiu area	67
Pedro Sánchez site (LA 65005)	San Ildefonso area	45
Vigil-Torres site (LA 77861)	Ranchos de Taos	4
Baca Larranaga site (LA 72268)	Santa Fe	26
LA 78945	Albuquerque	1
LA 83110	Ojo Caliente area	1

Table 40. Comparison of percentages of strike-a-light flint edge shape type for LA 67321 and the combined assemblage

Edge Shape	LA 67321	Combined Assemblage
No shape possible	3.2	0.6
Straight	25.8	27.4
Concavities	35.5	44.8
Convex	12.9	9.3
Irregular	4.8	2.8
Straight and concave segments	8.1	7.6
Straight, concave, and convex segments	0.0	0.3
Concave and convex segments	9.7	7.1

Table 41. Comparison of percentages of strike-a-light flint wear pattern types for LA 67321 and the combined assemblages

Wear Pattern	LA 67321	Combined Assemblages
Unidirectional retouch and wear	55.0	56.2
Bidirectional retouch and wear	3.3	4.6
Unidirectional retouch with bidirectional wear	18.3	3.5
Bidirectional retouch with unidirectional wear	2.1	1.3
Minimal use	6.7	3.9
Unidirectional wear	10.0	21.8
Bidirectional wear	1.7	8.7

Table 42. Strike-a-light flint wear pattern by edge angle for LA 67321 and the combined assemblages (number of cases)

Wear Pattern	LA 67321	Combined Assemblages
Unidirectional retouch and wear	69.4° (33)	64.2°(356)
Bidirectional retouch and wear	74.5° (2)	55.8° (29)
Unidirectional retouch with bidirectional wear	69.4° (11)	64.6° (22)
Bidirectional retouch with unidirectional wear	73.0° (3)	54.6° (8)
Minimal use	78.0° (4)	74.2° (25)
Unidirectional wear	76.2° (6)	67.9° (138)
Bidirectional wear	85.0° (1)	63.9° (55)

Table 43. Combined wear type category by edge angle interval for the entire strike-a-light assemblage (frequencies and row percentages)

Wear Category	20-39○	40-69○	70-114○	Totals
Unidirectionally retouched	34 8.1	202 48.0	185 43.9	421 61.1
Bidirectionally retouched	7 16.7	22 52.4	13 31.0	42 6.1
Minimal use	17 7.5	85 37.6	124 54.9	226 32.8
Totals	58 8.4	309 44.8	322 46.7	689 100.0

Table 44. Strike-a-light flint wear pattern category by edge shape (frequencies and column percentages)

Edge Shape	Unidirectionally Retouched	Bidirectionally Retouched	Minimal	Totals
Straight	84 20.0	9 21.4	97 42.9	190 27.6
Concavities	213 50.7	17 40.5	76 33.6	306 44.5
Convex	37 8.8	7 16.7	23 10.2	67 9.7
Irregular	12 2.9	2 4.8	7 3.1	21 3.1
Straight-concave	35 8.3	3 7.1	15 6.6	53 7.7
Concave-convex	39 9.3	4 9.5	8 3.5	51 7.4
Totals Percent	39 61.0	42 6.1	226 32.8	688 100.0

Table 45. Average strike-a-light flint edge angle for each wear pattern by edge shape

Wear Pattern	Straight	Concavities	Convex	Irregular	Straight/ Concave	Concave/ Convex	Mean
Unidirectional retouch and wear	66.5	62.8	67.7	58.2	66.2	68.4	64.6
Bidirectional retouch and wear	55.9	51.1	65.8	60.0	63.5	59.6	57.0
Unidirectional retouch and bidirectional wear	77.1	63.2	67.3	55.5	49.0	0.0	66.2
Bidirectional retouch and unidirectional wear	65.0	52.5	71.0	0.0	69.0	0.0	59.6
Minimal use	81.4	65.4	71.0	57.5	110.8	87.0	74.7
Unidirectional wear	72.8	65.1	66.8	68.5	65.5	64.3	68.5
Bidirectional wear	70.2	63.8	62.5	44.7	28.5	65.3	64.2
Mean	70.2	63.8	67.2	57.1	64.4	67.6	65.6

Table 46. Average strike-a-light flint edge angle for each wear pattern group by edge shape

Edge Shape	Unidirectionally Retouched	Bidirectionally Retouched	Minimal	Mean
Straight	67.8	57.9	73.7	70.3
Concavities	62.8	51.6	64.8	62.7
Convex	67.7	67.3	66.4	67.2
Irregular	57.8	60.0	55.1	57.1
Straight-concave	64.7	65.3	63.5	64.4
Concave-convex	68.4	59.8	67.5	67.6
Mean	64.8	57.7	68.5	65.6

Table 47. Material type selection compared for the two phases of excavation at LA 67321 (frequencies and column percentages)

Material Type	OCA Excavation	OAS Excavation	Totals
Chert	121 67.2	132 72.9	253 70.1
Obsidian	5 2.8	7 3.9	12 3.3
Basalt	4 2.2	4 2.2	8 2.2
Andesite	32 17.8	3 1.7	35 9.7
Rhyolite	0 0.0	28 15.5	28 7.8
Limestone	7 3.9	2 1.1	9 2.5
Quartzite	10 5.6	3 1.7	13 3.6
Massive quartz	0 0.0	2 1.1	2 0.6
Undifferentiated metamorphic	1 0.6	0 0.0	1 0.3
Totals Percent	180 49.9	181 50.1	361 100.0

Table 48. Artifact types compared for the two phases of excavation at LA 67321 (frequencies and column percentages)

Artifact Type	OCA Excavation	OAS Excavation	Totals
Angular debris	21 68.5	42 23.2	63 17.5
Core flakes	138 76.7	105 58.0	243 67.3
Biface flakes	1 0.6	0 0.0	1 0.3
Strike-a-light flints [1]	9 5.0	27 14.9	36 10.0
Cores	9 5.0	4 2.2	13 3.6
Formal tools	2 1.1	3 1.7	5 1.4
Totals Percent	180 49.9	181 50.1	361 100.0

1 Strike-a-light flakes included for OAS excavation.

Table 49. Platform types compared for the two phases of excavation at LA 67321, broken flakes and obscured platforms eliminated (frequencies and column percentages)

Platform Type	OCA Excavation	OAS Excavation
Cortical	30 21.6	11 10.5
Single facet	70 50.4	23 21.9
Multifacet	19 13.7	18 17.1
Retouched	0 0.0	1 1.0
Collapsed	2 1.4	18 17.1
Crushed	2 1.4	3 2.9
Absent/obscured	16 11.5	34 32.3
Totals Percent	139 57.0	105 43.0

Table 50. Comparison of Hispanic chipped stone assemblage characteristics

Site	No. of Artifacts	% Cherts	% Strike-a-light Flints	Flake: Angular Debris	% Formal Tools	% Biface Flakes
LA 2	230	79.1	0.4	1.87:1	1.7	0.4
LA 953	1,488	62.0	0.3	2.75:1	1.3	0.1
LA 16768	57	94.7	3.5	1.20:1	0.0	0.0
LA 16772	58	77.6	0.0	1.80:1	1.7	1.7
LA 54000	132	81.2	14.4	4.79:1	5.3	4.6
LA 54313	687	85.0	17.5	2.43:1	2.5	1.0
LA 59658	188	94.2	35.7	4.00:1	0.5	1.6
LA 65005	249	79.5	18.1	1.51:1	0.8	1.6
LA 67321	361	70.1	10.0	3.87:1	1.4	0.3
LA 77861	14	64.3	28.6	4.00:1	14.3	0.0
LA 83110	17	41.2	5.9	3.25:1	0.0	0.0
LA 99029	313	90.1	22.4	1.58:1	2.2	0.6
LA 67321 (OAS)	181	72.9	14.4	2.52:1	1.7	0.0
Mean	80.2	14.8	14.8	2.85:1	1.96	1.28
Standard deviation	9.7	10.9	10.9	1.16	1.41	1.37

