THE ABAJO DE LA CRUZ SITE (LA 10832)

AND LATE PREHISTORY IN NORTHERN OTERO COUNTY, NEW MEXICO

By

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For

Buddy (Ronald J.) and D. J. Scraggs

who have helped me in many, many ways.
Their friendship, generosity, and support have added immeasurably
to the quality of my life and the success of this project.

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Chapter 1

INTRODUCTION

In 1972 the New Mexico State Highway Department asked the Laboratory of Anthropology, Museum of New Mexico to conduct archaeological salvage excavations at several sites along U.S. Highway 70 in the vicinity of Bent, New Mexico (Figure 1). Bent is between the towns of Mescalero and Tularosa in north-central Otero county. The formal name for the project was the Bent Highway Salvage Project. The highway department project designation was F-021-1(13), 6.2 Miles East of Tularosa-East.

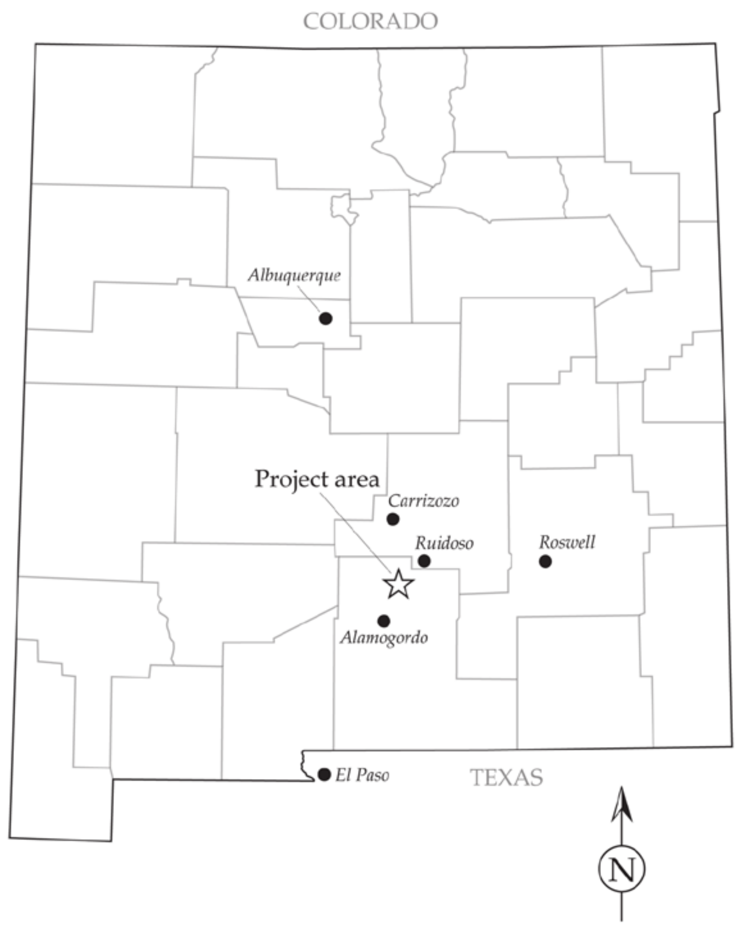

Figure 1. Project location in relation to modern towns.

The fieldwork took place between August 28 and December 7, 1972. Rather than poke holes in a number of sites, most of which had been severely disturbed by earlier versions of U.S. 70, the work focused on the two sites that would be most affected by the new construction. These sites were LA 10832, the subject of this report, and LA 10835 (reported in Wiseman 1991).

At the time, funding for highway salvage projects did not provide for full analysis and final reports. Instead, a short report was prepared on the basis of field observations and impressions and was submitted to the highway department to fulfill the museum's contractual obligations (Wiseman 1973). All of this changed in May 1975, but no monies were made available for earlier projects . Thus, analyses and reporting beyond the usual "quickies" relied on personal efforts, usually without compensation to the archaeologist, the authors of specialized analyses, or for dating.

I always intended to analyze the artifacts and write a suitable final report on the Bent project. However, prior to that step, I performed a survey of the area to be able to place the sites, especially LA 10832—the Abajo de la Cruz site or simply "Abajo"—in its local prehistoric context (Wiseman 1979).[1] The supplemental work was initially designed to be a sample survey based on transects perpendicular to the primary stream of the area, optimistically named the Rio Tularosa but locally known as Tuly Creek. The ends of the transects were placed at the tops of ridges and mountains because these are the local divides between drainages. Fortuitous acquisition of a set of scale maps from a land developer caused me to restrict the survey to the terraces along Tuly Creek and the lower reaches of its primary local tributary, Nogal Canyon. In other words, the transects were abandoned in favor of full coverage focused on settings where sites were likely, while avoiding steep slopes. The survey took place intermittently (on holidays and using personal leave time) through mid-October 1982. All prehistoric sites found during the survey were recorded and registered with the Archaeological Records Management Section (ARMS) of the Laboratory of Anthropology, Museum of New Mexico. Grab collections of surface artifacts were made and deposited with the Archaeological Research Collections of the same institution. A formal report on the survey will not be written because of the sensitive nature of site locations, but some of the data from that work will be included in this report to provide a context for Abajo de la Cruz.

As always seems to happen to well-intentioned archaeologists, a myriad of other projects intervened once the supplemental survey was completed. I began writing this report in the winter of 2012 and completed it in the summer of 2014. The manuscript was submitted for publication in April 2015.

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[1] The site name, Abajo de la Cruz, is Spanish for "Below the Cross." Nearby Round Mountain has a large Christian cross on its summit, probably originally placed there for Catholic rituals relating to Easter.

Chapter 2

NATURAL SETTING

Government Land Office Survey Notes

Early historical accounts of the Rio Tularosa and its environs provide interesting insights about farming along the valley bottom and other potential uses by humans. Here I present the Government Land Office (GLO) surveyor's accounts for three townships through which the Rio Tularosa passes. The GLO records are at the Bureau of Land Management State Office in Santa Fe.

The versions provided here include minor format changes, minimal editing for clarity (mostly addition of punctuation), and annotations [*italicized and in brackets*] to relate farms, ranches, and springs to modern names and places. From the descriptions given (especially of T 14 S, R 10 E), it appears that township lines have shifted since the surveys were done.

Township: 13 South 11 East
Landmarks: Village of Bent (see below)
Survey Dates: October–November 1883; July–August 1884
GLO Records: pp. 76–77

> The greater part of this Township is mountainous, covered with a dense growth of pinyon and cedar timber, the greater part of which is scrubby. There is some good pine in the N.E. part.
>
> The Rio Tularosa, a fine stream of water, runs through the southern part.
>
> The valley along the river is 1st rate land, the greater part of which is cultivated.
>
> Several Americans and Mexicans have farms in the township. The Township is made fractional on the North and East by the Mescalero Apache Indian Reservation.
>
> The soil outside the valleys is 3d rate, covered with a good growth of grass.
>
> There are some good copper indications in the S.E. 1/4 of the N.E. 1/4 of Sec. 26.

Township: 14 South 11 East
Landmarks: Round Mountain, LA 10832. A short stretch of the Rio Tularosa Valley extends through the northwest corner.
Survey Dates: October–November 1883
GLO Records: pp. 71–72

> The eastern and central parts of this Township are very rough and mountainous. Covered with a dense growth of pine, pinyon, and cedar timber, mostly scrubby, although there is some splendid merchantable pine.
>
> The western part of the Township is rolling and in places broken with a scrubby undergrowth of pinyon and cedar.
>
> There is a large cattle ranch in the north part of sec. 20 [*1 km west of Rancheria and Martinez springs*]. The grass throughout the township is generally very good.
>
> The soil is 3d rate. There is also a fine spring of water in the N.W. [*quarter*] N.W. [*quarter*] of Sec. 21 & a Mexican ranch in Sec. 5 [*immediately south of Rio Tularosa valley*].
>
> The ranch and spring of Mr. Loomis are situated in the SE1/4 of NW1/4 of Sec. 2 [*at Nogal Spring in Nogal Canyon*].

Township: 14 South 10 East.
Landmarks: lower stretch of the Rio Tularosa Valley, down to the village of Tularosa
Survey Dates: October 1866–June 1867
GLO Records: pp. 65–66.

> The surface of this Township is level in the west and southwest and broken in the east and northeast portions. In the northeast the rock is the “old red sandstone” of the geologist and the water is impregnated with salts. The Rio Tularosa runs in a southwesterly direction through this entire Township. There is a large amount of its water wasted by spreading over its bottom land for a considerable portion of its course, and, where this is the case, it has no natural channels [*this may be the result of the natural damming and alluviation that Warren (Chapter 3) detected through her analysis of the valley fill, especially as relates to the occurrence of caliche tubules*].
>
> Near where the Tularosa enters the plain it is taken from its channel and conveyed by means of acequias through the southwestern portion of this and into the adjoining Township for the purposes of irrigation.
>
> There is no timber in this Township, the people making use of the mesquite bush for firewood and bringing what little timber they use for building from the mountains to the east, a distance of from 15 to 20 miles.

The Plasa [*Plaza*] Tularosa which was laid out four years since contained about 600 inhabitants.

There is no mineral found in the Township. The land is only valuable agriculturally.

Topography

In Chapter 3, Helene Warren describes the local geology. The Abajo de la Cruz site is on a high terrace remnant on the south side of Tularosa creek (Figure 2). This location is just outside the mouth of Tularosa canyon, where it emerges from the mountains. The site elevation is 1700 m (5580 feet), with surrounding heights reaching 2200 m (7220 feet). The site is 15 m above the valley floor, where the site's occupants would have grown most if not all of their crops.

Figure 2. View of project area from top of Round Mountain, looking west. LA 10832 is located at the bend in Old Mescalero Road in the left center of photo; vehicles are parked at the site.

Climate

The area is characterized by warm summers and mild winters. The average annual precipitation at the site is about 430 mm (17 inches), with the normal growing season precipitation (May through September) between 255 and 280 mm (10 to 11 inches) (U.S. Weather Bureau 1967). Interpolating between the values for Mescalero (6 km east, elevation 2068 m, enclosed by mountains) and Tularosa (9 km southwest, elevation 1354 m, in the Tularosa basin), the average annual temperature is about 13.2 degrees C (55.7 degrees F). January lows average about 3.5 degrees C (38.3 degrees F), and July highs about 23.0 degrees C (73.5 degrees F)(raw data from Gabin and Lesperance 1977). The frost-free season averages about 190 days each year (Tuan et al. 1973). The effective temperature is about 13.7 degrees C (Cordell 1979, Map 2).

A factor that would have been important to farmers at Abajo de la Cruz is cold air drainage from the mountains and down the valley of the Tularosa during the winter and at night during the growing season. The resulting cold air probably shortened the frost-free season and slowed the maturation of crops during the growing season. The extent of this effect can only be determined by keeping temperature records at the site, which I have not done. Our experience in November 1972 was that the cold breeze from the canyon lasted until about 9 A.M., at which time the air from the basin took over, providing welcome warmth.

Soils

The arable soils of the valley bottom and of lower side slopes in the vicinity of Abajo de la Cruz belong to the Pena-Cale-Kerrick mapping unit. Pena-Aztec Variant soils surround the site (Derr 1981).

