MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

RESULTS OF A LIMITED TESTING PROGRAM ALONG NM 503 AND DATA RECOVERY PLAN FOR LA 103919, SANTA FE COUNTY, NEW MEXICO

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ARCHAEOLOGY NOTES 151

SANTA FE 1994 NEW MEXICO

ADMINISTRATIVE SUMMARY

Test excavations at two sites--LA 39957 and LA 103919--along NM 503 near Nambé demonstrated that one of the sites has the potential to provide information on local prehistory and history. It was determined that LA 39957 had originally been recorded in the wrong location and is actually 122 m northeast of the location shown in the original documentation. Testing revealed no cultural deposits in the incorrectly documented location. LA 103919 is a two component site with Rio Grande Developmental period and historic Euroamerican materials. With the exception of three historic structures, LA 103919 lies entirely within the proposed project limits. Within the right-of-way, the prehistoric component of LA 103919 contains intact subsurface deposits, use surfaces, and features on both the north and south sides of NM 503. A use surface associated with a historic Euroamerican component of the site, is within the right-of-way. At the request of the New Mexico State Highway and Transportation Department (NMSHTD), testing was conducted at these sites and a data recovery plan was prepared. This plan includes discussions of local prehistory and history, a research orientation, site descriptions and field strategies.

MNM Project No. 41.579 (NM 503 East)
NMSHTD No. SP-BS-1511(200)
CN 2388

Submitted in fulfillment of the Joint Powers Agreement D 05486 between the New Mexico State Highway and transportation Department and the Office of Archaeological Studies, Museum of New Mexico, Office of Cultural Affairs.

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INTRODUCTION

At the request of Mr. William L. Taylor of the New Mexico State Highway and Transportation Department (NMSHTD), the Office of Archaeological Studies (OAS), Museum of New Mexico, conducted test excavations and prepared a data recovery plan for a site along NM 503, Santa Fe County, New Mexico (Fig. 1). Stephen C. Lent was the supervisor, and was assisted by Patrick Severts, Sonya Urban, and Kelly Hoodenpyle. Sonya Urban wrote the site descriptions and Patrick Severts worked on the testing report. The report was edited by Robin Gould, and the figures were produced by Ann Noble. Timothy D. Maxwell acted as principal investigator.

Two sites--LA 39957 and LA 103919--are within the NMSHTD proposed project area. These sites were identified during a NMSHTD cultural resource inventory by Sandra L. Marshall (1994). The project area was on highway right-of-way acquired from private sources and on private land. There was no testing on lands owned or controlled by Pojoaque Pueblo. Results of the testing program by the OAS at these two sites are described below.

It was determined that LA 39957 had been incorrectly located and recorded during the initial documentation. LA 39957 is actually located approximately 122 m to the northeast and well outside of the proposed right-of-way. No further investigations are recommended.

A limited testing program for sites along NM 503 have shown that only one site, LA 103919, has the potential to provide information on local prehistory and history. A data recovery plan for this site was developed and is presented in this report. The data recovery plan includes proposed research orientations and a strategy for implementing research objectives through excavation and analysis. Also included are descriptions of the sites and testing results, a discussion of regional history and prehistory, and data on the environment. Site location data are included as Appendix 1.

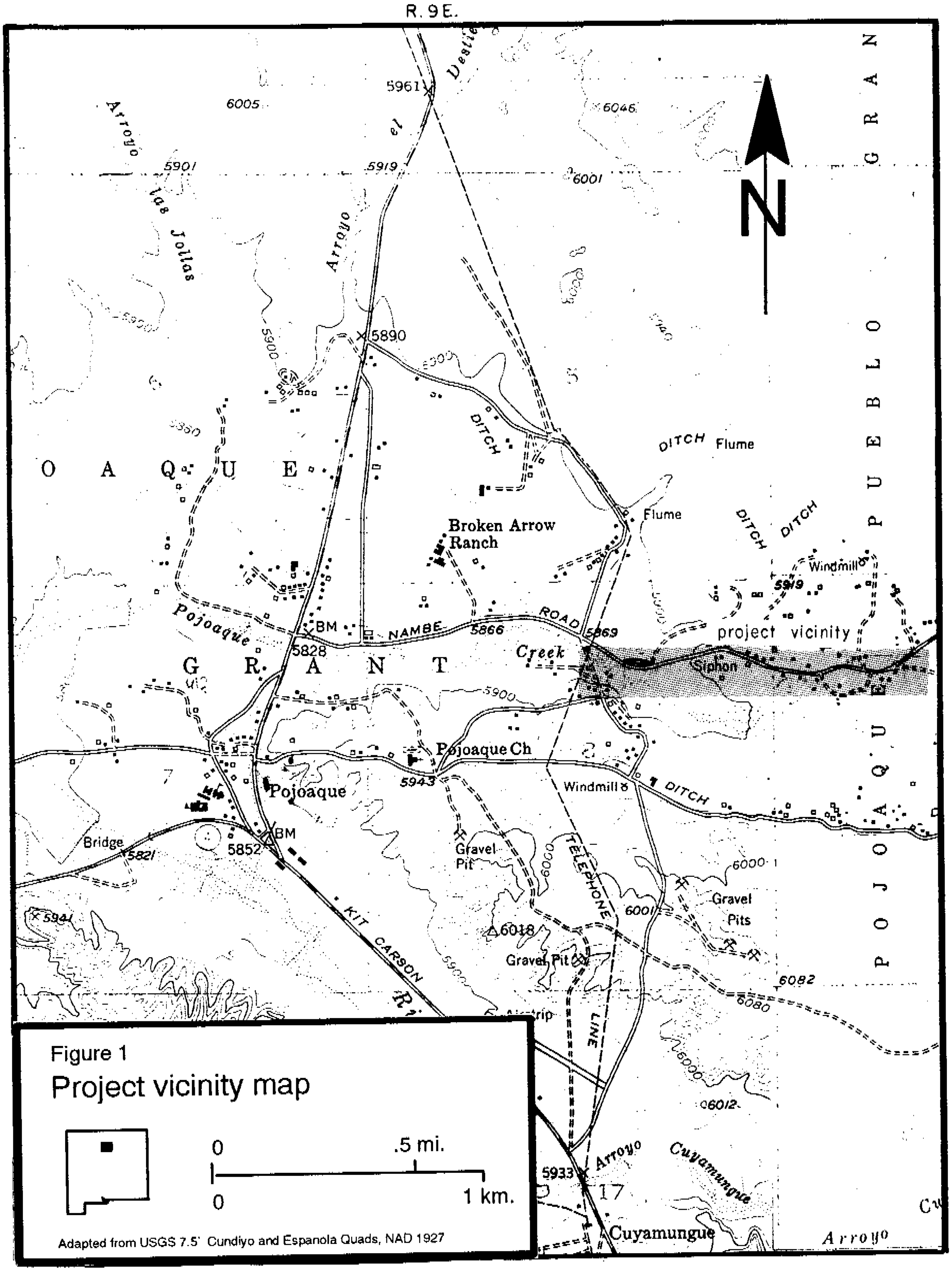


Figure 1
Project vicinity map

ENVIRONMENT

The following section has been extracted from Anschuetz (1986).

Physiography

Pojoaque Pueblo is located in a fault-zone feature known as the Española Basin, one in a chain of six or seven basins composing the Rio Grande Rift, extending from southern Colorado to southern New Mexico (Kelley 1979:281). This basin, which is considered an extension of the Southern Rocky Mountain Province (Fenneman 1931), is enclosed by uplands of alternating mountain ranges and uplifted plateaus, and the Rio Grande flows along the long axis of the feature (Kelley 1979:281). The northern boundary of the Española Basin is composed of the eroded edge of the Taos Plateau. The Sangre de Cristo Mountains form the east edge, and the southern boundary is marked by the Cerrillos Hills and the northern edge of the Galisteo Basin. The La Bajada fault escarpment and the Cerros del Rio volcanic hills denote the southwestern periphery. The basin is bounded to the west by the Jemez volcanic field, and the Brazos and Tusas mountains form the northwestern boundary.

Elevations along the Rio Grande through the basin vary from 1,845 m in the north to 1,616 m in the south, and altitudes in the surrounding mountains reach 3,994 m in the Sangre de Cristos, 3,522 m in the Jemez Mountains, and 2,623 m in the Brazos and Tusas mountains (Kelley 1979:281).

The Española Basin is centered about the confluence of the Rio Grande and the Rio Chama, its principal tributary (Kelley 1979:281). This juncture is 18.4 km north of the present study area. The principal perennial drainages within the Pojoaque Pueblo Grant consist of the Rio Pojoaque and the Rio Tesuque, which have their headwaters in the Sangre de Cristo Mountains, 25.6 km to the southeast. Both drainages form narrow valleys that range between 400 and 800 m wide. These valleys merge just northwest of Pojoaque Pueblo, at which point the Rio Pojoaque flows west to the Rio Grande.

Geology

The Rio Grande Rift was established during the late Oligocene epoch (about 30 million years B.P.) when a cycle of crystal downwarping and extensional faulting succeeded a period of regional uplift (Kelley 1979:281). As the subsidence of the Española Basin proceeded through the Miocene and Pliocene epochs (about 3 to 25 million years ago), erosion from the Nacimiento, Jemez, and Brazos uplifts to the north and northwest and the mature Laramide Sangre de Cristo uplift to the east provided most of the sediments for what is known as the Santa Fe group, the prominent geologic unit within the Española Basin. Other sources of sediments of this geologic unit include volcanic fields in the Jemez, Brazos, and Sangre de Cristos (in an area northeast of the Española Basin). Formations within the Santa Fe group, such as the Tesuque formation, consist of deep deposits (over 1 km thick) of poorly consolidated sands, gravels and conglomerates, mudstones, siltstones, and volcanic ash beds (Lucas 1984).

The Española trough was subjected to extensive tilting and faulting during the late Pliocene, after which time widespread tectonic stability set in. The resulting geologic structure of the basin is characterized by west-dipping strata that are transversed by numerous north-trending normal faults. These stratigraphic characteristics, coupled with rapid sedimentation, allowed deposition to reach a maximum depth of 2 km at the western periphery of the basin. The subsequent erosion of upturned beds and elevated scarps has resulted in the highly dissected, rugged topography found in much of the project area (Kelley 1979; Lucas 1984).

A second notable geologic unit found in the vicinity of the project area is the Quaternary Valley and Arroyo alluvium (Lucas 1984). The Ortiz Pediment gravels once covered the Tesuque formation of the Santa Fe group. Because of extensive erosion, these gravels are now found only on isolated high ridges and hilltops, such as the Las Barrancas badlands area northwest of the Rio Pojoaque and Rio Tesuque confluence (see Kelley 1979, fig. 1). The Cerros del Rio volcanic field lies along the Cañada Ancha drainage southwest of the project area. This field extends some distance to the west and consists of a variety of volcanic features. The Quaternary Terrace gravels are river gravel deposits that are exposed in the bottoms of the tributary arroyos between the higher piedmont deposits and the lower valley bottom alluvium.

Climate

Latitude and altitude are the two basic determinants of temperature; however, altitude is the more powerful variable in New Mexico (Tuan et al. 1973). In general, mean temperatures decline faster with increased elevation than with increased latitude. Cold air drainage is a common and well-known feature of New Mexico valleys (Tuan et al. 1973). Narrow valleys create their own temperature regimes by channeling air flow: the usual patterns are warm up-valley winds during the day and cool down-valley winds at night. In contrast, shifts in temperature over broad valley floors are influenced by the local relief (Tuan et al. 1973).

Climatic data for the immediate Pojoaque area are unfortunately incomplete (see Reynolds 1956a, 1956b; Gabin and Lesperance 1977). The comparative data presented in the following discussion are taken from the Santa Fe and Española weather stations. The Santa Fe station, which is 24 km south of the study area, is at an elevation of 2,195 m. The Española station lies 12.4 km to the north at an elevation of 1,732 m. These stations, therefore, bracket the study area, which is at an elevation of 1,799 m.

The mean annual temperature reported by the Santa Fe and Española stations are 48.6-49.3 degrees Celsius and 49.4-50.7 degrees Celsius, respectively (Gabin and Lesperance 1977). The climatological data further indicate that the study area conforms to the general temperature regime of New Mexico; that is, hot summers and relatively cool winters.

The average frost-free period (growing season) at Santa Fe is 164 days. The latest and earliest recorded frosts are May 31 (in 1877) and September 12 (in 1898) (Reynolds 1956a:251). In contrast, Española reports an average growing season of 152 days, with an extreme first frost date of September 12 (recorded in 1898) and a last frost date of June 6 (in 1927) (Reynolds 1956a:250). The shorter growing season for Española, which is approximately 450 m lower than Santa Fe, may be attributable, in part, to cold air drainage through the Rio Grande and Rio Chama valleys. Although a frost-free season of 130 days is sufficiently long to allow the growing of most indigenous varieties of maize through dry farming (Schoenwetter and Dittert 1968; Hack 1942), the unpredictability of late spring and early fall frosts creates agricultural risk. The best agricultural strategy is to plant late enough that seedlings will not erupt above the ground until after the last frost, but early enough that they will be able to fully mature prior to the first killing fall frost (Anderson and Oakes 1980).

Precipitation records from Santa Fe show an annual mean of 361-366 mm. In contrast, the lower Española area reports an annual precipitation mean of only 237-241 mm (Gabin and Lesperance 1977). Annual precipitation records from these stations, as from much of the northern Southwest, vary greatly from year to year. For example, a maximum of 630 mm of precipitation was recorded in Santa Fe during 1855, compared to a minimum of 128 mm in 1917 (Reynolds 1956b). The amount of precipitation is even more variable for any given month in successive years.

Late summer is the wettest season in the annual cycle of the study area, whereas June is one of the driest months. Precipitation records from Santa Fe and Española indicate that more than 45 percent of the mean annual precipitation falls between July and September (Gabin and Lesperance 1977). Although October is drier than September, it is nevertheless, the fourth wettest month of the annual cycle in the Española records. Significant precipitation (7.6 percent of the annual total) also falls in Santa Fe during this month. Late summer and fall moisture is derived from the Gulf of Mexico, when air masses from this region push inland to bring the economically important monsoons (Tuan et al. 1973:20). Summer rains tend to be violent and localized. This saturates the ground surface in the beginning of a storm, resulting in the loss of much of the moisture through runoff.

Moisture is also lost through evapotranspiration, the combined evaporation from the soil surface and transpiration from plants when moisture is unlimited (Chang 1959). Mean annual evapotranspiration losses are 859 mm in Santa Fe and 932 mm in Española (Gabin and Lesperance 1977), creating potential annual moisture deficits of 493 mm and 691 mm, respectively. June, which is a critical time for the germination of plants, suffers the greatest moisture deficits.

The above temperature, precipitation, and potential evapotranspiration data suggest that Pojoaque is climatologically a high risk area for dry-farm agriculture. The dates of the first and last frosts are unpredictable, and frost damage may result in significantly reduced crop yields in some years even though the long-term mean growing season is more than adequate for maize agriculture. Cold air drainage within the valleys increases the risk of frost damage. Precipitation levels are clearly not sufficient to overcome the deficits of potential evapotranspiration, and the amount of precipitation in any given year cannot be predicted from year to year, let alone from month to month. The seasonality of rainfall is a third problem since there may be too much moisture in the early fall when many agricultural plants need to dry for harvesting and storage.

Soils

Soils found within the project area fall into two geomorphic groups: soils of the Dissected Piedmont plain and soils of the Recent Alluvial valleys (Folks 1975). The former, which is most common, is composed of Pojoaque-Rough Broken Land association. Pojoaque soils are derived from Quaternary period surficial deposits, as well as mixed sandstone, shale and siltstone alluvium of the Tesuque formation of the Santa Fe group (Lucas 1984). These well-drained soils are characterized as moderately sloping to moderately steep (5-25 percent), deep, loamy and gravelly deposits that are often covered with lag gravels (Folks 1975:4). Pojoaque soils are intermingled with Rough Broken Land soils and most often occur on the ridgetops between drainages. This soil association is not used for farming today.

Soils of the Recent Alluvial valleys geomorphic group are composed of the El Rancho-Fruitland soil association. These deep, loamy soils, which commonly occur on the low terraces of the Rio Pojoaque and Rio Tesuque drainages within the vicinity of the study area, are derived from Tesuque Formation sedimentary rocks and Sangre de Cristo granitic rocks (Folks 1975:3). Slopes range from 0 to 5 percent. This soil association is used today for irrigated crops.

Flora

Pojoaque Pueblo is located in or near three habitat types: (1) piñon-juniper grasslands; (2) dry riparian; and (3) riparian/wetlands. Piñon-juniper grasslands, which support a variety of plant and animal species, is the most common habitat. The characteristic vegetation includes piñon, juniper, prickly pear, cholla, yucca, and several species of muhly and gramma grass (Pilz 1984).

The dry riparian habitat occurs in arroyo bottoms, on arroyo banks, and in the level to nearly level floodplains adjacent to some of the wider drainages. In the project area this habitat occurs in the Calabasa Arroyo, Arroyo Cuma, and in a narrow finger of the Arroyo Ancho. Some of the more common plants found are rabbitbrush, fourwing saltbush, mountain mahogany, Gambel oak, Rocky Mountain beeplant, and numerous grasses, including Indian ricegrass, three-awn, side-oats gramma, and flax (Pilz 1984).

The riparian/wetlands habitat is found only along the perennial streams, such as the Rio Pojoaque and Rio Tesuque. Modern vegetation includes willow, cottonwood, salt cedar, rushes, and sedges (Pilz 1984). In the wider valley bottoms, ditch irrigation is practiced, including the area north of the present study area.

Fauna

Fauna found within the project area includes coyote, badger, porcupine, blacktailed jackrabbit, desert cottontail, spotted ground squirrel, and many species of birds. Mule deer and black bear are known to occur, but in low numbers (Pilz 1984). Use of the area by elk, black and grizzly bear may have been more common prior to the turn of the century (Carroll 1984:2).

CULTURAL HISTORY OVERVIEW

Stephen C. Lent and James L. Moore

To place the prehistoric and historic developments of the Northern Tewa Pueblo area in perspective, a brief overview of the prehistoric background and a summary of archaeological work at the Pueblo and in the vicinity of the project area is given in the following section. The discussion is limited to the Pueblo period.

Chronology

Researchers in the Rio Grande area have perceived the developments in that area as departing from the traditional Pecos Classification (Kidder 1927). Wendorf and Reed (1955) have redefined the Pueblo I through Pueblo V periods based on the occurrence of ceramic types, changes in settlement patterns, economy, and other characteristics. The principal temporal intervals defined by Wendorf and Reed include the Developmental, Coalition, and Classic periods.

The Developmental Period (A.D. 600-1200)

The early portion of the Developmental period in the Northern Rio Grande dates between A.D. 600 and 900 and is comparable to the late Basketmaker III and Pueblo I periods of the Pecos Classification. Late Basketmaker sites are rare and tend to be small with a ceramic assemblage composed primarily of Lino Gray, San Marcial Black-on-white, and various plain brown and red-slipped wares. The majority of the documented early Developmental sites are in the Albuquerque and Santa Fe areas (Frisbie 1967; Reinhart 1967; Peckham 1984). Although the settlement of the Rio Grande drainage has typically been attributed to immigration from southern areas (Bullard 1962; Jenkins and Schroeder 1974), investigations north of Albuquerque suggest an in situ development of an indigenous population (Frisbie 1967; Lent et al. 1986).

Within the vicinity of the present study area, early Developmental sites are scattered along the Rio Tesuque and Rio Nambe drainages (McNutt 1969; Peckham 1984:276). Based on excavation data, early Developmental habitation sites are small villages of shallow, circular pithouse structures. The sites commonly feature between one and three pithouses (Stuart and Gauthier 1981), and rectilinear surface storage cists are often found in association. These pit structures appear to be more similar to San Juan Anasazi examples than those of the Mogollon, although San Juan architectural "elaborations" such as benches, partitions, and slab linings are absent (Cordell 1979:43).

Sites of the Developmental period tend to be located near intermittent tributaries of the Rio Grande, presumably for access to water and arable land. A preference for elevated settings near hunting and gathering resources is also exhibited, possibly because of their use as an overlook (Cordell 1979).