Table 51. Comparison of flake platforms in Hispanic chipped stone assemblages

Site	Cortical	Single Facet	Multifacet	Modified	Absent/Obscured
LA 2	12.1	30.0	16.4	0.7	40.7
LA 953	22.2	41.3	2.9	0.7	32.9
LA 16768	0.0	32.3	38.7	0.0	58.1
LA 16772	10.8	43.2	5.4	2.7	37.8
LA 54000	9.9	33.0	1.1	6.6	49.5
LA 54313	11.5	39.6	2.8	2.6	43.6
LA 59658	7.8	44.5	3.9	2.3	41.4
LA 65005	10.3	25.5	16.6	2.8	44.8
LA 67321	16.8	38.1	15.2	0.4	30.7
LA 77861	0.0	33.3	22.2	0.0	44.4
LA 83110	30.8	0.0	23.1	0.0	46.2
LA 99029	12.4	30.3	23.2	1.6	32.4
LA 67321 (OAS)	9.5	19.8	15.5	0.9	54.3
Mean	12.88	35.39	10.26	2.21	39.50
Standard deviation	4.28	6.14	7.94	1.87	6.34

Table 52. Historic artifact material types

Material Types	Disturbed		Upper Cultural Layer		Lower Cultural Layer	South Area
	Stratum 1 (East)	Stratum 2 (West)	Stratum 3 (East)	Stratum 4 (West)	Stratum 6 (East)	Stratum 5
Ceramic	9	5	19	4	29	38
Glass	6	563	4	28	3	
Iron	1	7				
Steel		6				
Ferrous metal		5	2			
Indeterminate coating on ferrous metal		19				
Silver-plated nonferrous metal						1
Gold						1
Copper			5		1	
Metal and caulk	1					
Slag		3	8		4	
Stucco					1	
Plastic		2			1	
Rubber					1	
Indeterminate wood		1				
Multiple/composite		1				
Unknown					3	
Total (n=782)	17	612	38	32	43	40

Table 53. Valencia historic artifact analysis categories

	Disturbed		Upper Cultural Layer		Lower Cultural Layer	South Area
	Stratum 1 (East)	Stratum 2 (West)	Stratum 3 (East)	Stratum 4 (West)	Stratum 6 (East)	Stratum 5
Unidentifiable	6	227	18	15	10	
Economy/Production						(1)*
Foodstuffs (nonfaunal)					3	
Indulgences	1	358	1	13		
Domestic Routine	9	5	19	4	29	36
Furnishings						1
Construction/Maintenance	1	1			1	
Personal effects		21				2
Entertainment and leisure						1
Transportation						
Total (n=782)	17	612	38	32	43	40

* Reworked majolica sherd counted in domestic routine; reworked into a spindle whorl.

Table 54. Comparison of OAS and OCA ceramic assemblages from LA 67321

Type	OAS		OCA	
	Count	Percent	Count	Percent
Majolica	69	67.6	35	50.0
Refined earthenware	1	1.0	24	34.3
Porcelain	18	17.6	4	5.7
Mexican lead glaze	14	13.7	6	8.6
Semiporcelain			1	4.4
Totals	102	100.0	70	100.0

Table 55. Euroamerican ceramic counts by stratagraphic unit

Stratigraphic Unit	East of NM 47	West of NM 47
Disturbed	9	5
Upper cultural	19	4
Lower cultural	29	
South area	38	

Table 56. Valencia historic artifact ceramic types

Ceramic Type	Disturbed		Upper Cultural		Lower Cultural (Stratum 6)	South Area (Stratum 5)	Totals
	East (Stratum 1)	West (Stratum 2)	East (Stratum 3)	West (Stratum 4)			
Fig Springs Polychrome					1 3.4%		1 1.0%
Abo Polychrome					5 17.2%		5 4.8%
Castillo? Polychrome					1 3.4%		1 1.0%
Puebla Blue-on-white			2 10.5%	1 25.0%	6 20.7%		9 8.6%
San Elizario Polychrome	2 22.2%	1 20.0%	4 21.0%		7 24.1%		14 14.5%
Huejotzingo Banded	1 11.1%	1 20.0%	3 15.8%				5 4.8%
Tumacacori Polychrome				1 25.0%			1 1.0%
Unknown majolicas	4 44.4%	2 40.0%	7 36.8%	1 25.0%	5 17.2%	4 10.5%	23 22.1%
Unknown polychrome majolicas			3 15.8%	1 25.0%	3 10.3%	4 10.5%	11 10.6%
Olive jar	1 11.1%						11.0%
Mexican glaze ware		1 20.0%			1 3.4%	12 31.6%	14 13.5%
Chinese porcelain						18 47.4%	18 17.3%
Ironstone	1 11.1%						1 1.0%
Totals	9 8.6%	5 4.8%	19 18.3%	4 3.8%	29 27.9%	38 36.5%	104 100.0%

Table 57. Comparison of majolica assemblages from Cochiti and Valencia

Site/Date Type	LA 591 1600s	LA 34 1600s	LA 6178 1700s	LA 70 1700s	LA 67321
Fig Springs Polychrome	X				X
San Luis Blue-on-white	X				
Abo Polychrome		X			X
Puaray Polychrome		X			
Unidentified blue-on-white		X			X
Plain White	X		X	X	X
Puebla Blue-on-white			X	X	X
Green-on-white			X	X	X
Aranama Polychrome			X	X	?
Huejotzingo Banded			X	X	X
San Elizario Polychrome			X	X	X
Tumacacori Polychrome				X	X

Table 58. Taxa recovered from LA 67321

Taxon	Common Name or Size	Count (NISP)		MNI	
		N	%	Minimum	Maximum
Unknown small	small animal	1	.0		
Small mammal/medium to large bird	crow to rabbit size	32	.5		
Small mammal	jackrabbit or smaller	6	.1		1
Small to medium mammal	rodent to coyote size	163	2.5		
Medium mammal	jackrabbit to sheep size	3	.0		
Medium to large mammal	coyote to small deer size	1955	29.5		
Large mammal	small deer or larger	1157	17.5		
Very large mammal	elk, bison, horse size	188	2.8		
cf. *Perognathus* sp.	pocket mice	3	.0	1	1
Small rodent	woodrat or smaller	1	.0		
Sylvilagus sp.	cottontail rabbit	1	.0	1	1-2
Lepus sp.	jackrabbit	5	.1	1	1

