MUSEUM OF NEW MEXICO

OFFICE OF ARCHAEOLOGICAL STUDIES

BULL WELL TESTING: ARCHAEOLOGICAL TEST EXCAVATIONS AT TWO SITES ALONG NM 537, RIO ARRIBA COUNTY, NEW MEXICO

Jeffrey L. Boyer

with contributions by
C. Dean Wilson

Submitted by Eric Blinman
Principal Investigator

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ADMINISTRATIVE SUMMARY

Between June 1 and 11, 1993, the Office of Archaeological Studies, Museum of New Mexico, conducted limited archaeological test excavations at two sites along New Mexico 537, Rio Arriba County, New Mexico. Test excavations were conducted at the request of William L. Taylor, New Mexico State Highway and Transportation Department (NMSHTD). Both sites are on lands belonging to the Jicarilla Apache Tribe.

LA 81219 is a large site consisting of one large and three small artifact concentrations within a dispersed artifact scatter. A strip 66 m long by 30.5 m wide is within NMSHTD right-of-way, comprising 50.1 percent of the site area. Archaeological testing was limited to that area. One small artifact concentration, Concentration 4, was entirely within the project area. The other three concentrations extended into the project area. Artifacts observed in the concentrations include black-on-white and plain gray sherds, chert and obsidian core flakes, and obsidian bifacial tools. Test excavations at LA 81219 focused on searching for and identifying possible subsurface deposits, features, or past occupational surfaces within the project area. Because so few artifacts in Concentrations 2 and 3 were present within the project area, test excavations were limited to Concentrations 1 and 4. Test excavations in Concentration 4 revealed no subsurface deposits or features. Excavations in Concentration 1 revealed a thin, artifact-bearing stratum just below the modern ground surface. The stratum, a deposit of laminar clay, was initially thought to represent an occupational surface. However, sherds, chipped stone flakes, burned bone, burned sandstone, and charcoal were distributed throughout the deposit, showing that it was not a surface. Its laminar structure suggests that it was alluvially redeposited and not a cultural feature. Transects of auger tests along both sides of the highway failed to reveal evidence of subsurface features or deposits. Although charcoal was collected from the artifact-bearing stratum, the sample was too small for radiocarbon dating. Pottery types suggest that the site dates to the Rosa phase (ca. A.D. 700-850) of the region's Anasazi occupation.

LA 81220 is a large site consisting of one small artifact concentration and two shallow, circular depressions thought to represent Anasazi pithouses. A strip 130 m long by 8 m wide is within the NMSHTD project area, comprising 25.7 percent of the site area. The artifact concentration is outside the project area, and both depressions extend into the project area. Very few artifacts were present on the surface of the site; those observed include plain gray sherds and chert and obsidian core flakes. Test excavations were limited to the western edges of the two depressions where they extended into project limits and focused on determining whether the depressions were cultural features. Although test excavations failed to reveal architectural remains at either depression, auger tests revealed sherds and subsurface charcoal .8 to 1.8 m below modern ground surface in Depression 1 and 1.8 m below modern ground surface in Depression 2. For comparison, a series of seven auger tests was excavated at 10 m intervals across the site. They failed to reveal charcoal or any other possible cultural materials, suggesting that the two depressions are pithouses.

Juniper charcoal was collected from an auger test in Depression 1 and submitted for

radiocarbon dating. A calibrated date of A.D. 651 (1-sigma range: 552-690) was obtained. This date falls within the Sambrito phase (A.D. 400-700). However, like LA 81219, the sherds from LA 81220 suggest the site was occupied during the Rosa phase. Because the charcoal was juniper and because its depositional context is unknown, the radiocarbon date from Depression 1 does not rule out the age of the site suggested by ceramics.

Given the nature and extent of archaeological test excavations at LA 81219 and LA 81220, the goals specified in the testing design have been met. Testing at LA 81219 revealed the presence of a clay stratum containing sherds, chipped stone artifacts, burned bone, and burned sandstone fragments. Although the stratum appears other than cultural in origin, it is the only artifact-bearing deposit encountered during testing. Further, it is clearly associated, at least spatially, with the artifact concentration containing the greatest number of surface artifacts found on the site. As such, the stratum has potential to provide information about on-site activities and site structure. Test excavations did not reveal the presence of other cultural deposits, features, or surfaces associated with the stratum or with any of the other artifact concentrations. We recommend that the area in which the stratum is present be avoided during highway construction.

Testing at LA 81220 revealed subsurface artifacts and charcoal within the two large depressions. Although no architectural remains were encountered, it seems likely that the depressions are cultural features, perhaps Anasazi Rosa-phase pithouses. Test excavations did not reveal the presence of other cultural deposits, features, or surfaces associated with the depressions. We recommend that the two depressions be avoided during highway construction.

Submitted in fulfillment of Joint Powers Agreement DO5486 between the Museum of New Mexico and the New Mexico State Highway and Transportation Department.

MNM Project No. 41.562 (Bull Well Testing)
NMSHTD Project No. FLH-1352(11), CN 2069
Test excavations were authorized by a letter of consent signed by Leonard Atole, president of the Jicarilla Apache Tribe, and USDI Bureau of Indian Affairs permit BIA/AAO-93-003.

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INTRODUCTION

LA 81219 and LA 81220 were recorded during an archaeological survey along NM 537 in Bull Well Draw, between Dulce and Cuba, New Mexico (Fig. 1 and Appendix 1). The survey was conducted for the New Mexico State Highway and Transportation Department (NMSHTD) in advance of planned reconstruction of a section of NM 537 (Velarde 1989). Both sites are on land belonging to the Jicarilla Apache Tribe. The sites were relocated and rerecorded during a survey of temporary construction permit areas (TCPs) and construction maintenance easements (CMEs) along NM 537 (Levine 1993). A program of archaeological testing was recommended to determine the extent and data potential of the portions of the sites within the NMSHTD project area. At the request of William L. Taylor, NMSHTD, a testing design was prepared by the Office of Archaeological Studies, Museum of New Mexico (OAS), and submitted to NMSHTD, the Jicarilla Apache Tribe, and the USDI Bureau of Indian Affairs (BIA) prior to fieldwork (Boyer in prep.).

Between June 1 and 11, 1993, OAS conducted archaeological test excavations at LA 81219 and LA 81220. Excavations were authorized by a letter of consent signed by Leonard Atole, president of the Jicarilla Apache Tribe, and BIA permit BIA/AAO-93-003. Eric Blinman, OAS assistant director, acted as principal investigator, and Jeffrey L. Boyer acted as project director. The field crew consisted of Boyer, Sibel Melik, Marcy Snow, and Robert Emerson. In the laboratory, C. Dean Wilson analyzed the ceramic artifacts. Sonya Urban aided Wilson in processing the ceramic data. Boyer analyzed the chipped stone artifacts, Linda Mick-O'Hara identified the faunal remains from LA 81219, and Mollie Toll identified the charcoal prior to its submission for radiocarbon dating.

The Bull Well project area is in Bull Well Draw in southwestern Rio Arriba County, approximately 64 km (40 miles) southwest of Dulce (Fig. 1 and Appendix 1). Bull Well Draw is an intermittent, northwest-trending tributary of Tapicito Creek, which is, in turn, a tributary of Cañon Largo. Cañon Largo flows into the San Juan River. The sites are on the valley floor of Bull Well Draw at an elevation of 2,118 m (6,950 ft).

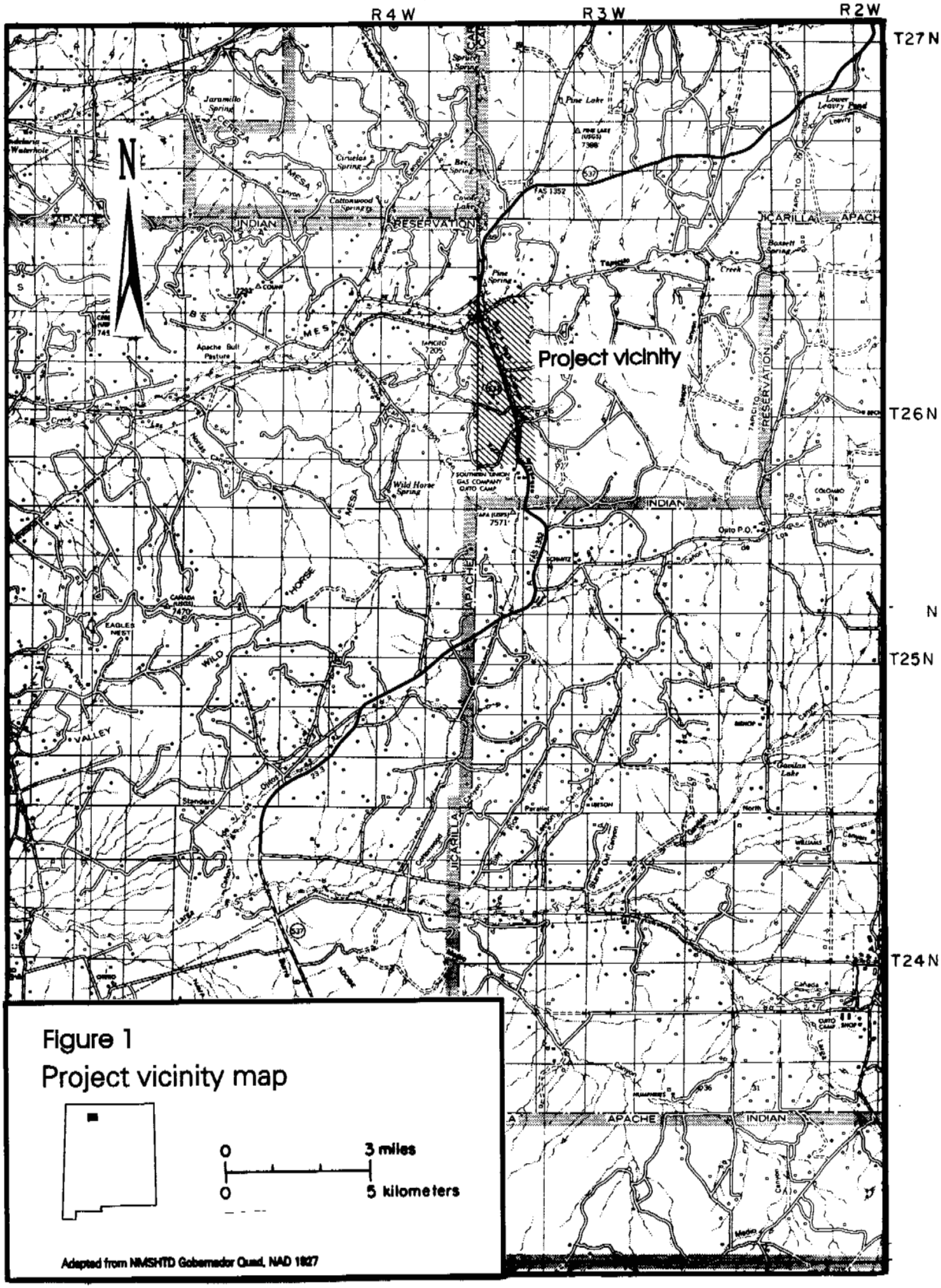

Figure 1
Project vicinity map

THE NATURAL ENVIRONMENT

Regional Physiography

Maker et al. (1973:6) describe the mountainous part of western Rio Arriba County as follows:

> The part of the county west of a north-south line just east of Chama and Tierra Amarilla is within the Colorado Plateau physiographic province. The altitude generally ranges from 6,000 to 9,000 feet, but is most commonly between 6,500 and 8,000 feet. It is an area dominated by rough and variable topography consisting of a series of high rimmed areas and plateaus intermingled with deep canyons and relatively narrow valley bottoms. The plateau and mesa tops range from gently sloping to moderately steep and rolling. The sides of the mesas and plateaus are commonly steep to very steep. The valley areas and alluvial slopes adjacent to the drainages are gently to strongly sloping.
>
> Most of this part of the county is west of the Continental Divide and drains to the San Juan River which eventually joins the Colorado River in Utah.

The region is in the northeastern part of the San Juan Basin. Describing the geology of the region surrounding the project area, Ireland (1984:5) notes, "Many of the lithological units found in the Basin are of sedimentary origin," in contrast to volcanic formations in the higher mountains of eastern Rio Arriba County.

Soils

Soils in the project area are included by Maker et al. (1973) in the Travessilla-Persayo-Rock Land association. They describe the regional physiography found with this association as "nearly level to gently sloping small valley floors, strongly to moderately steep and rolling uplands, and steep escarpments and breaks" (Maker et al. 1973:13). The project area is typical of this profile. Figure 2 shows Bull Well Draw looking east from the escarpment on the west side of the draw. The sites are on the valley floor in the middle ground. The sandstone walls of the eastern escarpment are visible in the background.