The transition to above-ground rectilinear and contiguous habitation structures is more apparent in the Santa Fe district (Wendorf and Reed 1955:140). However, McNutt (1969) reports the presence of pithouses in the Red Mesa component of the Tesuque Bypass site near modern Tesuque Pueblo. A late Developmental community (LA 835, the Pojoaque Grant site), is composed of 12 to 15 small room blocks with associated kivas and a Cibola-style great kiva. Ceramics recovered through excavation in conjunction with tree-ring dates suggest an occupation between A.D. 800 and 1150. The variety of pottery and other materials of nonlocal origin associated with the site suggests that LA 835 may have served as a regional economic center (Stubbs 1954). At the northeast juncture of the Pojoaque Pueblo access road and US 84/285 is LA 61, the ancestral component of Pojoaque Pueblo. The associated site complex consists of an extensive series of prehistoric Anasazi components and the historic and modern Tewa pueblo of Pojoaque. Pueblo occupation in the area began around A.D. 950, and has continued, with occasional abandonment, to the present day. Ceramics associated with the site include pottery from the Developmental, Coalition, and historic periods, i.e., mineral-painted wares, organically painted wares, Biscuit wares, Glaze wares, micaceous wares, historic Tewa polychromes, and polished black-on-red and buff types.

The Coalition Period (A.D. 1200-1325)

The Coalition period (A.D. 1200 to 1325) in the Northern Rio Grande is marked by a shift from mineral pigment to organic paint (primarily Santa Fe Black-on-white) in decorated pottery. There are substantial increases in the number and size of habitation sites coincidental with expansion into previously unoccupied areas. Although above-ground pueblos were built, pit structure architecture continued into the early phases of this period. Rectangular kivas, which are incorporated into room blocks, coexisted with the subterranean circular structures (Cordell 1979:44). Frisbie (1967) notes the shift away from less optimal upland settings and a return to the permanent water and arable land adjacent to the major drainages.

In the Northern Rio Grande, the Coalition period is characterized by two interdependent trends in population and settlement reflected in substantial population growth. These trends include a significant increase in the number and size of the habitation sites and the expansion of permanent year-round settlement by Anasazi agriculturalists into areas of greater latitude and elevation. The Chama, Gallina, Pajarito Plateau, Taos, and Galisteo Basin districts, which had been the focus of infrequent Anasazi use prior to A.D. 1100 to 1200, were intensively settled during this period (Cordell 1979). Among the representative sites of the Coalition period are LA 4632, LA 12700, and Otowi, or Potsuwii (LA 169).

The Classic Period (A.D. 1335-1600)

The Classic period (A.D. 1325-1600) postdates the abandonment of the San Juan Basin by sedentary agriculturalists. It is characterized as a time when regional populations may have reached their maximum size, and large communities with multiple plaza and room-block complexes were established (Wendorf and Reed 1955:13). The beginning of the Classic period in the Northern Rio Grande coincides with the appearance of locally manufactured red-slipped and glaze-decorated ceramics in the vicinity of Santa Fe, Albuquerque, Galisteo, and Salinas after ca. A.D. 1315, and Biscuit Wares in the Pajarito Plateau, Santa Fe, and Chama areas (Mera 1935; Warren 1979). In the Santa Fe area, the Galisteo Basin saw the evolution of some of the Southwest's most spectacular ruins. Many of these large pueblos were tested or excavated by N. C. Nelson in the early part of the twentieth century (Nelson 1914, 1916). Possibly the first stratigraphic excavation in the United States was executed by Nelson on the room blocks and the midden of San Cristóbal Pueblo (LA 80). Other projects in the Galisteo area include those by Smiley, Stubbs, and Bannister (1953); the School of American Research (Lang 1977); a project at San Lazaro (LA 91, LA 92) by Southern Illinois University (Smiley 1988); and in the summer of 1992, a project at Pueblo Blanco for Northern Illinois University (Creamer n.d.). The majority of these Classic period sites were established in the early 1300s. By the late 1400s, this area appears to have experienced a substantial decline in population.

Sites of the Classic period are characterized by a bimodal distribution--large communities associated with small structures, fieldhouses, or seasonally occupied farmsteads. This contrasts with the preceding Coalition period, where a greater range of site types characterized the settlement pattern. Investigations of the large Biscuit Ware pueblo sites on the Pajarito Plateau include initial studies by Adolph Bandelier (1882), Hewett (1953), and Steen (1977), who recorded sites within Frijoles Canyon including Pueblo Canyon, Tshirege, and Tsankawi. Several large archaeological projects have included Cochiti (Biella and Chapman 1979), a UCLA intensive survey and limited excavation project (Hill and Trierweiler 1986), and a National Park Service survey of Bandelier National Monument (McKenna and Powers 1986).

The Biscuit series and incised wares were produced in and adjacent to the study area. Beginning with Wiyo Black-on-white (A.D. 1300-1400), the series includes Biscuit A (A.D. 1375-1450), Biscuit B (A.D. 1400-1500 or 1550), and Sankawe Black-on-cream (A.D. 1500-1600) (Breternitz 1966). The appearance of Potsuwi Incised, about the time that Biscuit B became common, suggests contact with the Plains Indian groups. The addition of a red slip to Sankawe (or Tsankawi) Black-on-cream was the origin of the Tewa Polychrome series, ancestral to types that are still being produced in the Rio Grande pueblos. The Chama Valley and Pajarito Plateau were mostly abandoned by the end of this period, and population was concentrated along the Rio Grande when the Spanish arrived in A.D. 1540.

Native groups underwent numerous changes in lifestyle, social organization, and religion after the Spanish settlement of New Mexico. The introduction of new crops and livestock contributed to major changes in subsistence, as did mission programs that taught new industries (Simmons 1979:181). Incursions by Plains Indians caused the abandonment of many pueblos and a constriction of the region occupied by Pueblo groups (Chavez 1979; Schroeder 1979). A combination of new diseases to which the Pueblos had no natural defenses, intermarriage, conflict attendant with the Pueblo Revolt of A.D. 1680-92, and abandonment of their traditional life contributed to a significant decrease in Pueblo populations over the next few centuries (Dozier 1970; Eggan 1979).

Historic Period (A.D. 1540-present)

Exploration 1539-1597

Based on information gathered by Alvar Nuñez Cabeza de Vaca and his companions, New Spain turned its attention northward. Initial exploration by de Niza and Coronado occurred in 1539 and 1540-1541. No other formal contact between New Spain and New Mexico occurred until 1581, when Father Augustín Rodríguez and Captain Francisco Sánchez Chamuscado led a group up the Rio Grande to the Pueblo country (Hammond and Rey 1966). Ostensibly to rescue two priests left by the Rodríguez-Chamuscado expedition, Antonio de Espejo led a party of explorers into New Mexico in 1582. In 1590-1591 Gaspar Castaño de Sosa entered the region, but was arrested for colonizing without appropriate approval and was returned to Mexico (Simmons 1979). In 1593 a second attempt at colonization was made under the leadership of Francisco de Legua Bonilla and Antonio Gutiérrez de Humaña, but the expedition was nearly decimated by Indians (Hammond and Rey 1953).

Colonization 1598-1680

Juan de Oñate established the first successful colony in New Mexico at San Juan Pueblo in 1598. By 1600 the Spanish had moved into San Gabriel del Yunque, sister village to San Juan, which was abandoned by its residents for Spanish use (F. Ellis 1987). Oñate was removed from the governorship in 1607 and replaced by Pedro de Peralta, who founded Santa Fe and moved the capital there around 1610 (Simmons 1979).

The early period of Spanish occupation was predicated on Christianization of the Pueblos. Oñate's colony was a disappointment--they failed to find the mineral wealth they came north in search of. The Crown almost abandoned New Mexico because of its poverty, but the numerous native inhabitants provided a good opportunity for the church to win new souls. The colony was therefore allowed to continue, with its maintenance almost entirely underwritten by the royal treasury (Simmons 1979:181). Because seventeenth-century New Mexico was primarily a mission area, the church was extraordinarily powerful and influential, causing considerable conflict with the secular government (R. Ellis 1971:30-31). Beginning in the 1640s this struggle weakened the Spanish hold on New Mexico (Simmons 1979:184).

New Mexico was supplied by wagons from New Spain during this period, a service that was controlled by the missions (Moorhead 1958). Caravans were scheduled for every three years, but their departures were actually quite irregular (Moorhead 1958). This service constituted the only reliable means of communication and supply for the province.

> In theory the supply service was established and maintained for the exclusive use of the religious stations,. . . in practice some wagons were commandeered or chartered for purely secular purposes, first by the governors and later by the merchants of New Mexico. (Moorhead 1958:34)

This system led to serious shortages of important supplies, such as metal, and kept the cost of manufactured goods high.

Only a few early Spanish sites have been excavated. Materials from this period were found in Santa Fe at the Palace of the Governors and during excavations at the La Fonda Parking Lot (Wiseman 1992). A few early Spanish sites were excavated at Cochiti Reservoir. Two -- the Cochiti Springs (LA 34) and Las Majadas (LA 591) sites -- were occupied by Spanish settlers, while a third -- LA 5013 -- was either Spanish or Pueblo (Bussey and Honea 1971; Laumbach et al. 1977; C. Snow 1979; D. Snow 1973). The Signal site (LA 9142) near the Galisteo Dam may also date to this period (Alexander 1971).

The Pueblo Revolt and Reconquest 1680-1694

A combination of religious intolerance, forced labor, the extortion of tribute, and Apache raids led the Pueblo Indians to revolt in 1680, driving the Spanish colonists from New Mexico. The Pueblos resented Spanish attempts to supplant their traditional religions with Christianity, and numerous abuses of the *encomienda* and *repartimiento* systems fueled their unrest (Forbes 1960; Simmons 1979). These problems were further exacerbated by nomadic Indian attacks, either in retaliation for Spanish slave raids or because of drought-induced famine (R. Ellis 1971:52; Sando 1979:195). The colonists who survived the revolt retreated to El Paso del Norte, accompanied by the few Pueblo Indians that remained loyal to them.

Attempts at reconquest were made by Antonio de Otermín in 1681 and Domingo Jironza Petriz de Cruzate in 1687, but both failed (R. Ellis 1971). In 1692 Don Diego de Vargas negotiated the Spanish return, exploiting the factionalism that had once again developed among the Pueblos (R. Ellis 1971:64; Simmons 1979:186). De Vargas returned to Santa Fe in 1693, and reestablished the colony. Hostilities continued until around 1700, but by the early years of the eighteenth century the Spanish were again firmly in control.

Spanish Colonial Period 1694-1821

Though failing in its attempt to throw off the Spanish yoke, the Pueblo Revolt caused many changes. The hated *encomienda* system of tribute was never reestablished, and the missionary system was scaled down (Simmons 1979). The new Spanish population grew rapidly and soon surpassed that of the Pueblos. Relations between the Spanish and Pueblos became considerably more cordial. The post-Revolt Spanish colonists tended to be small farmers and herdsmen, living in scattered communities that did not demand the amount of forced native labor that the pre-Revolt economic system had.

Spanish settlements were loose clusters of ranchos, sometimes grouped together into defensive plazas. The increased number of colonists created a great demand for land in the Rio Grande core area, and a drop in the Pueblo population caused a shortage of cheap labor. These trends resulted in a shift from large land holdings to smaller grants (Simmons 1969). The royal government continued to subsidize New Mexico, but it now served as a buffer against the enemies of New Spain (Bannon 1963), not as a mission field.

New Mexico was a distant province on the frontier of New Spain, and continually suffered from a lack of supplies while shielding the inner provinces from Plains Indian raids and the ambitions of the French in Louisiana. These aspects of frontier life are critical to an understanding of Spanish Colonial New Mexico.

Following the Pueblo Revolt, the caravan service continued to supply New Mexico, but by the middle of the eighteenth century the merchants of Chihuahua had gained control of the service (Moorhead 1958). A considerable trade developed between New Mexico and Chihuahua during this period (Athearn 1974), benefitting the Chihuahuan merchants at the expense of the New Mexicans. This was documented by Father Juan Augustín de Morfi in 1778, who described the dismal situation of the New Mexican merchants (Simmons 1977). Not only did the Chihuahuan merchants inflate prices, they also invented an illusory monetary system, which they manipulated to increase profits even further (Simmons 1977:16). Thus, New Mexico was poorly supplied with goods sold at exorbitant prices. This problem was partly rectified by trading with local Indians for essentials such as pottery, hides, and agricultural produce. Some goods were apparently produced by cottage industries. Unfortunately, many products had no local substitutes.

Metal, especially iron, was in short supply (Simmons and Turley 1980). Nearly all iron came from Spain, and colonial iron production was forbidden by royal policy to protect the monopoly enjoyed by Vizcaya (Simmons and Turley 1980:18). Though imported iron was relatively cheap in Mexico, by the time it arrived in New Mexico it was quite costly. Not only did the lack of metal limit the production of tools and weapons, it also made them very expensive.

The lack of metal as well as the unreliable supply system hurt New Mexico in its role as a defensive buffer. Numerous accounts mention the scarcity of firearms and other weapons in the province (Kinnaird 1958; Miller 1975; Reeve 1960; Thomas 1940). In addition to the lack of armaments, few soldiers were ever stationed in New Mexico, forcing the use of militia and other auxiliary troops. Continued conflict with nomadic Indians led to adoption of a defensive posture by many settlements, and even individual ranches were built as fortresses.

Several Spanish Colonial sites have been studied in New Mexico. Investigations at LA 16769 found a large rectangular casa-corral and possible tower (Levine et al. 1985). Seven Spanish Colonial sites were excavated at Cochiti Reservoir (Chapman et al. 1977; Hunter-Anderson et al. 1979; D. Snow 1973, 1976a, 1976b). They ranged from one-room structures to the multiroomed Torreon site (LA 6178). Three Spanish Colonial homesteads were excavated in the Puerco River Valley (Haecker 1976). Investigations have been conducted near Placitas at San Antonio de las Huertas (LA 25674) and the Ideal site (LA 8671) (Brody and Colberg 1966; Ferg 1982). Several late Spanish Colonial-Territorial sites have been found in Albuquerque's North Valley (Rudecoff 1987; Sargeant 1985). Near Abiquiú, the Spanish Colonial-Territorial plaza at Santa Rosa de Lima de Abiquiú (LA 806) and settlement at La Puente (LA 54313) have been examined (Boyer 1988; Carrillo 1978; Salazar 1976).

Mexico declared its independence from Spain in 1821, bringing two major changes to New Mexico--a more lenient land grant policy and expansion of the trade network (Levine et al. 1985). Trade between Missouri and Santa Fe began soon after independence, and dominated events in New Mexico for the next quarter century (Connor and Skaggs 1977). During that era the Santa Fe Trail's

> . . . commercial traffic significantly altered the political and economic growth of the United States and, to a lesser extent, the social and economic growth as well. It also raised the standard of living of the New Mexicans, made them more dependent upon the Americans, and facilitated the military invasion which changed their very citizenship. (Moorhead 1958:105)

Trade with the United States brought ample and comparatively inexpensive goods to New Mexico and broke the Chihuahuan monopoly. This is reflected in the material culture of sites from this period, with more manufactured goods occurring than ever before. New Mexico remained a part of Mexico until 1846, when war broke out with the United States. American troops led by Colonel Stephen W. Kearny took possession of New Mexico on August 15, 1846 (Twitchell 1963). New Mexico remained an American territory until it was granted statehood in 1912.

A few Hispanic Territorial sites have been studied. They include Sena Plaza (LA 55368) in Santa Fe (Elliot 1986), Paraje de Fra Cristobal (LA 1124) in south-central New Mexico (Boyd 1984, 1986), the Trujillo House (LA 59658) near Abiquiú, the Ontiberos site (LA 27573) near Roswell (Oakes 1983), and Plaza de San José (LA 6992) (Schaafsma and Mayer n.d.).

Other historic occurrences near the project area include the Salazar House (LA 39962) and Mill sites (LA 39963) (NMCRIS files, Colorado State College, 1983), the Jean Bouquet Ranch (LA 5139, State Register Property No. 212) and the Bouquet Archaeological District (National Register Property No. 888). The complex is located on the northeast corner of the NM 503-US 84/285 Interchange. The district is unique in that many of its components represent and occupational continuum from the eighteenth century to the present. There are a variety of late nineteenth- and early twentieth-century structures and a property that may have been developed during the late eighteenth or early nineteenth century, the Acequia de los Trujillos, the McKnown office or "River House," the grave of Jean Bouquet, and a horticultural area that includes hedge-fence rows of Bois D'Arc (Osage orange) trees and other domestic trees (M. Marshall 1993; S. Marshall 1994).

METHODS

Purpose of Testing

The purpose of the testing program was to determine the nature and extent of surface and subsurface archaeological remains. These remains required professional assessment for their potential contribution to the prehistory or history of a region. The following procedures were used at each site.

Definition of Site Limits and Artifact Distributions

To determine site limits, archaeologists traversed the site using parallel transects across the portion of the site within the proposed project limits. Artifacts observed during these transects were marked with pinflags. Site limits were considered to be the boundary between the presence and absence of artifacts and features. The pinflags also revealed areas of relatively higher artifact density and provided an indication of artifact distribution in general. On sites with high artifact density (where marking each artifact with a pinflag was impractical), only the site limits and artifact concentrations were marked with pinflags.

Selection of Site Areas to be Tested

The overall strategy used for determining the areas to be tested was purposive, rather than probabilistic--that is, nonrandom. Features such as hearths and rock alignments were tested to determine if they had the potential to contribute significant data. Unidentifiable, but visible surface manifestations of possible subsurface features were selected for testing in order to determine their nature and extent. These manifestations included, but were not be limited to, soil discolorations, charcoal/ash deposits, or rock alignments/concentrations.

Collection and Recording

A sample of the assemblage was recorded in the field. Artifacts that provided data on temporal placement or cultural affiliation were collected. Surface artifacts that occurred within areas selected for test excavations were collected before testing proceeded. Locations of artifacts were recorded using either a Brunton or by grid designations based on Cartesian coordinates. This grid system was established prior to test excavations, and consisted of a north-south/east-west baseline intersecting at a point arbitrarily defined as 50N/50S. Feature locations and general characteristics were mapped in relation to this grid system. Photographs of the site and features were also taken.

Test Excavation Procedures

Test excavations were performed entirely with hand tools. Test pits did not exceed 1-by-1-m and excavation proceeded in arbitrary 10 cm or 20 cm levels. As natural strata were defined, excavation proceeded using those layers as the boundaries of the vertical excavation units. All soil and sediment deposits were screened through ¼-inch mesh. Samples for flotation, pollen, or radiocarbon analysis were taken from test excavation areas, as appropriate. Recovered artifacts were bagged by horizontal and vertical provenience unit. All test pits were backfilled at the completion of the testing program.

Augering

Any depressions suggestive of possible subsurface features, such as pit structures, were tested with hand soil augers. These auger tests were used to recover charcoal, wood, artifacts, or other evidence associated with semisubterranean structures or buried cultural material. Auger tests were also used to determine the subsurface extent of cultural lenses or strata that were identified during test excavations. All soil removed by auger testing was screened through ¼-inch mesh. Additional auger tests were also used to determine if other buried features, having no surface manifestations, were present.

Limits of Testing

The combined horizontal extent of tested areas did not exceed 2 percent of the total site area, excluding the testing of possible features and any auger tests. When intact features were found during test excavations, digging ceased, the feature was documented, and black plastic was used to indicate the location of the feature should data recovery be recommended in the future. The test pit was then backfilled.

Expansion of Testing

There were no equivocal results regarding the nature and extent of subsurface remains. Should there have been a need to expand the testing program, then appropriate authorities would have been contacted with a revised proposal. The additional testing would have proceeded after the revised proposal had been approved.

Human Remains

No human remains were encountered.

Laboratory Analyses

All collected artifacts were cleaned, sorted, and examined in the laboratories of the Office of Archaeological Studies. Analyses within each artifact material class were conducted in accordance to standards established by the Office of Archaeological Studies (see specific analytical techniques for ceramic and lithic artifacts below).

Disposition of Recovered Artifacts

Unless otherwise stipulated by landowners or land managers, all recovered artifacts will be curated in the Archaeological Research Collections at the Museum of New Mexico, Laboratory of Anthropology. As a division of the Museum of New Mexico, the Office of Archaeological Studies maintains a curation agreement with the Archaeological Research Collections unit.

Site Mapping

Site boundaries, physical and cultural features, test excavation locations, auger tests, and areas of proposed project limits were recorded with a Brunton compass and a metric tape measure. A scaled site map is included in this report.