Taxon	Common Name or Size	Count (NISP)		MNI	
		N	%	Minimum	Maximum
Canis sp.	canid, dog or coyote size	1	.0	1	1
Spilogale gracilis	spotted skunk	1	.0	1	1
Artiodactyl	sheep to cow size	9	.1		
Small artiodactyl	sheep to deer size	1029	15.6		
Large artiodactyl	elk, cow, bison, horse	276	4.2		
Bos taurus	domestic cow or oxen	138	2.1	3	9
Bos or *Bison*	cow or bison	9	.1		3
cf. *Bison bison*	bison	1	.0	1	1
Ovis aries	domestic sheep	4	.1	2	4
Ovis/Capra	domestic sheep or goat	1276	19.3	11	30
Capra hircus	domestic goat	4	.1	3	4
Sus scrofa	domestic pig	12	.2	2	2
Equus cf. *caballus*	horse	2	.0	1	2
Medium bird	quail or chicken size	8	.1		
Medium to large bird	quail or larger	6	.1		2
Duck	medium-sized duck	1	.0	1	1
Falco cf. *mexicana*	prairie falcon	2	.0	1	1
Galliformes	chicken, quail, etc.	3	.0		
Gallus gallus	domestic chicken	67	1.0	4	5
Emydinae	box and water turtles	2	.0		1
Chrysemys picata	painted turtle	1	.0	1	1
Ophidia	snakes	1	.0	1	1
Itiobus bubalus	smallmouth buffalofish	2	.0	1	1
Snail		1	.0	1	1
Bivalve		1	.0	1	1
Egg shell	chicken size	244	3.7		
Totals		6616	100.0	39	76-77

Table 59. Taxa by provenience (count/percent)

Taxon	Disturbed		Upper Cultural		Lower Cultural	South Area
	East	West	East	West		
UNKNOWNS: Small unknown			1/ .1			
Small mammal/ medium-large bird			9/ .5		22/ .6	1/ .2
Small mammal					5/ .1	1/ .2
Small-medium mammal	2/ 1.7		38/ 2.2	1/ .3	110/ 2.8	12/ 2.9
Medium mammal	2/ 1.7				1/ .0	
Medium to large mammal	43/ 37.4	50/ 40.7	540/ 30.6	105/ 35.7	1127/ 28.8	90/ 22.0
Large mammal	24/ 20.9	10/ 8.1	363/ 20.6	16/ 5.4	710/ 18.2	34/ 8.3
Very large mammal	5/ 4.3	8/ 6.5	32/ 1.8	5/ 1.7	131/ 3.4	7/ 1.7
Total unknowns	76/ 66.1	68/ 55.3	983/ 55.7	127/ 43.2	2106/ 53.9	145/ 35.4
SMALL TO MEDIUM MAMMALS: Pocket mice					3/ .1	
Small rodent					1/ .0	
Cottontail					1/ .0	
Jackrabbit			5/ .3			
Canid					1/ .0	
Skunk				1/ .3		
Total small-medium mammals	0	0	5/ .3	1/ .3	6/ .1	0
ARTIODACTYLS: Artiodactyl			8/ .5		1/ .0	
Small artiodactyl	11/ 9.6	14/ 11.4	232/ 13.1	40/ 13.6	718/ 18.4	14/ 3.4
Large artiodactyl	4/ 3.5	10/ 8.1	66/ 3.7	3/ 1.0	184/ 4.7	9/ 2.2
Cow	1/ .9	3/ 2.4	39/ 2.2	2/ .7	81/ 2.1	12/ 2.9
Cow or bison	2/ 1.7		2/ .1		5/ .1	
Bison	1/ .9					
Sheep	1/ .9		1/ .1	1/ .3	1/ .0	
Sheep or goat	18/ 15.7	28/ 22.8	379/ 21.5	100/ 34.0	708/ 18.1	43/ 10.5
Goat			2/ .1	1/ .3	1/ .0	
Pig			10/ .6		2/ .1	
Horse			1/ .1			1/ .2
Total artiodactyl	38/ 33.0	55/ 44.7	740/ 41.9	147/ 50.0	1701/ 43.5	79/ 19.3
BIRDS: Medium bird			4/ .2		5/ .1	
Medium to large bird	1/ .9			1/ .3	3/ .1	1/ .2
Duck			1/ .1			

Taxon	Disturbed		Upper Cultural		Lower Cultural	South Area
	East	West	East	West		
Falcon					2/ .1	
Galliform			1/ .1		2/ .1	
Chicken			22/ 1.2		44/ 1.1	1/ .2
Egg shell			7/ .4	16/ 5.4	36/ .9	184/ 44.9
Total bird	1/ .9	0	35/ 2.0	17/ 5.8	92/ 2.3	186/ 45.4
Turtle			1/ .1		1/ .0	
Painted turtle					1/ .0	
Snake				1/ .3		
FISH: Buffalofish			2/ .1			
INVERTEBRATES: Snail				1/ .3		
Bivalve					1/ .0	
TOTALS	115	123	1766	294	3908	410

Table 60. Environmental and animal alteration by provenience

Alteration	Disturbed		Upper Cultural		South Area	Lower Cultural	Total Site
	East	West	East	West			
ENVIRONMENTAL: Pitted	15.7	.8	3.7	1.0	1.0	.1	1.4
Checked/exfoliated	38.3	42.3	15.5	21.4	12.0	9.0	12.6
Root etched	9.6	4.9	20.4	2.7	.7	2.8	7.5
ANIMAL: Carnivore gnawing	.9		.7	1.0	1.2	.4	.5
Tooth punctures	.9		.4	.3	1.2	.5	.5
Gnawed and punctured			.3	.3		.0	.1
Scat			.2				.1
Scat (?)		1.6	.2			.0	.1

Table 61. Portion of the element represented by taxon

Taxon	N	Portion Represented (%)		
		> 75 %	25-75%	<25%
UNKNOWNS:				
Small unknown	1			100.0
Small mammal/medium to large bird	32	3.1		96.9
Small mammal	6			100.0
Small-medium mammal	163	2.4		97.5
Medium mammal	3			100.0
Medium to large mammal	1995		.2	99.8
Large mammal	1157			100.0
Very large mammal	188			100.0
SMALL TO MEDIUM MAMMALS:				
Pocket mice	3	33.3		66.7
Small rodent	1			100.0
Cottontail	1		100.0	
Jackrabbit	5	20.0	60.0	20.0
Canid	1		100.0	
Skunk	1	100.0		
ARTIODACTYLS:				
Artiodactyl	9			100.0
Small artiodactyl	1029	1.0	4.1	94.9
Large artiodactyl	276		1.1	98.9
Cow	138	11.5	13.8	74.6
Cow or bison	9		22.2	77.7
Bison	1			100.0
Sheep	4		25.0	75.0
Sheep or goat	1376	9.4	23.6	67.0
Goat	4	25.0	50.0	25.0
Pig	12	16.7	25.0	58.3
Horse	2			100.0
BIRDS:				
Medium bird	8		50.0	50.0
Medium-large bird	6		33.3	66.7
Duck	1	100.0		

Taxon	N	Portion Represented (%)		
		> 75 %	25-75%	<25%
Falcon	2	50.0	50.0	
Galliform	3		66.7	33.3
Chicken	67	35.8	43.3	20.9
HERPS: Turtle	2			100.0
Painted turtle	1			100.0
Snake	1	100.0		
FISH: Buffalofish	2			100.0
INVERTEBRATES: Snail	1	100.0		
Bivalve	1		100.0	
TOTALS	6367	2.8	6.7	90.5

Table 62. Taxon by age (only those with less than mature individuals)