Travessilla soils are shallow to moderately deep and form on sandstone mesa tops and breaks. Persayo soils, also shallow to moderately deep, form on sloping and rolling shale ridges and knolls. The Rock Land portion of the association is "a complex of very shallow soils, outcrops of interbedded sandstone and shale, and other types of sedimentary rocks" (Maker et al. 1973:13). Maker et al. (1973:13-14) also observe that the exception to these soils of sedimentary origin are the soils in the narrow valley bottoms, which are forming in "old alluvial fill materials." These soils, unclassified but included in the Travessilla-Persayo-Rock Land association, consist of thick, noncalcareous, fine sandy loam topsoil underlain by heavy,

sandy clay or clay loam subsoils. Beneath the subsoils are calcareous loam or sandy clay loam substrata with gravel and cobbles. Soil depth is usually more than 1.5 m (60 in). While the named components of the soil association are typical of soils in the general project region, the unclassified alluvium soils are characteristic of the valley bottom in which the sites are located. Artifacts present on the surface of both sites, the shallow artifact-bearing deposits at LA 81219, and depressions probably indicating pithouses at LA 81220 suggest that, relative to the depth of the valley bottom alluvial fill, there has been little soil accumulation in the valley bottom since the sites were occupied.

Figure 2. Overview of project area, looking east.

Generally, the soils in the Travessilla-Persayo-Rock Land association are considered nonirrigable (Maker et al. 1973:Fig. 2) The exception is the deep, alluvial soil found in the valley bottoms. However, these soils are considered poor for irrigation due to their propensity for high salinity, flooding, and erosion (Maker et al. 1973:14).

Climate

Maker et al. (1973:7) state that temperature and precipitation patterns at Dulce "are generally representative of other localities in the mountainous areas" of Rio Arriba County.

Table 1 lists climatic data for the Dulce weather station (Maker et al. 1973; Gabin and Lesperance 1977), including monthly and annual precipitation, temperature, and potential evapotranspiration (PE) means. It also shows precipitation surpluses or deficits and the percent of PE provided by mean precipitation. Figure 3 shows the relationships between mean monthly precipitation, temperature, and PE.

The annual temperature curve climbs smoothly from its low point in January to its high point in July, then drops smoothly back to its low. PE, which is largely affected by temperature, also follows a bell curve, although not as smoothly as the temperature curve. After March, the PE curve climbs rapidly, peaking in July, then dropping rapidly through October. Between November and March, there is relatively little change in PE (Fig. 3).

In contrast to temperature and PE, precipitation is remarkably constant through the year. Monthly means run between 20 and 62 mm, but only during July and August are monthly means greater than 40 mm. During the other 10 months, precipitation runs between 20 and 40 mm, with six monthly means between 30 and 40 mm. The spring and early summer months are relatively dry, with mean precipitation values dropping from 36.3 mm in March to 20.1 mm in June. These are the same months when rising temperatures prompt a dramatic rise in PE. This could have important implications for farming because the early part of the growing season, when water is critical for seed sprouting and young plant growth, is also the part of the year with the greatest difference between precipitation and PE. Mean precipitation provides the smallest percent of mean PE water needs during the months of April, May, and June (Table 1).

Dulce has a frost-free season averaging 90 days (Maker et al. 1973). Mean monthly minimum temperatures (Table 1) show that the maximum agricultural growing season is between May and September, when minimum temperatures are generally above freezing. However, the average last day of freezing temperatures in the spring is June 14 (Maker et al. 1973). This short growing season, combined with the spring-early summer precipitation deficit, would make dry farming a precarious economic pursuit, particularly in the long term. The only possible mitigating factor might be the amount of moisture retained in the ground from winter snows. Between October and March, mean precipitation provides 326.7 percent of PE water needs, generating a precipitation surplus. This surplus may be available as spring-early summer ground moisture. How significant this surplus is, or was prehistorically, for farming is unknown.

Vegetation

Maker et al. (1973:13) state that the soils in the Travessilla-Persayo-Rock Land association, combined with climatic conditions, support "a good cover of native vegetation consisting of a relatively dense overstory of piñon pine and juniper trees with an occasional ponderosa pine. The understory vegetation includes Gambel oak, mountain mahogany, big sagebrush, bitterbrush, blue grama, muttongrass, western wheatgrass, galleta, junegrass, piñon ricegrass, and elk sedge." This describes the sandstone-shale ridges and mesas of the general

area. They go on to state that the valley areas, characterized by the unclassified alluvial soils, "do not have the overstory of trees. These support good stands of native vegetation dominated by big sagebrush, blue grama, and western wheatgrass" (Maker et al. 1973:13), like the valley bottom of Bull Well Draw.

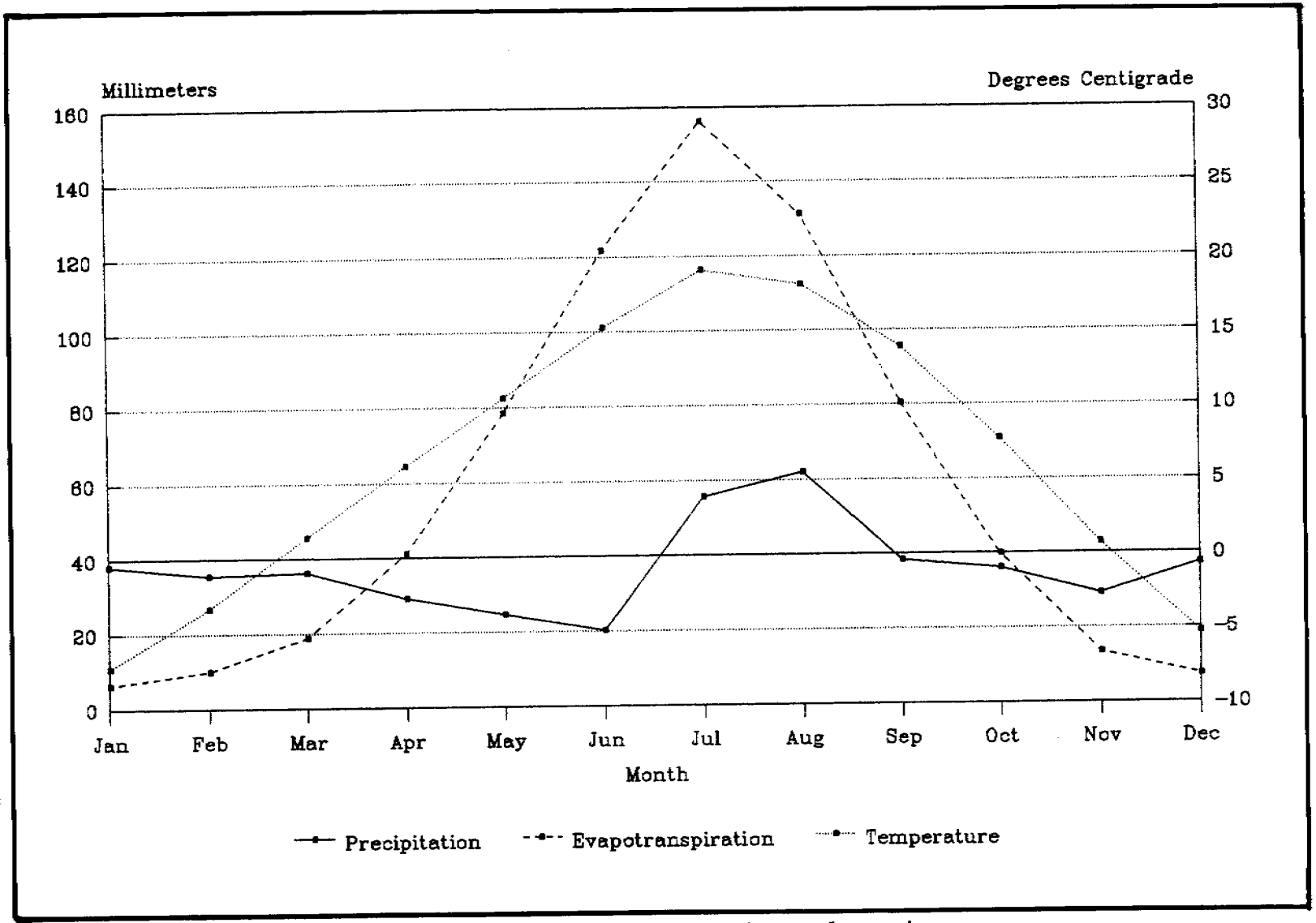

Figure 3. Mean precipitation, evapotranspiration, and temperature, Dulce weather station.

Table 1. Dulce weather station climatic data, compiled from Maker et al. (1973) and Gabin and Lesperance (1977)

Climate Data	Months												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Mean Precipitation (mm)	38.1	35.6	36.3	29.2	24.6	20.1	55.6	62.0	38.4	36.1	29.2	37.3	448.6
Mean Temperature (C)	-7.3	-3.3	1.4	6.1	10.6	15.3	19.1	18.1	13.9	7.7	.7	-5.3	-6.4
Mean Minimum Temperature (C)	-17.2	-12.8	-7.7	-3.9	0	3.3	7.7	7.7	2.8	-3.3	-9.4	-15.0	-4.0
Potential Evapotranspiration (mm)	6.4	9.9	18.8	41.1	78.5	121.7	156.2	131.2	80.3	39.9	13.4	7.4	704.8
Precipitation Surplus or Deficit (mm)*	+31.7	+25.6	+17.5	-11.9	-53.8	-101.6	-100.6	-69.1	-41.9	-3.8	+15.7	+30.0	-256.2
Percent of Potential Evapotranspiration Provided by Mean Precipitation	595.3	359.6	193.1	28.9	31.3	16.5	35.6	47.3	47.8	90.5	217.9	504.1	63.7

* difference between mean precipitation and potential evapotranspiration

THE CULTURAL ENVIRONMENT

Because this project involved testing at two Anasazi sites that appear to date to the Rosa phase, the report does not warrant a lengthy overview of regional prehistory and history. Rather, it will focus on the early Puebloan occupation of the region, specifically the Rosa phase.

Regional Survey Results

In 1984, Broster and Ireland (1984) and Broster (1984) reported the results of a survey program on the Jicarilla Apache Reservation. The program involved a sample survey of potential timber sale and development areas on the reservation. A total of 62,809 ha (155,200 acres) of potential commercial forest was identified, of which 10 percent, or 6,281 ha, was surveyed in 65 ha (160 acre) units. Some 196 prehistoric sites with 214 temporal components were recorded. Of these, 24 components (11.2 percent) were assigned to the Rosa phase and 15 (7.0 percent) were assigned to the Rosa or Piedra phases, based on surface artifact assemblages. These figures suggest a reservation-wide site density of .06 site/ha and a Rosa/Rosa–Piedra component density of .006 component/ha.

Rosa-phase sites are more common on the Carson National Forest's Jicarilla Ranger District, immediately west of the reservation. Young and Lawrence (1988) report that by the end of 1987, only about 4 percent of the district's 58,987 ha (145,755 acres) had been surveyed. Of 211 sites recorded at that time, 195 (92.4 percent) were Anasazi sites, and 130 (61.6 percent) were Anasazi architectural sites. Seventy-six sites (36.0 percent of the total, 58.5 percent of architectural sites) had pithouses. Fourteen sites (6.6 percent of the total, 10.8 percent of architectural sites) had both pithouses and surface structures, and seven sites (3.3 percent of the total, 5.4 percent of architectural sites) were recorded as pithouse villages (Young and Lawrence 1988:36). Young and Lawrence (1988:37) state, "Phase designations within the Anasazi have not been recorded for many of the sites, but the majority of the architectural sites are Pueblo I Rosa Phase pithouses. Most of the other architectural site types that have phase designations also are coded as Rosa Phase or have multiple phase designations that include the Rosa Phase."

These figures yield an overall site density of .09 site/ha and an Anasazi architectural site density of .06 site/ha. Most of the latter are Rosa-phase sites. The figures suggest that prehistoric site density decreases about 1.5 times and Rosa-phase site/component density decreases about 10 times between the Jicarilla Ranger District and the higher terrain of the reservation. This indicates that the Bull Well project area is near the eastern edge of the Rosa-phase area, an idea supported by Shields and Cater's (1992) review of the spatial distribution of Rosa-phase sites, which places the eastern Rosa-phase boundary at the Continental Divide, only about 19 km east of the project area.

Describing the Rosa Phase

The Rosa phase and its sites and artifact assemblages were first defined by Hall (1944). Hall based his description of the phase on Earl Morris's excavations in the first decades of the 1900s, H. P. Mera's 1932-38 survey and excavations, and his own excavations in the Gobernador region. Hall (1944:5-6) considered the Gobernador region to be an Anasazi frontier peripheral to the San Juan Basin: "The interrelation of indigenous Southwestern cultures has been studied by many, but our information concerning peripheral manifestations has been far less complete than for those centrally located. This paper concerns itself with the northeastern periphery and is a detailed description of one cultural manifestation and its relationship to others both within and outside the immediate area. Our subject is the Rosa Phase."

According to Hall (1944:85-89), typical Rosa-phase sites include circular pithouses up to 2 m or more deep, 6 to 12 m in diameter, and oriented to the east. Many pithouses have a bench encircling the interior wall and adobe-lined hearths. Internal storage features are rare. Single-room surface structures that Hall calls "outdoor surface granaries" are present, as are outdoor storage pits and remains of ramada shelters. Stockades of upright poles encircle the structures, and it is common for all structures at a site to be burned.