RESULTS OF LIMITED TEST EXCAVATIONS

Site Description, LA 103919

LA 103919 is a two-component site located on both sides of NM 503, on private land and highway right-of-way acquired from private sources (Fig. 2). The surface attributes, as recorded by S. Marshall (1994), consist of two principal components. The prehistoric component is a scatter of ceramics and lithic artifacts, ground stone, and charcoal deposits. The historic component is confined to the south side of NM 503 and consists of a scatter of glass (amethyst colored, clear patinated, and brown-green) and metal. Outside of the right-of-way are three collapsed brick and adobe structures dating to approximately the turn of the twentieth century. S. Marshall (1994:6) only recorded two historic structures. A third historic structure, with two standing walls, is located adjacent to the right-of-way on the southwestern end of the site. The artifact scatter from this structure extends into the right-of-way. Two irrigation ditches, which are still in use, are located in the vicinity of the historic structure.

Test Excavations

To test the site, eight 1-by-1-m noncontiguous test pits and 46 auger tests were excavated.

Test Pit 1

Test Pit 1 was excavated to test a stain and associated artifacts eroding from a cutbank along the southern shoulder of NM 503. This unit was excavated to a depth of 1.30 m below the present ground surface (bgs) in eight arbitrary 10-20 cm levels. Artifacts were present throughout Levels 1-7 but absent in Level 8. Intact prehistoric subsurface deposits were present between 31 and 110 cm bgs, associated with charcoal inclusions and dark staining. The soil ranged from silty sandy loam (10YR 4/4 dark yellowish brown) towards the surface of the pit, with compact sand and decomposing sandstone (10YR 6/3 pale brown) towards the base (Fig. 3). A shell pendant was found in Level 7. The base of the unit was augered to a maximum depth of 2.12 m bgs. Charcoal was recovered to a depth of 1.40 m bgs.

Test Pit 2

Test Pit 2 was placed to test a charcoal stain and associated artifacts eroding from a cutbank along the southern shoulder of NM 503. The unit was excavated in four arbitrary 10-cm levels to a final depth of 40 cm bgs. The subsurface stratigraphy consisted of: (1) 12 cm of silty sandy loam with 2 percent gravels, 10 YR 5/4 yellowish brown with prehistoric ceramic and lithic artifacts; (2) a 10-cm layer of sandy loam with less than 1 percent gravels, 10 YR 3/1 very dark gray charcoal stained lens with ceramic artifacts and a concentration of microflakes in the NW corner; (3) sterile sandy soil (10 YR 5/6 yellowish brown) with no cultural material. There was

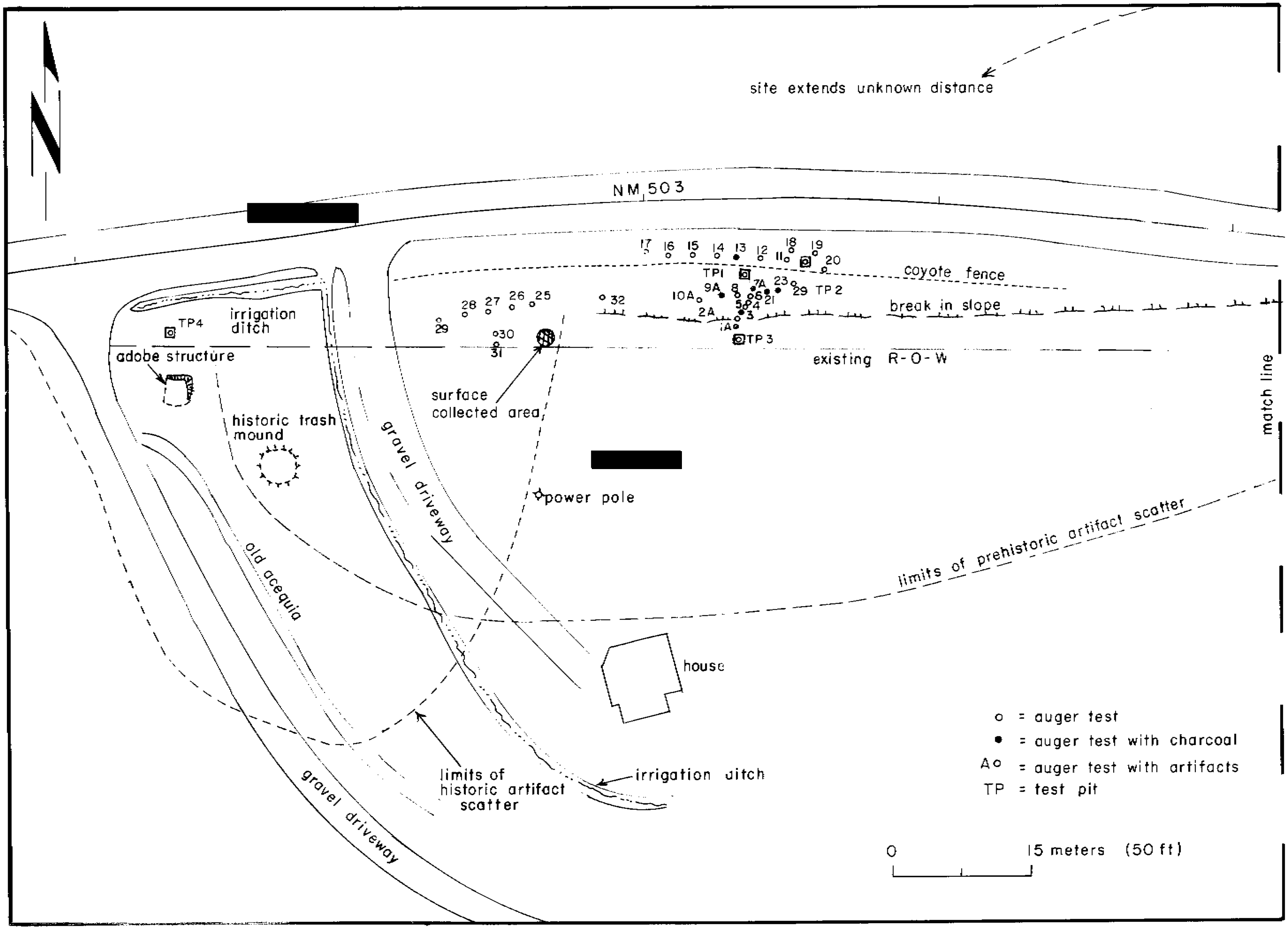


Figure 2. LA 103919 site map.

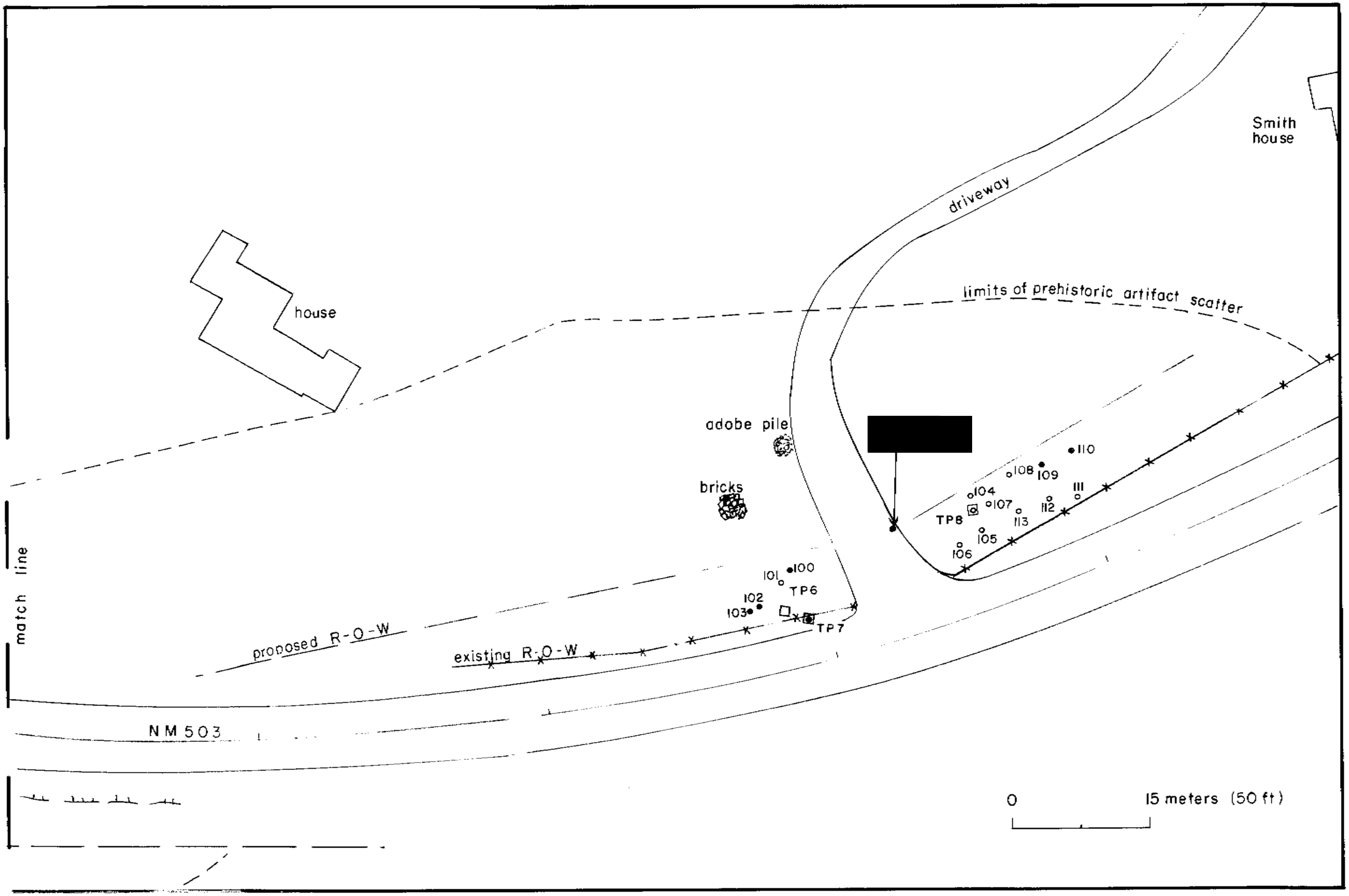
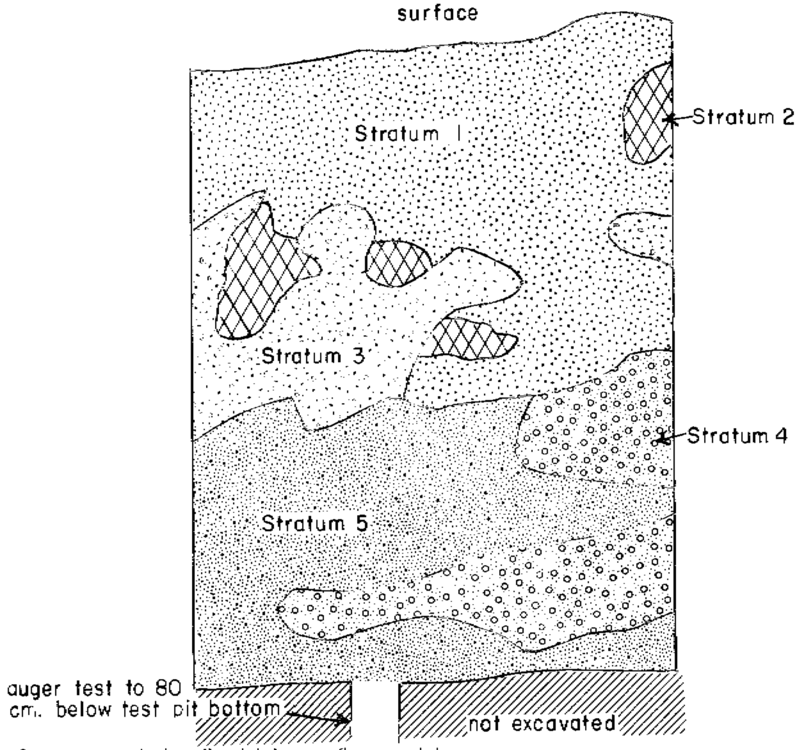
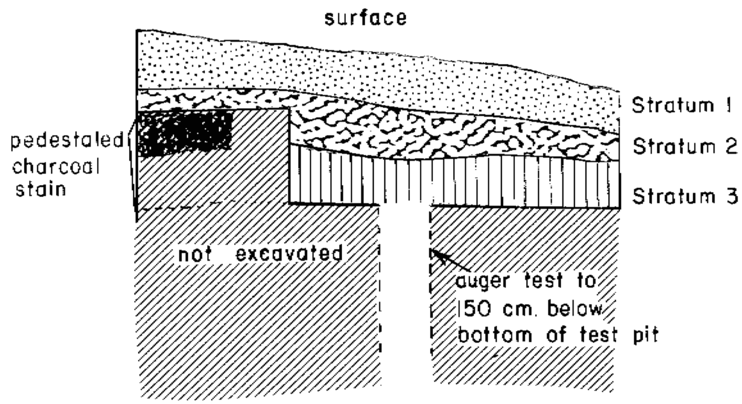


Figure 2. (Continued).



Stratum 1 = dark yellowish brown fine sand, heavy charcoal, some artifacts
Stratum 2 = very dark grayish brown fine sand, charcoal, some artifacts
Stratum 3 = yellowish brown fine sand with charcoal flecks, some artifacts
Stratum 4 = pale brown fine crumbly sand with small gravel and charcoal, some artifacts
Stratum 5 = pale brown crumbly fine sand with few gravels, few artifacts

Figure 3. LA 103919, Test Pit 1, south wall profile.



Stratum 1 = sandy loam – yellowish brown

Stratum 2 = charcoal stained sandy loam, some burned sandstone – very dark gray

Stratum 3 = sandy loam – yellowish brown

0 50 cm.

Figure 4. LA 103919, Test Pit 2, north wall profile.

a dark subrectangular stain in the northwest corner at 18 cm bgs measuring 26 cm (east-west) by 22 cm (north-south), and was approximately 1 cm thick. It appeared to continue to the northwest (Fig. 4). The base of the test pit was augered to 1.50 m beyond the excavated area, and no further cultural materials were encountered.

Test Pit 3

Test Pit 3 was randomly placed at the summit of the mound to test for subsurface deposits. It was excavated in two arbitrary 10 cm levels to a maximum depth of 28 cm bgs. The stratigraphy consisted of: (1) a 2-cm layer of sandy silty topsoil (10 YR 6/3 pale brown) with one ceramic artifact; (2) a 24 cm layer of clayey-platey sandy soil (10 YR 4/2 dark grayish brown) with no cultural material. Decomposing sandstone bedrock (10 YR 3/3 dark brown) was encountered at 28 cm bgs. Excavation was terminated, and because of the bedrock, soil augering was not possible.

Test Pit 4

Test Pit 4 was randomly placed to test the area next to an eroded adobe structure located south of the existing highway right of way. It was excavated to a depth of 70 cm bgs in seven arbitrary 10 cm levels. Artifacts were present throughout all levels. The subsurface stratigraphy consisted of: (1) a 25-cm layer of loamy organic soil with fewer than 1 percent gravels, 10 YR 5/4 yellowish brown with ceramic and historic artifacts and nonhuman bone recovered; (2) 30 cm sandy organic loam, 10 YR 7/3 very pale brown with historic artifacts; (3) a 20-cm layer of sandy-clayey soil containing platey sandstone inclusions, 10 YR 4/4 dark yellowish brown with cultural material. Bedrock was encountered at 68-74 cm bgs. Several artifacts were found lying flat on the bedrock, which may have constituted an activity surface associated with the structure. Charcoal inclusions were observed throughout the levels to approximately 5 cm above the bedrock. Augering was not possible due to bedrock.

Test Pit 5

Bedrock and highly compacted clay were encountered in the first levels of Test Pit 5. This unit was terminated, and Test Pit 5 was not used.

On the north side of NM 503 Test Pits 6-8 and Auger Tests 100-113 were excavated (see Fig. 2).

Test Pit 6

Test Pit 6 was excavated to test a stain and associated artifacts eroding from a roadcut along the northern shoulder of NM 503. This unit was excavated to a depth of 87 cm bgs in eight arbitrary 10-20 cm levels (Fig. 5). Intact subsurface deposits were present between 42 and 87 cm bgs, associated with charcoal inclusions and dark staining. The soil ranged from silty sandy loam with 2 percent sandstone inclusions (7.5 YR 4/4 brown) towards the surface of the pit, with sandy

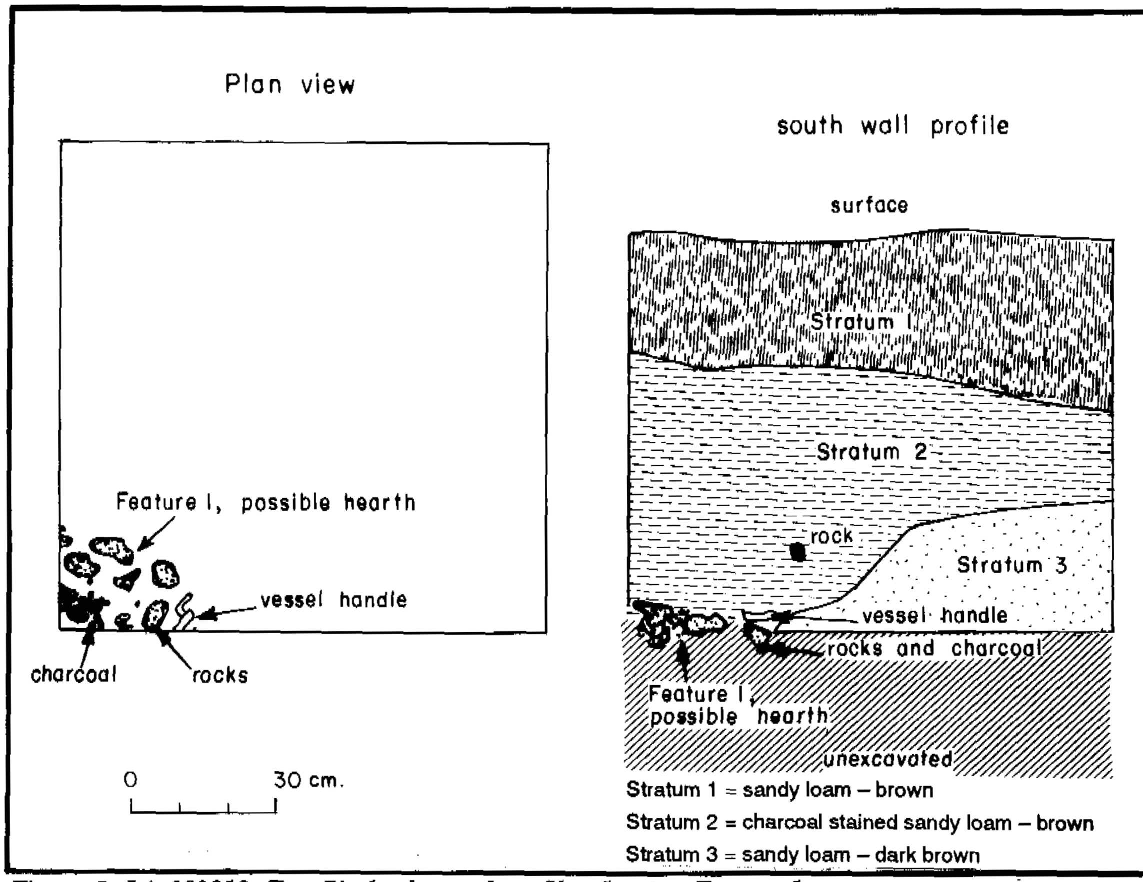


Figure 5. LA 103919, Test Pit 6, plan and profile, showing Feature 1.