Taxon	N	Neonate	Immature	Young Adult	Mature
UNKNOWNS: Small unknown	1			100.0	
Small mammal/ medium to large bird	32		3.1	12.5	86.4
Small mammal	6			16.7	83.3
Small-medium mammal	163		8.0	21,5	70.6
Medium to large mammal	1955	.2	2.2	11.5	86.2
Large mammal	1157			16.2	83.8
Very large mammal	188			5.9	94.1
SMALL TO MEDIUM MAMMALS: Pocket mice	3			33.3	66.7
Cottontail	1				100.0
Jackrabbit	5			20.0	80.0
Canid	1		100.0		
ARTIODACTYLS: Artiodactyl	9			11.9	88.9
Small artiodactyl	1029	.7	4.3	18.8	76.3
Large artiodactyl	276		1.8	20.7	77.5
Cow	138		.7	23.9	75.4
Cow or bison	9		11.1	22.2	66.7
Sheep or goat	1276	1.4	4.0	22.6	71.9
Pig	12			58.3	41.7
Birds: Medium bird	8		12.5	25.0	62.5
Medium-large bird	6		16.7	33.3	50.0
Galliform	3			33.3	66.7
Chicken	67	1.5	9.0	58.2	31.3
TOTALS	6367	.4	2.6	17.2	79.8

Neonate = newborn; immature is up to 2/3 mature size; young adult is near full size or full size with unfused epiphyses.

Table 63. Degree of burning by taxon and provenience (percent of those taxa with burning)

Taxon	Burn Degree	Disturbed		Upper Cultural		South Area	Lower Cultural
		East	West	East	West		
Small mammal/ medium-large bird	scorched			33.3			45.5
	charred			11.1			13.6
	calcine						4.5
	scorched and charred			11.1			4.5
Small mammal	scorched						40.0
	charred						20.0
	scorched and charred						20.0
Medium mammal	scorched			18.4			52.7
	charred			2.6	100.0		4.5
	calcine			26.3		16.7	6.4
	scorched and charred			2.6			1.8
Medium to large mammal	scorched	4.7	14.0	14.8	13.3	2.2	46.0
	charred	9.3		7.8		1.1	9.5
	calcine			3.0	1.9	10.0	4.2
	scorched and charred			1.1			1.7
	charred and calcine						.4
Large mammal	scorched		10.0	6.3	12.5	11.8	36.2
	charred			19.6	12.5	2.9	11.3
	calcine			1.4	6.3	26.5	12.1
	scorched and charred			1.7		5.9	.8
	charred and calcine						.3
Very large mammal	scorched		25.0	9.4			49.6
	charred			9.4			8.4
	calcine						7.6
	scorched and charred			3.1		14.3	2.3
	charred and calcine					14.3	2.3
Pocket mice	charred						100.0
Small rodent	charred						100.0
Cottontail	scorched						100.0
Artiodactyl	scorched			12.5			
	charred			75.0			
	calcine						.6
Small artiodactyl	scorched	9.1	7.1	9.9	10.0		50.1
	charred			2.6	5.0		6.4
	calcine			.4	5.0		.8
	scorched and charred			1.7			1.5
	charred and calcine						.4
Large artiodactyl	scorched	25.0	10.0	21.2			57.6
	charred			1.5			1.6
	calcine						1.6
	scorched and charred					11.1	1.1
	charred and calcine						.5
Cow	scorched			2.6			51.9
	charred			5.1			2.5
	calcine						3.7
Cow or bison	scorched						100.0
	charred	50.0					

Taxon	Burn Degree	Disturbed		Upper Cultural		South Area	Lower Cultural
		East	West	East	West		
Sheep or goat	scorched	5.6	28.6	9.8	4.0		46.6
	charred	11.1		4.5		2.3	6.6
	calcine						.6
	scorched and charred			2.1			6.4
	charred and calcine						1.0
Goat	charred						100.0
Pig	scorched			10.0			100.0
Medium bird	scorched						40.0
Medium-large bird	scorched						33.3
Falcon	scorched						100.0
Galliform	scorched						100.0
Chicken	scorched			4.5		100.0	40.9
	scorched and charred			4.5			
Turtle	scorched						100.0
Painted turtle	scorched						100.0
Sucker	charred			50.0			
	scorched and charred			50.0			
TOTALS	scorched	4.3	16.3	11.0	8.7	3.1	46.1
	charred	6.1		8.6	1.8	1.3	8.0
	calcine			1.8	1.8	8.8	4.3
	scorched and charred			1.6		1.8	2.3
	charred and calcine					.4	.5

Table 64. Body part by area for all taxa, *Ovis/Capra*, and *Bos/Bison*

Body Part	Taxa	Disturbed	Upper Cultural Level	South Area	Lower Cultural Level
Cranial	all taxa	17.4	13.7	9.7	10.8
	sheep/goat	42.2	25.8	11.6	30.0
	sheep/goat/small artiodactyl	38.6	24.7	10.5	23.8
	sheep/goat/small artiodactyl +	15.7	15.1	6.1	12.2
	cow/bison	57.1	10.0	50.0	7.3
	cow/bison +	23.5	4.8	28.6	3.8
Axial	all taxa	16.5	31.4	40.7	32.6
	sheep/goat	28.9	49.6	74.4	46.0
	sheep/goat/small artiodactyl	38.6	58.5	78.9	63.0
	sheep/goat/small artiodactyl +	16.2	29.9	42.5	30.2
	cow/bison	14.3	42.5	33.3	53.7
	cow/bison +	20.6	54.8	39.3	59.4
Front Limb	all taxa	4.2	2.7	1.3	2.4
	sheep/goat	8.9	8.4	4.7	9.0
	sheep/goat/small artiodactyl	7.1	5.6	3.5	5.2
	sheep/goat/small artiodactyl +	2.5	2.4	1.1	2.3
	cow/bison	14.3	7.5	8.3	8.5
	cow/bison +	14.7	2.1	3.6	2.3
Hind Limb	all taxa	.8	1.8	1.3	2.2
	sheep/goat	2.2	4.5	4.7	7.3
	sheep/goat/small artiodactyl	1.4	3.4	3.5	3.9
	sheep/goat/small artiodactyl +	.5	1.5	1.1	1.7
	cow/bison		12.5	8.3	12.2
	cow/bison +	2.9	4.1	3.6	3.0
Feet	all taxa	4.2	3.8	.9	2.0
	sheep/goat	17.8	10.7	4.7	7.7
	sheep/goat/small artiodactyl	12.9	7.2	3.5	3.9
	sheep/goat/small artiodactyl +	4.6	3.0	1.1	1.7
	cow/bison	14.3	27.5		18.3
	cow/bison +	2.9	8.2		4.3

Body Part	Taxa	Disturbed	Upper Cultural Level	South Area	Lower Cultural Level
Long Bone	all taxa	36.4	31.7	24.3	30.4
	sheep/goat				
	sheep/goat/small artiodactyl	1.4			.1
	sheep/goat/small artiodactyl +	37.1	33.0	24.3	31.5
	cow/bison				
	cow/bison +	29.4	17.1	21.4	16.4
Flat Bone	all taxa	20.3	14.8	21.7	19.7
	sheep/goat		1.1		
	sheep/goat/small artiodactyl		.7		
	sheep/goat/small artiodactyl +	23.4	15.2	23.8	20.4
	cow/bison				
	cow/bison +	5.9	8.9	3.6	10.8

Note: + for sheep/goat includes medium to large mammal and large mammal; + for cow/bison includes large ariodactyl and very large mammal.