Pena soils of the Tularosa creek valley bottom are deep, well-drained, and formed in mixed alluvium. The typical pedon is as follows (Derr 1981:102–103):

> The A1 horizon (0–9 inches) is dark grayish brown to very dark grayish brown silty clay loam, depending on moisture content; “moderate fine and medium granular and weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common very fine tubular pores; 5 percent gravel; strongly calcareous; moderately alkaline; gradual smooth boundary.”
>
> The ACca horizon (9–14 inches) is brown to very dark grayish brown gravelly clay loam, depending on moisture content; “moderate fine and medium granular structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine tubular pores; 15 percent limestone gravel with calcium carbonate casts; strongly calcareous; moderately alkaline; abrupt wavy boundary.”
>
> The Cca horizon (14–60 inches) is white to pale brown very gravelly silt loam; “massive, hard, firm, slightly sticky and slightly plastic; very few fine roots; common fine tubular

> pores; 35 percent limestone gravel with calcium carbonate coats and 15 percent cobbles; strongly calcareous; moderately alkaline."

When it comes to productivity of native grasses, Pena soils are among the best in Otero county in spite of the calcareous and alkalinity factors (Derr 1981, Table 6). How that translates to productivity of cultigens, especially the unknown prehistoric varieties of maize grown by the inhabitants of Abajo de la Cruz, is uncertain.

Aztec Variant soils of the lower side slope pediments and alluvial fans along Tularosa Creek are high in gypsum, "deep, well drained soils that formed in mixed alluvium and gypsiferous sediment." The typical pedon is as follows (Derr 1981:86):

> The A1 horizon (0–8 inches) is pale brown to dark brown gravelly fine sandy loam, depending on moisture content; "weak medium granular structure; soft, very friable, non-sticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; about 20 percent gravel; moderately calcareous, lime disseminated; desert pavement of about 75 percent gravel and 5 percent cobbles is on the surface; moderately alkaline; abrupt wavy boundary."
>
> The C1csca horizon (8-31 in) is very pale brown to pale brown very gravelly sandy loam; "massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; 35 percent gravel; about 35 percent large crystals and masses of gypsum; strongly calcareous; moderately alkaline; clear wavy boundary."
>
> The C2 horizon (31-60 in) is very pale brown to brown very gravelly sandy loam; "massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; 50 percent gravel; about 20 percent large crystals and soft masses of gypsum; strongly calcareous; moderately alkaline."

When it comes to productivity of native grasses, Aztec Variant soils are superior to most other soils in Otero county but inferior to Pena soils (Derr 1981, Table 6). In this case as well, the suitability for prehistoric varieties of maize is uncertain.

Surface Water

The Rio Tularosa, immediately north of the site, is a perennial mountain stream that drains the south side of Sierra Blanca (which reaches 3660 m or 12,000 feet) and the north end of the Sacramento Mountains (at elevations of 2590 m or 8500 feet). Surface flow is sustained by numerous springs located along the stream's main stem and tributaries. In modern times (1948–1968), the total natural flow (base and flood combined) of the Rio Tularosa, at the Bent gaging station near the site, has ranged between 5,850 and 9,020 acre-feet per year (Garza and McLean 1977, Table 2). This works out to 16.0 to 24.7 acre-feet per day or 9 cubic feet per second (cfs) (New Mexico Water Quality Control Commission 1975). In other words, 5.2 to 8.0 million gallons of water pass Abajo de la Cruz on an average day!

The benefits of this much water are diminished by the dissolved minerals it contains. Water quality is best at the head springs but deteriorates steadily as the water moves downstream. The principal additions are chlorides and sulfates dissolved by the water as it passes over various soils and geologic strata. At the site, the dissolved solids are mainly carbonates and sulfates. The concentration of dissolved solids is inversely proportional to flow, such that during drier years the chemical content increases (Garza and McLean 1977:12).

One sample of Rio Tularosa water was collected from the USGS Bent station near Abajo de la Cruz on May 15, 1973 (New Mexico Water Quality Control Commission 1975). At that time, the flow was 8.28 cfs, the temperature was 12.2 degrees C (54 degrees F), chloride content was 63.29 mg/l, sulfate content was 617.55 mg/l, and the pH was 7.51. The report goes on to say:

> The mean 1242 milligrams per liter total dissolved solids is very close to the 1000 parts per million drinking water standard recommended by the Environmental Improvement Agency. The average concentration of sulfates is 617.6 milligrams per liter, however, which can cause a laxative effect to people not used to drinking such concentrations.
>
> Of the physical characteristics, temperature, odor, turbidity, and color, no major extremes have been recorded. The occasional rise in temperature above the standard in the Rio Tularosa near Bent is thought to be natural in origin and is not considered to preclude any uses designated by the standards. Sulfates in concentrations found in the Rio Tularosa...are enough to produce a faint odor ... Turbidity is affected only occasionally during storms, as is color.
>
> Except for sulfates and total dissolved solids noted above, ... inorganic constituents do not constitute a problem ... Nutrients and pH are well within the standard and recommended limits ... Dissolved oxygen is generally a function of temperature and so ... is also well within the standards established to protect the designated uses in the Rio Tularosa [New Mexico Water Quality Control Commission 1975].

Native Plants and Animals

In Chapter 4, Gail Tierney describes the local plants in detail. The general vegetation in the immediate vicinity of the site is juniper scrubland. The lower slopes of mountains a few hundred meters south of the site are covered with juniper-pinyon woodland. Dick-Peddie (1993) classifies the local vegetation around the site as Montane Scrub. He characterizes it as follows.

> This scrubland is found in situations where the available moisture is less than might be expected considering the altitude, latitude, and/or surrounding vegetation. Montane Scrub often constitutes a patch or strip within other, more extensive types of vegetation. These patches and strips of climax montane scrub reflect conditions such as a high, rocky, windswept knoll; a southwesterly facing slope; or an escarpment of an exposed rock stratum. Some of the montane scrub found in New

> Mexico is extensive enough to be mapped at the scale we have used [Dick-Peddie 1993:123–124].

The strip of Montane Scrub that includes the area of Abajo de la Cruz is one of the larger ones in the state. It spans the western bajada and outlying rocky hills (Godfrey Hills, Cub Mountain, etc.) of Sierra Blanca, starting just south of the Rio Tularosa and extending northward to a few kilometers south of Carrizozo. At one time the valley bottom of the Rio Tularosa probably supported a fairly rich riparian vegetation, but now that is also Montane Scrub due to entrenchment of the creek channel. The 10 to 15 m deep channel supports a dense cottonwood bosque.

Animals in the general vicinity of the site include mule deer, cottontail, jackrabbit, coyote, bobcat, the occasional black bear and mountain lion, woodrat, and a host of smaller rats, mice, lizards, and snakes (Findley et al. 1975).

Chapter 3

GEOLOGY AND MINERAL RESOURCES[1]

A. H. Warren

The Mogollon Indians who settled in the Tularosa Valley near what is now called Bent, New Mexico built their homes on pediment and terrace remnants above the river channel. Here they could dig their pit rooms into the soft beds of the Yeso Formation or in the unconsolidated silty alluvium of the old valley fill. At that time the perennial stream of the Tularosa flowed in its narrow but shallow channel below the prehistoric homes. Small fields on the valley floor bordering the river channel provided ample space for the growing of corn or other crops. In the foothills and mountain ranges to the north, south, and east wild game and food plants could be found.

The Countryside

The archaeological sites are located on a westward sloping bench or old pediment of the Sacramento Mountains in south Central New Mexico. To the north is the Sierra Blanca, at 12,003 feet the highest mountain in the southern part of the state. The Rio Tularosa dissects the pediment and flows westward to the Tularosa Basin. An area of alkali flats, gypsum sands, mesquite, and lava flows, the basin has internal drainage and ranges in elevation from 3900 feet at the lowest point to nearly 4800 feet near the mountain front. The pediment bench on which the sites are located ends abruptly on the west at a fault escarpment some 150 to 200 feet high near the town of Tularosa. In the vicinity of Bent, an upper escarpment rises more than 1000 feet above the bench

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[1]Helene Warren's published report on the geology and other resources in the vicinity of LA 10832 (Warren 1973) resulted from fieldwork conducted in conjunction with the archaeological excavations. Some of her information covers subjects discussed in Chapter 2 (water, climate, etc.) but much of it is supplemental rather than duplicative.

Warren discusses, however briefly, pottery tempering materials she noted in grab samples of sherds from excavated and surveyed sites in the Bent area. She calls one temper type "gray and pink feldspar syenite (?)" and shows it to be a major tempering material in Bent area sites. This is in spite of the fact that the parent rock is not local, but occurs on the east side of the Sierra Blanca. This syenite may well outcrop around most of Sierra Blanca at an elevation of about 9000 feet (2743 m) amsl. The material is highly distinctive, occurs in pottery recovered from sites throughout southeastern New Mexico, and is an identifier of Sierra Blanca-made Playas pottery (see Wiseman 1981, 2002:91–95, 2004:76–80).

Warren's report is reproduced with slight changes in format and minor editing. Information regarding exact site locations has been omitted, and I have added occasional comments in square brackets.

Regge N. Wiseman

[Note from the series editor: additional minor editing took place during report production.]

and the channel of the Rio Tularosa. Mescalero is about four miles east of Bent, and Tularosa is 13 miles to the west.

The sedimentary rocks of the Abo and Yeso Formations (Permian) underlie the old pediment surface, which in this vicinity is five to six miles wide from east to west. Exposures are poor, however, as much of the area is covered by Quaternary pediment and fan gravel. A narrow line of deciduous trees is nearly hidden by the deep canyon walls of the Rio Tularosa. Sparse desert vegetation is found on the lower slopes and finger-like ridges of bedrock, pediment, and valley alluvium.

Today the area in the vicinity of the archaeological sites near Bent is characterized by an over-steepened topography caused by the down-cutting by some 30 feet of the Rio Tularosa channel within the past 50 or so years. The old valley flats are still in the process of being cut and the old pediment surfaces are being eroded. Nogal Canyon, which joins the Tularosa near Bent, has as yet escaped the downward cutting and perches as a hanging valley above the Rio Tularosa. A small perennial stream in Nogal Canyon provides irrigation water for the terraced fields that line the flat floored valley, which probably looks very much like the Tularosa Valley did before it was incised.

Land and Water Resources

The Rio Tularosa flows southwestward through its steep-walled canyon from its headwaters in the Sacramentos and maintains a perennial flow. Before its channel was incised, its waters were diverted into irrigation ditches to water the crops of the [historic] Valley residents. In 1905, 470 acres on the Mescalero Indian Reservation and 537 acres between Mescalero and Tularosa were under irrigation. An additional 160 acres were irrigated in Nogal Canyon (Meinzer and Hare 1915:207). Today, there is no land under irrigation below the Indian Reservation due to the deeply eroded valley. In 1967, however, 600 acres were being cultivated on the Mescalero Reservation and 1,970 acres in the Tularosa Basin with irrigation water provided by the Rio Tularosa, which has an average annual runoff of 11,080 acre-feet. Today, Tularosa obtains most of its municipal water supply from this source. The water is very hard, however, and contains sulfates and other minerals that exceed the maximum limits recommended by the Public Health Service.

This high content of minerals has resulted in deposition of tufa deposits along the course on the Rio Tularosa. Above Mescalero, these deposits caused damming of the river and alluviation above the dam (Meinzer and Hare 1915:158). Tufa deposits found on the lower terraces downstream from Bent suggest that in the past similar dams had existed in the Tularosa Valley, and may have been the cause of the aggradation of the old valley fill.

A spring or seep is located on the south side of the river across from the Bent Post Office. The largest springs in the Tularosa drainage basin are those at the head of the valley upstream from Mescalero, which supply much of the water to the stream.

Climate

The Tularosa Basin has a hot, dry desert climate with most of the precipitation occurring in the summer months, while winters are relatively dry and warm. The annual rainfall in Tularosa, at an elevation of 4500 feet, averages between 9.5 and 10 inches per year, and the average of days with temperatures above 90 degrees (F) is 107. At Mescalero, elevation 6500 feet, the average rainfall is between 18 and 19 inches, with temperature over 90 degrees five days a year. Annual rainfall projected for the Bent sites is between 14 and 15 inches per year. [These figures are not "normalized" and therefore vary somewhat from those on the U.S. Weather Bureau maps of 1967, as described in the preceding chapter.]