Unpainted pottery sherds far outnumber painted sherds at the sites. Chipped stone tools, including side-notched and stemmed projectile points, and ground stone tools, including narrow trough metates, are present. Hall sees evidence of a mixed economy incorporating hunting, gathering, and agriculture. He also suggests that the sites were only seasonally occupied.

In 1963, Peckham (1963) reported on the excavation of two Rosa-phase sites along what is now U.S. 64 in Burns Canyon south of Dulce. The project area was about 34 km north of the Bull Well Draw sites and near the eastern boundary of the Rosa-phase area. One of the sites, LA 3321, was a refuse area in a filled arroyo. It could not be associated with structural features. The other site, LA 3320, consisted of three pithouses and an outdoor hearth. Two of the pithouses, Rooms 1 and 3, were circular and oriented north-south. Room 1 had a bench encircling the interior wall; Room 3 had no bench. The bench in Room 1 held a large trough metate, and a storage cist had been excavated into the bench. Room 1 had a hearth-ashpit-deflector complex in line with the ventilator. Floor features included two single postholes and two pairs of postholes, all arranged in a quadrilateral pattern; a sealed cist; and two "ladder rest" depressions. Floor artifacts included a maul, 12 manos, and a small metate. In contrast, Room 3 had a simple hearth but no ashpit or deflector. Two single postholes and two pairs of postholes were present. There were no other floor features or artifacts.

Room 2 was roughly pentagonal and both smaller and shallower than Rooms 1 and 3. It had what appeared to be a ramp entry on its east side, three postholes in a trilateral pattern, and a simple, slab-lined hearth.

Rooms 1 and 2 were burned. Room 3 had apparently been abandoned, dismantled, and

used as a refuse area. There was no evidence of a stockade around the structural area of the site, nor of surface structures.

Comparing his pithouses to Hall's, Peckham (1963:111-112) feels that Room 1 most closely resembled the pithouses that Hall considered typical of Rosa-phase pithouses. Although lacking some internal features, Room 3 also generally conformed to common Rosa-phase pithouses. In contrast, Room 2 was not characteristic of common Rosa-phase structures but did resemble two pithouses, Houses C and D at Site 12, excavated by Hall. Peckham (1963:112) states, "Hall suggests that House D may have been a summer shelter or been built by an intrusive group. It is equally possible that these structures, which are unlike the typical Rosa Phase houses, may have been temporary dwellings occupied during what must have been a rather lengthy period of construction of the larger, deeper pit houses."

The ceramic assemblage from LA 3320 was dominated by Rosa Gray (63.2 percent) and Rosa Brown (19 percent). Unidentified white ware sherds (10.1 percent) and Rosa Black-on-white sherds (3.2 percent) make up about 13 percent of the assemblage. The only intrusive type was represented by a single sherd of Mancos Gray. The refuse area at LA 3321, on the other hand, yielded a few sherds of Gallina, Piedra, and Chapin Black-on-white, Bluff Black-on-red, and Lino Gray. Together, these intrusive sherds comprised 1.8 percent of the assemblage. Peckham (1963:113) states, "The absence of intrusive pottery at LA 3320 seems to preclude the possibility that the site's inhabitants enjoyed much if any contact with groups very far from the Burns Canyon community. On the other hand, the relatively wide array of pottery types found at LA 3321 would indicate that people occupying the Burns Canyon area at a slightly later date benefitted considerably from contacts with the Piedra area to the north and possibly with the Gallina area to the south."

The presence of an "incomplete" architectural assemblage lacking surface structures and a stockade, as well as sherds suggestive of the Gallina area, indicate to Peckham that the Burns Canyon sites were quite "peripheral" to the Rosa-phase area and perhaps more closely linked to the Gallina area to the south (Peckham 1963:96, 101, 112-114).

Excavations at Navajo Reservoir west of the Gobernador region included 16 Rosa-phase sites. On the basis of these sites, Eddy (1972:28) defines the "basic settlement unit" of the Rosa phase as a pithouse with a surface structure, scattered trash, and exterior work areas with pits and hearths. "Multiple-unit sites" consist of two to five pithouses, while villages have six or more. Eddy (1972:28-29) observes that two different pithouse styles are present. The earlier type is a small, shallow structure thought to represent a holdover form from the previous Sambrito phase. It corresponds to the small pithouses that Hall thought might have been summer shelters and Peckham suggested were temporary dwellings used during construction of the "typical" larger pithouses. Later in the phase, this type gave way to larger, "elaborate style" pithouses. The later structures are 1.2 to 2.4 m deep and have up to three times the floor space of the earlier structures.

Apparently, the appearance of surface jacal structures is associated with the change to larger, deeper pithouses. Architectural storage facilities include the surface structures, outdoor

pits, and interior "furnishings" in pithouses (Eddy 1972:31). Eddy (1972:29) also notes that, "Although stockades were defined by Hall as typical of the Rosa Phase, in the Reservoir District, this defensive measure was not necessary until middle Piedra Phase (A.D. 900)." Since stockades were not found at the reservoir sites and Peckham found no evidence of a stockade at LA 3320, we must wonder whether stockades should be considered typical of Rosa-phase sites or whether Hall's Gobernador sites are actually atypical in this regard.

Eddy (1972:29) observes that it was during the Rosa phase that the bow and arrow were introduced, prompting a "major modification in the hunting activity." Locally made pottery is much more common on Rosa-phase sites than on earlier Sambrito-phase sites. Apparently associated with the earlier Sambrito-like pithouses are imported ceramics suggesting trade between the reservoir district and the Animas or La Plata Valleys 32 to 56 km to the west and northwest. The shift to larger pithouses and surface structures seems to be associated with ceramics, suggesting exchange with the Animas Valley, some 105 km to the northwest.

Besides architectural sites, other Rosa-phase sites examined at Navajo Reservoir included "summer farming sites"; "fly camps," from which hunting and gathering activities were organized; rock shelters; and a cemetery. Eddy (1972:29) observes a settlement pattern consisting of "Simple Nuclear-Centered communities" comprised of pithouse villages and "surrounding satellites." These communities are separated by open areas occupied by "randomly scattered farm homesteads."

Eddy (1972:65) believes that a small Anasazi population "colonized" the reservoir district in the Sambrito phase. The Rosa phase, he argues, saw a "population explosion" revealed by 26 times more Rosa-phase than Sambrito-phase sites in the district. Interestingly, there are also twice as many Rosa-phase sites as sites belonging to the subsequent Piedra phase. However, Eddy's (1972:66-67) population estimates indicate that the Rosa- and Piedra-phase populations were about the same size. Eddy suggests that this indicates population stability between the two phases. This shows an inconsistency in his argument. A 26-fold increase in the number of sites between the Sambrito and Rosa phases suggests significant population growth and movement into the district during the Rosa phase, a phenomenon that Eddy calls a "population explosion." However, Eddy does not argue for a population decrease when the number of sites drops by half between the Rosa and Piedra phases. Rather, he uses his population estimates to argue for stability between the two phases. Following Eddy, Shields and Cater (1992:62) argue that the Anasazi population reached a peak in the Rosa phase that was "sustained" through the Piedra phase. They attribute the high frequency of Rosa-phase sites to "horticultural techniques and field locations" that resulted from climatic conditions. If, in fact, the population remained relatively stable between the Rosa and Piedra phases, then the high frequency of Rosa-phase sites suggests a simpler answer: high population mobility. This is a common feature of frontier colonization, in which populations are relatively mobile until aggregate communities are established. Prior to that, both scattered, mobile homesteads and communities of homesteads appeared and disappeared as colonists learned about and experiment with the availability of various resources, such as water, arable land, wild food, and building materials (see Boyer et al. 1994).

Dating the Rosa Phase

Hall (1944) first postulated that the Rosa phase dated between A.D. 700 and 900, based on a series of tree-ring dates from eight excavated pithouses and two excavated surface structures. Since not all his tree-ring samples produced cutting ("bark") dates, Hall (1944:83-84) presents both the dates of each sample's outer ring and the sample's estimated bark date. Figure 4 shows the number of bark dates for each year between A.D. 700 and 900. Bark dates range from 711 to 877. There are two dates in the 710s, followed by a trimodal distribution of dates. The first mode begins in 780, peaks between 792 and 807, and drops off by 815. The second mode is between 829 and 835. The third begins in 842, peaks at 865, and drops off by 877. Based on these dates, Hall's dates of 700 to 900 seem reasonable.

Using ceramic cross-dating, Peckham (1963:94) dates his Burns Canyon sites between A.D. 825 and 900. It is not clear why he feels that the sites date so late in the phase, although ceramic evidence of possible links to the subsequent Piedra and Largo-Gallina phases may encourage him to assign the late date. However, that evidence is largely limited to a few sherds from LA 3321, and Peckham (1963:113) does suggest that LA 3321 was occupied later than LA 3320.

Eddy (1966:470) states that Hall's dates of 700 to 900 were modified following excavations at Navajo Reservoir. Although chronometric techniques were not able to establish the dates of the Rosa phase, Piedra-phase chronometric dates place that phase between 850 and 950. Therefore, the Rosa-phase dates were changed to 700 to 850, the dates commonly in use today. However, shortening the phase by 50 years seems to dismiss the strong peak in the tree-ring dates between 842 and 877 from Hall's Gobernador sites. Further, there is what may be a discrepancy in Eddy's description of the Rosa phase, based on excavations at Navajo Reservoir. Above, we mentioned that early Rosa-phase pithouses are small and shallow compared to later pithouses. Eddy (1972:28) suggests that the transition took place around 750 and that the earlier pithouses were holdover forms from the Sambrito phase. Apparently associated with this transition at about 750 was the appearance of surface structures and a shift in regional ceramic exchange, resulting in sites that are recognizably Rosa phase. It seems possible that, if the pre-750 structures more closely resemble Sambrito structures, then Eddy's data, and perhaps Peckham's as well, suggest that the "earlier " (pre-750) pithouses were actually Sambrito-phase structures. If so, then the Rosa phase in the Navajo Reservoir District may not actually begin until about 750.

Together, information from Navajo Reservoir, the Gobernador sites, and Burns Canyon indicate that there is some interregional variation in the timing of the Rosa phase. Hall's bark dates point to pithouse construction between about 710 and the late 870s. However, we should note that most of his dates fall after 780. Only two of 45 (4.4 percent) samples dated before 780. Even Hall's outer-ring (noncutting) dates support this pattern (Fig. 5). Of 85 outer-ring dates, only six (7.1 percent) are earlier than 750; they span the years between 702 and 745. Three samples date to the 750s and 760s. The remaining 76 samples cluster in two groups, one dating between 777 and 821 and the second between 828 and 866. Five samples

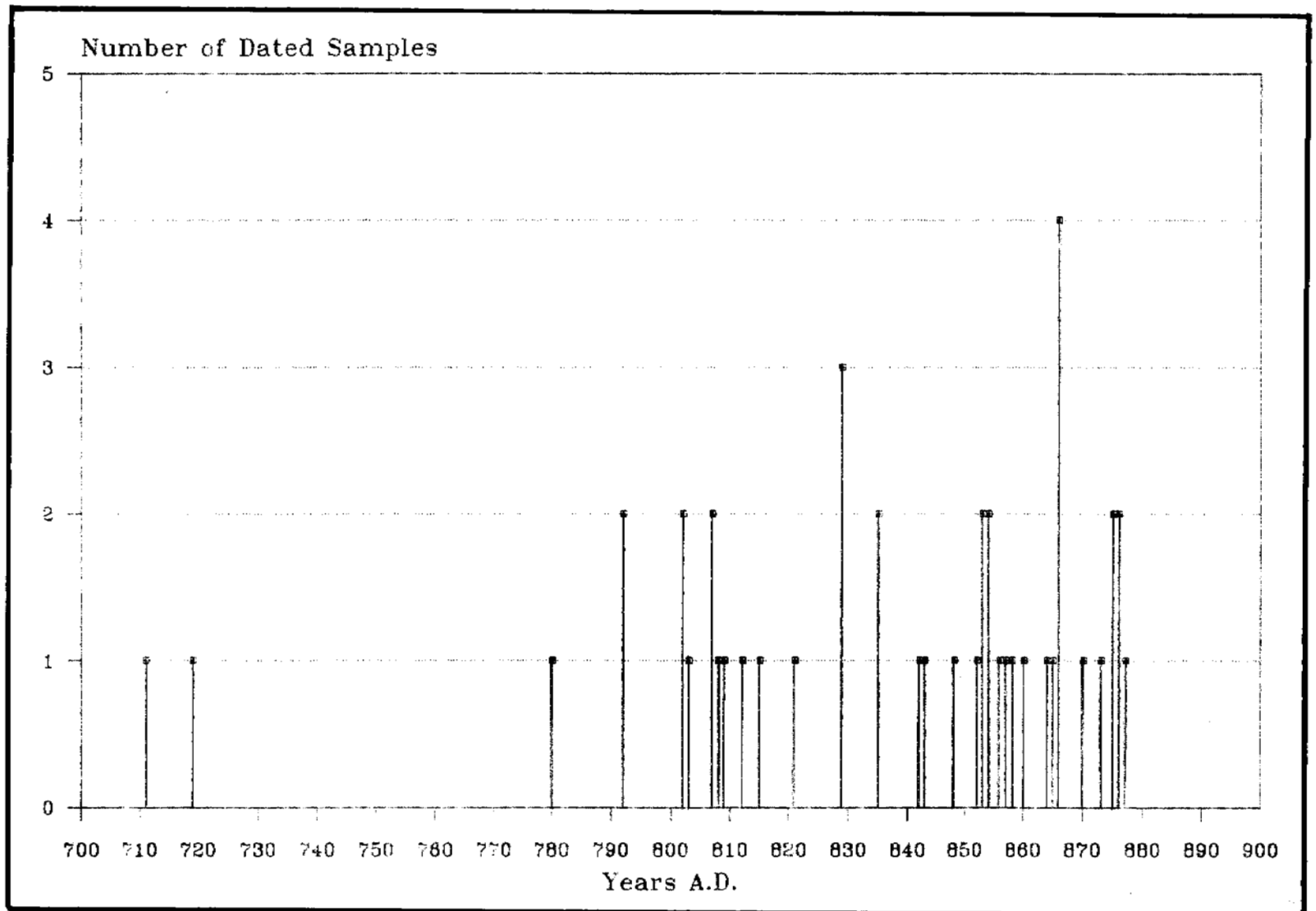

Figure 4. Tree-ring "bark" dates from Hall's (1944) Gobernador Rosa-phase sites.