Table 65. Processing by taxon and provenience (percent of taxon with that form of processing)

Taxon	Processing Type	Disturbed		Upper Cultural		South Area	Lower Cultural
		East	West	East	West		
Small mammal/bird	cuts			11.1			
Small-medium mammal	cuts			2.6			1.8
	impact			2.6		8.3	.9
	spiral break					8.3	4.5
	part removed			2.6			
	chop						.9
	abrasion						.9
	cut and snap						.9
Medium to large mammal	cuts			1.1	1.0	4.4	2.2
	impact	2.3		3.1	3.8		2.8
	spiral break	9.1		.9		4.4	4.0
	part removed		2.0	.6			.4
	chop	2.3		.2	1.0		.3
	abrasion			.2	1.9		1.3
	cut and snap			.2		3.3	.2
	bone flake			.7		1.1	
	peel						.1

Taxon	Processing Type	Disturbed		Upper Cultural		South Area	Lower Cultural
		East	West	East	West		
Large mammal	cuts	4.2		1.4		5.9	2.8
	impact	8.3		7.4		14.7	5.1
	spiral break			2.8			4.1
	part removed			.3		5.9	.6
	chop			.8			.7
	abrasion			.6			.4
	cut and snap		10.0			2.9	1.1
	bone flake			1.1		2.9	2.7
Very large mammal	cuts						6.9
	impact	40.0		12.5		28.6	8.4
	spiral break						.8
	chop						.8
	abrasion			3.1			
	part removed		12.5				
	cut and snap		12.5				1.5
	bone flake			3.1			
Small artiodactyl	cuts		7.1	3.4		7.1	5.6
	impact	9.1		.9			1.1
	spiral break						.4
	part removed			2.6	2.5		1.7
	chop			.4	5.0		.4
	abrasion			.4			.3
	cut and snap			4.3	2.5		8.8
	peel						16.7
Large artiodactyl	cuts	25.0		6.1		22.2	10.3
	impact			4.5	33.3		11.4
	spiral break						1.1
	sawn			1.5			
	part removed		10.0	1.5		22.2	4.3
	chop			3.0			4.3
	cut and snap			24.2		22.2	16.3
	split	25.0					
	peel						.5
Cow	cuts			12.8			9.9
	impact			12.8	50.0	16.7	12.3
	spiral break						2.5
	part removed			10.3		8.3	7.4
	chop			7.7			9.9
	cut and snap			12.8			22.2
	split	100.0					
	bone flake						1.2
Cow or bison	impact	50.0		50.0			
	part removed			50.0			
	chop	50.0					60.0
Bison	chop	100.0					
Sheep	cuts				100.0		

Taxon	Processing Type	Disturbed		Upper Cultural		South Area	Lower Cultural
		East	West	East	West		
Sheep or goat	cuts		3.6	7.9	6.0	4.7	8.6
	impact			7.4	4.0	11.6	5.6
	spiral break			.8			1.0
	sawn			.3	1.0		
	part removed	5.6	3.6	3.2	7.0	4.7	4.2
	chop		3.6	3.4	6.0	7.0	2.7
	chop and cut			.3		11.6	.3
	abrasion			.3			1.0
	cut and snap			4.2	4.0		7.2
	split			.3			
	peel			.3	1.0		.4
Goat	cut and snap			50.0			
Pig	cut			10.0			
	impact			30.0			
	chop			10.0			
	cut and snap						50.0
Horse	impact			100.0			
Chicken	cuts			4.5			2.3
TOTALS	cuts	1.7	1.6	3.5	2.9	4.9	4.8
	impact	6.1		5.2	3.6	6.6	4.1
	spiral break	3.5		1.0		2.2	2.4
	sawn			.1	.4		
	part removed	.9	3.3	1.6	2.9	3.1	1.7
	chop	2.6	.8	1.4	3.2	1.3	1.3
	chop and cut			.1			.1
	abrasion			.3	.7		.7
	cut and snap		1.6	2.8	1.8	4.9	4.5
	split	1.7		.1			
	bone flake			.5		.9	.5
	peel			.1	.4		.2
	total	16.5	7.3	16.7	15.9	23.9	20.3

Table 66. Secondary processing by taxon and provenience for those taxa with secondary processing

Taxon	Processing Type	Disturbed		Upper Cultural		South Area	Lower Cultural
		East	West	East	West		
Small-medium mammal	cuts						.9
Medium to large mammal	cuts			.2			.5
	impact				1.0		.7
	spiral break						.1
	abrasion						.1
	cut and snap					1.1	
	bone flake						.1
Large mammal	cuts						.3
	impact			.6			1.0
	spiral break					2.9	
	chop			.3			
	cut and snap		10.0				
Very large mammal	cuts						.8
	impact						1.5
	spiral break						1.5
	part removed						.8
Small artiodactyl	cuts						1.1
	impact			.4			.1
	spiral break						.1
	part removed			.9			
	abrasion		7.1	.9			
	cut and snap			1.3			1.1
Large artiodactyl	cuts	25.0		1.5		11.1	4.3
	impact						3.3
	spiral break			1.5			.5
	chop			3.0			
	abrasion						1.1
	cut and snap			9.1		11.1	3.8
Cow	cuts			7.7			9.9
	impact			7.7			4.9
	spiral break						1.2
	part removed					8.3	
	chop			2.6			7.4
	cut and snap			5.1			4.9
	peel						1.2
Cow or bison	cuts	50.0					
	chop	50.0					20.0
Sheep	cuts				100.0		
Sheep or goat	cuts			2.4	1.0	4.7	1.6
	impact			2.6		2.3	4.1
	spiral break			.3		2.3	1.0
	part removed			.3			.6
	chop			.3			.3
	abrasion			.3			.4
	cut and snap			1.3	1.0		2.3
	peel			.3		2.3	
TOTALS	cuts	1.7		.8	.7	1.3	1.2
	impact			.9	.4	.4	1.5
	spiral break			.1		.9	.3
	part removed			.2		.4	.1
	chop	.9		.3			.2
	abrasion		.8	.2			.2
	cut and snap		.8	.9	.4	.9	.9
	bone flake						.0
	peel			.1		.4	.0
	total	2.6	1.6	3.5	1.5	4.3	4.4

Table 67. Sheep/goat and small artiodactyl processing by body part (first and second processing types)

Element	Cuts	Impact	Spiral Break	Sawn	Portion Cut Off	Chops	Chop and Cut	Abrasion	Cut and Snap	Split	Peel
Long bone: shaft		1									
Horn: shaft									1		
Cranium	6				1	2					1
Mandible	12	13			2	3	1	5	3		1
Hyoid: shaft	1							1			
Vertebra	2				1						
Atlas	1				4				2		
Axis	3					1			2		
Cervical vertebra					7	1			2		
Thoracic vertebra	11				5				7		
Lumbar vertebra	2				11	3			8		
Sternum					1				1		
Rib: proximal	11	4			14				21		2
shaft	70	1	1		12	5		8	89		4
distal	5				3				24		
Scapula: glenoid/neck	1	6			1	1			1		
body	6	7			3	8			9		
Innominate	11	13		1	3	6			2		
Humerus: proximal		3	2					1			
shaft	2	3	2			1					
distal	3	4	1		4				1		
Radius: proximal	2	10	1		1		1				
shaft	5	12	2			2	1	2	1		
distal	2	2									
Ulna: proximal	1	1				1					
shaft	1										
distal			1								
Carpal	1										