According to Meinzer and Hare (1915:92-93), "On the intermediate levels (of the Sacramento Mountains) where precipitation is between 15 and 20 inches, some success is also had with dry farming." Where the average precipitation is not much over 10 inches, they point out that dry farming has in general not been successful, although in favorable years good yields of certain crops are possible.

Rocks of the Bent Area

Sedimentary rocks cropping out in the vicinity of the Bent archaeological sites include those of the Yeso and Abo Formations of Permian age and pediment and fan gravels and valley alluvium of Quaternary age (Table 1). Dikes and sills of the Sierra Blanca Volcanic series intrude the sedimentary rocks on the south side of the Rio Tularosa from Bent west to Round Mountain.

Table 1. General Sequence of Rock Units along the Rio Tularosa near Bent, New Mexico.
(Modified from Pray 1961 and Otte 1959)

Period	Formation	Description
Quaternary	Alluvium	Unconsolidated valley fill, alluvial fans, colluvium
	Older valley fill	Peaty and calcareous silt, sand, and occasional gravel deposits; caliche tubules and mollusc shells are characteristic
	Older pediment and fan gravel	Partially consolidated limestone cobbles and boulders originally from the San Andres Formation (Permian) mainly
UNCONFORMITY		
Permian	Yeso Formation	Pinkish-gray, yellow, to red siltstone; gypsum; some limestone, dolomite, shale
	Abo Formation	Mudstones, arkose, conglomerate, limestone, dark red

The soft gypsiferous beds of the Yeso Formation are poorly exposed, since they weather rapidly and are often overlain with Quaternary gravel. A conspicuous landmark is Round Mountain, which is capped by a resistant massive bed of limestone of the Yeso Formation.

The red sandstones and conglomerates of the Abo Formation are occasionally exposed on the sides of ridges or in arroyo cuts. Red quartzite cobbles derive from the Abo conglomerates from a lag gravel on the ridge above the Virginia (Bent) Mine and may be found occasionally in the axial terrace gravel along the Rio Tularosa.

Pediment and fan gravels of Pleistocene and Recent age are composed primarily of limestone cobbles and boulders, probably from the San Andres Formation of the Sacramento Mountains. Locally, a cobble of a dike or sill rock from Sierra Blanca intrusives may be found. Both the pediment and fan gravels and the terrace gravel may be well-cemented in some areas.

The valley fill of the Tularosa Valley consists of unconsolidated, or partially consolidated, light tannish gray clay and silt with scattered pebbles or cobbles and an occasional lens of gravel. The fill is laminated and contains mollusc shells, caliche tubules, and peat, with occasional charcoal fragments. Calcareous tufa was found on the surface of the fill in two localities. Bands of vertically stacked caliche tubules may be found at different levels in the fill. These appear to have been formed by the precipitation of caliche around standing reeds in a cienega or swamp. The Yeso Formation (Permian) which forms the substratum in much of the Tularosa Valley undoubtedly has contributed much of the mineralization to the surface and ground water of the area. The accumulation of the valley fill appears to have been continuous over a long period of time as no evidence of alternating cutting and filling was found.

There appears to have been at least two periods of down-cutting since the valley fill was deposited, however. The first period resulted in a high terrace about 100 feet above the present channel. During the present [20th] century, the channel has cut an additional 30 feet into the valley fill. The high terrace decreases in height downstream, while the lower terrace remains about the same height between Bent and Tularosa. The high terrace was probably due to faulting which causes headward lowering of the base level, as the mountain block was uplifted in respect to the Tularosa Basin (Otte 1959:85).

At least two of the sites, LA 10832 and a small unnamed site nearby, are located on the higher terrace. The more recent dissection of the valley has occurred in the last 50 or so years and is still continuing as head cuts move farther up the tributary channels. According to local residents, the recent cutting has been gradual. No climatic change can be noted in the past 50 or 60 years, which could have brought about the dissection. In all likelihood the recent cutting has been brought about by ecological changes in the local environment and stream regimen since the settlement of the valley nearly a century ago.

Igneous Intrusive Rocks

An andesite porphyry sill has been mapped by Otte (1959) about two miles downstream from the sites. An aplitic dike, paralleling the river to the south, was traced from the Virginia (Bent) Mine to the vicinity of Round Mountain near LA 10832, less than one mile southeast of Bent. Thompson (1972) describes the intrusive rocks of the Sierra Blanca Volcanics as being basically monzonitic. The dike at Bent is a fine-grained light colored rock, varied in mineralogy and in places has been subject to contact metamorphism. The Sierra Blanca Volcanics are believed to be Oligocene or late Eocene (Kelley 1971:60).

Mineral Resources of the Tularosa Area

The Virginia, or Bent Mine, at Bent, New Mexico, is primarily a copper mine but has produced about 20 different minerals, many of which would have been useful to the prehistoric Indian. Malachite and azurite are two copper carbonates often used for green and blue pigments. Hematite and other iron minerals are also present. The mine is located on the south side of the Rio Tularosa in an outcrop of the Abo Formation (Permian). The ridge above the mine is littered with red to white quartzite cobbles from a conglomerate in the Abo. These quartzite cobbles, which are also found in terrace gravel downstream, were used by the Indians for hammerstones and other tools. A cream-colored chert, which occurs as nodules in the conglomerate, had apparently been gathered and used by the early residents of the area. A quartz crystal, which may have come from the mine, was found on the ridge above the mine.

On the south side of the glory hole at the Virginia Mine are numerous small quarry cuts, of ancient appearance, which may be evidence of prehistoric mining. One sherd of Chupadero Black-on-white and various flakes of quartzite and a crude hammer were found on the slope below the quarries. The minerals in the quarry include malachite and barite.

Turquoise deposits that were worked prehistorically are located in the Sierra Blanca and in the Jarilla Hills at Orogrande. Jones (1904:170) mentions old workings near the divide which separates the old Bonito Mining District from the Nogal District on the western [should say eastern?] slopes of the Sierra Blanca Peak. Old pits and broken stone tools and turquoise fragments have recently been found at the old Parsons Mine in the Bonito District. Jones (1905:203) also reported stone hammers from the old turquoise mines and dumps in the Orogrande District. These and other mining districts peripheral to the Tularosa Basin contained numerous other minerals which may have been used by the Indians for pigments, paints, and ornaments.

The salt deposits found on the alkali flats of the Tularosa Basin attracted the early Mexican colonists, and very likely the Indians before that. Salt and mirabilite (glauber salt) are found in Lake Lucero and other playa lakes between the White Sands and the San Andres Mountains. Meinzer and Hare (1915:16) write, "At the time of the Mexican cession and prior to that time, a wagon road led from El Paso over the desert east of the Franklin, Organ, and San Andres mountains, to the alkali flats, and a northward continuation of this road is said to have extended to Manzano in the Estancia Valley. The heavy wooden wheels of the oxcarts and the irons with which the oxen were shod are still occasionally seen along this old Mexican salt trail. According to one report the salt was derived from Malpais Spring or Salt Creek, a few men being sent in advance of the main expedition to lead the water over an alkali flat, where it evaporated and deposited its content of salt."

Gypsum occurs in the Yeso Formation (Permian) south of Bent. Evidence of a lime kiln at LA 10833, a 19th century house ruin, suggests historic use of gypsum deposits for house plaster and possibly other uses. Gypsum was used by prehistoric Indians for plaster and paints, although there was no evidence to indicate use in the Bent sites. Northrop (1959) reports a deposit of gray and yellowish white alabaster, or "Mexican Onyx", about one and a half miles south of Bent. Stone of this type was often used by Indians for carved fetishes and ornamental artifacts. A good quality, translucent steatite, or soapstone, has been reported from the Hembrillo district in the San Andres Mountains. Coal deposits occur near Capitan, White Oaks, Carrizozo, and Oscuro.

Chert, which was used extensively for flaked artifacts in prehistoric times, has been reported from many formations in the Sacramento Mountains. The Rio Bonito Member of the San Andres Limestone (Permian) contains light-colored chert, cream to gray and often finely banded ("fingerprint") chert. The conglomerates of the Laborcita Formation (Permian) also contain chert pebbles suitable for artifact material. Chert also occurs in the Bug Scuffle Limestone (Pennsylvanian) in the Sacramento Mountains. A bed of jasper has been reported two miles south of Ancho (Northrop 1959). None of the cherts in the Sacramentos is particularly distinctive, except possibly the banded variety of the San Andres Limestone. Similar chert has been found in the San Andres Limestone in many other areas in New Mexico, however, and has been extensively utilized by prehistoric people wherever it occurs.

Common clays of the type that might have been used to make primitive pottery are generally easy to find. Some of the fine clays of the valley fill along the Rio Tularosa appear to be plastic, although these may also contain mineral impurities. Clays occur in both the Yeso and Abo formations. A brick plant was operated at Ancho for a number of years around the turn of the century, probably using Triassic clays (Griswold 1959:106). A pottery plant east of La Luz appears to have used clay from the Laborcita Formation (Permian).

The dike and sill rocks of the Sierra Blanca intrusives may have supplied the rock for tempering materials in the Jornada Brownwares made in this area. Most of these intrusives are syenitic in composition (Thompson 1972) and contain varying amounts of hornblende or biotite. Aplite dikes with finer granular texture would also have been suitable for tempering material. However, mineralogical variations occur within a single outcrop, as in the dike at Bent, so that tracing sources actually used by prehistoric potters might be difficult.

The Archaeological Sites

LA 10831

The pit houses were located on a low rise above the old alluvial valley floor, which slopes gently to the now deeply incised Tularosa channel. A thin veneer of the old pediment gravel covers the gypsum beds of the Yeso Formation. Possibly the site was chosen by the Indians because the soft beds of the Yeso could be easily excavated for pit rooms. Today the Rio Tularosa is about 30 feet below the old valley surface in a channel with vertical walls. There is no terracing of the valley fill here as there is further upstream toward Bent.

Sherds collected from the surface of the site indicate that most of the pottery was intrusive to the site (Table 2). Seventy-eight percent of the Jornada Brown sherds contained a distinctive hornblende syenite temper which may be indigenous to the Sierra Blanca region north of the Bent area. This type is the same as Jelinek's (1967) "South Pecos Brown." Decorated wares are almost exclusively Mimbres Black-on-white, which was imported from somewhere in the Mimbres area more than 100 miles to the west. The source of the Mimbres wares is not known at this time, but similar sherds with rhyolite tuff temper and white clay have been noted at sites in the lower Rio Grande Valley near Hatch.

LA 10832 (Abajo de la Cruz)

This excavated site is on the crest of a small ridge along the Rio Tularosa. Round Mountain is across a small tributary valley to the east of the site. A layer of axial river gravel, including quartzite and limestone cobbles, is underlain by the softer silt of the old valley fill. The red sandstone beds of the Abo Formation crop out below the valley fill, and are exposed to a height of about 20 feet above the river channel. Red-colored tufa and abundant caliche tubules occur on the second terrace above the channel, but below the ridge on which LA 10832 is located. The tufa and caliche tubules are evidence of a former spring or cienega.

At the foot of Round Mountain scattered sherds and lithic debris are evidence of another site on the upper level of the old valley fill, above two river terraces. The middle terrace is discontinuous, as at LA 10832.

LA 10833

A two room historic house ruin is at the head of a small valley. Cracked rocks and gypsum fragments on the slope above the house may be from an old lime kiln. A portion of the house wall that was exposed had several layers of white plaster on what had been an inside wall.