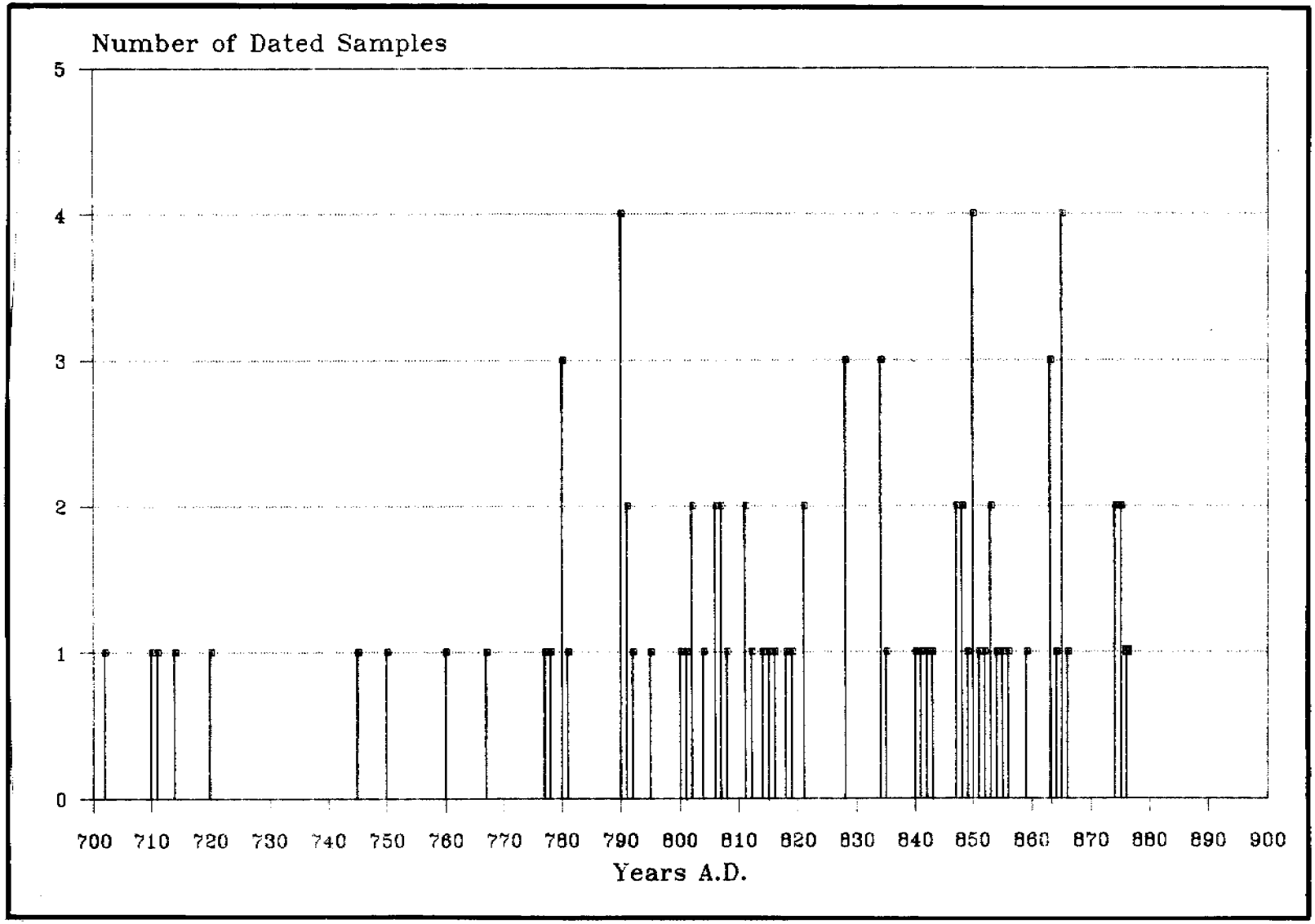

Figure 5. Tree-ring "outer-ring" dates from Hall's (1944) Gobernador Rosa-phase sites.

have outer-ring dates in the 870s. The paucity of outer-ring dates before 777 and of bark dates before 780 suggests that Hall's 700 date for the beginning of the phase is too early. This may lend some support to the possibility, as seen from the Navajo Reservoir sites, that the Rosa phase actually began around 750, or perhaps later.

On the other hand, Hall's dates seem to dispute Eddy's contention that the Rosa phase ended about 850. The presence of both outer-ring and bark dates in the 860s and 870s strongly suggests that 850 is too early for an ending date. Whether the Rosa phase lasted until 900 in the Gobernador remains to be seen. However, Eddy is adamant that Piedra-phase dates show that phase starting around 850 in the Navajo Reservoir District. It seems entirely possible that the Rosa phase lasted longer in the Gobernador, and perhaps in the mountainous area to the east, than in the Navajo Reservoir District. This may be supported by Peckham's contention for transitional relationships between Rosa and Gallina sherds from the Burns Canyon sites.

Based on the evidence reviewed here, the Rosa phase should perhaps be dated between A.D. 750 and 850/900, the ending date varying according to region. However, since this overview hardly constitutes an intensive examination of Sambrito-, Rosa-, and Piedra-phase chronometrics, we will, in the remainder of this report, use the accepted dates of A.D. 700 to 850, with the caveat that they may well not be accurate.

FIELD PROCEDURES

The testing design outlined general and specific testing procedures for the project (Boyer in prep.). These procedures were followed in the field, with minor modifications based on testing results. This section details testing procedures at each site.

LA 81219

Test excavations at LA 81219 focused on searching for and identifying possible subsurface deposits, features, or past occupational surfaces within the NMSHTD project area. Surface artifacts were marked with pinflags, revealing four artifact concentrations, two on each side of the highway right-of-way. With the exception of Concentration 1, all surface artifacts were piece-plotted on the site map. The number of artifacts in Concentration 1 was determined to be too high to warrant piece-plotting.

A primary site datum, Datum A, was placed outside project limits on the west side of the highway. Designated 100N/100E, this datum was used to establish a grid network across the site. The site was mapped using transit and stadia rod. Two subdatums were located within project limits. Their elevations relative to the primary datum provided vertical elevation control during test excavations.

Based on the location and density of surface artifacts within project limits, two areas were selected for test excavation. One was in the southeast corner of Concentration 1, on the east side of the highway. The second was in Concentration 4, on the west side of the highway. Excavations were conducted by 10 cm arbitrary levels in 1 by 1 m units within the grid network. In Concentration 1, a dark stratum containing artifacts, burned rocks, and burned bone was recognized in unit 102N/132E. In unit 102N/131E, it was initially defined as a surface. Consequently, several units surrounding unit 102N/131E were excavated, in keeping with the testing design. In all, eight 1 m by 1 m units were excavated. One, 101N/132E, was excavated to the bottom of Level 2. Unit 102N/132E was excavated into Level 2 to the base of the dark stratum. The remaining six units were excavated to what appeared to be about half way through the stratum. This depth was first thought to represent the surface. In one unit, 102N/131E, excavating to this depth meant digging into but not to the bottom of Level 2. In the other units, excavation stopped within Level 1. An auger was used to examine the soil beneath units 101N/132E and 103N/131E. Auger tests were also excavated at grid points 102N/128E, 102N/129E, and 102N/130E to examine the soil beneath and west of the excavation area. Augering was intended to show whether cultural deposits or features were present beneath the stratum and to define the approximate horizontal size of the stratum within project limits.

In Concentration 4, a single 1 by 1 m unit, 131N/96E, was excavated to the bottom of Level 2. An auger was used to examine the soil beneath the unit.

Paralleling the fence on the east side of the right-of-way, a transect of 11 auger holes was excavated to examine the soil between and beyond Concentrations 1 and 2. In keeping with the testing design, they were initially placed at 10 m intervals. Based on the results of testing in Concentration 1, the interval near Concentrations 1 and 2 was decreased to 5 m. On the west side of the right-of-way, two auger transects were used to examine the soil between and beyond Concentrations 3 and 4. The transects were separated by an abandoned road entering the site from the west. In Concentration 3, the interval was 5 m, increasing to 10 m south of the concentration. In the vicinity of Concentration 4, the interval was 5 m.

LA 81220

Test excavations at LA 81220 focused on the same goals as at LA 81219. Surface artifacts were marked with pinflags. A total of 28 surface sherds and chipped stone flakes were located. All but two were on the east side of the highway, and only seven were inside the NMSHTD project area. One artifact concentration was defined outside project limits. Because so few surface artifacts were present, they were piece-plotted on the site map.

A primary site datum, Datum A, was placed outside project limits on the west side of the highway. Designated 100N/100E, this datum was used to establish a grid network across the site. The site was mapped using transit and stadia rod. Two subdatums were located within the project area. Their elevations relative to the primary datum provided vertical elevation control during test excavations.

Two large, circular depressions extended into the project area, and test excavation units were placed along the west sides of the depressions. At Depression 1, in the approximate center of the site, one 1 by 1 m unit, 86N/99E, was excavated in 10 cm arbitrary levels to the bottom of Level 2. An auger was used to examine the soil beneath the excavation unit.

After on-site consultation with Bruce Harrill, BIA Albuquerque area archaeologist, a transect of four auger holes was excavated along the 86N grid line, east of the excavation unit, outside the project area. Initially placed at 2 m intervals, these auger holes were intended to examine the soil within the depression. Near the right-of-way fence, the interval was decreased to 0.5 m. Based on the results, a second series of four auger holes was excavated at 1 m intervals paralleling the fence.

At Depression 2, in the northern part of the site, two 1 by 1 m units were excavated in 10 cm arbitrary levels. Unit 122N/84E was excavated to the bottom of Level 4, while 123N/85E was excavated to the bottom of Level 2. Auger holes were used to examine the soil beneath each excavation unit. A transect of four auger holes placed at 2 m intervals was excavated along the 124N line, east of the excavation units, outside the project area. As at Depression 1, these auger holes were intended to examine the soil in the depression.

Following the testing design, a transect of seven auger holes was excavated paralleling the fence on the east side of the highway. The auger holes were placed at 10 m intervals.

LABORATORY PROCEDURES

Artifacts collected during testing were returned to OAS for analysis. Sixteen chipped stone artifacts were analyzed using the OAS standardized analytical format (OAS 1995). Two radiocarbon samples were returned to OAS, analyzed for species identification, and submitted for analysis. Faunal remains consisting of four bone fragments were identified by part, species or mammal size group, and condition. For information on procedures followed in the ceramic analysis, see Wilson (this volume).

RESULTS OF TEST EXCAVATIONS

LA 81219

LA 81219 is a large site measuring approximately 73 m east-west by 55 m north-south (4,015 sq m). The site is found on both sides of NM 537 between [redacted] is within the site boundary near the north side of the site. A strip 66 m long by 30.5 m wide (2,013 sq m) is within NMSHTD right-of-way, comprising 50.1 percent of the site area.

Four large concentrations of surface artifacts were recorded at LA 81219. Concentration 1 is on the east side of the highway. Largely present outside project limits, it extended into project limits on its west side. The concentration was approximately 17 m long north-south by 12 m wide east-west. It contained over 50 painted and plain gray sherds, over 10 white chert core flakes, and one Polvadera obsidian biface, a possible projectile point. The concentration is bisected by a high-pressure natural gas pipeline.

Concentration 2 is 10 m south of Concentration 1. It measured 13.5 m long east-west by 9 m wide north-south and consisted of only five plain gray sherds and a single white chert core flake. The flake and three sherds were within project limits. The remaining sherds are outside project limits.