Element	Cuts	Impact	Spiral Break	Sawn	Portion Cut Off	Chops	Chop and Cut	Abrasion	Cut and Snap	Split	Peel
Metacarpal: proximal		5									
shaft	1	2	1			4			1		
distal	1	1			1						
Femur: proximal	1	3									
shaft	3	8	6			5					
distal		5	1		1						
Tibia: proximal	3	3			2				2		
shaft	2	7	1		1	4					
distal	2	9	1			2			2		
Calcaneus	2										
Tarsal	1					1					
Metatarsal: proximal	2	2			1	1			1		
shaft	4	3	2					1	1		
distal	1	1							1		
Metapodial: distal									1		
Phalanx: proximal	1			1							
shaft		1	1						1		
distal							1			1	
Totals	183	130	23	2	79	51	3	18	184	1	8
	26.8%	19.1%	3.4%	.3%	11.6%	5.9%	.4%	2.6%	27.0%	.1%	1.2%

Table 68. Bos/bison and large artiodactyl processing by body part (first and second processing types)

Element	Cuts	Impact	Spiral	Sawn	Portion Cut Off	Chop	Cut and Snap	Split	Abrasion	Peel
Long bone: shaft		18	1			1		1		
Flat bone	1									1
Cranium					1	1				
Mandible						2	1			
Atlas						1				
Axis						2				
Cervical vertebra	2						1			
Thoracic vertebra	1	2			2	1	1			
Lumbar vertebra	4				1	3	2			
Caudal vertebra							1			
Sternum	1									
Rib: proximal	4	6			6	2	7			
shaft	35	15	1	1	7	13	59		2	
distal		1					4			
Scapula: glenoid/neck		1				1	1			
body	2	2	1			3	3			1
Innominate	3		1		1	1	3			
Humerus: proximal	2	1				1	1			
shaft		1								
distal		1					1			
Radius: shaft	1					1				
Ulna: proximal		1				1	1			
Carpal	1									
Metacarpal: shaft	1									
distal					1	1				

Element	Cuts	Impact	Spiral	Sawn	Portion Cut Off	Chop	Cut and Snap	Split	Abrasion	Peel
Femur: proximal	1	1	2		1					
shaft		2	1		2					
distal		1				1				
Tibia: proximal		1			1					
shaft	2	1*			1	1				
distal	1	1								
Astragalus							2	1		
Calcaneus	1	1								
Tarsal							1			
Metatarsal: shaft		2								
Carpal/tarsal:					1					
Metapodial: distal							1			
Phalanx: proximal							1			
Totals	63 21.8%	59 20.4%	7 2.4%	1 .3%	25 8.6%	37 12.8%	91 31.5%	2 .7%	2 .7%	2 .7%

* impact flake

Table 69. Pig processing by body part

Element	Cuts	Impact	Chop	Cut and Snap
Axis			1	
Rib: distal				1
Humerus: distal		1		
Radius: proximal distal		1 1		
Ulna: distal	1			
Totals	1	3	1	1

Table 70. Full-sort flotation analysis, upper cultural layer

Provenience	186N 206E	187N 209E, Level 4	185N 204E	185N 203E	Feature 3, West ½ fill
FS No.	106	133	167	177	187
CULTURAL					
Annuals: *Chenopodium* goosefoot			1*		
Physalis groundcherry			1*		
Xanthium cocklebur		2 fragments*		1 fragment*	
Cultigens: Capsicum pepper	1*			6*	7*
Cucurbita squash	3 fragments*; rind+*	1 fragment*; rind+*			
Phaseolus bean				1 fragment*	
Zea mays maize	2 kernel fragments*; 1 glume*	cupules+*	cupules+*	1 embryo fragment*	1 kernel*; cupules+*
Other: Monocotyledonae monocot		stems+*	stems+*		
Solanaceae nightshade family		1pc			
Undetermined		1*, 2 achenes*		2 pp*	
POSSIBLY CULTURAL					
Annuals: *Nicotiana* tobacco	5				
NONCULTURAL					
Portulaca purslane *Talinum* flameflower		4 1			
Grasses and grass-like plants: Cyperaceae sedge family Other: *Cryptantha* hiddenflower		1	1		
Euphorbia spurge	1				
Solanaceae nightshade family		1			
Perennials: Juniperus juniper					leaflet+
Pinus edulis piñon					needle+

Table 71. Flotation wood charcoal, upper cultural layer

Provenience	186N 206E	187N 209E, Level 4	185N 204E	185N 203E	Feature 3, West ½ fill	Totals	
FS No.	106	133	167	177	187	Weight	%
Conifers: *Juniperus* Juniper			1/<0.1			<0.1	<1%
Pinus Pine			4/<0.1			<0.1	<1%
Nonconifers: cf. *Acer negundo* box alder	1/<0.1					<0.1	<1%
Populus/Salix Cottonwood/willow	19/0.2	20/0.5	15/0.1	20/0.2	20/0.5	1.5	100%
Total taxa	2	1	3	1	1	3	-
Totals	20/0.2	20/0.5	20/0.1	20/0.2	20/0.5	1.5	100%

Note: Wood data recorded as number of pieces/weight in grams.

Table 72. Full-sort flotation analysis results , south area

Provenience	Feature 1, South ½	Feature 1, North ½
FS No.	162	163
CULTURAL Annuals: *Portulaca* purslane		3*
Cultigens: *Zea mays* maize	1 kernel*; cupule+*	1embryo*; cupule+*
Undetermined		3*
NONCULTURAL Annuals: *Chenopodium* goosefoot	1	
Portulaca purslane	1	
Talinum flameflower	1	
Other: Undetermined		2

Note: Plant remains are seeds unless indicated otherwise.
+ = 1-10/liter; * = charred.

Table 73. Flotation wood charcoal, south area

Provenience	Feature 1, South ½	Feature 1, North ½	Totals	
FS No.	162	163	Weight	%
CONIFERS: *Juniperus* juniper	10/0.9	11/0.5	1.4	54%
Pinus pine	1/<0.1		<0.1	<1%
NONCONIFERS: Populus/Salix cottonwood/willow	2/<0.1	3/0.4	0.4	15%
Quercus oak	2/<0.1	1/<0.1	<0.1	<1%
Rosaceae rose family	4/0.5	3/0.1	0.6	23%
UNKNOWN NONCONIFER	1/0.1	2/0.1	0.2	8%
Total taxa	6	5	6	-
Totals	20/1.5	20/1.1	2.6	100%

Note: Wood data recorded as number of pieces/weight in grams.