[The structure and possible lime kiln were destroyed by construction of US 70. This is the site mentioned earlier in Warren's report as having a possible lime kiln.]

Table 2. Pottery and Temper Analysis of Sherds from Four Archaeological Sites near Bent, New Mexico.

	LA 10835		LA 10831		LA 10834		LA 10832	
	No.	%	No.	%	No.	%	No.	%
Temper Type								
Hornblende syenite? (5A)	4	6	93	52	55	51	151	41
Dike rocks, aplites (6)	1	2	23	13	19	17	57	16
Dike rocks and quartz (6F)	57	86	9	5			77	21
Rhyolite (?) tuffs			49	28	23	21	9	3
Crushed sherd			4	2	11	10	66	18
Other	4	6			1	1	5	1
Totals	66	100	178	100	109	100	365	100
Pottery Type								
Jornada Brown, plain surface	63	97	114	64	75	69	163	38
Jornada Brown, with red slip	1	1	7	4			24	6
Jornada Brown, with tooling	1	1					41	10
El Paso Polychrome			3	2			45	10
Mimbres Black-on-white*			47	26	25	23		
Chupadero Black-on-white			6	3	5	4	72	17
Glaze-on-red					2	2		
Three Rivers Red-on-terracotta	1	1					63	14
Corrugated							15	3
Other			1	1	2	2	2	2
Totals	66	100	178	100	109	100	425	100

*See the comment in a bracketed paragraph on Page 20.

LA 10834

LA 10834, the most extensive site surveyed on the project, has a pottery type and temper type distribution almost identical to that of LA 10831. The low percentage of Chupadero Black-on-white should place the two sites in Lehmer's Three Rivers, A.D. 1100 to 1200, or Capitan (A.D. 900 to 1100), Jornada Branch phases. An anomaly is the presence of a few sherds of Glaze-on-red, which are generally considered post-1300.

LA 10835

LA 10835 [the Bent site, Wiseman 1991].The storage pits excavated at this site were probably in the unconsolidated sand deposits of the old pediment. [In fact, they were in a thick caliche stratum that was quite stable.]

Pottery of the Bent Sites—Analyses

Three ceramic assemblage types are represented in the four sites studied. These are only tentative analyses based upon examination with a stereo-microscope of a select number of sherds.

The first of these (LA 10835 in Table 2) may represent the earliest of the sites. The brownwares are coarse and unsmoothed, 68 percent containing a crushed igneous or volcanic rock composed of white feldspar and coarse angular quartz. An additional 18 percent had small amounts of a gold colored mica in the temper as well. The brownware sherds seem to be more akin to El Paso Brown than Jornada Brown, as the latter is characterized by a polished exterior surface.

One of the 66 sherds examined contained crushed sandstone or arkose, in which the feldspar is orange. This is probably the local Abo sandstone and indicates at least some pottery manufacture in the area. A very small percentage have what appears to be crushed sandstone temper with white to gray and orange feldspar, which may also be from the Abo Formation.

Two of the sites, LA 10831 and LA 10834, neither of which was excavated, have very similar distribution of pottery and temper types. Over 50 percent of the sherds contain hornblende syenite (?), a rock characterized by gray and pink feldspar. This rock does not occur in the Tularosa Valley but has been found in the terrace gravel along the Rio Ruidoso and probably derives from the Sierra Blanca Volcanics. In contrast, at the excavated site, "Abajo de la Cruz" (LA 10832), 40 percent contained a similar tempering material, while only 6 percent did at LA 10835.

The two sites [LA 10831 and LA 10834] contained from 20 to 25 percent [see next paragraph for comment] Mimbres Black-on-white sherds and a corresponding amount of rhyolite tuff temper, while only two percent of this temper appeared at LA 10832 and none at LA 10835. Presence of the rhyolite tempered sherds indicates contact with the Mogollon area to the west or southwest or Chihuahua. Less than 5 percent of the sherds at the site represent Chupadero B/W pots, and no Three Rivers R/T was found. About 5 percent of the sherds at LA 10831 could be classified as El Paso Polychrome. The assemblage is consistent with the Capitan Phase (A.D. 900 to 1100) as described by Lehmer. The presence of glazewares that resemble the Glaze A redwares of the Rio Gande Valley, which were produced in post 1300 times, is an anomaly which cannot be explained at this time. Possibly, there are two components separated by a period of time at this site. Or perhaps the identification with the Capitan Phase is incorrect.

[Warren's high percentages for Mimbres Black-on-white must be due to grab sample bias favoring painted sherds. At all of the many sites I surveyed and recorded in the project area following the Bent excavation project (Wiseman 1979), I never encountered a site with percentages of Mimbres even close to these. Anyone giving credence to percentages as high as 20 to 25 percent on any of these sites would conclude that a major Mimbres occupation (colonization ?) occurred along the Rio Tularosa, but that person would be greatly mistaken. The sites were occupied by local brownware users who acquired an occasional Mimbres vessel in trade, nothing more.]

At Abajo de la Cruz (LA 10832), the second site which was excavated, Mimbres B/W is absent, while Chupadero B/W takes its place. El Paso Polychrome is also well represented. About 10 percent of the sherds analyzed were tooled or punctate brownware or red-slipped wares, of an appearance which might be classified as Playas Red Incised or Punctate in the Border Region of Chihuahua and New Mexico. However, 80 percent (35 sherds) apparently contained local Sierra Blanca Volcanic temper materials and only 10 percent (3 sherds) contained the rhyolite tuff associated with the Border Region Playas Red types. All the Three Rivers Red-on-Terracotta sherds at LA 10832 contained crushed rock from the Sierra Blanca Volcanics also, mainly the gray-pink feldspar (syenite?) Mentioned above. Corrugated sherds were sparse, constituting 3 to 4 percent of the total sheds examined. About half of these contained rhyolite tuff, indicating manufacture in the Mogollon area.

Chapter 4

MODERN PLANTS IN THE VICINITY OF LA 10832[1]

Gail D. Tierney

Under a professional services contract with the Museum of New Mexico and the State Highway Department, a botanical survey and collection were made of the Bent Highway Salvage Project prehistoric sites on September 12–15, 1972. The collections have been pressed, identified, and stored for reference at the Laboratory of Anthropology, Santa Fe, New Mexico.

The purpose of the survey was threefold: to establish a reference collection of useful plants of that area, to facilitate the identification of archaeological botanical remains, and to determine and permanently record information regarding the present environment of the area.

The area to be surveyed was studied the day before and unknown plants were collected and keyed so that they could be named, making it unnecessary to collect them time and again. A northwest-southeast transect, from the bed of the Rio Tularosa through LA 10832 and continuing approximately one-half mile south, was surveyed. Plants were collected or noted at pre-determined elevations while staying within approximately 100 feet on either side of the transect. Plants were also collected and relative density noted on and around the other [archaeological] sites.

The plant list according to elevation and geological formation is not precise. Rather, those plants that appeared most frequently in that zone relative to other collecting zones on the transect are listed and there was, of course, much overlap. There was very little overlap on the site [LA 10832] and immediately below the site. The plants here were frequently either exclusive of the surrounding area or especially concentrated here.

The prehistoric dwellings surveyed are in the Lower Sonoran Life Zone. The vegetation type is mostly desert scrub. Within one-half mile south of LA 10832 is an extension of the Upper Sonoran Life Zone and directly north is the riparian environment of the Rio Tularosa.

September 1972 was a favorable time for plant collecting in the Rio Tularosa Valley. The somewhat tardy “Mexican Monsoon” had poured rain for about three weeks previous and vegetation was verdant, with annuals up and blooming and perennials blooming heavily for a second time that year.

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[1] Gail Tierney’s report on the modern vegetation in the vicinity of LA 10832 (Tierney 1973) resulted from field work conducted in conjunction with the archaeological excavations. Her observations are interesting, particularly with regard to the species of prickly pear (*tuna cardona)* that evidently was imported during prehistoric times by the residents of Abajo de la Cruz. Her report is reproduced with slight changes in format and minor editing (RNW).

[Note from the series editor: additional minor editing took place during report production.]

Lately, a hypothesis concerning prehistoric population estimates through the use of botanical surveys has proven viable (Kelly 1980). Therefore, the list of plants is organized in a somewhat different manner than is usual for preliminary reports. It is hoped that a better geographical description of the area of the site and possibly immediate resources could be obtained in this manner and will prove more useful in the long run to any final report accomplished at a later date.

The botanical collection was begun one-half mile southeast of LA 10832. This is the highest point of the surveyed area, some 6200 feet, and is on one of many steep hills. Large and jagged fossiliferous limestone blocks lie scattered on gravel, and the soil is thin. As one looks down the hill it is evident that the western exposure supports sotol and ocotillo and is a more xeric environment than the eastern exposure which supports more pinyon and large juniper.

Scientific Name	**Common Name**	**Use**
Bouteloua curtipendula	side-oats grama	*
Bouteloua eriopoda	black grama	*
Castilleja sp.	paint-brush	edible, ceremonial
Dalea formosa	indigo or pea bush	*
Dasyliron wheeleri	sotol	edible, fiber, beverage
Echinocereus sp.	hedgehog cactus	edible
Ephedra sp.	Mormon tea	medicinal, beverage
Eurotia lanata	winter-fat	medicinal
Fallugia paradoxa	Apache plume	medicinal
Fouquieria splendens	ocotillo	tools, wood
Juniperus monosperma	one-seeded juniper	edible, fuel, tools
Koeberlinia spinosa	crucifixion thorn	edible seeds
Linum aristatum	yellow flax	medicinal
Mamillaria sp.	fishhook cactus	edible
Phorodendron juniperinum	juniper mistletoe	medicinal, beverage
Pinus edulis	pinyon	edible, medicinal
Rhus microphylla	sumac	*
Viguiera sp.	golden eye	[Missing]
Yucca baccata	banana yucca	edible, fiber

* Similar species have been specified in the ethnographic literature as being useful.

Limestone gravel pediments dip like broad fingers into the Tularosa valley. Elevation range, on the surveyed slope, is approximately 5800 feet to 5600 feet. The soil is still thin and contains large cobbles. The localized distribution of plant species includes small juniper, black grama, creosote bush, and soaptree yucca.

Scientific Name	**Common Name**	**Use**
Bouteloua eriopoda	black grama	*
Cymphomeria gypsolphiloides	–	[Missing]
Dalea formosa	indigo or pea bush	*
Eriogonum jamesii	antelope sage	medicinal
Ephedra sp.	Mormon tea	medicinal, beverage
Eurotia lanata	winter-fat	medicinal
Gaura sp.	butterfly weed	[Missing]
Gutierrezia lucida	snakeweed	medicinal
Juniperus monosperma	one-seeded juniper	edible, fuel, tools
Larrea tridentata	creosote bush	medicinal, glue
Lepidium medium	pepper grass	edible
Lycurus pholeoides	wolf tail	**
Nolina microcarpa	bear grass	edible, fiber
Petalostemum candidum	white prairie clover	medicinal
Platyopuntia sp. (nc)	prickly pear	edible
Prosopis juliflora	mesquite	edible, medicinal,
Rhus trilobata	skunkbush sumac	edible, basketry
Sporobolus cryptandum	sand dropseed	edible
Thelesperma megapotamicum	Cota	beverage
Yucca baccata	banana yucca	edible, fiber
Yucca elata	soaptree yucca	edible, fiber

* Similar species have been specified in the ethnographic literature as being useful.
** Found within the prehistoric remains of Fresnal shelter (Bohrer 1973).

On the gravel terrace the soil is much deeper and softer than on the hills above. The elevation here slopes from 5600 feet to 5400 feet where the old valley fill begins. On either side of the terrace slopes are broad swales not dissected by arroyos. The vegetation here is varied, relatively abundant, and may be related to an extension of prehistoric man's activity from the site proper.