Concentration 3 is on the west side of the highway, due west of Concentration 1. It was 21 m long east-west by 12 m wide north-south and consisted of over 10 plain gray sherds, one corrugated gray sherd, two white chert core flakes, and one obsidian biface fragment. The biface fragment, one flake, and two sherds were within project limits. The remaining artifacts are outside project limits.

Concentration 4 is 20 m north of Concentration 3 within NMSHTD project limits. Measuring 2 m by 2 m, it consisted of three plain gray sherds, one painted sherd, and one white chert flake.

Because of the relatively high surface artifact densities in Concentrations 1 and 4, these areas were selected for test excavations. Table 2 lists the excavated 1 by 1 m grid units in each concentration. It shows the depth of excavation in each grid unit, including auger tests as appropriate, and cultural materials recovered from each grid unit. Eight 1 by 1 m grid units were excavated in Concentration 1 (Fig. 6). Excavation in Concentration 1 revealed a thin, artifact-bearing stratum just below the modern ground surface. The stratum was a dark grayish brown loamy clay with a laminar structure. The top of this stratum was encountered 6 to 13 cm below the modern ground surface (Fig. 7). In unit 102N/132E, it was defined as growing from 4 cm thick on the east side of the unit near the fence to 10 cm thick on the west side of the unit. Beneath this stratum is a culturally sterile, light red clay. In unit 101N/132E, an auger test suggested that the sterile red clay ended about 58 cm below ground surface, where the soil changed to a lighter color and less compact structure. At about 91 cm below surface, the soil became a fine, loose sand.

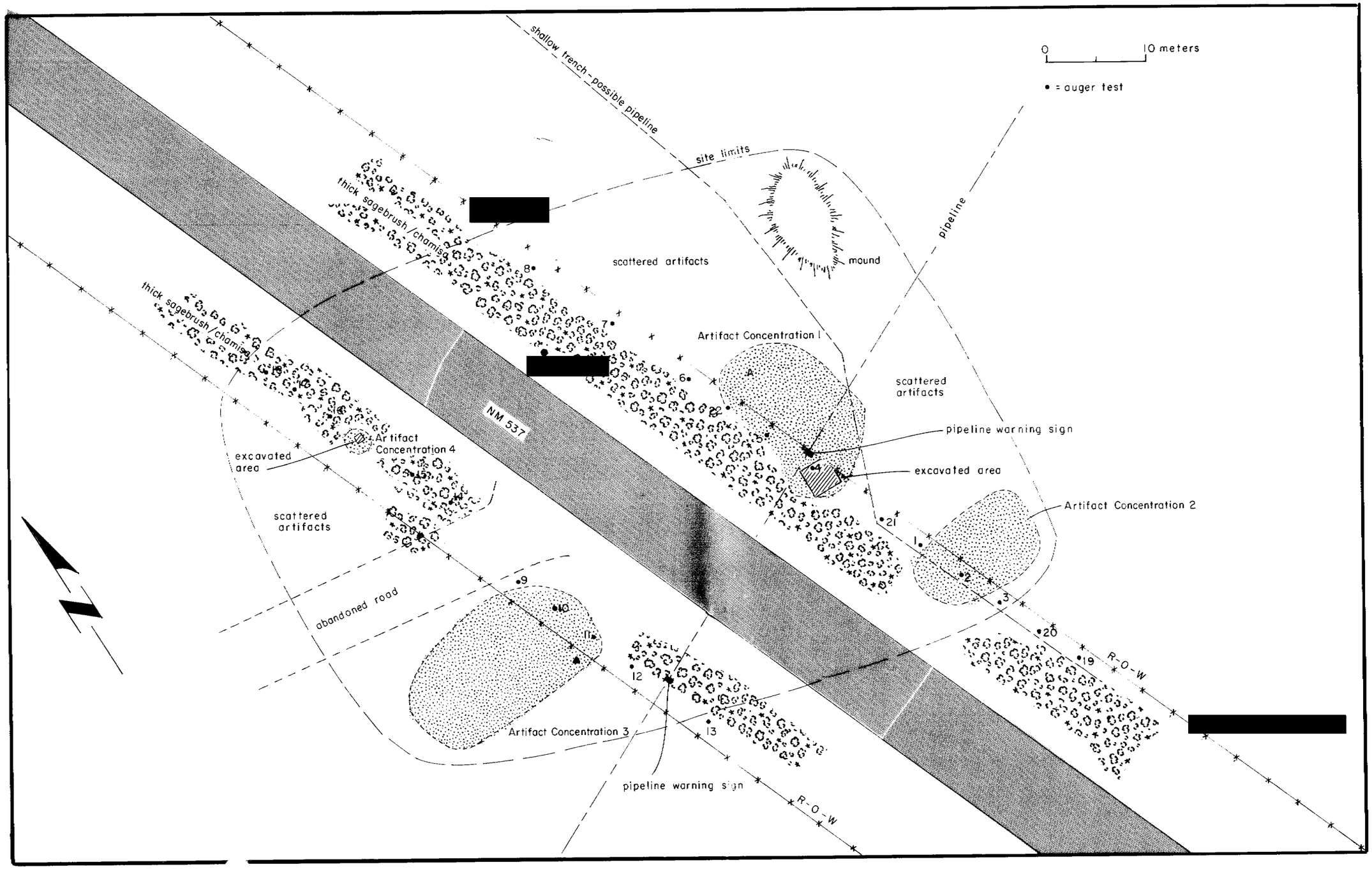

Figure 6. Site map, LA 81219.

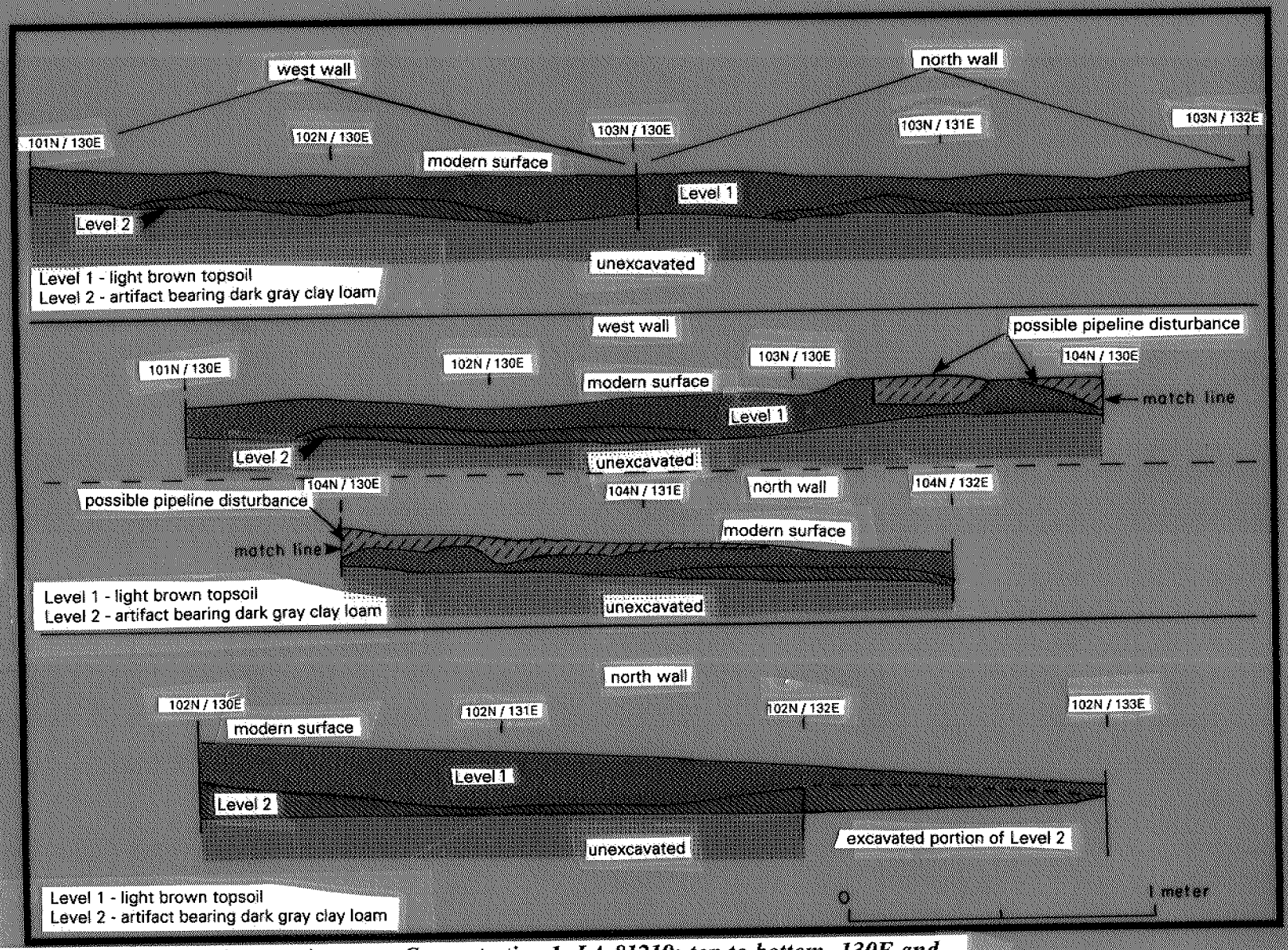

Figure 7. Profiles of excavation area, Concentration 1, LA 81219: top to bottom, 130E and 103N grid lines; 130E and 104N grid lines; and 102N grid line, showing the slope of the artifact-bearing stratum relative to the modern ground surface.

Table 2. Test pit information, LA 81219

Concentration	Grid Unit	Level	Thickness (cm)	Cultural Material
1	101N/130E	1	10-13	21 sherds, 4 lithics
	101N/131E	1	2-10	35 sherds, 10 lithics, charcoal
	101N/132E	0	0	2 sherds, 1 lithic, 1 bone
		1	5.5-10	3 sherds, 3 lithics
		2	6.5-10	-
		auger test	71	charcoal at 0-22 cm below bottom of Level 2
	102N/130E	1	8-14	22 sherds, 1 lithic, 1 bone
	102N/131E	1	1-6	3 sherds, 1 lithic
		2	3-7	27 sherds, 1 lithic, 1 bone, 3 possible ground stone fragments
	102N/132E	0	0	2 sherds
		1	4-10	4 sherds, 1 lithic
		2	4-10	12 sherds, 3 burned sandstone fragments
	103N/130E	1	6-13	9 sherds, 3 lithics, 1 wood fragment
	103N/131E	1	9-11.5	6 sherds, 1 lithic
		auger test	67	-
4	131N/96E	1	9-10.5	6 sherds, 1 lithic
		2	8-10.5	-
		auger test	1.10 m	-

In unit 102N/131E, excavation suggested that a surface was present. This impression came from the presence, at approximately the same depth across the unit, of a group of sherds and small rocks (Fig. 8). The sherds included a broken vessel rim and several body sherds, all perhaps from the same vessel. Consequently, the grid units surrounding 102N/131E were excavated to determine the horizontal extent of the "surface" and search for associated features. Excavation west of 102N/131E suggested that the top of the artifact-bearing stratum was slightly basin-shaped (Fig. 7), with the west half of unit 102N/131E in the approximate center. This may explain the distribution of artifacts on top of the stratum in unit 102N/131E (Fig. 8), which may have washed or settled into the center of the shallow depression. Excavation north, south, and west of unit 102N/131E, however, showed that artifacts, burned rock, burned bone, and charcoal were present throughout the thin stratum, negating the possibility that its top was a cultural surface.