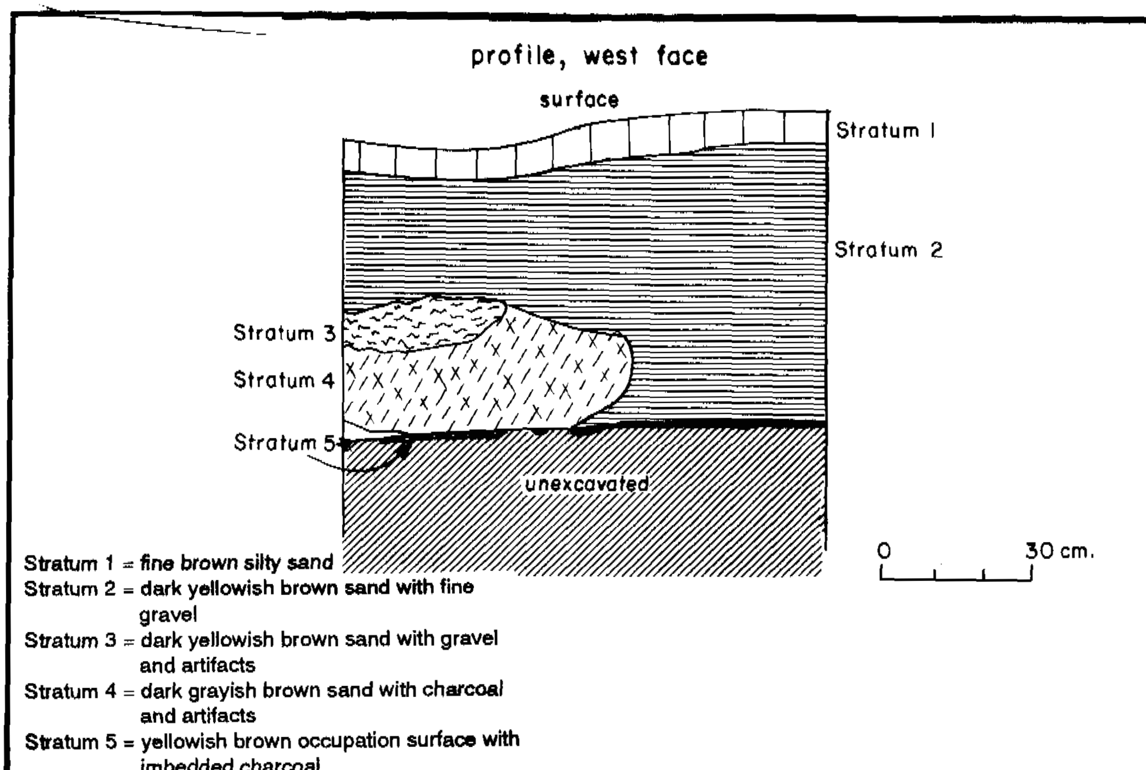


Figure 6. LA 103919, Test Pit 7, west face profile.

loam containing 7 percent sandstone gravels (7.5 YR 5/6 strong brown) towards the base. A charcoal stain was noted from 30-87 cm bgs containing a concentration of ceramic artifacts and charcoal. Feature 1, a possible hearth, was encountered at 84 cm bgs (see description below). Excavation was terminated at this point in accordance with the testing methods. This unit was augered to a depth of 80 cm below the base of the test pit. Sterile sand was encountered with no cultural materials present.

Test Pit 7

Test Pit 7 was placed to test a charcoal stain and associated artifacts eroding from a cutbank along the northern shoulder of NM 503. It was excavated in three arbitrary 10-20 cm levels to a maximum depth of 65 cm bgs. The subsurface stratigraphy consisted of: (1) 8 cm of fine silty sandy topsoil with small gravels, 10 YR 5/3 brown with ceramic and lithic artifacts; (2) a layer of sand with 10 percent gravels, 10 YR 4/4 dark yellowish brown containing charcoal and a concentration of prehistoric ceramic and lithic artifacts. This layer was intersected in the southern half of the unit by a distinct cultural level which consisted of (3) a 10 cm layer of sand with 10-20 percent gravels, 10 YR 4/4 dark yellowish-brown with a high concentration of microflakes and ceramic artifacts; (4) 24 cm layer of sand with small gravels, 10 YR 4/2 dark grayish brown with charcoal staining. A discontinuous charcoal-embedded surface was encountered at the western ends of the unit at 65 cm bgs (Fig. 6). A single ceramic artifact and a microflake were observed lying on the surface. The surface appeared to be approximately 2 cm thick. Excavation was halted at this point. The base of the test pit was augered to a final depth of 1.87 m bgs and no cultural material was found.

Test Pit 8

Test Pit 8 was randomly placed to test subsurface deposits at the eastern end of the site. It was excavated to a final depth of 70 cm bgs in four arbitrary 20 cm levels. The stratigraphy consisted of (1) 22 cm homogeneous fine silty sand, 10 YR 5/4 yellowish brown with cultural materials present; (2) a 20 cm layer of sandy loam with sandstone gravels, 10 YR 4/3 brown containing charcoal inclusions and staining. Ceramic and lithic artifacts were more numerous in the stained areas. (3) 28 cm sandy loam with sandstone gravels, 10 YR 5/4 yellowish brown with prehistoric ceramic and lithic artifacts. The unit was augered to a maximum depth of 2.55 m bgs, with culturally sterile sand continuing to a depth of 1.50 m bgs. Sand with charcoal inclusions continued throughout the remainder of the auger test.

Feature Description

Feature 1

Feature 1 was located at Test Pit 6, Level 8 (84 cm bgs). It measured 20 cm north-south by 28 cm east-west. It consisted of a possible thermal feature in an undisturbed context (Stratum 2) between 80 and 85 cm bgs (see Fig. 5). Confined to the southwest corner of the unit, Feature 1 was composed of a mixed charcoal and ash stain, burned rock, a large ceramic strap handle, and artifact inclusions, including a lithic artifact and two ceramic artifacts (including the ceramic strap handle). The surrounding matrix consisted of a 7.5 YR 5/6 strong brown sandy loam with medium to large sandstone cobbles. There did not appear to be a surface associated with this feature. The feature was partially exposed and appeared to continue to the southwest. Excavation was discontinued once the feature was defined. It was preserved under black plastic and backfilled.

The ceramics associated with Feature 1 were nondiagnostic micaceous utility wares. The dating potential of this feature was not evident after limited testing. Further excavation may reveal additional information.

Auger Tests

A total of 46 auger tests (AH) were excavated on the north and south sides of NM 503. Cultural materials were recovered from Auger Tests 1, 2, 9, 10, 22, 100, 101, 102, at an average depth of 45 cm. Charcoal and artifacts were recovered from Auger Tests 1, 2, 9, 10, 22, 100, 101, 102. Charcoal only was recovered from Auger Tests 3, 4, 7, 8, 13, 17, 18, 21, 103. No cultural materials or charcoal were recovered from Auger Tests 5, 6, 11, 12, 14, 15, 16, 19, 20, 23-32, 104-113 (see Fig. 2).

Site Description, LA 39957

LA 39957 is a site located on the north side of NM 503, on private land and highway right-of-way acquired from private sources (Fig. 7). It was determined that LA 39957 had been incorrectly located and recorded during the initial documentation. LA 39957 is actually located approximately 122 m to the northeast and well outside of the proposed right-of-way. Three 1-by-1-m noncontiguous test pits and twelve auger tests were excavated.

Test Pit 1

Test Pit 1 was randomly placed to test for subsurface features. This unit was excavated to a depth of .30 m below the present ground surface (bgs) in three arbitrary 10 cm levels. Modern glass was found in the lower two levels, with no further cultural remains present. The soil ranged from sandy organic loam (10 YR 3/4 dark yellowish brown) in Layers 1 and 3, to sandy loam with 80 percent gravels (10 YR 7/6 yellow) in Layer 2. The base of the test pit was augered to a maximum depth of .70 m bgs. No cultural material was recovered.

Test Pit 2

Test Pit 2 was randomly placed to test for subsurface deposits. It was excavated in three arbitrary 10 cm levels to a final depth of .30 m bgs. The soil ranged from organic sandy loam with 5

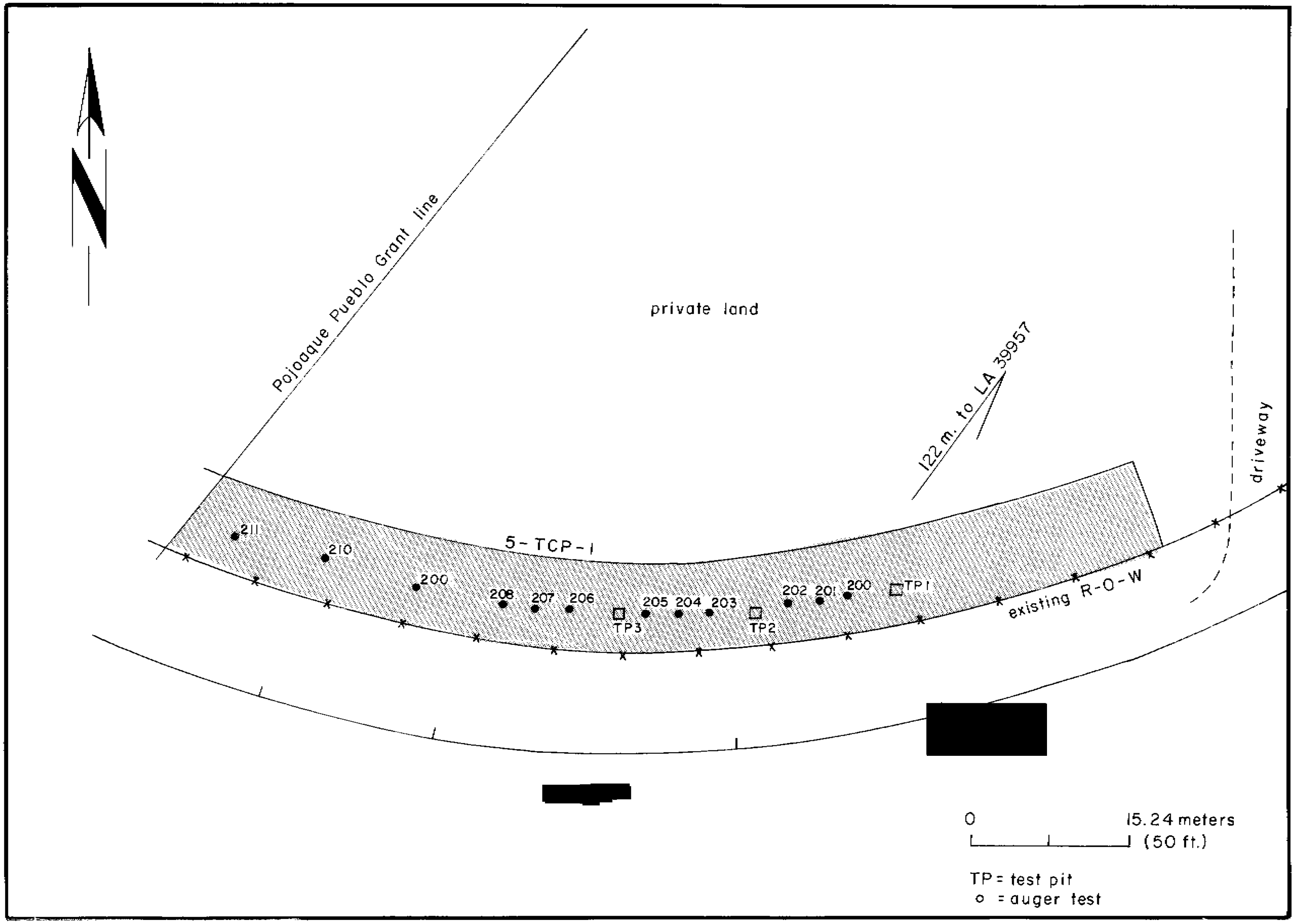


Figure 7. LA 39957 site map.

percent gravels (10 YR 5/6 yellowish-brown) in Layers 1 and 3, to sandy loam with 85 percent gravels (10 YR 4/6 dark yellowish brown). Modern glass was recovered at 30 cm bgs. The unit was augered to a depth of 90 cm bgs. No cultural materials were present.

Test Pit 3

Test Pit 3 was randomly placed to test for subsurface features. The unit was excavated to a depth of 45 cm bgs in three arbitrary 10 cm levels. The stratigraphy consisted of: (1) 10 cm of topsoil with decomposed organic materials (10 YR 4/3 brown), (2) a 35 cm layer of homogeneous sandy soil (7.5 YR 5/4 brown) with a pocket of gravelly soil (7.5 YR 5/4 brown) at 20 cm bgs. No cultural materials were present in any level. The base of the unit was augered to a depth of 1.15 m bgs and contained culturally sterile soil.

Auger Tests

Twelve auger tests (AH) were excavated on the north side of NM 503. Metal was recovered from Auger Test 208. Auger Tests 200-211 were void of cultural materials.

ARTIFACT ANALYSIS

Ceramic Analysis, Testing Phase of LA 103919

by C. Dean Wilson

Ceramic categories were recorded for sherds from selected proveniences at LA 103919 to determine the potential dating and sequence of occupations represented. This analysis was limited to recording ceramic types, using types or categories of the Tewa series defined for the Northern Rio Grande (McKenna and Miles 1990).

Table 1 illustrates the distribution of ceramic types identified during this analysis. The great majority of gray ware sherds, as defined by the absence of polished and slipped surfaces, exhibit very similar pastes and technologies. Types were distinguished by the presence of mica flecks on the surface and the presence and degree of coiled treatments on the exterior surface, and represent earlier utility ware types that may be associated with Developmental or Coalition period occupations.

White ware types, as distinguished by the presence of polished and slipped surfaces, were defined based on paint type, paste and slip characteristics, and thickness. With the exception of a single Santa Fe Black-on-white, decorated sherds from LA 103919 exhibit early characteristics and mineral paint indicative of types produced during the Developmental period. Sherds exhibiting painted styles indicative of both Red Mesa Black-on-white and Kwahe'e Black-on-white were identified, and indicate an occupation sometime during the Late Developmental period. Occupations in the Northern Rio Grande region dominated by Rio Grande variety of Red Mesa Black-on-white are poorly dated but appear to date sometine between A.D. 900 and 1050, while those dominated by Kwahe'e Black-on-white and associated trade wares are thought to date sometime between A.D. 1050 and 1200 (Stuart and Gauthier 1981). The dominance of Red Mesa Black-on-white over Kwahe's Black-on-white may indicate that the occupation of this dates sometime during this span.

The implications of this preliminary ceramic analysis for data recovery are examined in greater detail in the section entitled "Problem Domains."

Table 1. Type Distributions from LA 103919

TYPE	LEVEL 2		LEVEL 3		LEVEL 4	
	#	%	#	%	#	%
Plain polished white						
Plain polished slipped white			1	.5	1	1.5
Red ware, polished slipped (undiff)	1	1.5			1	1.5
Plain, Unpolished, Incised			1	.5		
Plain, Unpolished, Micaceous						
Plain Micaceous Slipped						
Micaceous Ridged (Sapawi)	13	32	3	1.6	9	13.4
Early Plain Micaceous	22	55.0	127	69.4	37	55.2
Coiled, Plain Corrugated, Micaceous			4	2.2	1	1.5
Neckbanded (Undiff)						
Kana'a Neckbanded			3	1.6		
Corrugated, Indented (Undiff)			1	.5		
Smeared, Indented, Corrugated, Micaceous			8	4.4	3	4.5
Tesuque Smeared Indented						
Gray Ware (Undiff)					1	1.5
Corrugated, Indented, Micaceous	4	10.0	29	15.8	11	16.4
Mineral Paint/White (Undiff)						
Red Mesa B/W	1	1.5	2	1.1	2	3.0
Kwahe'e B/W			2	1.1	1	1.5
Carbon/White (Undiff)						
Santa Fe B/W			1	.5		
Wiyo B/W						
Biscuit Ware (Undiff)						
Total	41		183		67	

Table 2. (Continued)

LA 103919 TYPE	Level 5		Level 6		Level 7	
	#	%	#	%	#	%
Plain polished white	1	1.4				
Plain polished slipped white						
Plain, Unpolished, Incised	2	2.7				
Plain, Unpolished, Micaceous						
Plain Micaceous Slipped			1	3.		
Micaceous Ridged (Sapawi)	8	10.8	4	12.1	3	12.5
Early Plain Micaceous	43	58.1	19	57.6	15	62.5
Coiled, Plain Corrugated, Micaceous	1	1.4				
Neckbanded (Undiff)						
Kana'a Neckbanded						
Corrugated, Indented (Undiff)						
Smeared, Indented, Corrugated, Micaceous	3	4.5	1	3.	3	12.5
Tesuque Smeared Indented						
Gray Ware (Undiff)						
Corrugated, Indented, Micaceous	14	18.9	8	24.2	1	4.2
Mineral Paint/White (Undiff)						
Red Mesa B/W	1	1.4			1	4.2
Kwahe'e B/W	1	1.4			1	4.2
Carbon/White (Undiff)						
Santa Fe B/W						
Wiyo B/W						
Biscuit Ware (Undiff)						
Total	74		33		24	

Table 2. (Continued)

LA 103919 TYPE	Level 8 #	Level 8 %	Surface #	Surface %	Total #	Total %
Plain polished white					1	.23
Plain polished slipped white					2	.46
Red ware polished slipped (undiff)	1	10.			3	.69
Plain, Unpolished, Incised					3	.69
Plain, Unpolished, Micaceous						
Plain Micaceous Slipped					1	.23
Micaceous Ridged (Sapawi)					40	9.21
Early Plain Micaceous	7	70.	2	100.	272	62.7
Coiled, Plain Corrugated, Micaceous					6	1.38
Neckbanded (Undiff)						
Kana'a Neckbanded					3	.69
Corrugated, Indented (Undiff)	1	10.			1	.23
Smeared, Indented, Corrugated, Micaceous					18.	4.15
Tesuque Smeared Indented						
Gray Ware (Undiff)					1	.23
Corrugated, Indented, Micaceous					67	15.4
Mineral Paint/White (Undiff)						
Red Mesa B/W	1	10.			8	1.84
Kwahe'e B/W					5	1.15
Carbon/White (Undiff)						
Santa Fe B/W					1	.23
Wiyo B/W						
Biscuit Ware (Undiff)						
Total	10		2		434	

Chipped Stone Artifact Analysis

James L. Moore

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, with higher magnification 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. Analytical results were entered into a computerized data base using the Statistical Package for the Social Sciences Data Entry program.

Analysis was completed using the OAS's (1990) standardized methodology, and was designed to examine material selection, reduction technology, and tool use. While material selection studies cannot reveal *how* materials were obtained, they can usually provide some indication of *where* they were procured. In particular, by examining the type of cortex present on artifacts, it is possible to determine whether the material was obtained at the source or from secondary deposits. By studying the reduction strategy employed at a site it is possible to assess the level of residential mobility. Where a high degree of residential mobility is usually accompanied by the use of a curated strategy, sedentary peoples more commonly use an expedient strategy. The types of tools present can be used to help assign site function, particularly on artifact scatters lacking features. Tools can also be used to help assess the range of activities that occurred at a site.

Attributes Examined during the Study

Table 2 lists the attributes examined during this study and indicates which ones relate to each class of chipped stone artifact. Four classes were recognized: flakes, angular debris, cores, and formal tools. Flakes were debitage exhibiting one or more of the following characteristics: definable dorsal and ventral surfaces, a bulb of percussion, and a striking platform. Angular debris were debitage lacking striking platforms and bulbs of percussion, and on which ventral or dorsal surfaces could not be defined. Cores were pieces of lithic material that had two or more negative scars originating from one or more surfaces. Formal tools were artifacts that were intentionally altered to produce specific shapes or edge angles. Alterations took the form of unifacial or bifacial retouching, and artifacts were considered intentionally shaped when retouch scars extended across two-thirds or more of a surface, or when intentional retouch was less extensive but caused significant alteration of artifact shape or edge angle.

Attributes recorded on all artifacts included material type and quality, artifact morphology and function, amount of surface covered by cortex, portion, evidence of thermal alteration, edge damage, and dimensions. Material type was coded by gross category unless specific sources could be identified. Texture was measured subjectively to examine flakeability. Most materials were divided into fine, medium, and coarse categories depending on grain size, and such measures were applied within but not across material types. Obsidian was classified as glassy by default, and this category was applied to no other material. The presence or absence of visible flaws that would affect material flakeability was also noted.

Table 2. Correlation of Attributes Analyzed with Chipped Stone Artifact Categories

attribute	flakes	angular debris	cores	formal tools
material type	x	x	x	x
material quality	x	x	x	x
artifact morphology	x	x	x	x
artifact function	x	x	x	x
cortex	x	x	x	x
cortex type	x	x	x	x
portion	x	x	x	x
platform type	x			
thermal alteration	x	x	x	x
wear patterns	x	x	x	
modified edge angles	x	x	x	x
dimensions	x	x	x	x

Two attributes were used to provide information about artifact form and function. The first was morphology, which categorized artifacts by general form. The second was function, which categorized tools by inferred use. Cortex was recorded by percent in increments of 10, and cortex type was defined when possible. All artifacts were coded as whole or fragmentary; when fragmentary, the portion was recorded if it could be identified. Two types of alteration were noted: thermal and edge damage. When present, the type and location of thermal alteration were recorded. This information was used to determine whether the artifact was purposely altered or not. Edge damage, both cultural and noncultural, was recorded and described when present. Edge angles were measured on all artifacts demonstrating cultural edge damage, and on all formal tools; edges lacking evidence of cultural damage were not measured.