Table 74. Full-sort flotation analysis, lower cultural layer

Provenience	180N 206E, Level 2	180N 206E, Level 4	185N 204E, Level 2	185N 204E	182N 203E, Feature 2, Base of Pit
FS No.	157	159	172	174	186
CULTURAL Annuals: *Amaranthus* Pigweed					2*; 1 pc
Cheno-am Goosefoot/amaranth				4*	2 pc; 2*
Helianthus Sunflower					8*
Nicotiana Tobacco					138*; 4 pc
Physalis Groundcherry				7*	19*
Portulaca purslane					3*
cf. *Suaeda* seep-weed	3*				
Xanthium cocklebur				1 fragment*	
Cultigens: Capsicum pepper		4*; 1 fragment	4*	8*; 1	1 pod fragment*; 114*; 3; 5 pc
Citrullus watermelon					16*
Coriandrum coriander				cf. 3*	2*; 2; 2 pc
Cucumis cantaloupe				2*	6*
Cucurbita squash	8 fragments			rind+*	rind+*
Cucurbita cf. *pepo* squash				43*; 3 pc	
Phaseolus bean				1*	5*
Phaseolus vulgaris common bean					1*
Triticum wheat		1*			2*; 2 rachilla*
Zea mays maize	cupule+*	cupule+*; cupule pc; 1 cupule segment*; 3 kernels*	1 kernel*; 1 embryo*	12 kernels*; 1 kernel pc; cupule+*; 1 cupule segment; 6 embryos*	43 kernels*; 4 cobs*; cupule+*; cupule+; 3 cupule segments; shank+*
Grasses and Grasslike plants: Cyperaceae sedge family		1*			12*
Gramineae grass family				17*	21*; stems+*

Table 74 (continued)

Provenience	180N 206E, Level 2	180N 206E, Level 4	185N 204E, Level 2	185N 204E	182N 203E, Feature 2, Base of Pit
FS No.	157	159	172	174	186
CULTURAL Grasses: *Sporobolus* dropseed grass					3*
Other: *Boerhavia* spiderling					1*
Monocotyledonae monocot				stems+*	stems+*
Solanaceae nightshade family	2 fragments pc				
Undetermined	1*	1 pc; 2*		1*; 1 pc; 6 pp*	3*; 3 pp*
POSSIBLY CULTURAL *Nicotiana* tobacco			1		178
NONCULTURAL Annuals: *Amaranthus* pigweed					5
Chenopodium goosefoot				1	1
Helianthus sunflower		1 fragment			3
Physalis groundcherry	6	91			9
Talinum Flameflower					1
Grasses and grass-like plants: Cyperaceae sedge family					34
Gramineae grass family				4	15
Other: *Euphorbia* spurge	1				
Perennnials: *Juniperus* juniper		twig+			twig+
Pinus edulis piñon		needle+			
Platyopuntia pricklypear cactus		1			

Note: Plant remains are seeds unless indicated otherwise.
+ = 1-10/liter; * = charred; pc = partially charred.

Table 75. Miscellaneous charred seed measurements, lower cultural layer (mm)

Taxon	*Citrullus* (watermelon)			*Cucumis* (cantaloupe)		*Phaseolus* (bean)			*Prunus persica* (peach)			*Triticum* (wheat)		
	L	W	TH	L	W	L	W	TH	L	W	TH	L	W	TH
FS 121	-	-	-	-	-	-	-	-	23.5	18.0	16.0	-	-	-
FS 159	-	-	-	-	-	-	-	-	-	-	-	5.0	3.8	3.5
FS 174	-	-	-	-	-	8.5	4.5	5.6	-	-	-	-	-	-
FS 184	-	-	-	-	-	-	-	-	23.8	19.3	13.5	-	-	-
FS 186	12.0	6.3	3.2	8.4	3.0	9.9	4.0	4.2	-	-	-	5.2	3.3	2.8
	12.0	6.2	4.7	7.9	1.9	-	8.5	6.6	-	-	-	5.2	3.5	3.0
	12.0	6.0	3.9	7.0	2.9	14.0	7.0	6.4	-	-	-	5.0	3.8	3.5
	9.8	6.3	2.3	8.0	2.5	-	-	-	-	-	-	-	-	-
	12.0	7.1	2.1	7.4	2.4	-	-	-	-	-	-	-	-	-
	11.0	7.2	2.4	9.3	3.0	-	-	-	-	-	-	-	-	-
	12.0	7.9	1.9	-	-	-	-	-	-	-	-	-	-	-
	9.0	5.7	2.5	-	-	-	-	-	-	-	-	-	-	-
	10.0	6.2	3.0	-	-	-	-	-	-	-	-	-	-	-
Averages	11.1	6.5	2.9	8.0	2.6	10.8	6.0	5.7	23.7	18.7	14.8	5.1	3.6	3.2

Note: The first four bean seeds were separate cotyledons, so thickness was doubled to estimate thickness of whole bean.
L = length, W = width, TH = thickness.

Table 76. Flotation wood charcoal, lower cultural layer

Provenience	180N 206E, Level 2	180N 206E, Level 4	185N 204E, Level 2	185N 204E	182N 203E, Feature 2, Base of Pit	Totals	
FS No.	157	159	172	174	186	Weight	%
Nonconifers: Populus/Salix cottonwood/willow	20/0.6	19/1.3	20/0.4	20/1.9	20/0.9	5.1	96
Unknown nonconifer		1/0.2				0.2	4
Total taxa	1	2	1	1	1	2	-
Totals	20/0.6	20/1.5	20/0.4	20/1.9	20/0.9	5.3	100

Note: Wood data recorded as number of pieces/weight in grams.

Table 77. Macrobotanical sample analysis, upper cultural layer and above

Provenience	Fill above Upper Cultural Layer	Upper Cultural Layer	
FS No.	121	114	166
Cultigens: *Cucurbita* Squash			
Prunus persica Peach	½ stone/1.2 g		
Zea mays Maize			4 c*/<0.1 g; 1 cs*/0.2 g
Other: Monocotyledonae Monocot			6 stems/0.1 g
Undetermined			
Perennials: *Atriplex/Sarcobatus* saltbush/greasewood			2 wood*/<0.1g
Populus/Salix Cottonwood/willow		1wood*/1.2 g	10 wood*/0.1g

Note: * = charred; c = cupule; cs = cupule segment.

Table 78. Macrobotanical sample analysis, lower cultural layer

FS No.	104	158	159	160	165
Cultigens: *Cucurbita* squash					seed fused to metal belt buckle
Prunus persica peach			1 pit fragment*/0.3 g		
Zea mays maize					
Perennials: *Populus/Salix* cottonwood/ willow	1 wood/297.4 g	5 wood*/1.5 g	4 wood*/1.9 g	1 wood*/<0.1 g; bark/19.9 g	
Undetermined		bark/31.5 g; bark pc/0.8 g	bark/24.5 g; bark pc/4.6 g		

FS No.	172	181	183	184	185
Cultigens: *Cucurbita* squash	2 rind*/0.1 g		1 rind*/<0.1 g		
Prunus persica peach				1 pit/ 2.5 g	
Zea mays maize	2 cobs*/3.4 g; 2 s*/1.4 g; 6 cs/1.6 g	1 cob*/1.7 g	5 cobs*/9.6 g; 5 cs*/2.6 g; 4 s*/3.2 g; 1k/<0.1 g		9 cobs*/24.4 g; 2 cs*/0.9 g
Perennials: *Populus/Salix* cottonwood/ willow	5 wood*/0.7 g		10 wood*/3.6 g; 2 wood pc/9.2 g; 12 wood/7.9 g; bark/54.4 g		6 wood*/1.1 g
Undetermined	bark*/0.2 g		bark pc/8.8 g bark/122.7 g		bark pc/1.0 g; bark/4.4 g

Note: * = charred; c = cupule; cs = cupule segment; k = kernel; pc = partially charred; s = shank.