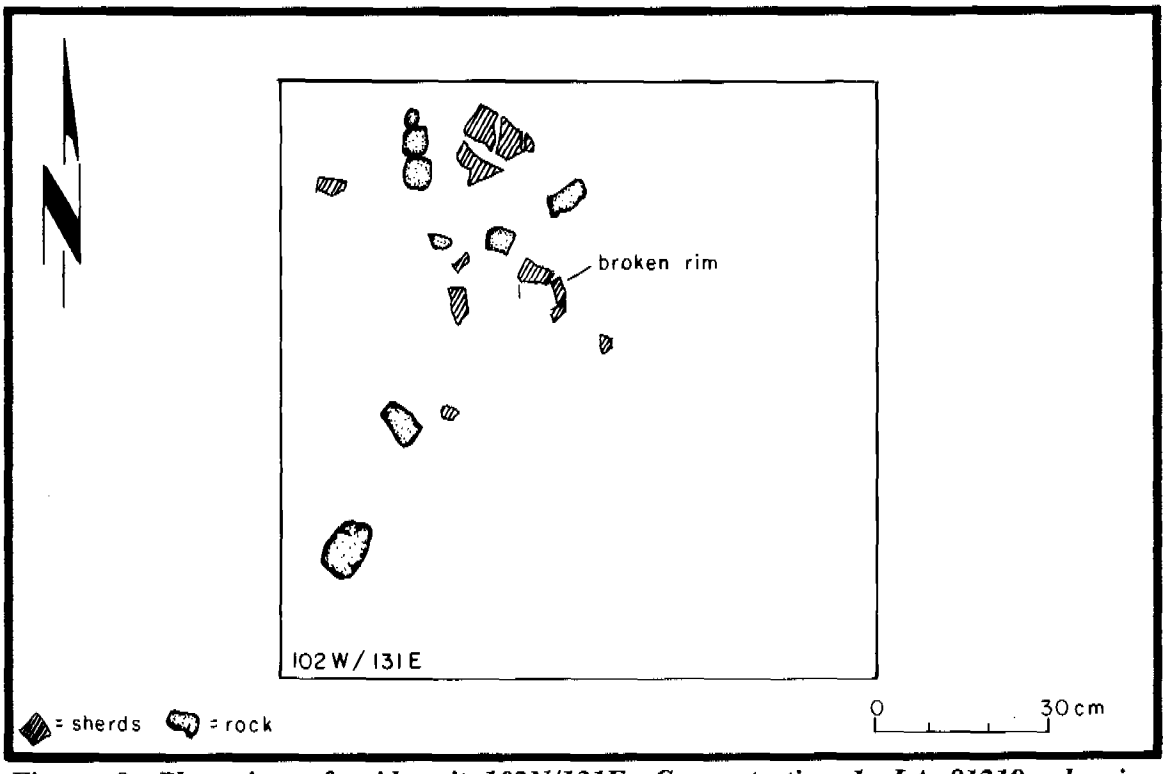

Figure 8. Plan view of grid unit 102N/131E, Concentration 1, LA 81219, showing distribution of sherds and rocks on and embedded in the artifact-bearing stratum.

Figure 9 shows the number of artifacts recovered from the eight excavation units. It suggests that the highest artifact density was in the center of the excavation area, which was also, at least in unit 102N/131E, the center of the shallow depression in the cultural stratum. This situation, combined with the laminar structure of the loamy clay comprising the matrix of the stratum, suggests that the stratum represents artifact redeposition in an alluvial context or by alluvial processes. To check this, Figure 9 also shows the number and percent of different artifact types collected from each unit. Distribution of sherds mirrors the overall distribution shown in this figure. Most sherds came from the two grid units that may have been at the bottom of the shallow depression. On the other hand, the chipped stone artifacts came primarily from the south side of the excavation area. Still, most came from unit 101N/131E. Bone fragments are too few to provide a significant picture of their distribution. Nonetheless, most came from units 102N/130E and 102N/131E. Since units 101N/131E and 102N/131E yielded significant numbers of artifacts of each type, there does not seem to be a real differential distribution of artifact types from the excavation area. This lends some support to the possibility that the artifacts found in the clay stratum were redistributed. It does not, however, explain why the artifacts and the stratum are associated with Concentration 1.

Auger tests west of the excavation area suggest that the artifact-bearing stratum is much less well defined 2 m west of the 130E grid line (Table 3). This may indicate that the stratum

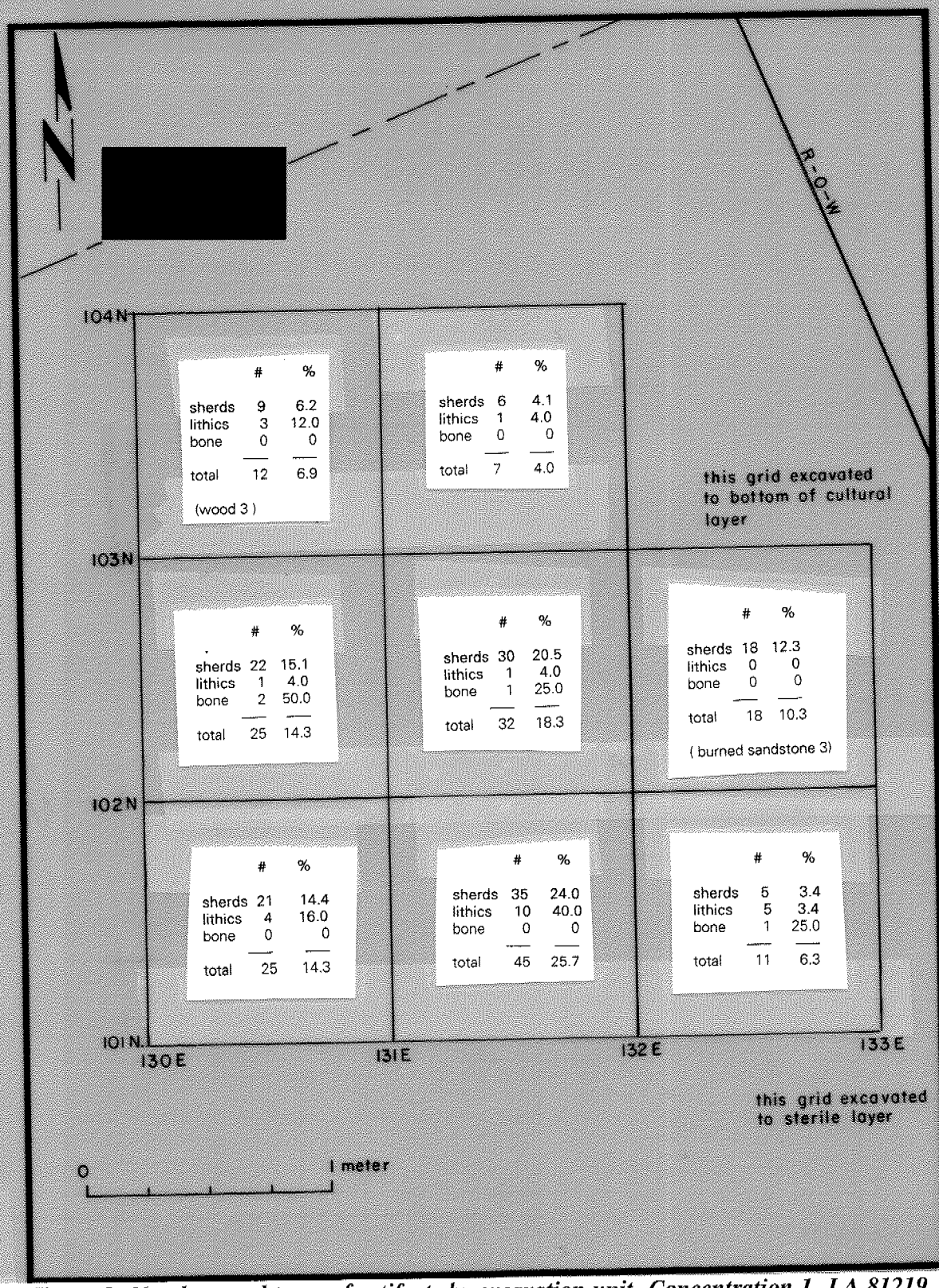

Figure 9. Numbers and types of artifacts by excavation unit, Concentration 1, LA 81219.

extends little more than 2 m west of the excavation area. Auger tests also show that, while subsurface charcoal was found 5 m north of the excavation, the cultural stratum was not clearly present, and charcoal was not present 10 m north of the excavation area (Table 3). Similarly, neither the cultural stratum nor charcoal was found in an auger test 5 m south of the excavation area (Table 3).

A single 1 by 1 m grid unit was excavated in Concentration 4 (Fig. 6). Table 2 shows that it yielded seven artifacts in the first level. Level 2 was culturally sterile. An auger test in the grid unit revealed a sequence of culturally sterile alluvial sands and clays beneath the excavated area.

Table 3 lists the auger tests conducted at LA 81219. It shows that, with the exception of auger tests in Concentration 1, no subsurface cultural material was encountered. Combined with the excavation data, this information indicates that Concentration 1 is not merely surficial, nor is it composed only of an artifact scatter. Although their nature was not clearly defined, both excavations and auger tests show the presence of subsurface deposits and possible features within the limits of Concentration 1. No evidence of cultural deposits or features was found in or around the other artifact concentrations.

Table 3. Auger test information, LA 81219

Concentration	Auger Test No.	Depth	Cultural Material	Comments
East Side of Highway				
1	102N/128E	95 cm	charcoal at 15 cm	Cultural stratum not as hard or dark as in auger tests at 129E and 130E. Charcoal also less abundant.
	102N/129E	1.10 m	charcoal at 11 cm	-
	102N/130E	90 cm	charcoal at 12 cm	-
	5	78 cm	charcoal at 22 cm	-
2	2 (86N/138E)	1.07 m	-	Unlike Auger Tests 1 and 3, on either side of Concentration 2, the soil does not become too loose to remain in the auger bucket at 65-67 cm below surface.
	1	66 cm	-	Soil too loose to remain in auger bucket at 65 cm below surface.
	3	65 cm	-	Soil too loose to remain in auger bucket at 67 cm below surface.
	6	1.02 m	-	
	7	84 cm	-	
	8	1.10 m	-	

Concentration	Auger Test No.	Depth	Cultural Material	Comments
	19	85 cm	-	
	20	95 cm	-	
	21	90 cm	-	
	22	1.10 m	-	
West Side of Highway				
3	10	60 cm	-	
	11	78 cm	-	
	9	74 cm	-	
	12	60 cm	-	
	13	77 cm	-	
	14	67 cm	-	
	15	68 cm	-	
	16	80 cm	-	
	17	80 cm	-	
	18	90 cm	-	

Analysis of Cultural Materials

Ceramic artifacts from LA 81219 are discussed by Wilson in a separate section, below. Other materials collected from the site are discussed in this section.

Dating the Site

Artifact Cross-Dating. As discussed by Wilson, below, the sherds in the ceramic assemblage suggest that the site dates to the Rosa phase (ca. A.D. 700-850) of the region's Anasazi occupation.

Chronometric Dates. Although charcoal was collected for radiocarbon dating, the sample proved too small. No chronometric dates are available.

Chipped Stone Artifacts

Fifteen chipped stone artifacts were recovered from excavations at LA 81219. Table 4 lists them by artifact morphology and material type. The most common artifacts are angular

debris and core flakes, pointing to expedient core flake manufacture technology. A single, multidirectional chert core was collected. The only chipped stone tool collected is a possible drill made of chert (Fig. 10). It is classified as a late-stage biface.

Undifferentiated chert is the most common material, comprising 80 percent of the small assemblage. Three other materials, chalcedony, quartzite, and Jemez obsidian, are represented by one core flake each. None of these materials are available on-site. Table 5 shows chipped stone material by dorsal cortex percent and type. Most (67 percent) of the artifacts are noncortical; three artifacts have waterworn cortex, and two have nonwaterworn cortex. The paucity of cortical artifacts suggests that previously reduced cores were brought to the site. Artifacts with waterworn cortex came from cores probably collected from secondary gravel contexts. Only the two chert flakes with nonwaterworn cortex could have come from cores collected from quarry deposits. The locations of such deposits are not known.

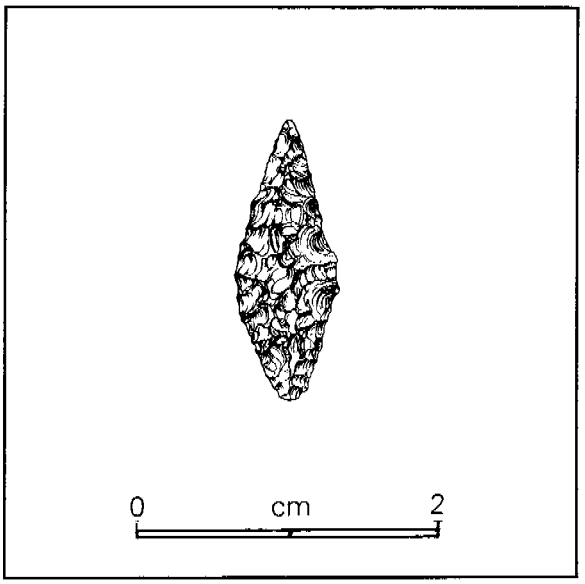

Figure 10. Chert drill, LA 81219

Table 4. Chipped stone artifact morphology by material type, LA 81219 (numbers in each cell are actual count)

Artifact Morphology	Material Type				Total
	Chert, Undifferentiated	Chalcedony	Quartzite, Undifferentiated	Jemez Obsidian	
Angular debris	7	-	-	-	7
Core flake	3	1	1	1	6
Multidirectional core	1	-	-	-	1
Drill	1	-	-	-	1
Total	12	1	1	1	15

Table 5. Chipped stone material type by cortex percent and type, LA 81219 (numbers in each cell are actual count)

Material Type	Dorsal Cortex Percent						Cortex Type		
	0	20	50	90	100	Total	Waterworn	Nonwaterworn	Total
Chert, undifferentiated	8	1	1	1	1	12	2	2	4
Chalcedony	1	-	-	-	-	1	-	-	-
Quartzite, undifferentiated	1	-	-	-	-	1	1	-	1
Jemez obsidian	1	-	-	-	-	1	-	-	-
Total	11	1	1	1	1	15	3	2	5

The dominance of a single material type may suggest relatively less settlement mobility and, perhaps, relatively less interregional material exchange than would be expected of hunter-gatherers. This is in keeping with the perceived relative sedentism of Anasazi villagers and is perhaps supported by the dominance, in the ceramic assemblage, of a brown-paste utility ware that may have been locally produced. Although the source of the chert observed in the assemblage is not known, it may have been local.