Dimensions were measured on each artifact. On angular debris and cores, length was defined as the artifact's largest measurement, width was the longest dimension perpendicular to the length, and thickness was perpendicular to the width and was usually the smallest measurement. On flakes and formal tools, length was the distance between the platform (or proximal end) and termination (or distal end), width was the distance between the edges paralleling the length, and thickness was the distance between dorsal and ventral surfaces.

Platforms only occur on flakes and were recorded for that artifact type alone. Platform type is an indicator of reduction technology and stage. Any modifications on platforms were noted, as were missing and collapsed platforms. Flakes were further divided into removals from cores and tools using a polythetic set of variables (Table 3). A polythetic framework is one in which fulfilling a majority of propositions 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 fulfill all of them, only a set percentage in any combination need be fulfilled. This

Table 3. Polythetic Set for Distinguishing Biface Flakes from Core Flakes

Whole Flakes

1. Platform:
    a. has more than one facet
    b. is modified (retouched and/or 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 (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:
-If whole it fulfills 7 of 10 attributes.
-If broken or platform is collapsed it fulfills 5 of 7 attributes.

array of conditions models an idealized tool flake and includes information on platform morphology, flake shape, and earlier removals. The polythetic set used here was adapted from Acklen et al. (1983). In keeping with that model, when a flake fulfilled 70 percent of the listed conditions it was considered a removal from a tool. This percentage is high enough to isolate flakes produced during the later stages of tool production from those removed from cores, while at the same time it is low enough to permit flakes that were removed from a tool but do not fulfill the entire set of conditions to be properly identified. While not all flakes removed from tools could be identified by the polythetic set, those that were can be considered definite evidence of tool manufacture. Flakes that fulfilled less than 70 percent of the conditions were classified as struck from cores. Instead of rigid definitions, the polythetic set provided a flexible means of categorizing flakes and helped account for some of the variability seen in flakes removed during experiments. For this analysis, tool flakes were subdivided into two categories based on size. Retouch flakes were removed from small tools and were generally less than 1 cm long, while biface flakes seem to have been removed from larger tools and were more than 1 cm long.

Distinguishing between tool and core flakes in an assemblage is an important step in defining basic reduction technology. A predominance of tool flakes, particularly those removed from large bifaces serving as cores, suggests a high degree of mobility. Conversely, a predominance of core flakes and only a few small tool flakes suggests limited formal tool manufacture by a sedentary population.

Chipped Stone Artifact Results

A total of 223 chipped stone artifacts was analyzed from LA 103919. Artifacts from 6 excavational units were examined, including Test Pits 1, 2, 3, 6, 7, and 8. Material type by artifact morphology is shown in Table 4. Cherts dominate, comprising nearly 58 percent of the assemblage. Obsidians are the next most common material category, making up 34 percent of the assemblage. Other materials occur in smaller amounts and include silicified wood, basalt, siltstone, quartzite, massive quartz, and sandstone. Only a single flake of the latter material was recovered, and was probably not related to the same set of activities as were the other chipped stone artifacts.

Various cherts were noted in the assemblage, with Pedernal chert being by far the most common type. Other varieties of chert are from unidentifiable sources. Obsidian is also rather common, and seems to have been obtained from several locales. Polvadera Peak obsidian was identified visually and comprises nearly half (44.7 percent) of the obsidian assemblage. Three pieces resemble types from other Jemez sources, and were probably obtained from Cerro del Medio (1) and Obsidian Ridge (2). Lacking trace element analysis, however, this is tentative. The remaining obsidian artifacts are probably from Jemez sources, but they lack distinguishing characteristics and could not be assigned to specific sources. No other materials are from known sources.

Table 5 illustrates cortex type for artifacts with cortical surfaces or platforms. Overall, waterworn cortex dominates the assemblage, indicating that most materials were obtained from gravel deposits, probably at some distance from their original sources. Exceptions to this include two pieces of probable Jemez obsidian and one piece that was probably obtained at the Cerro del Medio source. Since these artifacts have cortical surfaces that exhibit no evidence of transport by water, they were undoubtedly obtained at or near their sources.

Tool flakes comprise a fairly large part of the flake assemblage, and include 4 biface flakes (2.7 percent) and 25 retouch flakes (16.9 percent). As discussed in the chapter on analysis methods, both of these categories represent removals from tools, the main difference being size. Biface flakes were removed from relatively large bifaces and are more than 10 mm long, while retouch flakes were either removed from small bifaces or during the retouching of a larger biface and are less than 10 mm long. Retouch flakes from this site seem to represent removals from small bifaces. While an expedient core-flake reduction strategy dominated, tool manufacture was also important at LA 103919. The predominance of expedient reduction is supported by a rather

Table 4. Material Type by Artifact Morphology for Analyzed Chipped Stone Artifacts from LA 103919

Material	Indeter.	Angular debris	Core flake	Tool flake	Cores	Biface	Totals
chert	1(3.4)	9(31.0)	17(58.6)	1(3.4)	1(3.4)		29(13.0)
Pedernal chert		45(45.0)	52(52.0)	3(3.0)			100(44.8)
silicified wood		1(50.0)	1(50.0)				2(0.9)
obsidian		5(12.5)	22(55.0)	12(30.0)		1(2.5)	40(17.9)
Jemez obsidian		1(50.0)	1(50.0)				2(0.9)
Polvadera Peak obsidian		4(11.8)	16(47.1)	13(38.2)		1(2.9)	34(15.2)
basalt		3(42.9)	4(57.1)				7(3.1)
sandstone			1(100.0)				1(0.4)
siltstone			2(100.0)				2(0.9)
quartzite		1(50.0)	1(50.0)				2(0.9)
massive quartz		1(25.0)	3(75.0)				4(1.8)
totals(percent)	1(0.4)	70(31.4)	120(53.8)	29(13.0)	1(0.4)	2(0.9)	223(100)

Table 5. Cortex Types by Material Type for Chipped Stone Artifacts Analyzed from LA 103919

Material	Waterworn	Nonwaterworn	Indeter.	Totals
chert	7(100.0)			7(18.9)
Pedernal chert	14(93.3)		1(6.7)	15(40.5)
silicified wood	1(100.0)			1(2.7)
obsidian	1(33.3)	2(66.7)		3(8.1)
Jemez obsidian		1(100.0)		1(2.7)
Polvadera Peak obsidian	5(100.0)			5(13.5)
basalt	2(100.0)			2(5.4)
quartzite	1(100.0)			1(2.7)
massive quartz	2(100.0)			2(5.4)
totals(percent)	33(89.2)	3(8.1)	1(2.7)	37(100)

low flake to angular debris ratio of 2.13. This ratio also suggests that most cores were reduced by hard hammer percussion, which tends to produce large amounts of shatter. Much of the shattering is partially attributable to material quality, since 29.5 percent of the debitage contains flaws large enough to have affected flaking.

Flake platform type by artifact morphology is shown in Table 6. Nearly 43 percent of the core flake platforms are obscured or missing. Of those that remain, nearly half (49.3 percent) are simple cortical or single facet platforms, 46.3 percent are multifacet, and only 4.5 percent were modified to facilitate removal. These percentages are consistent with an expedient reduction strategy. The large percentage of multifacet platforms suggests that cores were extensively reduced before being discarded. Unfortunately, this cannot be confirmed by core size since only one was found in the analyzed assemblage. Some bipolar reduction also seems to have occurred, as evidenced by two flakes from cores that appear to have been reduced in this manner.

Similar percentages of biface and retouch flakes had obscured or missing platforms (44.8 percent). Of those that remain, 43.8 percent were modified to facilitate removal, 31.3 percent are multifacet, and only 25 percent are single facet. These percentages are considerably different from those for the core flakes, and suggest that greater care was taken in platform preparation during tool manufacture.

Some materials can be modified by heat to improve their flaking characteristics. Fine-grained cherts and silicified woods are particularly amenable to this type of processing. However, thermal alteration can also occur when materials are unintentionally exposed to heat. Table 7 illustrates the range of thermally altered materials from LA 103919. Only cherts evidenced any signs of heat treatment, and these artifacts comprise 4.5 percent of the assemblage. Of the thermally altered artifacts, 80 percent are Pedernal chert, suggesting that this material may have been intentionally modified to facilitate reduction. Thermal alteration patterns are shown by material type in Table 8. Two patterns are caused by mistakes occurring during purposeful heat treatment, or when materials are accidentally exposed to high levels of heat. Potlidding occurs when materials are heated too rapidly and water turns to steam instead of being driven off, causing an explosion that blows out a portion of the artifact's surface. Crazing occurs when heated materials cool too rapidly and experience uneven contraction rates.

One pattern is good evidence of successful intentional thermal alteration. When cherts are properly heat treated their crystalline structure is often altered and the material acquires a waxy luster. However, the exterior surfaces of the original nodule or flake retain the luster they had before being heated. Thus, artifacts with variable luster have at least one waxy surface, suggesting heat treatment, while other surfaces are dull or matte, suggesting that they represent the original pre-heat treatment luster. Four examples of this pattern were found during analysis; all are Pedernal chert. This is even stronger evidence that Pedernal chert was purposely altered to improve its flaking characteristics. Only one of these artifacts was a tool flake; two were core flakes, and one was a piece of angular debris. Thus, it is uncertain whether only debitage or both cores and debitage were heat treated. However, a single unreduced chert nodule exhibits potlid fractures suggestive of purposeful heat treatment, suggesting that relatively large pieces of material may have been subjected to thermal alteration.

Both formal and informal tools are uncommon in this assemblage, comprising only 1.4 percent of the total (Table 9). The style of the single projectile point found is consistent with an

Table 6. Platform Types by Flake Morphology for LA 103919

Platform type	Core flakes	Biface flakes	Bipolar flakes	Retouch flakes	Totals
cortical	3(100.0)				3(2.0)
single facet	30(88.2)		1(2.9)	3(8.8)	34(23.0)
multifacet	31(86.1)			5(13.9)	36(24.3)
multifacet & abraded	1(100.0)				1(0.7)
retouched	2(28.6)			5(71.4)	7(4.7)
retouched & abraded		1(100.0)			1(0.7)
abraded		1(00.0)			1(0.7)
collapsed	14(51.9)	1(3.7)		12(44.4)	27(18.2)
crushed	5(71.4)	1(14.3)	1(14.3)		7(4.7)
absent (snap)	17(100.0)				17(11.5)
absent (broken in manufacture)	14(100.0)				14(9.5)
totals(percent)	117(79.1)	4(2.7)	2(1.4)	25(16.9)	148(100)

Table 7. Thermally Altered Materials from LA 103919

Material	Thermal alteration	No thermal alteration	Totals
chert	2(6.9)	27(93.1)	29(13.0)
Pedernal chert	8(8.0)	92(92.0)	100(44.8)
silicified wood		2(100.0)	2(.9)
obsidian		40(100.0)	40(17.9)
Jemez obsidian		2(100.0)	2(.9)
Polvadera Peak obsidian		34(100.0)	34(15.2)
basalt		7(100.0)	7(3.1)
sandstone		1(100.0)	1(.4)
siltstone		2(100.0)	2(.9)
quartzite		2(100.0)	2(.9)
massive quartz		4(100.0)	4(1.8)
totals(percent)	10(4.5)	213(95.5)	223(100)

Table 8. Types of Thermal Alteration on Chipped Stone Artifacts from LA 103919

Alteration type	Chert	Pedernal chert	Totals
potlids-other surface	1(50.0)		1(10.0)
crazed	1(50.0)		1(10.0)
crazed & potlids		2(25.0)	2(20.0)
crazed with potlids on dorsal and ventral surfaces		1(12.5)	1(10.0)
potlid flake		1(12.5)	1(10.0)
variable luster		4(50.0)	4(40.0)
totals(percent)	2(20.0)	8(80.0)	10(100)

Table 9. Formal and Informal Tools from LA 103919 by Material Type

Tool type	Chert	Obsidian	Polvadera obsidian	totals
utilized debitage	1(100.0)			1(33.3)
drills		1(100.0)		1(33.3)
projectile points			1(100.0)	1(33.3)
totals(percent)	1(33.3)	1(33.3)	1(33.3)	3(100.0)

Table 10. Assemblage Characteristics for Each Test Pit Containing More Than One Chipped Stone Artifact on LA 103919

Assemblage characteristic	Test Pit 1	Test Pit 2	Test Pit 6	Test Pit 7	Test Pit 8
percentage of obsidian	27.0	100.0	16.3	28.2	28.6
percentage of biface flakes	5.4	4.0	2.3	0.0	0.0
percentage of retouch flakes	10.8	36.9	2.3	8.2	28.6
flake to angular debris ratio	3.83	25.0	1.80	1.39	2.50
percentage of modified platforms (missing platforms eliminated)	7.1	10.0	10.0	11.8	40.0

early Puebloan date and suggests hunting activities. The only other tools are a drill shaft and an informally used piece of debitage. All that can be suggested from these tools are general maintenance or manufacturing activities.

The results of testing and artifact analysis suggest that the remains examined at LA 103919 were deposited during the Developmental period, and that there may be some variation in activities across the site. In particular, a thermal feature (possibly a hearth) was encountered in Test Pit 6, while a probable exterior activity surface was found in Test Pit 7. In addition to the surface, numerous microflakes were also noted in this test pit. Similarly, Test Pit 2 also seemed to contain many microflakes, though a trash stratum and no occupational surfaces were encountered in that unit. Thus, it is necessary to examine the assemblage by excavational unit to determine whether any horizontal variation exists. Test Pit 3 contained only one lithic artifact and Test Pit 8 contained seven. While the sample of artifacts from both of these units seems too small to allow us to draw any conclusions, some interesting trends were noted while examining the distribution of attributes in the Test Pit 8 assemblage. Thus, only Test Pit 3 is dropped from consideration.

Test Pits 6 and 7 contained the largest numbers of chipped stone artifacts (43 and 110, respectively), while Test Pits 1 and 2 contained 37 and 25 lithic artifacts. Obsidian comprised moderate to very large percentages of each assemblage. Only the Test Pit 6 assemblage contained less than 25 percent of this material; obsidian still comprised 16.3 of that assemblage. Test Pit 2 contained only obsidian artifacts, setting that unit off from the rest.

Retouch flakes were found in all five of the test pits that contained more than one chipped stone artifact, and biface flakes occurred in three. Though they were recovered from most of the test pits biface flakes were relatively uncommon and, with the exception of Test Pit 1, no more than one example was found per test pit (Table 10). Retouch flakes comprise significant percentages of each assemblage with the exception of Test Pit 6, where only a single example was found (Table 10).

Thermally altered cherts were recovered from each unit except for Test Pit 2. Unfortunately, because of the small size of the thermally altered artifact sample, no patterns could be discerned. Interestingly, formal tools occurred in only two test pits; a piece of utilized debitage and a drill shaft were found in Test Pit 1, and a projectile point was recovered from Test Pit 7. Thus, tool-use loci seem rather limited in distribution, while each test pit yielded evidence of some tool manufacture.

Chipped stone artifacts seem rather evenly distributed vertically in Test Pits 1, 6, and 8. However, artifacts cluster at certain levels in the others. In particular, most debitage from Test Pit 2 was recovered from Level 2, with only a few pieces found any deeper. This suggests a concentrated distribution of chipped stone in that area related to a limited number of reduction or discard episodes rather than a series of unrelated events. The same appears to be true of the chipped stone artifacts in Test Pit 7; 97.3 percent of the artifacts in that unit were found in Level 3, while only 2.7 percent came from Level 2. This test pit ended at an occupational surface, and the vertical distribution of artifacts suggests that they are related to use of that surface rather than representative of trash discarded or washed onto the surface.

Though there is a relatively even distribution of artifacts through the various levels of Test Pit 6, there is a distinct clustering in the upper three levels with a tailing off at lower levels: Level 4 contained four artifacts, Level 5 had three, and Level 6 had only one. However, a thermal feature, possibly a hearth, was encountered at the bottom of Level 6. This distribution suggests that the chipped stone artifacts and feature are unrelated. If the thermal feature represents a hearth associated with a pithouse, this distribution is suggestive of trash thrown into an abandoned structure. If the thermal feature was an exterior hearth, considerable soil buildup is indicated for this part of the site, perhaps indicative of a long period of occupation or multiple occupational episodes.

A few differences were also noted in reduction technology characteristics for the various test pits. As Table 10 shows, the flake to angular debris ratio for most of the units is low, suggesting reliance on a core-flake reduction strategy. The exception to this is Test Pit 2, which has an extremely high ratio that is more indicative of biface reduction. Variation in reduction strategy is not really demonstrated by percentages of modified platforms (Table 10). All but Test Pit 8 have moderate percentages of modified platforms, and since only five flakes were recovered from the latter, sample error is probably responsible for that high percentage.

Conclusions

Several tentative conclusions can be drawn from this cursory examination. Test Pit 2, in particular, stands out from the other units. Its high flake to angular debris ratio, large percentage of retouch flakes, and presence of only obsidian suggests that this area contains a tool manufacturing locus, or debris discarded from such an activity. Though Test Pit 8 contained only a small number of artifacts, it also has a high percentage of retouch flakes and modified platforms, again suggestive of a manufacturing locus. While it is possible that sample error is responsible for these percentages, it is equally likely that this unit was at the edge of a manufacturing area (or deposits from such an activity), similar to that suggested for Test Pit 2. Though the structure of the Test Pit 7 assemblage was quite different from either of these, the apparent association of most of these chipped stone artifacts with a probable exterior activity surface suggests that important information might be available in that area of the site. In particular, data that can be compared with the probable manufacturing loci (Test Pits 2 and 8) should be available. While the latter appear to contain evidence of one or only a few reduction episodes that were aimed at formal tool production, the Test Pit 7 area seems to contain material from several unrelated reduction episodes, aimed at both manufacturing and simple core reduction. Materials from the Test Pit 6 area should also provide good comparative data, since that area seems to be a trash disposal locus containing materials from numerous reduction episodes.

SUMMARY AND RECOMMENDATIONS

This document presents the results of limited test excavations along NM 503, and a proposed data recovery plan for site LA 103919. Basic descriptive data were recorded for the ceramic artifact assemblage to assign dates to components and address patterns of affiliation, production, exchange, and use. The temporal interval suggested by the pottery recovered from LA 103919 suggests a relatively unmixed Developmental period (A.D. 900-1200) assemblage. During the data recovery program, it is anticipated that stylistic, technological and functional variables will be used to compare regional relationships between the Pojoaque area and the San Juan Basin, and other areas within the Rio Grande valley. Constituent analysis will focus on local production and exchange. Basic typological/functional attributes were recorded for the lithic artifact assemblage. These data suggest a reliance on a core-flake reduction strategy, and localized area of the site shows an extremely high ratio of biface reduction. Information concerning basic site function, mobility, and ties with other regions can be derived from the lithic artifact assemblage during data recovery. A model of frontier adaptation during the New Mexico Territorial period was presented, including suggested methods of inquiry to test the model through artifact analysis. Information from the Euroamerican component will be obtained through both archival and ethnohistorical research, and information obtained through interviews from long-term residents of the area.

After having completed limited test excavations at two sites along NM 503, the OAS has concluded that one site, LA 103919, has the potential to provide information on local prehistory and history. A program of data recovery is recommended for this site.

PROPOSED DATA RECOVERY PLAN

Timothy D. Maxwell

Research Orientation

Prehistoric Occupation

LA 103919 appears to have an occupation surface dating to the Developmental period (A.D. 600-1200). It is not known whether this occupation surface represents an outdoor activity area or a room interior. Minimally, this stratum has the potential to offer information on limited activity sets as determined by artifacts in association with the surface. Optimally, the surface may be part of a residential structure and offer substantially more information about regional settlement and subsistence patterns.

The foundation of the research proposed for this project is that of regional settlement and subsistence patterns. Of course, more specific concerns are to be addressed, but in recent years, archaeologists have found it productive to move away from a focus on individual sites to an examination of regional patterns. Specific sites provide only a limited look at prehistoric lifeways but their importance is increased by examining their role in the context of regional events.