Scientific Name	**Common Name**	**Use**
Berberis haematocarpa	mahonia, holly grape	edible, dye, tonic
Bouteloua eriopoda	black grama	*
Bouteloua gracilis	blue grama	edible
Dalea formosa	indigo or pea bush	*
Eriogonum jamesii	antelope sage	medicinal
Eurotia lanata	winter-fat	medicinal
Fallugia paradoxa	Apache plume	medicinal
Gutierrezia microcephala	snakeweed	medicinal
Haploppapus spinulosus	–	medicinal

Lepidium medium	pepper grass	edible
Nolina microcarpa	bear grass	edible, fiber
Petalostemum candidum	white prairie clover	medicinal
Prosopis juliflora	mesquite	edible, medicinal
Psilostrophe tagetina	paper daisy	–
Sporobolus contractus	dropseed	edible
Yucca baccata	banana yucca	edible, fiber
Yucca elata	soaptree yucca	edible, fiber

* Similar species have been specified in the ethnographic literature as being useful.

Prehistoric site LA 10832 is at the northern tip of the gravel terrace. Drainage is good here and the site was not sheet washed as are so many sites along the Rio Tularosa. Plants that appear closely associated with the site are: threadleaf groundsel, cinchweed, wild potato, mariola, stickleaf, bear grass, Apache plume, yucca baccata, and skunkbush sumac.

Scientific Name	**Common Name**	**Use**
Dalea wrightii	indigo or pea bush	*
Eriogonum fendleri	antelope sage	medicinal
Fallugia paradoxa	Apache plume	medicinal
Lepidium medium	peppergrass	edible
Nolina microcarpa	bear grass	edible, fiber
Partheneum incanum	mariola	rubber
Pectis papposa	cinchweed	edible, seasoning
Rhus trilobata	skunkbush sumac	edible
Senecio longilobus	threadleaf groundsel	medicinal
Solanum jamesii	wild potato	edible
Yucca baccata	banana yucca	edible, fiber
Yucca elata	soaptree yucca	edible, fiber

* Similar species have been specified in the ethnographic literature as being useful.

The colluvial slope vegetation is added here although that part of the actual transect was cut away by the road. The plants collected were on the colluvial slope about a mile east. The slope is trenched by an old irrigation ditch and in the vicinity of an abandoned farm house. Most of the species, such as asters, mallow, goldenrod, buffalo gourd, and rocky mountain beeweed, are plants of disturbed habitats. Some, such as the asters and goldenrod may have been introduced in historic times.

Scientific Name	Common Name	Use
Aster sp. (white)	–	*
Aster sp. (blue)	–	*
Cleome serrulata (nc)	bee weed	edible, paint
Clematis ligustifolia	–	stimulant?
Chrysothamnus nauseosus	rabbit brush	edible, dye
Cucurbita foetidissima	buffalo gourd	edible, pesticide
Helianthus annuus	sunflower	edible, dye
Ipomea sp. (intro)	morning glory	–
Lepidium medium	peppergrass	edible
Meliotus sp.	sweet clover	edible
Mirabilis multiflora	four o'clock	edible, hallucinogen
Solidago canadensis	goldenrod	*
Sorghum halepense (naturalized)	[Missing]	edible
Sporobolus airoides	alkali sacaton	edible
Salix sp.	willow	medicinal
Sphaeralaceae	mallow	medicinal, edible
Verbesina encelioides	crownbeard	medicinal

* Similar species have been specified in the ethnographic literature as being useful.

The vegetation of the sandy old valley fill is dense. This area may have been prehistoric gardens. At any rate, such plants as summer cypress, wild poinsettia, and crownbeard are common New Mexico garden weeds. Immediately below the site and across the road was an ample stand of prickly pear cactus of a species not found elsewhere in the survey except in a similar situation below a prehistoric site. The fruit of this cactus was as large as a woman's fist.

Scientific Name	Common Name	Use
Aster arenosus	baby aster	medicinal
Atriplex canescens	salt bush	edible, etc.
Cloris virgata	–	–
Chrysothamnus nauseosus	rabbit brush	edible, dye, etc.
Cucurbita foetidissima	buffalo gourd	edible, insecticide
Euphorbia dentata	wild poinsettia	–
Guterrezia microcephala	snakeweed	medicinal
Ipomea coccinea	star glory	–
Kochia scoparia	summer cypress	edible
Lycurus pholeoides	wolftail	–
Mirabilis multiflora	our o'clock	edible, hallucinogen
Opuntia Englemannii	prickly pear	edible
Opuntia imbricata	cholla	edible

Opuntia streptacantha	*tuna cardona*	edible
Prosopis juliflora	mesquite	edible, medicinal
Salsola kali (introduced)	Russian thistle	edible
Solanum eleangnifolium	horsenettle	papain substitute
Sporobolus airoides	alkali sacaton	edible
Verbena ambrosifolia	vervain, sweet William	*
Verbesina enceliodes	crownbeard	medicinal

* Similar species have been specified in the ethnographic literature as being useful.

The Rio Tularosa channel had recently flooded and only a few tenacious plants were identified there.

Scientific Name	**Common Name**	**Use**
Conyza canadensis	–	medicinal
Juglans major	walnut	edible
Populus fremonti	cottonwood	edible, medicinal
Salix sp.	willow	medicinal, basketry
Sarcobatus vermiculatus	greasewood	medicinal
Tamarix pentandra (intro.)	salt cedar	–

The zonation of vegetation on the southeastern side of the Rio Tularosa may be a natural phenomenon; Lora Shields (1956) has documented concentric zones of creosote bush, mesquite, and salt bush from the Sacramento mountains into the northern Tularosa basin.

Another possibility is that mesquite may have been introduced by prehistoric Indians and the original pockets expanded with the introduction and consequent over-grazing of cattle (York and Dick-Peddie 1969). In support of this latter view is the archaeological evidence of prehistoric mesquite beans and pods in LA 10832, and the ethnological evidence of the semi-cultivation of mesquite in Mexico. Further, the singular distribution of *tuna cardona*, a cactus semi-cultivated for its succulent fruit in Mexico and definitely out of its range here, would indicate either cultural or trade ties with prehistoric Mexico. A close examination of the botanical remains of LA 10832 would be interesting.

Chapter 5

CULTURAL SETTING

Abajo de la Cruz is within a region originally assigned to the Jornada branch of the Mogollon culture (Lehmer 1948). This region included the Tularosa basin as well as Sierra Blanca and the Sacramento mountains. Since that time, Kelley (1984) has published her study of the cultural remains along the east side of Sierra Blanca. Her results demonstrate that sites of her Glencoe and Corona/Lincoln phases differ sufficiently from sites in Lehmer's Doña Ana and El Paso phases to warrant separate taxonomic status. Because Abajo de la Cruz sits on the boundary between these two cultural zones, one task of this report is to decide to which sequence the site belongs. To set the stage for later discussion, the appropriate phases of both sequences are described here.

Lehmer's Doña Ana and El Paso Phases

Doña Ana Phase

Lehmer (1948) characterized the Doña Ana phase as transitional between the Mesilla and the El Paso phases, that is, between the use of pit houses as the main form of habitation to pueblos of aggregated surface rooms. Presumably, both forms of structures were used at the same time at Dona Ana sites. The pottery assemblage is also supposed to be transitional in that older types such as El Paso Brown and Mimbres Black-on-white (Styles II and III) were used at the same time as newer types such as early El Paso Polychrome. During the Doña Ana phase, Chupadero Black-on-white, Three Rivers Red-on-terracotta, and St Johns Polychrome were made or imported. Lehmer originally estimated that the Doña Ana phase was short, starting about A.D. 1100 and ending about 1200.

More recent evaluations of the Lehmer sequence are based on the extensive archaeological work conducted for the Fort Bliss Army Facility. The most recent summation by Myles Miller (Miller and Kenmotsu 2004) demonstrates the excessive simplicity of the Lehmer sequence: architecture, pottery, and subsistence practices in the Hueco and Tularosa basins did not change in tandem as suggested by the phase system, and the details are much more complex than originally envisioned. And, although farming of maize in the greater El Paso region is now known to have begun before the time of Christ, maize did not become a major constituent in the local diet until after A.D. 1150. New dates are also offered for the Doña Ana phase—about A.D. 1000 to 1275.

El Paso Phase

The El Paso phase saw a crystallization of trends that began during the Doña Ana phase. Although pit houses were still used well into the phase, almost all habitations were pueblos, some of which included 100 or more rooms. The rooms may compose one or more linear buildings arranged parallel to one another, or four such buildings may be arranged in a square surrounding an open space or plaza (a plaza pueblo). Extra-large rooms built into the pueblo roomblocks were probably used for socio-religious purposes.

The pottery consists mostly of late El Paso Polychrome, but at most sites a small percentage is made up of an array of types imported from across the greater Southwest. Donor regions include Casas Grandes (northwest Chihuahua), the Salado (southwest New Mexico), the Western Pueblo (Arizona White Mountains to Zuni), the middle Rio Grande (Albuquerque–Socorro region), and the Sierra Blanca of south-central New Mexico.

Hydraulic features, including reservoirs and extensive fields, have been documented in some parts of the Jornada Mogollon. As was mentioned, maize and other cultigens formed an important part of the overall diet during the El Paso phase. The phase (and prehistoric farming in all non-riverine parts of the Jornada area) ceased about A.D. 1450.

Kelley’s Glencoe, Corona, and Lincoln Phases

During the 1950s, Texas Tech University excavated a series of sites extending from near Corona (Lincoln county) on the north to the Rio Peñasco valley (east of Cloudcroft, Otero county) on the south. This long, narrow region encompassed the southeastern highlands associated with the Gallinas mountains, the Jicarilla mountains, the entire circumference of the Capitan Mountains, the eastern highlands of Sierra Blanca, and the northeastern highlands of the Sacramento mountains. Kelley’s (1984) analysis of the archaeological remains resulted in a proposal to recognize two archaeological regions, each characterized by its own sequence. The southern region is the Glencoe, which reaches from the Rio Peñasco on the south to the Rio Bonito on the north. The Corona/Lincoln overlaps the Glencoe along the Rio Bonito and reaches northward to near the village of Corona.

The Glencoe Phase

The Glencoe phase represents all of the cultural remains investigated by Kelley in the southern Sierra Blanca region. Although these remains dated over a period of several hundred years, she thought that they did not embody enough variation to warrant designation of two or more phases. Instead, she uses lower case letters to distinguish early from late Glencoe.

Work subsequent to Kelley’s has documented sufficient information to warrant expansion of her system to a total of four sub-phases — initial, early, middle, and late Glencoe (Wiseman n.d. a). The middle and late sub-phases are described here.

Two aspects of the prehistoric populations designated as the Glencoe are critical to understanding how they differ from all surrounding peoples and cultures. First, they always used pit houses as their primary house form. These may have served mainly as winter habitations, especially during the middle and late sub-phases when they also used near-surface or on-surface jacal structures, probably as warm-weather shelters. Second, they always made Jornada Brown plain-surfaced pottery and used it as their primary type through all sub-phases. Maize was an important foodstuff during both the middle and late Glencoe sub-phases.

The middle Glencoe sub-phase is characterized by square to rectangular pit houses of varying sizes. They occur either scattered about as individual structures or are grouped. When grouped, they are aligned with one another as if to form a pueblo-style building. *Cimiento* structures (jacal surface or near-surface rooms with rock foundations) may or may not be present in the middle Glencoe sub-phase. Both individual and grouped rooms can occur at the same site. Some rooms are bank houses (built into slopes, with high-side walls deep into sterile and low-side walls at or near ground surface). Extra-large rectangular rooms that generally have the same few, simple floor features as the residential rooms (central fire pit, four-post roof support system, plus or minus scattered other features) probably served as socio-religious structures.