Table 79. Comparative morphometrics of peach stones from historic sites in New Mexico (dimensions in mm)

Site	N	Mean Length [Range] cv	Mean Width [Range] cv	Mean Thickness [Range] cv
Valencia	2	23.7 [23.5-23.8] 0.9	18.7 [18.0-19.3] 4.9	14.8 [13.5-16.0] 11.98
San Antonio 1975 excavations[1] Post 1820, Tijeras Canyon	25	24.0 [16.7 - 27.4] 10.5	19.1 [15.1-22.0] 11.6	15.5 [10.5-27.7] 23.8
San Antonio 1992 excavations[2] Post 1820, Tijeras Canyon	1	24.2	17.7	14.8
Trujillo House[3] A.D. 1750-1900, Abiquiu area	6	25.4 [25.0-25.8] 1.6	19.2 [16.8-20.3] 7.4	15.2 [13.6-16.5] 8.0
La Puente[4] Territorial period trash pit, in Spanish Colonial village midden	6	25.7 [22.3-28.8] 10.9	17.9 [14.9-20.7] 11.8	14.5 [14.1-14.6] 2.2
Yamutewa House[5] 18th to 20th century, Zuni Pueblo	7	24.8 [22.2-26.6] 6.0	18.0 [15.9-19.4] 7.9	13.5 [12.5-14.5] 5.8
Talpa[6] Late 19th to early 20th-century homestead, Taos area	7	21.6 [16.9-23.8] 10.5	15.5 [11.1-19.6] 24.0	13.8 [10.3-16.4] 14.6
Cerrososo[7] Habitation associated with a sawmill, A.D. 1900-1910, Cimarron area	14	21.0 [17.4-25.1] 8.3	17.1 [14.9-20.7] 11.8	15.4 [13.6-16.1] 6.7
Medanales[8] Late 19th century homestead, Abiquiu area	1	21.5	15.8	-
Navajo Indian Irrigation Project[9] Navajo homes, mostly 20th century, Farmington area	182	26.2 [15.3-36.8] 12.4 (Blocks 8-11) 13.8 (Block 3) 19.7 (Blocks 6,7)	-	-

[1]Toll 1997: Table 9
[2]Toll 1997: Table 9
[3]Toll 1989b: Table 18
[4]Toll 1989b: Table 18
[5]Toll 1987: Table 5
[6]Toll 1994: Table 6
[7]Toll 1984:13, and unpublished data in possession of author
[8]Toll 1986: Table 7
[9]Struever and Knight 1979; Donaldson and Toll 1982; Toll and Donaldson1981

Table 80. Species composition of radiocarbon wood samples

Site Area	South Area	Upper Cultural Layer	Lower Cultural Layer		Totals	
FS No.	162/163	167	159	183/185	Weight (g)	%
Conifers: *Juniperus* Juniper	10/3.5				3.5	14
Pinus edulis Piñon	1/1.6				1.6	6
Nonconifers: cf. *Artemisia* sagebrush			1/<0.1		<0.1	<1
Populus/Salix Cottonwood/willow		4/0.8	24/8.0	11/7.2	16.0	62
Quercus Oak	3/1.5				3.8	15
Undetermined Nonconifer	7/2.8			2/0.3	0.8	3
Totals	21/9.4	4/0.8	25/8.0	13/7.5	25.7	100

Note: Wood data recorded as number of pieces/weight in grams.

Table 81. *Zea mays* cob morphometrics, lower cultural layer (mm)

FS No./Cob No.	Row #	Type	Length	RSL	RD
FS 186 Cob 1	14	Straight	36.2	3.6	15.6
Cob 2	16		49.8	3.5	18.6
Cob 3	14	Straight	37.1	3.4	15.1
Cob 4	10?	Tip	13.0	-	6.7
FS Macro 6 Cob 5	12	Straight	24.4	4.6	16.3
Cob 6	14	Spiral, tip	33.5	3.5	15.7
Cob 7	12	Straight	43.3	4.2	21.2
FS 172 Cob 8	14	Straight	29.9	4.0	17.2
Cob 9	14	Straight	40.3	3.0	16.9
FS 181 Cob 10	14	Straight	32.5	4.1	17.7
FS 183 Cob 11	16	Straight	42.4	3.4	18.3
Cob 12	14	Straight	23.7	3.4	12.7
FS 185 Cob 13	12	Straight	25.8	3.2	10.1
Cob 14	12	Straight	30.5	3.9	18.4
Cob 15	12	Straight	22.4	3.5	20.0
Cob 16	14	Straight	23.0	4.2	20.4
Cob 17	12	Straight	68.7	4.1	23.2
Cob 18	14	Irregular	47.3	3.8	19.8
Cob 19	14	Irregular	23.7	3.8	13.9
Cob 20	12	Straight	26.5	3.3	17.7
Cob 21	14	Straight	33.9	4.0	19.8
Averages	13	-	33.7	3.7	16.9

Table 82. Comparative morphometrics of historic maize cobs

Cob Characteristics	Row Number						Cob Diameter (Intact Glumes)		RSL (Intact Cobs)	
	% 8 or Less	% 10	% 12	% 14 or More	N	Average	N	Average	N	Average
Hispanic LA 67321	-	5	33	62	21	13.3	21	16.9	20	3.7
Hispanic LA 24[1]	-	22	22	56	9	12.7	5	14.9	5	3.7
Puebloan LA 9093[2]	20	27	53	-	15	10.7	16	21.1	-	-

[1]Toll 1997: Table 12.
[2] Toll 198: Table 2.

Table 83. Radiocarbon dates

	Beta-107681	Beta-107682	Beta-107683
Provenience	Strata 6, 180N 206E, Level 4	Feature 1	Feature 2, base
Conventional date (A.D.)	1680	1830	1750
Calibrated dates (95% probability)	1460 to 1695 1725 to 1815 1920 to 1950	1675 to 1770 1800 to 1940	1655 to 1690 1735 to 1815 1925 to 1950
Sample composition	cottonwood/willow and artemisia	juniper, pine, oak, and undetermined nonconifer	cottonwood/willow and undetermined nonconifer

Table 84. Polythetic set for distinguishing biface flakes from core flakes

Whole Flakes

1. Platform:
   a. has more than one facet
   b. is modified (retouched and abraded)
2. Platform is lipped.
3. Platform angle is less than 45 degrees.
4. Dorsal scar orientation is:
   a. parallel
   b. multidirectional
   c. opposing
5. Dorsal topography is regular.
6. Edge outline is even, or flake has a waisted appearance.
7. Flake is less than 5 mm thick.
8. Flake has a relatively even thickness from proximal to distal end.
9. Bulb of percussion is weak (diffuse).
10. There is a pronounced ventral curvature.

Broken Flakes or Flakes with Collapsed Platforms

1. Dorsal scar orientation is:
   a. parallel
   b. multidirectional
   c. opposing
2. Dorsal topography is regular.
3. Edge outline is even.
4. Flake is less than 5 mm thick.
5. Flake has a relatively even thickness from proximal to distal end.
6. Bulb of percussion is weak.
7. There is a pronounced ventral curvature.

Artifact is a Biface Flake When:

1. if whole it fulfills 7 of 10 attributes.
2. if broken or platform is collapsed, it fulfills 5 of 7 attributes.