Faunal Remains

Four small bone fragments were collected from LA 81219: three small-mammal long-bone diaphysis fragments and one broken left tibia from an immature desert cottontail (*Sylvilagus audonbonii*). All four bone fragments are burned.

LA 81220

LA 81220 is a large site measuring 135 m north-south by 55 m east-west (7,425 sq m). With the exception of two sherds on the west side of the highway, the site was found on the east side of NM 537 between [redacted]. Discounting the two sherds on the west side of the highway, the site was about 30 m wide (4,050 sq m), of which a strip 130 m long by 8 m wide (1,040 sq m) is within NMSHTD project limits. This strip comprises 25.7 percent of the site area.

One artifact concentration was recorded at LA 81220. Located outside project limits, the concentration is 13 m north-south by 3 m east-west and consists of nine plain gray sherds. Two circular depressions were recorded at the site. Depression 1, in the approximate center of the site, is 8 m in diameter and 20 cm deep. About 1 m of the depression extends into NMSHTD project limits. Depression 2, near the northern end of the site, is also 8 m in diameter and about 18 cm deep. About 2.5 m of the depression extends into project limits.

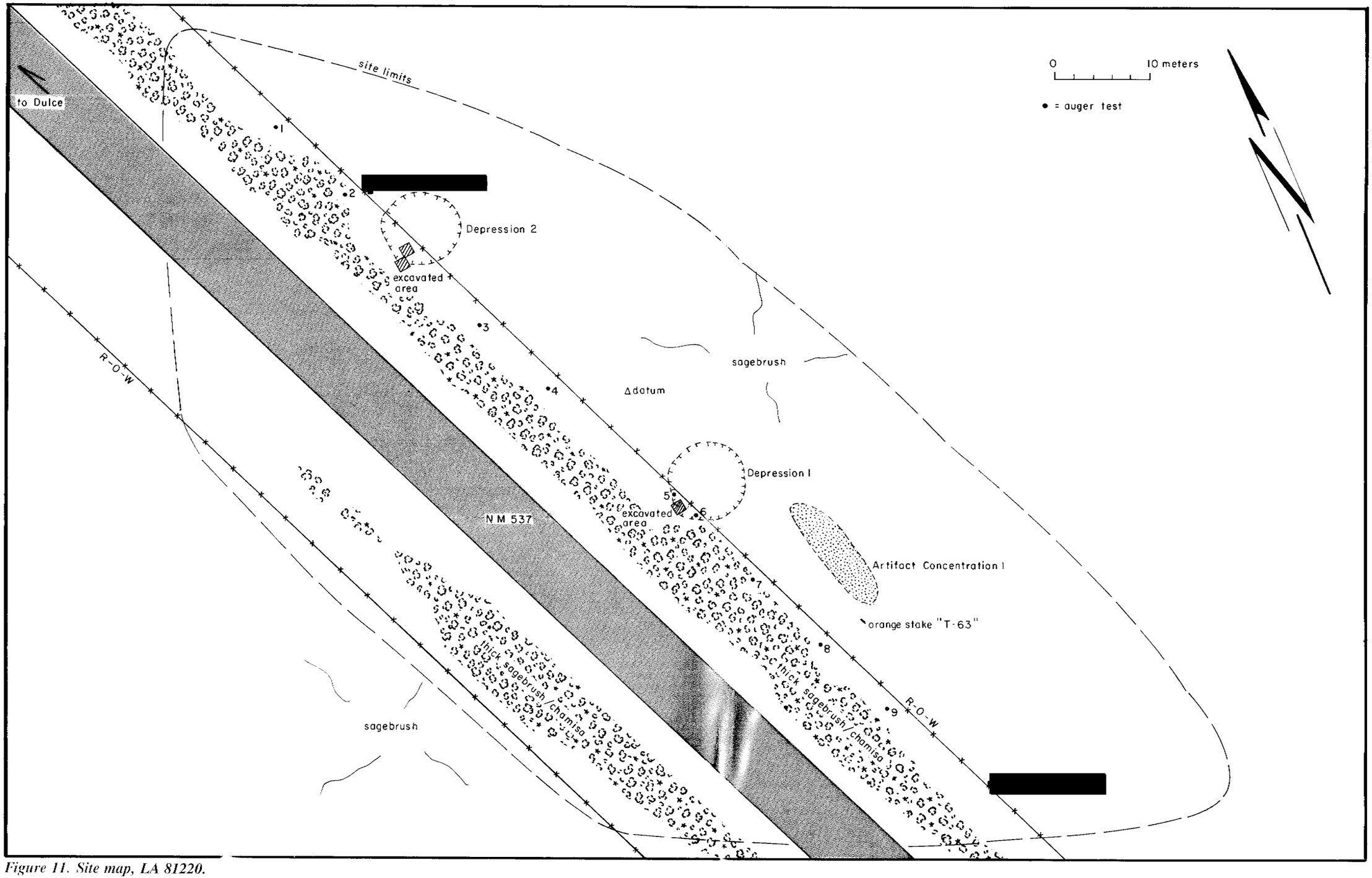

Figure 11. Site map, LA 81220.

Because the depressions may have represented pithouse locations, they were selected for test excavations. Table 6 lists the excavated 1 by 1 m grid units at each depression. A single 1 by 1 m unit was excavated at Depression 1. No cultural material was recovered, and no evidence of architectural remains was encountered. Excavation stopped in very hard clay at the bottom of Level 2. However, an auger hole in the unit revealed charcoal flecks at 71 cm below the bottom of Level 2. Table 7 lists the auger tests conducted at LA 81220. Sherds were recovered from an auger test 0.5 m east of the excavation unit, and charcoal was consistently found at 1.4 m below ground surface in auger tests 1, 2 and 4 m east of the excavation unit within the depression. The fact that Auger Tests 5 and 6 did not reveal subsurface charcoal may indicate that the western side of the depression was inaccurately defined.

Table 6. Test pit information, LA 81220

Depression	Grid Unit	Level	Thickness	Cultural Material
1	86N/99E	0	0	-
		1	10-16 cm	-
		2	9-13 cm	-
		auger test	1.80 m	flecks of charcoal at 71 cm below Level 2
2	122N/84E	0	0	-
		1	5-10 cm	-
		2	9-10 cm	2 sherds
		3	10-13 cm	-
		4	6-9.5 cm	-
		auger test	1.85 m	flecks of charcoal at 1.2 m below level 4 (1.6 m below ground surface); charcoal and gray soil at 1.4 m below level 4 (1.8 m below ground surface); charcoal not present below 1.45 m below Level 4
	123N/85E	0	0	-
		1	10-16 cm	-
		2	7-11 cm	-
		auger test	1.58 m	-

Two 1 by 1 m units were excavated on the west side of Depression 2. Table 6 shows that two sherds were recovered from Level 2 in unit 122N/84E and that charcoal and gray soil were found 1.4 m below the bottom of Level 4 (1.8 m below ground surface). No cultural material was found in unit 123N/85E. Table 7 shows that subsurface charcoal was encountered in two auger tests 1 and 7 m east of unit 123N/85E.

The auger test results from Depressions 1 and 2 can be compared with the results of

Auger Tests 1 through 4 and 7 through 9, located between and beyond the depressions. Table 7 shows that no subsurface charcoal or other material was recovered from those seven auger tests. This strongly suggests that Depressions 1 and 2 are cultural features, possibly the remains of pithouses.

Analysis of Cultural Materials

Ceramic artifacts from LA 81220 are discussed by Wilson, below. Other materials collected from the site are discussed in this section.

Dating the Site

Artifact Cross-Dating. As discussed by Wilson, below, the sherds in the ceramic assemblage suggest that the site dates to the Rosa phase (ca. A.D. 700-850) of the region's Anasazi occupation.

Chronometric Dates. A sample of juniper charcoal was collected from 1.4 to 1.43 m below modern ground surface in Auger Test 86N/101E in Depression 1. It was submitted for radiocarbon dating (Beta-65876). The sample yielded a 1-sigma adjusted date of A.D. 510 $\pm$ 110 (A.D. 400-620) and a calibrated date of A.D. 651 (1-sigma calibrated range: A.D. 552-670). These dates fall within the Sambrito phase (A.D. 400-700). Because the charcoal was juniper and because its depositional context is unknown, the sample is likely to predate the associated cultural activity by up to several centuries (Smiley 1985). Therefore, the radiocarbon date obtained from Depression 1 does not dispute the age of the site as suggested by ceramic sherds.

Chipped Stone Artifacts

A single undifferentiated chert core flake was collected from LA 81220. It was noncortical and had no platform.

Table 7. Auger test information, LA 81220

Depression	Auger Test No.	Depth	Cultural Material	Comments
1	86N/100.5E	1.80 m	2 sherds between 70 and 80 cm below surface	soil is a series of alluvial clay and sand strata
	86N/101E	1.50 m	wood and charcoal at 1.4 m, continuing to 1.5 m	alluvial clay from 45 to 86 cm, sandy clay from 86 to 140 cm; stopped by rock at 1.50, still getting charcoal; C-14 sample collected
	86N/102E	1.85 m	possible charcoal at 1.4 m	alluvial clay from 10 to 94 cm; sandy clay from 94 cm to 1.45 m; compact sandy clay from 1.45 to 1.55 m; fine, loose sand from 1.55 to 1.85 m
	86N/104E	1.85 m	charcoal flecks at 75 cm; charcoal flecks between 1.4 and 1.7 m.	alluvial clay from 16 cm to 1.0 m, sandy clay from 1.0 to 1.4 m, clayey sand from 1.4 to 1.85 m; small piece of red clay (?) found on auger tooth at 1.85 m, couldn't be picked up again
	87N/100E	1.80 m	-	
	5	1.88 m	-	
	6	32 cm	-	stopped by root
2	124N/87E	1.80 m	flecks of charcoal below 80 cm.	alluvial clays from 35 cm to 1.34 m, sandy clay from 1.34 to 1.80 m; wood or root fragments between 1.34 and 1.52 m
	124N/89E	1.84 m	-	alluvial clays from 33 cm to 1.36 m, sandy clay below 1.36 m
	124N/91E	1.80 m	-	alluvial clays from 22 cm to 1.36 m, sandy clay below 1.36 m
	124N/93E	1.80 m	flecks of charcoal at 98 cm, not present by 1.3 m.	alluvial clays from 23 cm to 1.53 m, sandy clay below 1.53 m
	1	1.86 m	-	series of alluvial clays and sands
	2	1.85 m	-	series of alluvial clays and sands
	3	1.85 m	-	series of alluvial clays and sands
	4	1.85 m	-	series of alluvial clays and sands
	7	1.83 m	-	no clays, only sands
	8	1.80 m	-	no clays, only sands
	9	1.90 m	-	no clays, only sands

CERAMIC ANALYSIS, LA 81219 AND LA 81220

by C. Dean Wilson

The ceramic analysis was designed to characterize the ceramic assemblage, determine cultural affiliation, date the sites, and record vessel function. In order to accomplish these goals, information concerning context of recovery, descriptive attributes, typological classification, counts, and weights was recorded for each sherd.

Description of Attributes

Various ceramic typological categories and attributes are the basis for the description and characterization of ceramic assemblages from each context. Attributes recorded include tempering material, pigment type, interior and exterior manipulation, slip, firing atmosphere, vitrification, vessel form, vessel appendage, and postfiring modifications. In addition, refired color was recorded for a sample of sherds.

Tempering Material

Temper categories were identified by examining freshly broken sherd surfaces through a binocular microscope. Broad temper categories were recorded based on combinations of temper particle color, shape, fracture, and reflectivity. The majority of sherds were tempered with a leucocratic igneous rock. This category was identified by the presence of white to clear angular fragments and is similar to material previously described as crushed quartzite (Wilson and Blinman 1991). Dark particles and distinct crystals were very rare to absent. The other igneous temper recognized consists of a mesocratic igneous rock, including crushed andesites and diorites. This category was identified by the presence of angular to subangular particles that are clear to milky white. Black crystals are often rod shaped and usually occur in smaller amounts either alone or within larger particles. Rounded or subrounded, white-to-translucent, well-sorted sand grains were also observed.

Paint Pigment

Pigment categories were recognized based on sherd surface characteristics and recorded for interior and exterior surfaces. Mineral pigment refers to the use of ground minerals including iron oxides. Mineral pigments rest on the vessel surface, obscure surface irregularities, and exhibit visible relief. Organic pigment refers to the use of vegetal pigments. Organic pigments soak into rather than being deposited on the vessel surface, and surface irregularities, streaks, and polish are visible through the paint.

Surface Manipulation

Surface manipulations refer to surface treatments and textures. They were noted for interior and exterior surfaces. Manipulations recognized during this study include the following: (1) plain unpolished: surfaces that are smoothed and obliterated, but not polished; (2) striations: distinct striations on a smoothed surface resulting from smoothing technique; (3) coiled: a series of thin rounded unobliterated coils, usually concentrated along the neck of jars; (4) basket impressed: basket impressions that indicate that the still wet, unfired vessel was formed within or pressed against a basket.