The pottery assemblages are dominated by Jornada Brown. Chupadero Black-on-white, Three Rivers Red-on-terracotta, El Paso Polychrome, and a few imported types such as Mimbres Black-on-white and St. Johns Polychrome also occur. The middle Glencoe sub-phase is not well dated but appears to have been primarily a 13th century manifestation. One example of a middle Glencoe site is the Crockett Canyon site (LA 2315) on the upper Rio Bonito in Lincoln county (Farwell et al. 1992).

The late Glencoe sub-phase is also characterized by square to rectangular pit houses of varying sizes. However, they usually occur in groups of two to six rooms that are aligned as if to form a pueblo-style building. Two or more room groups might occur at the same site. *Cimiento* structures and jacal structures without rock wall-bases may be present. Bank houses might be expected at sites on slopes.

The pottery assemblages are dominated by Jornada Brown, with Chupadero Black-on-white, Three Rivers Red-on-terracotta, and El Paso Polychrome also occur. Imported types are more varied than during the middle Glencoe sub-phase but as was the case in that phase, are not numerous. The primary distinguishing feature of late Glencoe pottery assemblages is the presence of Lincoln Black-on-red or Rio Grande Glaze A Red or both; the two types signal that late Glencoe sites were occupied from about A.D. 1300 or 1325 to 1400 or possibly a little later. The Glencoe site (Kelley 1984) dates to the late Glencoe sub-phase. The structures representing the various occupations at the Glencoe site have been visually disentangled and can be seen in Wiseman (n.d. a, n.d. b).

The Corona/Lincoln Sequence

The sites comprising this sequence are very similar in many respects to sites in the Gran Quivira region of central New Mexico. The similarities are so great, in fact, that some archaeologists suspect that the Sierra Blanca examples may have started as culture-unit intrusions from central New Mexico. Similarly, at least some late sites in Gallo Canyon near Corona (Ryberg and Hiner Pueblos) might be included in the Gran Quivira sequence, rather than in Kelley's Corona/Lincoln sequence (Wiseman n.d. a). Further complicating the situation, Wendorf's (1956) LA 2945, in Gallo Canyon southeast of Corona, may have been built and occupied by migrants from the El Paso region. However things settle out, most of the sites that Kelley assigns to her Corona and Lincoln phases differ sufficiently from those in the Glencoe and El Paso regions to warrant separate status.

Corona phase sites have one-room and multi-room structures marked by rectangular outlines of stones, either single or double alignments or both. These foundation stones (*cimientos* in Spanish) generally protrude slightly above the ground, the height depending in part on whether the individual rocks are cobbles or slabs set on edge. The superstructures are assumed to have been jacal (vertical posts spaced closely together and plastered with mud) or similar construction that left little or no mound when collapsed. Corona sites may have anywhere from one room to groupings or “pueblos” up to 50 rooms. Room sizes and shapes are fairly consistent. In the largest sites (such as the Phillips site [Kelley 1984]), some buildings appear to be grouped around a shared space or plaza. Large, shallow depressions (none excavated as yet) are occasionally seen and may be a socio-religious structure; they do not appear to be common.

Associated artifacts are generally thinly scattered about. The pottery assemblage is dominated by Jornada Brown, or in some cases by Jornada Brown, Micaceous variant (Kelley’s Gallo Micaceous Brown). Chupadero Black-on-white is an important but minor type. Occasionally, sherds of imported pottery types are found. Corona phase sites are not well dated, but may be present in the northern Sierra Blanca as early as A.D. 1000 (or a little earlier?) and as late as 1250 or 1300. They probably originated as site or culture-unit intrusions from the Gran Quivira region of central New Mexico (see Caperton 1981).

The *Lincoln phase* developed from the Corona phase. This is demonstrated by Kelley’s (1984) excavations at the Phillips site, where she found that House Unit 46, an early Lincoln phase unit, had a series of square to slightly rectangular rooms built in pueblo style with wall foundations made of larger amounts of rock than Corona structures. The bases were cobbles and slabs set on edge, overlain by other rocks and smaller slabs laid horizontally for up to three or four courses. From there up, the superstructures may have been built of less bulky materials that left low mounds when they collapsed. Floors of some rooms were partly excavated into the ground.

Lincoln phase rooms tend to be small and more or less square. Full-fledged Lincoln phase pueblos have full-height walls of masonry, adobe, or some combination of the two. Room sizes are consistent enough that plans of room blocks are reminiscent of waffle-iron patterns. Collapsed pueblos are mounded to about 1 m in height, indicating single story construction. The pueblos can be linear or can consist of four linear buildings enclosing plazas. Few Lincoln phase socio-religious structures have been excavated but these have been large, square to slightly subterranean rooms; they are either east of, and separate from, the pueblos or else are located within the plazas. In contrast to El Paso phase villages, they are not built within the linear residential units.

Lincoln phase sites tend to have significant accumulations of trash, some 1 m or more deep on certain slopes and in deposits overlying and within deeper features. Lincoln phase pottery assemblages differ significantly from those of the Corona phase in that Corona Corrugated is the primary utility ware (as opposed to Jornada Brown). Chupadero Black-on-white is a major service type. Other important but minor types include Three Rivers Red-on-terracotta, El Paso Polychrome, and Lincoln Black-on-red. The list of imported types includes the same wide variety that characterizes late Glencoe sub-phase sites. Lincoln Black-on-red and Rio Grande Glaze A Red are normally present and suggest occupations beginning about A.D. 1275–1325 and lasting to A.D. 1400 or 1450. Better dating the of Lincoln phase is greatly needed. Excavated Lincoln phase sites include the Block Lookout or Smokey Bear site (LA 2112) (Kelley 1984; Wiseman et al. 1971, 1976) and Robinson Pueblo (see various preliminary papers in Beckett 1991).

The Abajo de la Cruz Site and the Nogal Canyon No. 1 Site

The Abajo de la Cruz site and the Nogal Canyon No. 1 site (LA 2335) are located along the Rio Tularosa and its tributaries, on the boundary between the Glencoe and El Paso regions. To further complicate things, Abajo and LA 2335 share major characteristics with the Glencoe and El Paso phases but neither is fully Glencoe or El Paso in nature. The taxonomic challenge raised by these facts will be addressed later in this report.

Chapter 6

THE EXCAVATIONS

The Bent Highway Salvage Project, during which the Abajo de la Cruz site (LA 10832) was investigated, predated regulatory requirements for a formal research design. However, an informal plan was developed: explore the part of the site east of the obvious pueblo mound by means of a series of alternating 2 m wide strip trenches, and excavate and document any features found. Where features extended outside the strip trenches, excavations were expanded accordingly. Work ceased when the winter weather got severe and as the limits of the budget were approached.

Initially, excavations were not planned for the severely vandalized pueblo. However, during the field phase I decided to explore parts of it and was glad that I did. As it turned out, even this much disturbed feature revealed important data.

In those “early” days, additional monies were made available only for the preparation of a summary report of investigations (Wiseman 1973). Full analysis and preparation of this final report took place after I retired, with significant assistance (office and laboratory space, equipment, computer, telephone, copier, supplies) from the Office of Archaeological Studies, Museum of New Mexico, courtesy of the director, Eric Blinman.

The Site before Excavation

Before excavation, Abajo de la Cruz appeared as a low earthen mound with occasional field stones. The mound measured about 13 by 14 m and 0.5 m in height. Ten or so rooms were arranged in a compact, irregular square. I assumed that the pueblo consisted entirely of rooms with no central open space or plaza, based on the small size of the building. However, given the small size of the central plazas (5 by 5 to 6 by 6 m?) in sites such as Bloom Mound at Roswell and the Block Headquarters site north of the Capitan mountains, one has to wonder about Abajo de la Cruz.

Short sections of walls could be seen here and there in the sides of looters’ holes and on the surface. The building had suffered severe vandalism, with the largest hole reportedly made with a backhoe and another one immediately south of the mound having been made with dynamite. The individuals responsible for the dynamited hole reportedly were looking for gold! Several hand-dug holes pretty much encompassed the rest of the mound. The destruction appeared to be thorough.

East of the pueblo, the site was more or less flat and covered with brush and grass. An occasional sherd or stone artifact could be seen in barren areas among the plants. A slight depression just east of the pueblo suggested the presence of features such as a pit house, as later proved true. As usual, the density of surface artifacts decreased with distance from the pueblo mound. Based on the subtle and unpretentious surface remains, the site measured about 30 by 40 m.

Artifacts noted on the site surface and at the edge of the terrace included brownware pottery, Chupadero Black-on-white, Three Rivers Red-on-terracotta, El Paso Polychrome, Playas Red Incised, and St. Johns Polychrome. Chipped stone materials were dominated by a black chert that graded into a fine black siltstone and mudstone, plus smaller numbers of gray and white cherts. Two projectile point fragments were also found, but no ground stone artifacts. All of these items were collected as a single provenience, "Surface."

Vegetation inventoried on the surface of Abajo included single-seed juniper, mesquite, four-wing saltbush, snakeweed/rabbitbrush, creosote, cholla, pincushion cactus, barrel (?) cactus, prickly pear cactus, yucca (narrow and broad-leaf), and grama and dropseed grass. The large plants tended to cluster, with fairly wide expanses of grass in between. See Chapter 4 for a more detailed inventory of the modern vegetation on and near the site.

General Excavation Procedures

The procedures employed for the excavation of Abajo de la Cruz were those in general use by the Laboratory of Anthropology at the time. Every excavation unit (whether a surface collection area, test pit, test trench, or cultural feature) was assigned a sequential Feature Number. Excavations proceeded either by arbitrary vertical units, by natural units, or by cultural units as conditions warranted. For most heavy work (everything but small features and larger feature bottoms and floors), the fill was loosened by shovel, mattock, and railroad pick if conditions allowed. The soil outside the pueblo and in non-trashy areas was filled with limestone rock fragments of various sizes and numbers, making excavation difficult. Room fills and trash deposits over the pit houses contained some rock, but the organic content in the sediments made excavation much easier. The blackness of the fills in and overlying the structures readily signaled easier digging and marked the presence of archaeological remains awaiting the trowel! Cultural features located farther out from the pueblo were not as readily evident from the associated fills, but instead were found as the trenches encountered holes of various sizes in the caliche.

During the project, screening of fill through one-quarter inch wire mesh was limited to floor and bottom fills of features and any other special proveniences. Otherwise, after carefully turning loosened fill to retrieve artifacts such as sherds, chipped stone debris, bones, and the like, the crew loaded the unscreened fill into wheelbarrows and dumped it off site. The resulting backdirt piles were searched on a regular basis as a check on artifact retrieval success. Between the careful turning of the fill as it was excavated, the spreading of the fill as it poured from the wheelbarrows onto the backdirt piles, the tendency for artifacts, rocks, dirt clods, etc. to surface as the backdirt slid down the piles, and the work of the wind in blowing away fine sediments over time, it is amazing how easily artifacts came to light. A skilled crew working in this manner usually missed very few artifacts other than the tiniest flakes and the smallest animal bones (usually from rats, mice, and smaller species). Today, of course, this technique is no longer considered sufficiently effective and would not be used.

In large features, three vertical proveniences were used when natural and cultural stratigraphy were absent: *general fill* (surface to 10 cm above bottom or floor), *floor fill* (10 to 1 cm above bottom or floor), and *floor contact.*

For finer work in small features and larger feature bottoms and floors, the crew used trowels, dental tools, whisk brooms, and other small tools. A 1 m grid was introduced for subdividing feature bottom and floor fill collections in features such as structures and borrow pits. Artifacts in contact with the floors of structures and large cultural features were piece-plotted if they appeared to be in a primary context. If the objects' locations instead appeared to due to trash deposition or natural filling, the items were bagged as coming from floor fill.