The prehistoric site to be studied is important for its potential contribution to understanding these regional patterns. The site dates to the Developmental period and may represent some of the earliest year-round settlement in the valley. As discussed in more detail below, area residents in the Developmental period built both surface rooms and pit structures for living. The shift from subterranean dwellings to above-ground rooms was a phenomenon that occurred across the Southwest. This shift may have important implications for concomitant changes in social organization and subsistence strategies. Since the site contains a possible residence, archaeological investigation should offer data that can be used in the study of this transition in living space. Even if the site proves to be a seasonal habitation or an outdoor activity area, the artifact assemblage can still provide information on the diversity of daily activities performed by valley inhabitants.

Since it is one of earlier Puebloan sites in the region it will also provide information on the earliest subsistence practices in the area. Paleoenvironmental reconstruction of the region shows that there were a series of changes in rainfall patterns. It is often believed that early farmers reacted to such uncertainty by varying their subsistence pursuits and the plant and animal remains at the site should shed some light on the types of subsistence options practiced during the Developmental period. As discussed below, other researchers see a pattern of increasing specialization in subsistence strategies over time. By comparing the results obtained at this site with the evidence from earlier and later sites in the valley, a pattern may emerge that helps resolve this discussion.

The appearance of several small communities in the Santa Fe and Pojoaque valleys during the Developmental period also presaged a trend toward increasing population aggregation that culminated in the Classic period (A.D. 1325-1600). Population growth has been cited as a causal factor (Kohler 1989) in the appearance of aggregated communities while others (Leonard and Reed 1993) believe that population growth is the result of successful adaptation and not a cause of new adaptations. Although this particular site cannot provide figures on regional population size, it has the potential to have data, such as room dimensions, that can be applied to studies of population growth. This is discussed in more detail below.

Historic Occupation

The historic component is confined to the south side of NM 503 and consists of a scatter of glass (amethyst colored, clear patinated and brown-green) and metal. Outside of the right-of-way are three collapsed brick and adobe structures dating to approximately the turn of the twentieth century. The artifact scatter from this structure extends into the right-of-way. Two irrigation ditches, which are still in use, are located in the vicinity of the historic structure. Description of the Territorial phase model of adaptation has been discussed earlier.

There appears to be some depth to the trash deposits in places, particularly in the vicinity of Test Pit 4, which contained mostly historic artifacts. None of the structures are within the construction zone, but some trash deposits associated with their occupation are. Our examination of the historic component at this site will focus on those deposits, and on an investigation of associated documents and interviews with local residents.

The research design used for this investigation is adapted from similar studies near Pecos (Moore et al. 1991; Moore and Gaunt 1993). The focus of these studies is threefold. First, we are attempting to determine if patterning in the structure of trash assemblages contains clues to the ethnicity of site occupants. Second, we are interested in determining how Spanish adaptations to the New Mexico frontier changed over time, particularly when outside influences were introduced via the Santa Fe Trail and the railroad. Finally, how is relative affluence demonstrated by material culture remains, and what are the effects of increased contacts with the Anglo-American East?

PROBLEM DOMAINS

Prehistoric Occupation

The following research concerns will be addressed at LA 103919. The research problem is outlined and the specific archaeological techniques to be used are discussed.

Social Organization and the Structure of Living Space

Two questions are related to the evidence for a probable occupation surface. The surface has the potential to provide basic information on the type of living structure, the function of the structure, and the activities carried out at the site. Given the implications this occupational surface has for building a more complete understanding of site activities and perhaps social organization, the first data recovery concern is a simple one and revolves around identification:

1. **Does the occupation surface represent an outdoor activity area, an enclosed living area, or a pit structure?**

In general, the Developmental period is characterized by a shift to surface habitation structures; pit structures of this period have been found in the nearby Tesuque Valley (McNutt 1969). Other local residential sites of the period, such as LA 835, are composed of contiguous surface rooms built of puddled adobe on stone foundations. The difference between surface and subsurface architecture is likely to have implications for social organization and subsistence activities. As argued by Gilman (1983), the shift to surface rooms may be functionally related to increasing dependence on agriculture. As agricultural dependence increases, the majority of food appears during a brief harvesting period and greater amounts of food must be prepared and stored. Gilman (1983) maintains that specialized food preparation areas would be needed and are more efficient in above-ground dwellings while supplies of food have better protection from moisture and animals when stored in above-ground structures. Gilman also argues that increasing reliance on planted crops will increase sedentism and rather than move to warmer locales during colder months, people will move inside. Increased protection from the cold is offered by the improved thermal massing of masonry walls says Gilman (1983).

Alternatively, Plog (1974) believes that the socio-organizational differences between pit structures and surface rooms is related to interaction between population size, differentiation of activities, integration of activities, and technological change. As pointed out by Plog, social integrative structures should be reflected in architectural features such as kivas or multi-family dwellings. Plog found in a study of the Hay Hollow valley that the pithouse-to-pueblo transition was marked by population increase and increased differentiation of activities as seen in specialized space within rooms. New integrative structures also appeared, specifically, kivas, which became specialized, nonhabitation features.

Outdoor activity areas may also be specialized. As specialized differentiation in activities may have occurred, there may have been more formalized use of exterior space. For example, if warm season activities included the grinding of plant foods outdoors, then it would be expected that this area would be kept free of the debris that might be generated by other activities. Identification of such areas within bounded localities such as plazas enclosed by room blocks would also signal increasing differentiation of activities and the need to coordinate activities.

Site specific research. The issue of identification of the living surface will be resolved by removing overburden and expanding the original test pit until walls or features can be identified. If there are no architectural elements to indicate that the occupational surface was within an enclosed space, the surface likely represents an outdoor activity area. If the occupation surface was a surface room it may be bounded by walls, cobble foundations, adobe, or postholes that represent jacal construction; a pit structure would be indicated by subterranean walls formed by the removal of natural deposits.

2. What was the function of the living space?

In order to address questions of increasing differentiation and its implications for social organization, it is necessary to determine the function of any identified living space. Based upon ethnographic data, Hill (1970) provides a set of assumptions that can be tested to determine function. Briefly, living areas should display a variety of floor features, a diversity of artifacts types, and a nonrandom distribution of artifacts, while storage rooms should lack features and have low artifact diversity. Specialized activity rooms should have low artifact diversity and, depending upon the type of activity, a high number of specific tool types. If activity differentiation was not important, then the living surface should contain a wide variety of floor features, high artifact diversity, and manufacturing debris. These areas may also have a random distribution of artifact types.

Outside activity areas may also be specialized, for example, stone tool, pottery, basket, or food production may occur repeatedly in the same location. Soil may become compacted through continued use of the same location and it is expected that, if specialized, there will be a high frequency of similar artifact types. If there is random patterning to the artifact composition and distribution, the area may have had multiple uses or may be a discard area.

Site specific research. This issue will be studied through detailed inventory and mapping of site features and their locations and through laboratory analysis of the artifact assemblage. The inventory and mapping of site features, particularly those found on the occupation surface will provide a measure of activity diversity present. Statistical analysis of the artifact assemblage will quantify artifact evenness and richness (Kintigh 1989) and allow assessment of any mixture of activities within the activity area.

Subsistence Activities

The Developmental period witnessed a shift in population to generally higher elevational settings and an accompanying access to a wider range of environmental zones. Throughout the northern Rio Grande Valley, Dickson (1979) notes the spread of residential sites into the piedmont zone overlooking the major river drainages. With greater access to different resources, one would expect a wide variety of foods to appear. Gasser (1982) has observed increasing diversification in prehistoric Puebloan subsistence economy between A.D. 650 and 1225 as an increasingly wide spectrum of wild plant and animal foods were taken. Gasser believes that this may be due to environmental or social stress while Doebley (1981) surmises that it may be due to (1) a change in cultural preference; (2) a decrease in agricultural productivity; or (3) human destruction of the environment. Leonard (1989) re-examined Gasser's evidence and argues that the pattern of increasing food diversity was caused by a sampling problem and that there was actually increasing specialization in food production with the emphasis on agricultural production.

1. What was the nature of the prehistoric environment at the time the site was occupied?

2. What food resources were exploited and what does this information tell us about the potential of the local environment for farming, hunting and gathering, or a mixture of both?

The subsistence strategies of site occupants in the context of past environmental conditions can be assessed by the recovery and analysis of macrobotanical and faunal remains. For example, the presence of nonedible domesticated plant parts would suggest local farming practices while the occurrence of only edible portions might suggest the import of plant foods. The presence of certain skeletal elements such as skulls, vertebrae, or feet, may indicate that animals were hunted in proximity to the site. However, if these parts show evidence of extensive butchering, it may be evidence of food stress since these are skeletal elements with low meat value. The array of formal and informal tools can also be used to infer the range of past subsistence pursuits.

By gathering information on regional and local agricultural potential as well as the availability of wild plant and animal foods, it should be possible to examine the interplay between population and resource availability during the period(s) of occupation. Areas containing the two sites are often considered "marginal," a very dangerous concept. The danger in not in the use of this term, but in assigning it without carefully explaining what is meant by marginality. Regions that are extremely productive for hunter-gatherers might be marginal for farmers because of a lack of water or a short growing season. Conversely, some areas that are exquisitely suited to farming are marginal for hunter-gatherers because wild plant productivity is low or limited to very short seasons of availability. By reconstructing the regional environment it should be possible to determine its suitability for both hunting-gathering and agriculture.

Evidence of seasonality will also be obtained, if available. This type of information may be derived from pollen, flotation, and faunal samples, and by inference drawn from the presence or absence of certain feature or artifact types (for example, the presence or absence of hearths in habitation structures). The unfortunate reality, however, is that evidence for seasonality is usually so spotty that while we may be able to document site use in a given season, absence of evidence for use in another season is usually inconclusive.

Site specific research. To answer these questions, data on the environment at the time of occupation must be obtained. General environmental reconstructions for northern New Mexico are available (for example, Rose et al. 1981). Site specific information can be obtained through the analysis of pollen samples, macrobotanical remains, and faunal remains recovered during excavation. Macrobotanical remains will be retrieved through the sampling of features while pollen samples will be taken from features and various strata. The samples will be analyzed by specialists for plant species identification. Faunal remains will be retrieved through screening.

Population Growth

The Coalition period (A.D. 1200-1325), which follows the Developmental period, is one in which a trajectory of rapid population growth seems to have been established and culminated in a population maximum in the Classic period (A.D. 1325-1600). Although the study of a single site cannot provide figures on population size, it can contribute to studies of population growth. If it is established that the occupational surface represents an enclosed living space, that data will be helpful in more encompassing studies of prehistoric population change. Through a determination of room size, researchers can establish room size variation throughout each period and make correlations between the probable number of occupants and room size. These data also make it possible to make more accurate estimates of the number of rooms that may be present in room block mounds of the Developmental period.

Site specific research. The data needed to address this problem depend upon the nature of the occupational surface. If it is determined that the occupational surface was within an enclosed living space then those data can be used in the assessment of population size in future studies.

Temporal Context

Temporal placement of the sites is important for understanding region patterns of social and subsistence organization. The site must be placed in the proper temporal location to detect regional trends and changes in social and subsistence patterns. This is necessary for addressing each of the previous problem domains. Although the region was first occupied during the Developmental period, little is known about these early occupations. During the late Developmental period (A.D. 900-1200), the construction of small communities began to increase dramatically but it is unknown whether the site dates to the early or later portions of the Developmental period. The high frequency of Red Mesa Black-on-white suggests that the site may date to the earlier period.

Site specific research. It may be that stylistic and typological analysis of pottery is the only available method for determining occupation dates; therefore, all sherds will be retrieved for study. If appropriate features are encountered, radiocarbon and archaeomagnetic samples will also be retrieved.

Issues To Be Addressed by Ceramic Analysis

Temporal Issues. Before other patterns can be examined, it is necessary to determine the time of occupation and integrity of collections from various proveniences. Initial examinations of ceramic data will be directed toward the determination of the time of occupation represented at different proveniences.

The Late Developmental period as defined for the Rio Grande region spans A.D. 900 to 1200 (Wendorf 1954; Stuart and Gauthier 1981) and is similar to, but extends slightly later than the Pueblo II period as defined for areas of the Anasazi to the west. While many areas of the Northern Rio Grande country appear to have been first occupied by Anasazi groups during the Late Developmental period (A.D. 900 to 1200), very little is known about the dating and nature of these occupations. Thus, the dating and documentation of ceramic change within Developmental phase contexts is particularly important. Decorated types associated with this occupation are distinguished from later types by the use of mineral paint. The presence of significant frequencies of sherds exhibiting painted styles indicative of both Red Mesa Black-on-white and Kwahe'e Black-on-white may provide the basis for the differentiation of distinct phases of the Late Developmental period. Occupations in the Northern Rio Grande region dominated by the Rio Grande variety of Red Mesa Black-on-white are poorly dated but appear to date sometime between A.D. 900 and 1050, while those dominated by Kwahe'e Black-on-white and associated trade wares are thought to date sometime between A.D. 1050 and 1200 (Stuart and Gauthier 1981). The dominance of Kwahe'e Black-on-white over Red Mesa Black-on-white may indicate that Developmental phase components from LA 101412 date to the later part of this span. Changes in frequencies of gray ware types, as identified by surface treatments, may also provide for increased dating resolution of Developmental phase components. The presence of independently dated trade wares from other areas of the Anasazi such as Cibolan White Ware, San Juan (or Mesa Verde) White Ware, White Mountain Redware, and Mogollon types provide the opportunity for ceramic cross-dating of Developmental period components. Changes in surface treatments in Kwahe'e Black-on-white toward manipulations more similar to those found in later organic painted types of the Coalition period might allow for the recognition of components dating to the later part of the Developmental phase.

Patterns of Interaction, Production and Exchange. Once basic temporal sequences are established, ceramic distributions may be used to examine a variety of patterns. While very little is known about ceramic changes related to various trends for Developmental and Coalition period components in the Northern Rio Grande country, much more is known about ceramic change at contemporaneous Pueblo II and Pueblo III sites in areas of the San Juan Basin. Thus, information from studies in Anasazi regions to the west may provide a framework for the examination of various patterns of change.

The migration of people from areas of the San Juan Basin are often proposed as the source of population during the Developmental and Coalition periods. Given the extremely wide extent postulated for the Chaco system and the presence of a great kiva in the Pojoaque area, the potential influence and presence of Chaco (or Cibola series ceramics) will be examined. Types produced in other regions to the west, such as White Mountain Redware, Mogollon Brown Ware, and San Juan White Ware types may also indicate widespread exchange and interaction during this time.

Distributions in temper and pastes may provide additional information concerning patterns of local production and exchange with groups in other areas of the Rio Grande region that may not be evident by distributions of typological categories alone. The range of tempers and pastes noted in ceramic from this area also provides the potential for characterization of distinct production areas and localized exchange. The study area is located along an area of geological transition, resulting in potentially significant spatial differences in clay and temper sources from nearby locations. In order to recognize locally available pastes and temper, a range clays and temper sources found within a reasonable catchment areas LA 103919 will be collected characterized. Previously noted variability in pastes and tempers of Developmental period sites indicate the potential for the recognition of area of production of ceramic vessels during this period. Comparisons of distributions of pastes and temper types from assemblages associated with different components will allow for the examination of both the changing use of different material sources in local ceramic production as well as the identification of non-local ceramics. The characterization of gray wares exhibiting distinct micaceous pastes at Developmental phase components provides the potential to distinguish local gray wares from those produced in adjacent areas.

Vessel Use and Function. The presence of sherds at a given archaeological context is the result of the production and breakage of ceramic vessels for specific activities. Attributes relating to vessel shape, thickness, size, material resources, surface manipulation, technological attributes, and wear pattern; all may reflect the intended and actual use of ceramic vessels in various economic or social activities. Many aspects pertaining to use are strongly reflected by both ceramic ware distinctions and vessel form categories recorded. Data concerning the distribution of ceramic functional groupings may provide information concerning the nature and structure of activities occurring at different sites. The range of activities, for example, should be reflected in the range of ceramic forms, although other characteristics such as size may also indicate the use for which a vessel was intended.

Distributions of ware groups and vessels forms noted at LA 103919 can be compared with those noted for contemporaneous sites in the San Juan Basin to compare uses of vessels and associated activities between these regions. These distributions may provide information concerning similarities or differences in economies between these regions. Comparisons of gray wares from these regions may also provide an opportunity to examine the influence and effect of the early use of highly micaceous pastes in Rio Grande region.

Historic Occupation

Adaptations to the New Mexico Frontier

New Mexico was a frontier through most of its history, first to New Spain (1600 to 1821), then to Mexico (1821 to 1846), and finally to the United States (1846 to mid-twentieth century). Its role as a buffer for the interior provinces of New Spain and Mexico shaped much of its history. It remained a frontier during these periods because of distance from the interior provinces, the cost and difficulty of communication and transport, and continuous conflict with nomadic Indians. Though communication and transport costs decreased during the American Territorial period and conflict with nomadic Indians ended in the late nineteenth century, New Mexico remained a frontier into the twentieth century because of its small population and distance from centers of manufacture and consumption. It should be noted that throughout this discussion the terms *settlers* and *natives* are used without regard to ethnic origin. People moving onto a frontier are *settlers*, while *natives* are the population already resident there. Most discussions of frontiers are concerned with historic or geographic processes, and are hard to adapt to archaeological studies. A general discussion of frontiers is provided, followed by a model that attempts to apply these ideas to archaeological remains. Of particular interest to the model is the process of frontier acculturation.

The Frontier as Place and Process

Billington (1963) distinguishes between the frontier as a place and a process. As a place the frontier is:

> a geographic region adjacent to the unsettled portions of the continent in which a low man-land ratio and unusually abundant, unexploited, natural resources provide an exceptional opportunity for social and economic betterment to the small-propertied individual. (Billington 1963:25)

Movement onto a frontier is an economic process by this definition, where individuals who lack wealth seek a chance to improve their economic situation. A frontier is also:

> the process through which the socioeconomic-political experiences and standards of individuals were altered by an environment where a low man-land ratio and the presence of untapped natural resources provided an unusual opportunity for individual self-advancement. (Billington 1963:25)

Again, this definition views the frontier as an economic process where movement into a new environment caused changes in the settler's social, economic, and political systems. Steffen (1980) criticizes this model, suggesting that it is not relevant to development of the American frontier past the first tier of states west of the Mississippi River. Rather than farmers struggling to tame the frontier, these later settlers were more closely linked to mercantile capitalism (Steffen 1980). Two types of frontiers are defined:

> Mining and ranching were essentially expeditionary frontiers while the farming frontier was more sedentary in its nature. On the expeditionary frontier there was an absence of a "settling" mentality. Individuals of the mining and ranching frontiers, while temporarily removed from "civilization," retained the value structure which they brought with them. On the farming frontier the settler often experienced an equal sense of removal from civilization, but he had no intention of returning. Individuals on the farming frontier, were building their own civilization and in the process some of their original manners and customs were altered as an expedient to meet environmental circumstances. (Steffen 1980:25)

Thus, while changes in the settler's social organization and structure, customs, and subsistence patterns might be expected on a farming frontier, they should not occur on an expeditionary frontier. While movement onto the farming frontier resulted in value transformations, this did not occur with movement onto the expeditionary frontier because it remained closely linked to the mainstream culture (Steffen 1980).

In his discussion of frontiers and boundaries, Kristof (1959:272) notes that: "the frontier has, and always had, also a strategic meaning--the defensive line which keeps enemies out -- and in this depends on support from the hinterland." Frontiers are also areas of integration, representing a transition from one way of life to another, where traits from both are assimilated (Kristof

1959:273). As a place, New Mexico was a frontier that provided a chance for economic advancement while serving as a defensive buffer, first for the inner provinces of New Spain and Mexico, then for the United States. As a process, the New Mexico frontier was a place where Spanish, Indian, and Anglo-American cultures overlapped and adapted to one another, producing an amalgam that was neither wholly one nor another.

The degree of acculturation probably varied with wealth, the amount of interaction with other groups, and cultural biases. Rich individuals, particularly those of high social status, would be less likely to adopt the trappings of another culture, and more likely to try to preserve what they viewed as a traditional lifestyle. Poor people may have had no choice; partial assimilation of another lifestyle may have been necessary for survival. Such trends are demonstrated in the Spanish Colonial remains at St. Augustine, Florida (Deagan 1983). There, the proportion of aboriginal to European ceramics decreased as economic status rose. Among the European wares, the proportion of British trade ceramics to Spanish majolica and earthenware also decreased as economic status rose. Thus, access to the more desirable traditional commodities improved with economic status, and they were selected over other available merchandise.