Paste Color

The color of a sherd cross section provides information about clay sources and firing conditions. Red or buff profiles indicate strong oxidation atmospheres, black or dark gray profiles result from reduction atmospheres, and light gray and white may indicate low oxidation or neutral atmospheres. Paste color of sherd profiles recorded include black, gray to white, and brown to red.

Vitrification

Vitrification refers to a shiny or glassy appearance of the paste. Vitrification results from the partial melting of the clay and helps to indicate firing temperature and the concentration of fluxes within the paste. Categories recorded include not vitrified, slightly vitrified, and moderately vitrified.

Vessel Form

Vessel-form categories were assigned to sherds based on the observed shape of each sherd. Bowl sherds may be recognized based on shape or polish. Bowl rim sherds are identified by inward slope from the rim. Bowl body sherds were recognized by the presence of paint or polishing on the interior surface. *Jar body* refers to unpolished gray body sherds that could not be placed into more specific categories. *Jar neck* refers to nonrim sherds with a slope indicating they were derived from the neck of a jar. *Cooking/storage jar rim* refers to forms with relatively wide rim diameters that could have been utilized for cooking or storage.

Refired Paste Color

A sample of 20 sherds was refired in controlled oxidation conditions to compare their pastes. Refiring small clips taken from sherds provides a very rough comparison of clay sources and ceramic pastes based on the influence of mineral impurities, particularly iron, on paste color. Sherds were assigned to color groups using the Munsell soil color chart.

Typological Classification

All sherds were assigned to typological categories based on combinations of attributes. Sherds were first placed into a spatially distinct ceramic tradition based on temper, paint, and technological characteristics. Ware categories were assigned based on surface manipulation and form. Sherds were then assigned to a specific type using temporally sensitive surface manipulation and design styles. During this analysis, all sherds were assigned to one of three distinctive ware groups: brown paste utility wares, gray wares, or white wares.

A total of 161 sherds was recovered during investigations at LA 81219 and LA 81220. One hundred fifty were from LA 81219, and eleven were from LA 81220. The following discussion summarizes the results of analysis of these sherds.

Gray-Brown Paste Group (Rosa Brown?)

The great majority of sherds from LA 81219 (92 percent) and LA 81220 (81.8 percent) exhibit a distinct combination of paste, temper, and surface characteristics (Table 8). Ceramics belonging to this group are easily distinguishable from other groups by their brown-gray to brown to reddish surface color. Paste profiles are usually black, dark gray, dark brown, or reddish. Cores are usually absent. Clips taken from selected samples consistently refired to similar red colors when exposed to standardized oxidation conditions. This combination of characteristics indicates that vessels belonging to this paste group were fired in low oxidation (neutral) atmospheres similar to those utilized in firing gray and white ware vessels. Pastes were silty in appearance. A slight degree of vitrification is usually evident. Sherds were relatively soft and friable. The softness of these sherds appears to be the result of low-quality (possibly alluvial) clays rather than low temperature firings. All sherds assigned to this group were tempered with leucocratic igneous rock (Table 9). In addition, most sherds contain numerous micaceous inclusions, which are often visible on the surfaces. Vessel-wall thickness is variable, although most sherds are relatively thick. All sherds belonging to this paste group are from jars (93.2 percent from jar bodies, 6.1 percent from jar necks, and 0.7 percent from cooking jar rims) (Table 10). Variation of form and paste indicate that several vessels are represented by sherds assigned to this paste group.

All sherds belonging to this group are unpolished and sometimes exhibit faint striations on the surfaces. Most sherds exhibit plain obliterated treatments on both surfaces and were classified as plain body sherds. A few sherds exhibit distinctive textured decorations on the exterior surface including exposed coils and basket impressions (Table 8). These treatments form the basis for the recognition of distinctive type categories. While sherds assigned to the brown-paste group exhibit some characteristics similar to several types defined for the Gobernador and Largo-Gallina regions, the combination of attributes noted in these sherds is distinct from any I have seen. These sherds exhibit pastes and forms characteristic of Sambrito Utility, the earliest northern Anasazi ceramic type in the region (Wilson and Blinman 1993). They differ from existing descriptions of Sambrito Utility in the lack of polishing, the presence

of crushed igneous rather than sand temper, and the presence of examples with textured treatments

Table 8. Ceramic type by site

Ceramic Type	Comparative Site Summary				Total	
	LA 81219		LA 81220		Count	Percent
	Count	Percent	Count	Percent		
Mesa Verde gray body	1	0.7			1	0.6
Chapin Black-on-white	1	0.7			1	0.6
Basketmaker III/Pueblo I white	7	4.7	2	18.2	9	5.6
Brown paste body	128	85.3	9	81.8	137	85.1
Gray body	3	2.0			3	1.9
Basket-impressed	9	6.0			9	5.6
Coiled gray	1	0.7			1	0.6
Total	150	100.0	11	100.0	161	100.0

There are also similarities between the brown-paste sherds and Dinetah Gray, a type dating to the early Navajo occupation (Wilson and Blinman 1993; Brugge 1963). Similarities include soft surfaces, paste colors, and forms. Differences include sherds thickness and different surface textures.

Brown-paste sherds from LA 81219 and LA 81220 also closely resemble sherds previously classified as Rosa Brown, a type dating mainly to the Rosa phase. Rosa Brown was first used to describe a subset of Rosa Gray whose vessels fired to brown colors, apparently reflecting the use of high iron clays (Hall 1944; Peckham 1963). Rosa Brown sherds are tempered with a leucocratic igneous rock identical to that noted during this study. Early descriptions of Rosa Brown include some sherds exhibiting surface textures and basket-impressions that appear to be identical to the brown-paste pottery described here. Later descriptions of Rosa Brown seem to be limited to the use of self-tempered clays in the production of figurines and miniatures (Eddy 1966; Wilson and Blinman 1993). This is distinct from the pottery described during this study. Thus, the brown-paste pottery from LA 81219 and LA 81220 is identical to early descriptions of Rosa Brown. This type appears to be identical to Rosa Gray, with the exception of the use of high-iron clay firing to brownish colors even when exposed to neutral atmospheres utilized during the firing of Anasazi pottery. While most Rosa-phase sites are dominated by Rosa Gray sherds exhibiting lighter colored surfaces and pastes, the dominance of brown-paste ceramics at LA 81219 and LA 81220 indicates that this paste group may reflect the use of distinct clay resources. Nonsystematic

clay sampling in the Dulce area has identified several sources of silty, iron-rich clay derived from poorly indurated shale; no sources of low-iron clay in the same region have been identified to date (Eric Blinman, pers. comm., 1994). During the present study, therefore, the brown-paste group is considered to be a variety of Rosa Gray produced in the Dulce area.

Gray Wares

Four utility ware sherds are similar to the brown-paste utility sherds except that they exhibit gray pastes and white to gray surface colors (Table 8). These sherds refire to pink colors when exposed to a oxidation atmosphere, indicating the use of clays lower in iron content than the brown-paste group. They appear to be slighter harder than those assigned to the brown-paste group. It is possible that some of the sherds classified here as gray wares may be unpainted portions of white ware vessels. Temper distributions are also different: two sherds contain crushed mesocratic igneous rock, one sherd is tempered with crushed leucocratic igneous rock, and the fourth sherd is tempered with sand (Table 9). The presence of tempering material different from that found in the presumably local brown-paste utility wares may indicate that gray wares were not produced locally.

Table 9. Ceramic temper by site and ware

Temper by Site	Ware						Total	
	Gray-Brown Ware		Gray Ware		White Ware		Count	Percent
	Count	Percent	Count	Percent	Count	Percent		
LA 81219								
Mesocratic igneous			2	50.0	8	80.0	10	6.2
Sand			1	25.0			1	0.6
Leucocratic igneous	138	93.9	1	25.0			139	86.3
LA 81220								
Mesocratic igneous					2	20.0	2	1.2
Leucocratic igneous	9	6.1					9	5.6
Total	147	100.0	4	100.0	10	100.0	161	100.0

White Wares

Sherds exhibiting painted decorations on either vessel surface were classified as white wares. It was not possible to differentiate unpainted white ware and gray ware sherds. Eight white ware sherds were identified from LA 81219; two were identified from LA 81220 (Table

8). White ware sherds consistently exhibit white to gray pastes and light-colored surfaces. These sherds refired to buff or pink colors in oxidation conditions. Surfaces are unpolished or slightly polished and are fairly hard. The vessels appear to have been well fired. Most white ware sherds exhibited decorations executed in organic paint, although a single sherd was decorated with mineral pigment. Given the small size of these sherds, it was difficult to assign them to specific types. Thin parallel lines and dots were represented on nine sherds. The lack of surface polish and the style of painted designs indicate that these sherds represent early types. Most were classified as Basketmaker III/Pueblo I white wares (Table 8), similar to early ceramics from Rosa-phase sites (Hall 1944; Peckham 1963). A single sherd exhibits a Basketmaker III design and was classified as Chapin Black-on-white. All white ware sherds were tempered with mesocratic igneous rock (Table 9), unlike that noted in the brown-paste group, and similar to that noted in Mesa Verde tradition types (Abel 1955; Wilson and Blinman 1993). This indicates that white wares were not produced locally at these sites.

Table 10. Ceramic vessel form by site and ware

Vessel Form by Site	Ware						Total	
	Gray-Brown Ware		Gray Ware		White Ware		Count	Percent
	Count	Percent	Count	Percent	Count	Percent		
LA 81219								
Bowl body			1	25.0	7	70.0	8	5.0
Bowl rim					1	10.0	1	0.6
Jar body	128	87.1	3	75.0			131	81.4
Cooking jar	1	0.7					1	0.6
Jar neck	9	6.1					9	5.6
LA 81220								
Bowl body					2	20.0	2	1.2
Jar body	9	6.1					9	5.6
Total	147	100.0	4	100.0	10	100.0	161	100.0

Ceramic Dating

Determining the age of the small assemblages, which are dominated by plain utility wares, presents a challenge, since three distinct occupations in the general Dulce area are dominated by plain utility wares: the Rosa phase, the Gallina phase, and early Navajo (Dinetah and Gobernador) phases. Ceramic distributions from LA 81219 and LA 81220 indicate they date to the Rosa phase (ca. A.D. 700 to 850) (Eddy 1966; Hall 1944; Peckham 1963; Wilson and Blinman 1993), although evidence for the dating of LA 81220 sherds is weaker because of the very small number (11) of sherds recovered from this site. Both sites are dominated by

sherds exhibiting brown paste that appear to be similar to sherds from the Gobernador region described as Rosa Brown (Hall 1944; Peckham 1963). Sherds belonging to this paste group, exhibiting coiled and basket-impressed textures, were present at LA 81219. Similar textures occur on types associated with the Rosa phase. The manipulations and styles noted in white ware sherds from LA 81219 are similar to those noted in Basketmaker III and Pueblo I types. While temporally distinctive designs and surface textures are not represented by the few sherds from LA 81220, the general treatment of these sherds is similar enough to those from LA 81219 to suggest they are contemporaneous. Thus, it is probable that both these sites date to the Pueblo I period, Rosa phase.

Associated Patterns

Distributions from these assemblages permit limited interpretations on production, exchange, and vessel use. Brown-paste utility wares dominate these assemblages and probably reflect the use of local resources found in the Dulce area. Gray and white wares are present in low frequencies and generally contain distinctive pastes and tempering material. These differences indicate that gray wares and white wares were not locally produced at these sites and probably resulted from exchange with neighboring area. Areal specialization of white wares appears to have been surprisingly high during the Basketmaker III period (Blinman and Wilson 1992). Such specialization may have resulted from the limited distribution of high quality, low-iron clays from which light-colored, hard vessels could be produced.

Most sherds from these sites derived from utility wares and jar forms. A few sherds were derived from decorated bowls, indicating the range of activities associated within domestic assemblages.

RECOMMENDATIONS

Given the nature and extent of archaeological test excavations at LA 81219 and LA 81220, we feel that the goals of testing specified in the testing design have been met. Testing at LA 81219 revealed the presence of a clay stratum containing sherds, chipped stone artifacts, burned bone, and burned sandstone fragments. Although the stratum appears not to be cultural in origin, it is the only artifact-bearing deposit encountered during testing. Further, it is clearly associated, at least spatially, with the artifact concentration containing the greatest number of surface artifacts found on the site. As such, the stratum has potential to provide information regarding on-site activities and site structure. Test excavations did not reveal the presence of other cultural deposits, features, or surfaces associated with the stratum or any of the other artifact concentrations. Our recommendation is that the area in which the stratum has been defined be avoided during highway construction activities.

Testing at LA 81220 revealed subsurface artifacts and charcoal within the two large depressions. Although test excavations did not encounter architectural remains, it is likely that the depressions are cultural features, perhaps Anasazi Rosa phase pithouses. Test excavations did not reveal other cultural deposits, features, or surfaces associated with the depressions. We recommend that the two depressions be avoided during highway construction activities.

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