Samples for specialized studies were collected from contexts that showed the greatest promise for useful information; for example, flotation samples were taken from culturally stained fill. In the end, it was not possible to store all of the samples and most were discarded even though they had been kept for several years following the excavations.

Surface Collections and Surface Stripping Operations

Non-systematic surface collections were made before the excavations and as fortuitous finds were made thereafter. The collections were made for the site as a whole.

The first step during excavation was to lay out baselines for the strip trench grid (Figure 3). The north-south baseline was established more or less parallel to the east side of the pueblo mound. Total length was about 30 m. The east-west baseline started at the north end of the north-south baseline and extended 60 m east. Alternate 2 m wide, north-south strip trenches were then laid out with chalk line strings, and excavation started with the westernmost trench (Figure 4).

In all, five such trenches were excavated east of the pueblo, with lengths ranging from 23 to 39 meters. The last or easternmost trench (Feature 6) showed signs of approaching the eastern subsurface limits of the site. Due to a lack of time, we were unable to excavate an additional trench to confirm that the edge of the site had been reached.

Excavations were carried from the modern ground surface to solid caliche in a single cut. At the north ends, trench depths were generally shallower (0 to 30 cm) because of the proximity of the terrace edge. Toward the south ends, depths were deeper (30 to 40 cm). Excavation revealed that the deposits were mostly the same for each trench. The fill of the northernmost 4 to 6 m of each trench encountered the highest concentration of caliche cobbles and rock fragments. From there, the rock content decreased from north to south and the amount of brown soil increased. The difficulty of excavation (loosening the fill, loading it into wheelbarrows, and carting it away for disposal) ranged from extreme in the rocky north ends of the trenches to moderate at their south ends. We all earned our $1.80 to $2.50 per hour (plus $20 per diem) and were bone tired at the end of each day!

Overall, refuse deposits in the form of sherds, stone artifacts, culturally stained soil, occasional burned rocks (or FCR, for "fire-cracked rock," as Southwesternists seem to prefer) and small charcoal pieces and flecks were disseminated rather than concentrated throughout each trench, except where features were discovered. Even for the cultural features that included trash, concentrations were only moderate at best.

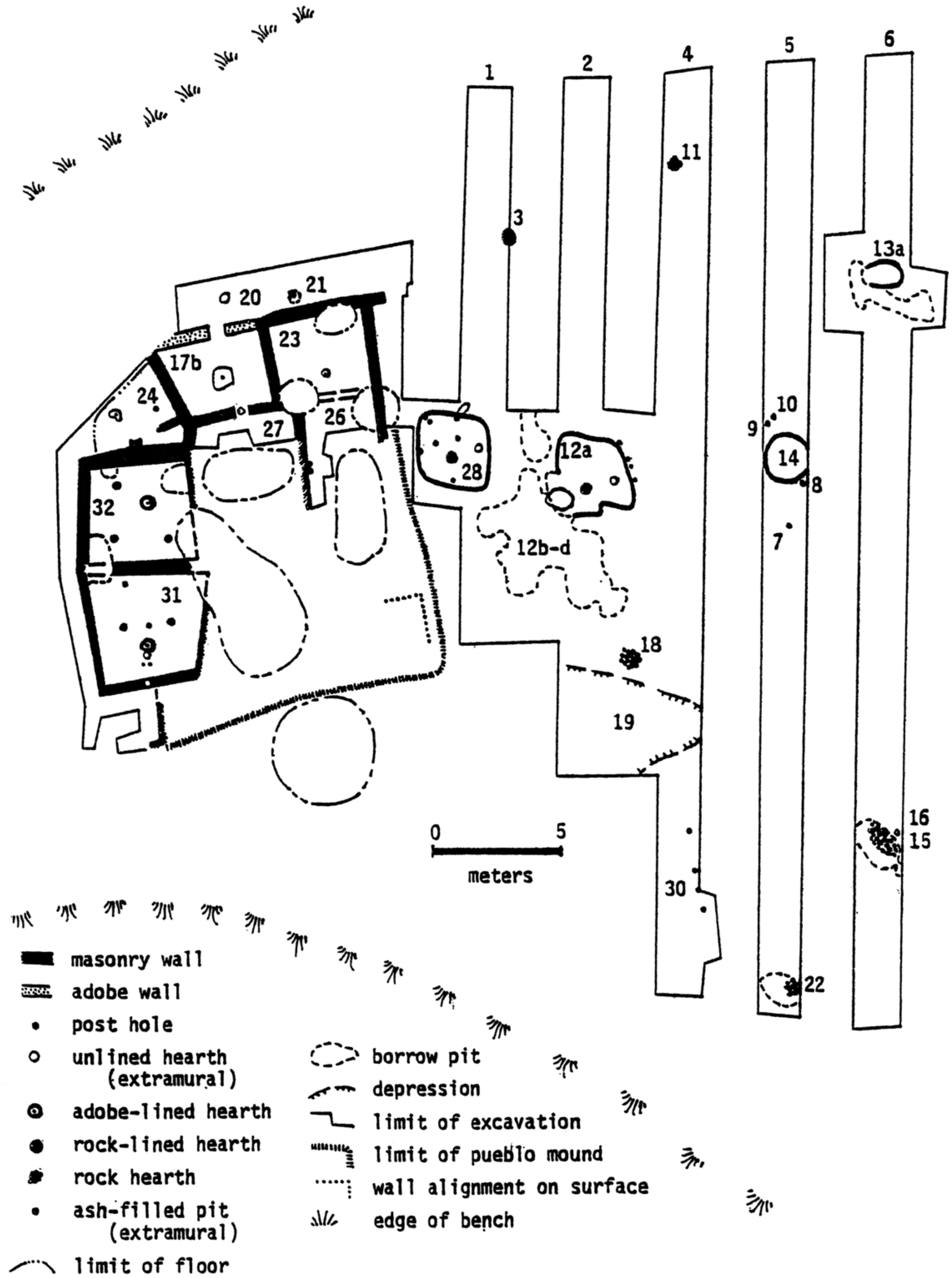

Figure 3. LA 10832, site plan.

Figure 4. Excavation of 2 m wide strip trenches. Looking north-northwest.
Crew members, from left to right: Jim Hunter, Sue Hunter,
Bill Allan, Dave McNeece, and Fred Hull.

The site contained very little trash, as is revealed in the few items listed in the artifact tables. While screening of all fill would have raised the numbers considerably, the totals would still have been low compared to those from large, late sites throughout the Southwest.

Several extramural features were found among the five strip trenches. This is no surprise for the trenches closest to the pueblo, but several features, including borrow pits, storage pits, extramural hearths, small ash deposit pits, and a line of posts (possibly historical), were found thinly scattered over the entire tested area. In many cases, the trenches had to be expanded to permit investigation of the features. As a result, 400 m^2 were opened east of the pueblo.

Once the trenches were completed, we turned our attention to investigating each of the exposed features. These included two pit houses, two storage pits, seven caliche quarry pits, five extramural hearths, five ash-deposit pits, the possibly historical line of four posts, and a deep (but not fully excavated), silty clay-filled feature of unknown origin and significance. Each feature is described later in this report.

Excavations in the Pit Houses and Extramural Features

The outlines of the pit houses and other features outside the pueblo were discovered by the strip trenching and defined when abrupt drops were encountered in the caliche substrate. The perimeters of the drops in the caliche were traced out in their entirety using picks and shovels. Once the feature was clearly defined, it was excavated as a unit from top to bottom. Small test pits were excavated as needed to find the bottoms or floors, so that the distinctions in vertical provenience (general fill, floor fill, floor contact) could be maintained. As was mentioned, the bottoms of borrow pits and pit houses were gridded into one-meter squares for fill sampling. The feature bottoms, including floors, were exposed using trowels and brushes.

Excavations in the Pueblo

Excavations in the pueblo started with the definition of the north and west exterior walls and part of the east exterior wall. The 1 to 2 m meter wide trenches used for this purpose showed that the fill next to the building was like that found in the strip trenches, but with one slight difference: the rocks were mostly blocky or tabular, having tumbled from the pueblo walls. Two small fire pits were uncovered just outside the north wall. By the time the excavations ended, four rooms were completely exposed, along with parts of three others.

Rooms fills were excavated using shovels and picks, and vertical proveniences were the standard general fill, floor fill, and floor contact. Since at this point the project time was getting short, the floor fills were not gridded nor were systematic attempts made to collect fill samples as was done for the pit houses and borrow pits. The floors were uncovered using trowels and brushes.

Depths of floors below modern ground surface varied from 30 to 105 cm, in part reflecting their position relative to the terrace edge. Floor depths also varied relative to each other and to the aboriginal ground surface. Some floors appear to have been more or less at aboriginal ground level, but others were excavated as much as 30 cm into it. Presumably, some rooms were excavated more deeply to reach firmer sediments that would provide greater stability.

Feature (Excavation Unit) Descriptions

Fea. No.	Description	Location
0	Surface collection	Entire surface of site; no sub-proveniences
1	Strip zone	Nearest to pueblo
2	Strip zone	Next strip zone east of Feature 1
3	Rock hearth	North end of Feature 1
4	Strip zone	Next strip zone east of Feature 2
5	Strip zone	Next strip zone east of Feature 4
6	Strip zone	Easternmost strip zone
7	Ash deposit pit	In Feature 5, near Feature 14

Fea. No.	Description	Location
8	Ash deposit pit	In Feature 5, near Feature 14
9	Ash deposit pit	In Feature 5, near Feature 14
10	Ash deposit pit	In Feature 5, near Feature 14
11	Rock hearth	North end of Feature 4
12a	Pit House	Discovered in Feature 2
12b	Borrow pit	Next to Pit House 12a
12c	Borrow pit	Next to Pit House 12a
12d	Borrow pit	Next to Pit House 12a
12e	Borrow pit	Next to Pit House 12a
13a	Extramural pit	North end of Feature 6
13b	Extramural pit? (questionable)	north end of Feature 6, next to Feature 13a
14	Extramural storage pit	Center of Feature 5
15	Borrow pit	South end of Feature 6
16	Ash deposit pit	South end of Feature 6, next to Feature 15
17a	Strip trench	Along north side of (and to define) north wall of pueblo
17b	Pueblo room	North-central part of pueblo
18	Rock hearth	6 m south of Pit House 12a
19	possible geologic anomaly	
20	Non-rock hearth	Outside and north of Pueblo Room 17b
21	Partial rock hearth	Outside and north of Pueblo Room 23
22	Rock hearth	South end of Feature 5
23	Pueblo room	Northeast corner of pueblo
24	Pueblo room (eroded)	Northwest corner of pueblo
25	Trench	Along west side of pueblo; used to trace west wall
26	Pueblo room (partly exposed)	South of Pueblo Room 23
27	Pueblo room (partly exposed)	South of Pueblo Room 17b
28	Pit house	Discovered in Feature 1; next to east side of pueblo
29	Borrow pit	Deeper aboriginal excavation, below the Feature 12b-d group
30	Line of posts (historical?)	South end of Feature 4
31	Pueblo room	Southwest corner of pueblo
32	Pueblo room	West-central portion of the pueblo

Chapter 7

THE PIT HOUSES

Two pit houses were discovered east of the pueblo.