No matter how close or attenuated contact between natives and settlers was, cultural bias could cause the acceptance or rejection of specific aspects of the other lifestyle. Traits seen as superior or adaptive might be assimilated, while those viewed as inferior are rejected. This is a two-way street--as settlers adapt to new environmental and cultural constraints, they will adopt native traits that are considered useful or necessary. In a similar fashion, the native population will adopt desirable traits from the settlers. However, there may also be a forced assimilation of economic, organizational, or religious traits, with settlers compelling the native population to accept their ways.

Acculturation may also depend on the type of frontier being settled. It may act in both directions on a farming frontier, with settlers and natives assimilating adaptive traits from each other. Acculturation is more likely to be one-way on an expeditionary frontier. Settlers should retain most of their traditional cultural baggage, while natives should assimilate traits from them. This may be true of the late New Mexican frontier, where the Anglo-American population maintained close ties with its homeland while the native Hispanic, and to a certain extent Indian, populations were separated from their homeland.

The Frontier as a Dynamic Process

Because of the nature of expansion, frontiers are spatially and temporally impermanent (Lewis 1977:153). They change over time when events that occurred in the center of an occupied region are repeated on its periphery as the region expands outward (Lewis 1977:153). Chances for economic advancement decrease as frontiers become settled -- unclaimed land becomes scarce and the best agricultural and pastoral areas are already occupied. New settlers begin to press beyond what had been the frontier in search of economic opportunity. A new frontier is formed, and the previous frontier becomes part of the hinterland.

Though New Mexico was a frontier to New Spain and Mexico, when viewed as a discrete spatial entity it was also comprised of a hinterland and frontier. The hinterland was the core area along the Rio Grande where most of the population and wealth was concentrated. The frontier was the zone that surrounded the core area and, to some extent, protected it. The frontier represented a chance for economic advancement, and was settled by people who were willing to leave the relative safety of the core area in search of land or wealth.

This process is illustrated by movement into the Chama Valley (Quintana and Snow 1980). The first settlements in that area were small scattered homesteads. Rather than community grants, early settlers built on individual allotments and may have used the valley seasonally for livestock grazing. Occupancy became year-round as the region developed; more substantial homes were built, and multi-family plazas began appearing. This was a rapid process--the first individual grant was approved in 1724 and the first community grant in 1734 (Carrillo 1988; Quintana and Snow 1980). Conflict with Indians kept the frontier from expanding further outward until late in the Spanish Colonial period. Initially, the village of Abiquiú was on the edge of the frontier settlement zone. When herders and later farmers pushed beyond to develop lands to the north and west, Abiquiú stopped serving as an outpost and became a supply center (Van Ness 1980).

Thus, the location of the New Mexican frontier was variable, changing as areas on the fringe of the Spanish-occupied zone were settled or abandoned. The entire territory was a frontier during initial colonization. Later, a core area developed and expanded as the frontier was pushed outward by those seeking economic improvement. A lack of official support hindered this expansion, causing it to proceed slowly and suffer continual setbacks. This process underwent radical change as the United States came into close contact with New Mexico in 1821. Suddenly New Mexico was on the United States' frontier, and represented an area that could be exploited for economic gain. Led by trappers and traders, Americans began filtering into the region. Movement onto this frontier increased after the area was acquired by the United States in 1846. These settlers considered both Spanish and Indians to be the native population. Thus, the position of the Spanish inhabitants of New Mexico was suddenly reversed--they were in the same position relative to the American settlers as Pueblo and other Indians had once been to them. Political and economic power had shifted hands, and the Spanish no longer completely controlled either. The process of acculturation began once again as both natives and settlers strove to adapt to these new conditions.

Socioeconomic and Cultural Change on Frontiers

Social change accompanies movement onto frontiers, and settlers often suffer a sudden loss of sociocultural complexity because of the attenuation of economic and social contact between frontier and core area (Doolittle 1973; Lewis 1973, 1977). Even so, Lewis (1977) suggests that settlers must maintain a higher level of sociocultural complexity than natives, and Casagrande and others (1964) feel that settlers must possess a technological superiority over natives, as well as a power advantage. Communication between frontier and core area are important, and a continuity of tradition with the parent culture is maintained (Casagrande et al. 1964). Doolittle (1973) distinguishes between *colonial* and *pioneer* societies. Colonial societies are almost completely dependent on the parent culture for economic and technological support, while pioneer societies are largely self-sufficient. These differences are relative, and may be a function of communication and transportation speed.

Frontier societies must also be adaptable. Because of the difficulties involved in transportation and communication, many goods may not be available on a frontier for long periods of time, the delivery of goods may be unreliable, or the cost of transport may make them so expensive that they are affordable by only a small part of the populace. When this situation prevails there may be a reverse acculturation--rather than the native population adopting the settler's technology, the settlers may be forced to adopt native technologies. Thus, there is evidence that Spanish settlers in New Mexico adopted native lithic and ceramic technologies to supplement or replace goods that were economically unavailable to them (Levine 1990; Moore 1992).

While frontier models consider adaptational changes in settlers, they are generally silent on corresponding changes in native societies. Obviously, native societies must adapt to the presence of settlers in their midst, and it is necessary to examine these processes before frontier adaptations can be understood. Native responses to settlement by outsiders should be conditioned by a number of factors including:

1. The degree of technological and organizational superiority displayed by the settlers.

2. The amount of interaction occurring between the groups.

3. Communication and transport costs between core area and frontier.

4. Cultural and political attitudes of one group toward the other.

5. The amount of sociocultural disruption caused by contact between settlers and natives.

6. The economic status of natives vis-a-vis settlers.

If settlers appear to have little organizational or technological superiority over natives and there is no perception of an advantage to be gained by their presence, there may be an outright and hostile rejection of the settlers. The movement of Americans onto the northern Plains is an example of this process. European contact with this frontier was based on the fur trade until the early 1800s, operating according to customs which were violated by Americans who began entering Indian lands to hunt and trap in addition to trading (Swagerty 1988:363). Indians allowed trading posts to be built under the economically advantageous conditions of the early fur trade (Swagerty 1988). Their culture underwent significant changes in adapting to this economy, but those changes did not include accepting the presence of permanent settlers. The end of the Mexican War in 1848 brought a surge in westward movement, accelerated by the discovery of gold in California and the end of the Civil War (Utley 1988; Winther 1964). Resentful of the foreigners moving into their lands, Plains Indians unleashed a devastating campaign to drive them out. Many factors probably contributed to these hostilities; among them was a perception that the invaders were not militarily superior (because frontier defenses were weakened by the Civil War), and that there were no advantages to be gained by allowing them to remain.

Overwhelming technological or organizational superiority can result in an initial acceptance of settlers; however, if the deficits associated with colonization outweigh the benefits, organized resistance may eventually occur. Success or failure are dependent on the degree of technological or organizational superiority possessed by settlers. Initial Spanish settlement of New Mexico met little or no organized resistance (Bannon 1963; Sando 1979). However, as the deficits associated with this occupation became clear, a rebellion was organized and the Pueblos were able to displace the settlers for twelve years (Sando 1979; Simmons 1979).

The acculturation of settlers and natives to one another depends on the amount of contact occurring between the groups. This is tempered by the cost of communication and transport between frontier and core area as well as the cultural and political attitudes of one group toward the other. When settlers form elite enclaves and choose not to mix with native peoples except under controlled conditions, contact will be severely limited. While acculturation will occur, it may be slow and selective. Native groups might adopt desirable aspects of the settler's culture, but the settlers will maintain close ties with the core area and assimilate little of the native culture. However, as communication between frontier and core area becomes more difficult and expensive, the amount of native material culture assimilated by settlers should increase. If native groups reject the settler's culture passively rather than overtly, settlers might still be restricted to enclaves and natives may adopt few traits other than the goods they find desirable. The former process is illustrated by the British colonization of India, while the latter is exemplified by European attempts to establish colonies in China.

All of these processes can be affected by the amount of sociocultural disruption caused by contact between settlers and natives. This is best exemplified by early European colonies in the New World. Spanish settlers possessed little technological or organizational superiority over the native imperial powers of Mexico and Peru, yet small groups of adventurers were able to prevail over these powerful nations. In both cases, the appearance of Spanish settlers on the scene disrupted the balance of power and introduced new diseases to which the native populations had no immunity. In Mexico, Cortez was able to exploit dissention between the Aztecs and their vassal states and enemies, using the latter to cause the downfall of the former (Bray 1968; Cantu 1966). Aztec resistance was seriously affected by an outbreak of smallpox, which reduced the leadership as well as the general populace (Bray 1968; Cantu 1966). Smallpox also contributed to the Spanish conquest of the Incas in Peru by devastating the population before Pizarro's arrival (Hyams and Ordish 1963). The ruling Inca was one of the victims of this epidemic, setting in motion events that culminated in a bitter civil war as two of his sons fought for the throne (Hyams and Ordish 1963). Pizarro was able to exploit these conditions, and several of the more distant provinces eventually allied with him, seizing the opportunity to rid themselves of Inca rule. In both cases, extreme disruptions caused by the introduction of new diseases and alliances with an outside power contributed to the defeat of nations that should have been able to resist the colonial efforts of foreigners under more favorable conditions.

Interaction between native and settlers and the adoption of aspects of the other's culture can be conditioned by wealth and proximity. Rich individuals have fewer reasons to interact with the other population than do poor people--they can always hire others to act as go-betweens. Thus, as economic status increases, direct contact with the other population should decrease; conversely, as economic status decreases, interaction with the alien group should increase. Wealth also allows some individuals to better maintain the outward trappings of their traditional culture, or to acquire those of another culture. Thus, wealthy settlers are able to maintain their traditional material culture, while wealthy natives can more easily acquire the settlers' material culture. A similar differentiation should occur at the lower end of the economic scale. The greatest degree of acculturation to native customs and material culture should occur among poor settlers. Economically, they are less able to maintain their traditional material culture and more prone to adopting aspects of native culture that enhance their prospects for survival. Conversely, the least amount of acculturation in the native population should occur among poorer individuals, who are forced to maintain their traditional material culture because they can't afford to acquire that of the settlers.

A Model of Frontier Acculturation

While this discussion has considered New Mexico to be a frontier to New Spain, Mexico, and the United States, the model for examining the historic component on LA 103919 will concentrate on the latter period. This research will continue studies begun at three sites near Abiquiú (Moore et al. n.d.). Significant variation in material remains from Spanish Colonial and Territorial period occupations were found at those sites, reflecting differences in access to goods resulting from changing frontier and trade patterns. Although general access to manufactured goods was poor during the Spanish Colonial period, the situation was particularly dismal on the frontier. Few artifacts of distinctly European manufacture were found in Spanish Colonial deposits. Instead, the assemblage indicated heavy trade with local Indians for certain commodities, and some adoption of native technologies. Territorial period deposits demonstrated a different orientation. Dramatically improved access to manufactured goods was indicated, and was associated with a decreased reliance on native technologies.

These sites provide data concerning Spanish adaptations to the New Mexican frontier. Unfortunately, information from other cultural groups was lacking in that study. This gap has been partially filled and our data base augmented by studies near Pecos. There, an Anglo-American Territorial period homestead was investigated, as well as a Santa Fe Trail period Spanish site (Moore et al. 1991; Moore and Gaunt 1993). Analysis is still proceeding on these assemblages, but they will provide data that can be compared and contrasted with the results from LA 103919 as well as from Abiquiú.

The primary question that must be addressed at LA 103919 is relatively simple, but its implications are quite complex. Succinctly stated, the main question that will be asked is:

> What can these archaeological remains tell us about the ethnicity of site residents and the process of acculturation on the frontier?

The first problem that must be resolved is whether site occupants were settlers or natives. While the easiest way to address this problem will be to locate documents concerning the site, it is possible that such documentation does not exist or contains insufficient detail. Thus, it is necessary to construct a model that takes into account membership in both populations.

Settlers on a frontier maintain continuity with their parent culture. As Casagrande and others (1964:283) note, colonization is "a conscious effort to reconstitute a familiar way of life in an alien land." Native populations also maintain contact with their parent culture, even when the acquisition of material goods from settlers is desirable. Traits that are most likely to be acquired by either group are those that enhance adaptability. Those that will be retained include aspects of material culture that demonstrate group membership. The ability to accomplish both of these things is conditioned by wealth and proximity. The closest approximation of parent culture should be seen among wealthy settlers and poor natives. While the former can afford to copy and maintain their traditional lifestyle, it is difficult for the latter to acquire a new material culture. Sites belonging to members of these economic groups should be relatively easy to distinguish.

Sites representing other strata of society will not be as easy to distinguish. In particular, sites belonging to poor settlers or wealthy natives should be similar, because it is desirable for both to acquire some of the characteristics of the other. Poor settlers will often be forced to adopt characteristics of the native culture that help them adapt to the frontier. Wealthy natives may find it desirable to display their wealth, and one of the best ways to do this is to acquire expensive material goods, which will often include items imported by settlers.

Analysis of Territorial period remains at two sites near Abiquiú showed that while access to manufactured goods improved with the coming of the railroad, certain aspects of traditional material culture persisted. While it is not yet possible to determine whether this occurred for economic or cultural reasons, the latter is likely. At both sites, there continued to be a heavy reliance on locally produced pottery and the use of lithic artifacts for certain tasks. These artifact classes may be the key to determining ethnicity at sites of questionable cultural origin. Ceramics were more important in Spanish than British colonies. Hispanic assemblages from Florida, the Abiquiú area, and Santa Fe are dominated by kitchen activity related remains, which in turn are distinguished by a preponderance of pottery (Boyer 1992; Deagan 1983; Wiseman 1992). Chipped stone tools were used as components in fire-making systems (gunflints and strike-a-light flints), and as replacements for expensive and difficult to acquire metal tools (Moore 1992). While improved supply and transport seems to have superseded the latter use, the former was retained.

With these distinctions in mind, test implications can be generated. They include:

1. If site occupants were native Hispanics:

    a. Material culture should be dominated by kitchen activity related items; primarily pottery. While other activity sets may be represented by a diverse range of artifacts, kitchen activity related items should comprise a dominant proportion of the assemblage.

    b. A heavy reliance on locally produced pottery should be evident.

    c. Lithic artifacts should occur in the assemblage; they will be associated with other remains, and should reflect fire-making activities.

    d. Imported pottery may include Spanish wares.

2. If site occupants were Anglo-American settlers:

    a. While kitchen activity related items should comprise a large percentage of the assemblage, they will not dominate material culture remains. Other activities should be represented by roughly equivalent percentages of related artifacts.

    b. Little locally produced pottery should occur.

    c. If lithic artifacts occur, they should reflect an earlier occupation of the area, and should not be in direct association with the rest of the assemblage.

    d. Imported pottery should be dominated by American and British produced wares; Spanish wares should be absent.

e. Aspects of native culture in the assemblage should be subsistence related. These may include specialized tools and foods; limited numbers of utilitarian objects might also occur.

While it is assumed that certain classes of artifacts are ethnic markers, other possibilities must also be considered. Transport cost and difficulty are important aspects of frontier acculturation. Settlers are more apt to adopt parts of the native adaptational system when it is difficult and expensive to acquire those goods from the parent culture. The attenuation of contact with New Spain caused Spanish settlers in New Mexico to adopt aspects of native culture as noted above. By the time the historic component on LA 103919 was occupied, the movement of manufactured goods was much more efficient and less expensive. Settlers would be expected to assimilate few aspects of native material culture under these conditions. If use of the artifacts assumed to be ethnic markers in the model is, instead, a function of economics, there may be no easily discernable differences between settler and native assemblages. While the Abiquiú sites were of a similar age and contained evidence of continuity in material culture, that area is much further away from the main supply centers and transport corridors. Were cultural factors responsible for the retention of traditional material culture in that area or was it due to transport costs? The latter might be indicated if LA 103919 was occupied by local Hispanics and has an assemblage that is indistinguishable from Anglo-American sites of similar date.

Data Required to Test the Model

Several types of data are needed to test this model. The most important may be those available in documents. While it will be possible to partially test the model without documentary data, precise information on site residents and occupational date are needed to accurately define ethnicity, market access, and site function. In the absence of documentary information it will be possible to come to some conclusions concerning ethnicity and market access, but a rigorous test requires some documentation of site residents. Documentary sources that may provide needed data include deeds and tax assessment rolls.

Excavation will provide information on material culture. These data are critical to any tests of the model, whether the ethnicity of site residents and dates of occupation are available from documentary sources or not. Lacking documentary data, the artifact assemblage should contribute information on the date of occupation, and can be examined in light of the model to provide an estimation of ethnicity. These conclusions can then be compared with data from other sites of comparable age and known ethnicity to evaluate their accuracy. When contrasted with documentary information, assemblage data will allow a more comprehensive evaluation of the model and its predictive capabilities.

The artifact assemblage should also provide information on the range of activities that occurred at the site. This will be important to an assessment of its position in the settlement system. Information on subsistence should be provided by faunal specimens, botanical samples, and other material remains such as cans and bottles. These data are needed to assess the degree of subsistence acculturation demonstrated by site occupants, particularly since this is the area in which settlers are most likely to have adopted native traits.

Finally, accurate information on the ethnicity of site occupants and the date of occupation will allow an assessment of the degree of acculturation demonstrated by the artifact assemblage. Again, by comparing and contrasting these data with other sites of comparable age and varying ethnicity, it should be possible to come to a preliminary assessment of how frontier acculturation varied with wealth, distance to market centers, and cultural origin.

FIELD AND ANALYSIS METHODS

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The following proposed excavation and analysis methods are generalized because the research issues and data collection requirements defined above require a broad range of information on chronology, subsistence practices, and site structure and patterning.

Excavation Procedures

Given the problem orientation outlined above, the general field strategy will be to maximize three types of information: (1) chronometric, (2) subsistence, and (3) feature identification. This will mean exposing as much of the site within the right-of-way as possible, identifying all features and deposits within that area, excavating all of the structural remains, obtaining a wide variety of chronometric samples, and obtaining samples of biological remains from as many features and deposits as possible.

In the field, the first step will be to reestablish the baseline for a grid system, which will be used to provenience surface collection and excavation units. A permanent baseline, marked by a rebar, was installed during the testing phase. Surface artifacts will be collected in 1-by-1-m grids. Any formal tools found on the surface will be bagged separately. Systematic surface collection should help unravel the issue of potential multiple occupations.

Excavation by strata is desirable in this case, not only because it will isolate separate occupations but because it will yield temporally associated clusters of structural remains and thus elucidate site structure. Therefore, exploratory units will be excavated into features and areas containing known or potential cultural deposits to aid in defining their stratigraphic context. Excavation units consisting of 1-by-1-m-grid units will be dug by hand in arbitrary levels (not to exceed 20 cm) unless natural stratigraphic breaks are identified. Once subsurface stratigraphy has been defined, excavation will be expanded from the exploratory grids to expose any cultural deposits and features that are present. Excavation will continue until sterile soil is encountered. Connecting excavations will be used to link discrete features and artifact clusters.

Because of the amount of overburden, mechanical equipment may be used to strip sterile overburden away from cultural deposits, to remove noncultural fill from large pit features, to stratigraphically link widely separated hand excavation areas, and for backfilling when excavations are completed.

All soils removed during hand trenching will be screened through ¼-inch wire mesh, and all artifacts will be removed and bagged for analysis. Artifacts found on floors or occupational surfaces will be mapped in place and bagged separately. Mesh screen of 1/8 inch should be used in certain areas to help recover evidence of formal tool manufacture. In particular, this size screen should be used in the vicinity of Test Pits 2, 7, and 8 to recover the microdebitage and small broken tool fragments needed for this type of analysis.

When structural features are encountered, these will be excavated in their entirety. We will also attempt to identify and excavate exterior work surfaces associated with such features, and to use the surfaces to link discrete features into common behavioral units.

For trash deposits (either as middens or fill within pit features), the emphasis will be different: our concern is primarily with obtaining representative biological remains (plus associated dating materials) from as many different occupations and contexts as possible. Therefore, for trash deposits a sample excavation approach may be appropriate, including heavier sampling of deposits that are richest in biological materials.

As a general rule, however, at least one pollen sample and one flotation sample will be collected from each cultural stratum and from the surface of each structure floor or occupational surface. Ground stone found in its original use context will be collected for pollen washes.

Because of our concern with building local chronologies, fieldwork will emphasize the recovery of samples for absolute dating. We will collect *all* pieces of wood with a high potential for dendrochronological study, whether or not they are in original context. *All* contexts suitable for archaeomagnetic dating (hearths, burned floors, and burned walls) will be sampled. We will also attempt to collect at least one radiocarbon sample. Radiocarbon samples will be taken from each structure or hearth encountered, as well as from general stratigraphic sequences. General collection practices will yield samples for obsidian hydration dating and ceramic cross-dating.

All excavation units and features will be mapped using a transit and stadia rod or 30 m tape. Artifacts will be provenienced by grid and excavation unit (or by exact location when such treatment is warranted). Plans and profiles of individual features and exploratory trenches will be drawn, and standard recording forms will be completed. Features will be photographed before and after excavation.

Discovery of burials during the data recovery effort seems unlikely. Only a small part of the site is in the construction area, and should human remains be encountered, the number of burials exposed is likely to be low. Should human remains be discovered, standard archaeological excavation techniques will be employed. They include definition of the burial pit, use of hand tools to expose skeletal materials, mapping, photographing of the position of the skeleton and any grave goods, and retrieval of soil for pollen analysis. We will attempt to excavate all human remains encountered, in order to rescue them for culturally appropriate disposition.

The field treatment of any human remains and other sensitive cultural materials will be in accordance with Section 18-6-11.2 NMSA 1978 and regulations issued by the State Historic Preservation Officer [HPD Rule 89-1]). In addition, treatment will be guided by Museum of New Mexico Rule 11, "Policy on Collection, Display, and Repatriation of Culturally Sensitive Materials," (adopted January 17, 1991, modified February 5, 1991). If human remains or other sensitive materials are recovered, appropriate law enforcement agencies and Indian tribal groups will be notified. No person will be allowed to handle or photograph the remains except as part of scientific data recovery efforts. Photographs of sensitive materials will not be released to the media or general public.

If human remains (including any associated burial goods) are recovered, their disposition will be based on consultations with the appropriate review authorities. If an alternative disposition is not established through the consultation process, the remains will be submitted to the Museum of New Mexico Archaeological Research Collection (ARC) for physical storage at the Department of Anthropology, University of New Mexico. Remaining artifacts will be submitted to ARC for physical storage.

As a final note, given the research issues outlined earlier, it is critical to obtain an extensive sample of dating, pollen, flotation, and faunal samples. If initial excavations indicate that such remains are rare, field methods will be modified to maximize their recovery. For example, if only a few contexts appear likely to yield useful flotation samples, the size of samples from those areas can be increased to yield more statistically meaningful counts of remains.

Analysis

Laboratory analysis will be conducted by the staff of the Office of Archaeological Studies and qualified professional consultants. The types of cultural materials and brief descriptions of the kinds of information desired from each are presented below.

Ceramic Artifacts

Distributions of various ceramic data from LA 103919 will provide information concerning the dating of sites and contexts, as well as the examination of trends in the affiliation, production, exchange, and use of pottery vessels. While the examination of all issues involves recording a large and varied range of categories and attributes, it is not feasible nor necessary to record all of these for the entire ceramic collection. Before various issues can be addressed, it is first necessary to determine the temporal association and integrity (in terms of mixing of material from different temporal components) of the ceramics from a given provenience. This is important as data from undated or highly mixed proveniences will contribute very little to our understanding of various changes and trends.

Thus, different systems or levels of analysis will be conducted on sherd collections from contexts of different integrity and research potential. The first level of analysis involves a "rough sort" recorded on sherds from all proveniences, and includes basic data required for the dating and evaluation of the integrity of sherd collections. Sherds from selected dated contexts will be analyzed and described in greater detail during an "intensive analysis." This will include categories and attributes recorded during rough sort as well as the recording of additional attributes allowing for the examination of various trends and patterns. Specialized stylistic analysis will be conducted on selected samples of decorated rim sherds. An attempt will be made to implement the more detailed analysis on sufficient samples of sherds from as many distinct temporal components as possible. The basic analytical system employed, variables recorded, and research issues that will be addressed using this data are discussed below.

Data Categories and Attributes. Ceramic analysis will involve recording information concerning the context of recovery, typological classification, descriptive attributes, and quantitative data. Contextual data include information concerning the site, field specimen (FS) number, and associated provenience. Sherds from each FS exhibiting unique combinations of typological and attribute classes will be assigned to a distinct lot number, and data describing these sherds will be recorded on a distinct data line. Sherds from each lot will be bagged separately along with a tag indicating the associated site, field specimen number (FS), and lot number. Quantitative data recorded for each data line include sherd counts and weight in grams.

Type Categories. Each sherd will be assigned to a typological category reflecting a series of hierarchical decisions made during analysis. First, an item is placed into a spatially distinct ceramic tradition or series on the basis of temper, paint, and technological characteristics. Next, it is put into a ware category based on surface manipulation or decoration. Last, it is assigned to a specific type using temporally sensitive surface manipulations or design styles.

The majority of sherds from sites spanning the entire Pueblo occupation of the study area belong to types of the Tewa series defined for the Northern Rio Grande region. Sherds exhibiting distinct textured treatments or painted styles will be placed into previously described formal types of this and other locally occurring series (Habicht-Mauche 1992; McKenna and Miles 1990, 1932; Laumbach et al. 1977; Wendorf 1953), while those lacking distinct decorations or manipulations will be assigned to informal descriptive categories based on surface characteristics (for example, unpainted polished white). These types are defined based on combinations of pastes, paint types, design styles, and surface manipulations known to be temporally sensitive. Types belonging to other ceramic series or traditions will also be identified by the presence of temper, treatments, or styles not used locally, and a higher frequency of nonlocal types will identified based on the examination of temper and paste characteristics during intensive analysis. The number of and strategies used to define types in the Northern Rio Grande region varies significantly from one study to the next. Some studies have attempted to "split" the commonly used temporally distinct types into a number of other types based on variation observed in slipped and polished treatment or temper size (Habicht-Mauche 1992; Honea 1968; Stubbs and Stallings 1953). While some of the variation defined in these types may be temporally or spatially significant, the use of a large number of types based on such criteria is potentially cumbersome and confusing. Thus, we prefer to initially "lump" such variation into a limited number of spatially distinct type categories defined for this area. The variables used to recognize more recently and precisely defined types will be recorded during intensive analysis, and their distributions may be used to further examine the significance of these types. For example, Pindi Black-on-white will not be differentiated from Santa Fe Black-on-white during the recording of type categories, but distributions of temper differences used to differentiate this type (Stubbs and Stallings 1953) may be examined for sherds assigned to Santa Fe Black-on-white in order to evaluate the significance of associated variation. Given discrepancies in categories and attributes used to define types in the Northern Rio Grande, detailed descriptions and illustration of the types employed during this study will be presented for increased data comparability in future studies.

Descriptive Attributes. Descriptive attribute categories were selected to provide detailed descriptions of the associated ceramic collections as well as the investigation of a wide range of research issues. Descriptive categories that may be recorded during various levels of analysis include vessel form, temper, paint pigment, surface manipulation, slip, modification, refired paste color, and various stylistic attributes.

Vessel form categories are assigned to all sherds and vessels based on observed shape. Sherds are incomplete subsamples of the original parent vessels, and the resolution of vessel form characterization depends on sherd size and portion of vessel represented. Vessel form categories utilized will include information concerning both vessel shape and vessel part. Examples of categories that will be employed include bowl rim, bowl body, jar body, jar neck, wide mouth (cooking/storage) jar rim, narrow mouth jar olla rim. *Rim radius* will be measured in order to obtain information concerning the relative size of vessels.

The identification of *temper type* is critical for the identification of nonlocal ceramics as well as the examination of patterns of ceramic production. Temper categories are identified by examining freshly broken sherd surfaces through a binocular microscope. These characterizations of temper are limited, but broad tempering categories can be identified by ranges in the color, shape, fracture, and reflectivity of tempering particles. These categories reflect material sources available and used as tempering agents in different geographic areas. Temper types expected to be identified during the present study include various classes of igneous rock including tuff, ash, andesites, and diorites; crushed sandstones; and crushed potsherds.

Paint pigments are distinguished by surface color and characteristics (Shepard 1955). Pigment use in this area is known to have changed, and categories that may be encountered include organic, iron oxide mineral, organic mineral polychromes, mineral polychromes, clay, and glaze pigments.

Surface Manipulation refers to surface treatments including textured treatment (such as corrugations and polishing), and will be recorded for each surface. *Slip* refers to the presence of a separate clay applied to the vessel surface to produce a distinctive effect. Categories recorded for each surface will include information concerning the presence, relative thickness, and color of slips. *Modification* includes information concerning the modification of sherds or vessels through use, shaping, or repair.

Refiring Analysis will also be conducted on small samples of sherds and clays and will involve recording information concerning the color of samples exposed to common firing conditions using a kiln. This allows for the common comparisons of pastes derived from different sources based on the presence of mineral impurities (particularly iron oxides) in the clay. A small sample of sherds exhibiting the range of pastes and temper types identified will be submitted for petrographic analysis or various types of chemical or compositional analysis to provide for more detailed characterizations and sourcing information.

A detailed stylistic and technological analysis, similar to that used during the La Plata Project, may be recorded for an even smaller subset of decorated rim sherds, providing information for the examination of various temporal and spatial trends. Attributes that may be recorded include wall thickness, rim shape, rim decoration, painted styles, and design orientation.

Reconstructible vessels (where a third or more of the original vessel is present) will also be analyzed separately. Vessel analysis will involve recording previously discussed attributes as well as the dimensions of each vessel.

Historic Locally-Made Pottery. In order to assign date, origin, and function to locally made pottery, a detailed analysis of morphological attributes will be undertaken. Sherds will be identified by existing type name and vessel form. Other attributes that will be studied include rim form and cross-section, vessel diameter, paste texture and color, temper, surface color and finish, slip, design style, thickness, and alterations such as burning, smudging, reuse, and mending. Examination under a binocular microscope will facilitate this analysis. The analysis of Euroamerican pottery will differ from this approach, and is discussed along with other categories of historic artifacts.

Historic locally-made pottery should provide information in several critical areas. In particular, this assemblage will provide temporal data that can be compared with dates from other sources to assess their reliability. This information will be provided by using such attributes as rim form and cross-section, paste color and texture, temper, surface color and finish, slip, design style, and thickness to assign sherds to existing types with known dates. These attributes can also be used to determine where many vessels originated, providing information concerning ties to other areas. Functional assignments will be made on the basis of vessel form and diameter, and alterations such as burning, smudging, reuse, and mending. Both storage and cooking vessels are expected. Sherds should be relatively common, and should represent a number of vessels of varying form and function.

Lithic Artifact Analysis

Chipped stone artifacts will be studied to provide data on material procurement and selection, activities, and alterations to enhance flaking quality. Certain attributes will be studied on all chipped stone artifacts. Material type and texture will provide data on selection and source, and in particular whether materials were procured nearby or from distant locations. The type of cortex present will also be used as an indicator of material origin--while some types suggest procurement at the source, others indicate secondary deposits. In conjunction with other studies, these data will provide information on mobility and ties with other regions. Chipped stone artifacts will be classified by morphology and presumed function, which will provide a basic categorization of activities employing chipped stone tools as well as a basis for more intensive analyses. They will also be examined for evidence of thermal alteration to enhance flakeability, a process that is tied to reduction strategy and the suitability of materials for reduction. The flakeability of some materials can be improved by heating, and this can be an important aid in strategies aimed at formal tool production while it is less important in strategies based on informal tool use.

A range of other attributes will also be examined, depending on artifact morphology. Information on group mobility and tool production can be derived from an analysis of the reduction strategy employed. The reduction process produces three basic byproducts: debitage, cores, and formal tools. Debitage and cores are the immediate byproducts of this process, while formal tools are byproducts that were modified to produce a specific shape. While the former categories provide information about the reduction strategy employed, the latter provide data on tool using activities. Thus, different attributes will be examined for each of these broad categories.

Debitage and cores will provide information on reduction strategies. Attributes used for this analysis will include debitage type, amount of cortical surface, artifact portion, and size. Cores will be morphologically identified by the direction of removals and number of striking platforms, providing basic information on how they were reduced. Flakes are debitage that were purposefully removed from cores, and can provide critical data on reduction technology. Hence, several attributes will be analyzed on this class of artifact including platform type and modification, platform lipping, direction of dorsal scarring, and distal termination.

Formal tools will be identified by morphology and wear patterns. Informal tools will be identified by the presence of marginal retouch or use-wear patterns along one or more debitage edges. A binocular microscope will be used to identify and classify retouch and wear patterns on all tools, and utilized or retouched edge angles will be measured. All evidence of edge modification will be recorded for informal tools, while evidence of use or modification unrelated to production will be recorded for formal tools. These attributes will provide information on activities employing chipped stone tools.

Data from lithic artifact analysis is important to the investigation of LA 103919. Information concerning basic site function, mobility, and ties with other regions can be derived from these studies. The study of this category of artifact will also help in examining questions of intrasite variability in activities, and should aid in defining formal tool manufacturing loci. The chipped-stone assemblage should reflect an expedient reduction strategy, with biface manufacture mostly limited to the production of tools with specialized shapes and purposes (as defined by Kelly 1988). Evidence of large unspecialized bifaces serving as cores as well as tools should be rare. A wide range of subsistence-related, manufacturing, and maintenance activities should be represented in the assemblage. While local materials should predominate, exotic materials, particularly obsidian, could occur in significant quantities, reflecting ties to other regions.

Ground Stone Artifacts

Like the chipped stone assemblage, ground stone artifacts will be studied to provide data on material procurement and selection, range of activities, and alterations. Raw material choice, procurement costs, and the cost of producing specific tools will be studied by examining material type and quality, preform morphology, production input, plan-view outline form (a measure of the regularity of artifact form), and ground surface texture. Because ground stone artifacts are large and durable, they may undergo a long life history and be used for a variety of purposes, even after being broken. Several attributes will be used to monitor artifact life histories by identifying post-manufacture changes in form and treatment. They include size, heat alterations, portion represented, evidence for sharpening of the grinding surface, wear patterns, physical alterations for secondary use, and the presence of adhesions. Relative tool and assemblage age will be measured by examining the cross-section form of manos, and the depth and cross-section of metate grinding surfaces.

The attributes listed above allow evaluation of the types of activities using groundstone tools represented, and assemblage cost and value. Cost is the amount of time and energy invested in procurement, preparation, and shaping. Value is a measure of how used or "worn out" an artifact is. Discard patterns should vary according to cost and value. As the amount of effort put into producing a ground stone tool increases, so should its use-life. High-cost tools should evidence curation and recycling, being used for a variety of functions through their life-span. Low-cost ground stone tools should demonstrate little evidence of curation or recycling occurring.

The types and numbers of ground stone tools recovered should vary with site function. Residential sites should contain relatively large numbers of ground stone tools reflecting food processing and preparation activities (manos and metates) as well as miscellaneous production tasks such as jewelry making (lap stones), wooden tool manufacture (shaft straighteners), and pottery manufacture (polishing stones). High-cost ground stone tools as well as those of a more expedient nature should be present. Temporarily occupied sites such as field houses and farmsteads should contain a smaller range of ground stone tools, mostly related to food processing and preparation. Most of the ground stone tools found at temporarily occupied sites should be expedient, and little effort should have been invested in procurement, shaping, and preparation. These artifacts should have little value beyond their immediate use.

Euroamerican Artifacts

This class of artifacts includes Euroamerican sherds, glass, metal, leather, plastic, cloth, etc. The most important attribute monitored by this analysis will be function. Artifacts will be arranged in categories related to basic human activities such as subsistence-production and indulgence. Within these categories, artifacts will be further subdivided by type and specific function. Other variables that will be studied include material type, evidence of source, and manufacturing date.

Material type provides a secondary method of categorizing artifacts. While this attribute was not chosen to be the focus of analysis, it will be recorded because it can be an important aid in dating artifacts. In addition, many other analyses are categorized by material type, so this information is necessary for comparison. Evidence of source includes attributes such as "manufacturer" and "brand name", where the former refers to the company that made an artifact and the latter to the product it contained. These attributes can provide information on where an artifact originated, and the size and scale of the mercantile network a site was tied into. Several attributes will be used to assign dates to artifacts, when possible. They include seams on bottles and cans, bottle finishes, can seals, glass color, size or volume, and pottery decoration styles. By combining these data with information on the maker of an artifact, it is often possible to very accurately determine the manufacturing date.

These attributes are critical to testing the model discussed earlier, whether documentary information on occupational date and the ethnic background of site occupants is available or not. In conjunction with documentary information, these data will permit a critical evaluation of the model. Lacking this information, it will allow a tentative assignment of occupational date and ethnic identity, permitting comparison with other, better documented sites. While this will not allow a rigorous test of the model, it will at least permit its evaluation.

Since LA 103919 is thought to have been occupied by native Hispanics, the kitchen-related (or domestic) activity set should dominate. Other functional categories such as indulgences and construction/maintenance should comprise much smaller parts of the assemblage. Locally manufactured items are expected; in particular, local pottery should occur in large numbers. Historic chipped-stone tools like strike-a-light flints and gunflints may be present, the latter in particular.

Documentary and Ethnographic Research

Archival and ethnographic research will be conducted to gather information pertinent to LA 103919 and the historic occupation of the study area. Types of documentary information being sought include the names, origin, and backgrounds of site residents, date of occupation, and range of economic activities performed there. Interviews with local residents will be used to supplement and augment the documentary research, provided long-term residents familiar with the occupation of LA 103919 can be found. Ethnographic research may provide anecdotal information that is otherwise unavailable in official documents, and will hopefully allow us to more accurately define the period of occupation, and the economic orientation and situation of site residents. By comparing these data with the analytic results it should be possible to assess the accuracy of the model developed earlier. In turn, this will permit an assessment of the ability of material remains to predict ethnic identification.

Faunal Remains

Faunal analysis will concentrate on identification of species, age, and bone elements to assist in documenting food procurement and consumption patterns. Evidence of processing, such as burning or roasting and cut marks, will also be recorded. These data will help determine season of occupation, hunting and food processing and consumption patterns, and may provide information on the local environment at the time of occupation.

Historic Faunal Remains. Analysis of historic faunal materials will concentrate on identification of species, age, bone element, and condition to aid in documenting food procurement and consumption patterns. Data concerning butchering and processing methods will also be collected. Analysis of historic faunal remains should provide information on the economic orientation of site occupants. Domestic animals should dominate the assemblage. The range of elements represented and butchering patterns will be used to determine how and where meat was procured. Evidence of axe butchering and the presence of elements from skulls, feet, and pelvis would suggest on-site butchering and processing. In this case, it is possible that site occupants were raising animals for consumption. The presence of saw cut bone representing a limited range of elements and meat cuts would suggest that meat was bought from a merchant. Evidence of burning, roasting, or boiling can provide details on the processing of faunal materials as well as confirming their economic use. Similarly, the age distribution of individuals represented in the assemblage may provide information on season(s) of use.

Floral Remains

Plant remains will be identified to the specific level when possible, and will be compared with floral data from other sites to help provide a clearer picture of plant use during the period(s) of occupation. Floral remains will also aid in determining seasonality. The discovery of both edible and nonedible parts from domesticates will be indicative of local production, while the lack of all but edible parts might suggest that domesticates were raised elsewhere and imported to the site. Both pollen and macrobotanical remains will be useful in reconstructing the local environment at the time of occupation.

Human Remains

As discussed earlier, the probability of locating and recovering human remains appears to be low.

If any human remains are found, the sample should be extremely limited. The main goal of skeletal analysis will be the nondestructive study of the remains to add to general data on prehistoric human populations, rather than to address specific questions raised in the research design. This approach will include standard metric studies, aging and sexing, and documentation of pathologies.

There is a possibility that human remains from the sites could yield bone tissue samples for carbon isotope studies, allowing us to estimate the relative proportion of maize in the diet of the site's inhabitants. Before this or any other destructive analysis is attempted, however, the Office of Archaeological Studies will work with the State of New Mexico Historic Preservation Division to ensure prior consultation with all concerned parties.

Research Results

The final report will be published in the Museum of New Mexico's *Archaeology Notes* series. The report will include all important information concerning excavation and analysis, as well as interpretive results. Photographs, site and feature plans, and data summaries will also be included. Field notes, maps, and photographs will be stored by the Archeological Records Management Section of the State Historic Preservation Division at the Laboratory of Anthropology in Santa Fe.

If human remains (including any associated burial goods) are recovered, the disposition will be based on consultation carried out in accordance with federal regulations through the Bureau of Indian Affairs. No disposition of the remains will be completed until the wishes of the Jicarilla Apache tribe and any other concerned parties are known. Unless an alternative disposition is established through the consultation process, the remains will be submitted to the Museum of New Mexico Archaeological Repository for physical storage at the forensic laboratory of the Department of Anthropology, University of New Mexico. Other artifacts will be submitted to the Archaeological Repository for physical storage.

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