Pit House 12 (Feature 12a)

This more or less square structure (Figures 5 and 6) began as a pit excavated 30 to 40 cm into the aboriginal ground surface. The original shape was a little distorted and difficult to identify because of subsequent prehistoric activities, especially in the vicinity of the southwest corner where caliche quarrying took place. Wall lengths at floor level were: north, 2.31 m; south, 3.16 m; east, 2.42 m; west, 3.20 m. The lower walls were the unfinished (unplastered), uneven (eroded?) sides of the original pit. Depths into sterile varied from 13 to 24 cm. Floor area was 7.7 m^2. The floor was also uneven; it was slightly dish-shaped, with the deepest part toward the center of the room. The floor had been plastered with 1 to 2 cm of brown-gray mud.

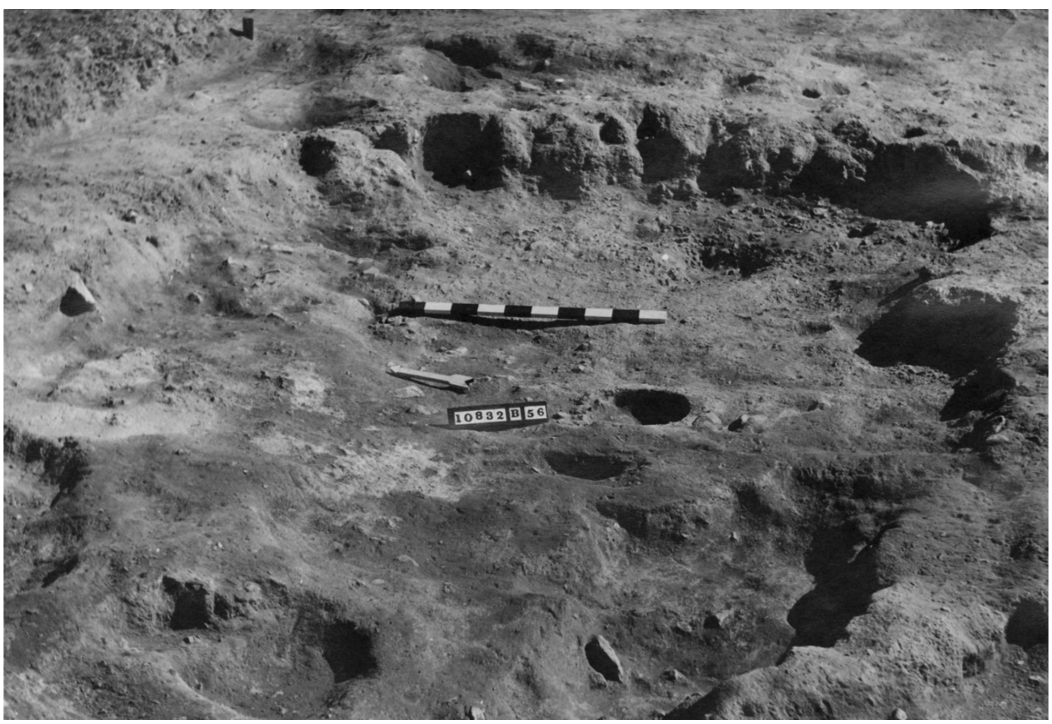

Figure 5. Pit House 12a, looking east. The fire pit is to the right of the number board.

The pit house fill was slightly compact, sandy, and light brown. Rocks, pebbles, and gravel were present throughout the fill, while charcoal stains and flecks and cultural items were scarce.

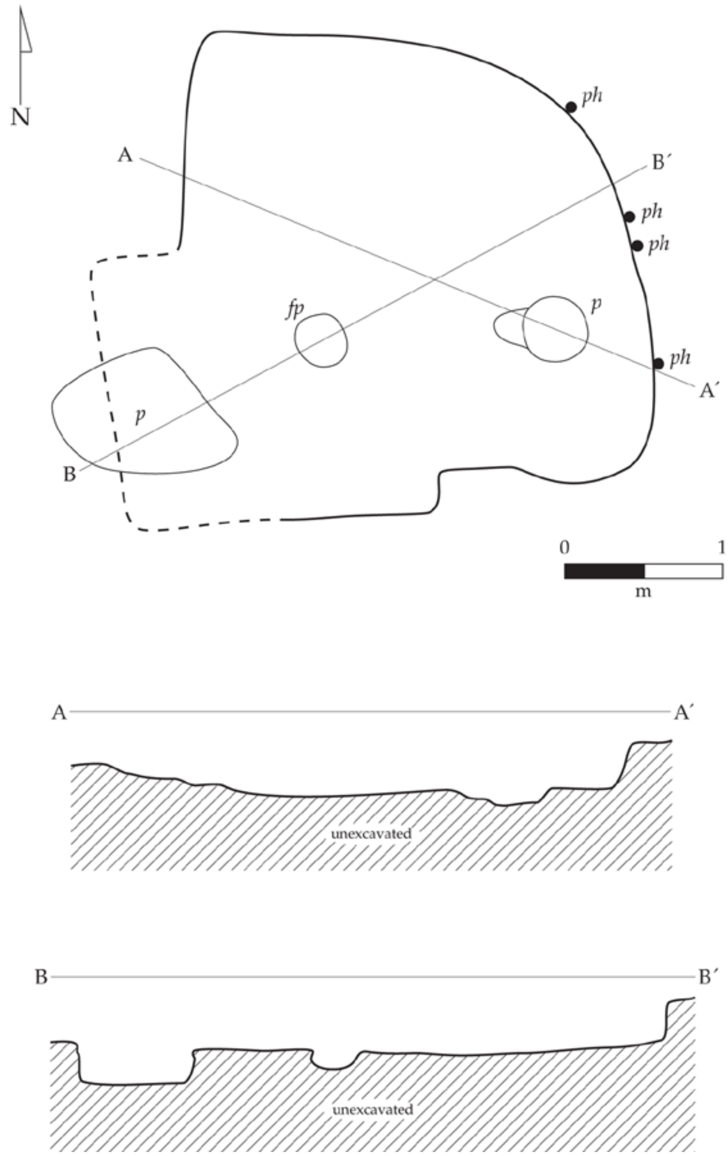

Figure 6. Pit House 12a plan and cross-sections. fp = fire pit; p = pit; ph = post hole.

The type of superstructure is unknown but it may have been brush. The structure did not burn. Four shallow (2–4 cm), small-diameter (5–10 cm) "divots" in the sterile soil along the east edge of the wall may represent anchor holes for superstructure elements. No interior post holes for roof support were found anywhere in the floor, suggesting that the superstructure was dome-shaped.

Two or possibly three floor features were present.

The fire pit was slightly southwest of the center of the room. This shallow pit was almost circular; it measured 31 by 33 cm and was 11 cm deep. It was dug into sterile soil, was naturally lined with small unmodified rocks of the sterile substrate, and was not plastered. The floor surface rose 1 to 2 cm to the edge of the fire pit. The fire pit fill was gray from charcoal-staining and contained maize remains and juniper and pinyon fuelwood fragments.

A shallow pit of unknown function was found in the southeast quadrant of the floor. The pit was circular with a shallower, parabola-shaped extension on the west side. It measured 40 by 59 cm by 10 cm deep. The sides and bottom were unplastered sterile soil with small protruding rocks. The pit fill was a continuation of the structure fill.

A larger pit, which may or may not have been part of the structure, was found in the disturbed southwestern corner of the pit house. The triangular pit had vertical sides and a flat bottom, with no interior plastering. The pit measured 100 by 75 cm and was 25 cm deep. The pit fill was a continuation of the structure fill.

Pit House 28 (Feature 28)

This square structure with rounded corners (Figures 7 and 8) began as a pit excavated about 1 m into caliche from the aboriginal ground surface. The walls were vertical but slightly irregular from top to bottom. The lower walls were the unfinished (unplastered), uneven sides of the original pit. Depths into sterile varied from 50 to 80 cm. Wall lengths at floor level were: north, 2.68 m; south, 2.52 m; east, 2.41 m; west, 2.78 m. The floor was irregular but more or less level; it had been plastered with 1 cm of brown-gray mud. Floor area was 6.6 m^2.

Figure 7. Pit House 28, looking northeast. The darker parts of the floor had been wet by recent heavy rain. At the time of the photograph, not all floor features were excavated.

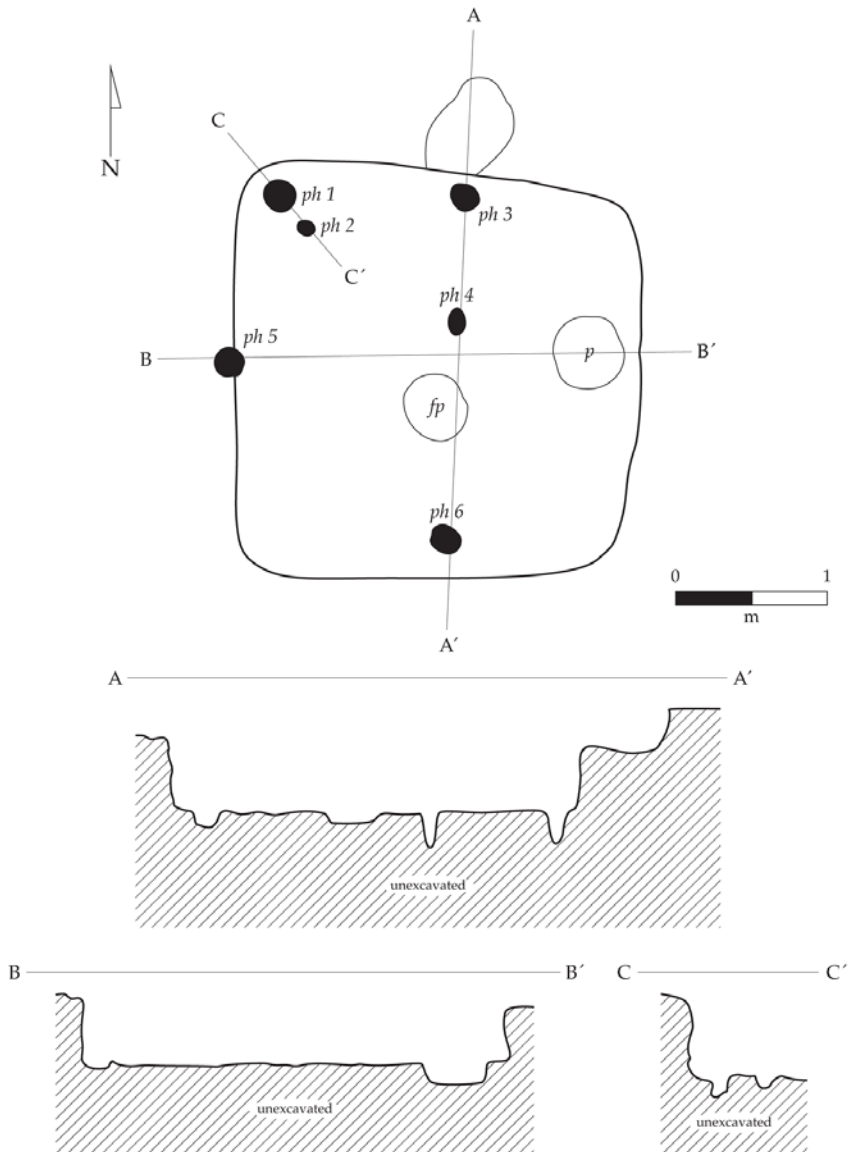

Figure 8. Pit House 28 plan and cross-sections. fp = fire pit; p = pit; ph = post hole.

The pit house fill was some of the richest on the site in terms of cultural refuse, but only moderately rich by Southwestern standards. The brown dirt fill (with some charcoal staining) yielded numerous rocks, pebbles, and pieces of gravel. Sherds, flaking debris, few formal artifacts, occasional burned rocks, red adobe lumps (weathered daub?), and small concentrations of ash and charcoal (individual dumps of fire pit contents?) were present.

The type of superstructure is unknown. Eight floor features were present.

A shallow pit that intersected the center of the north wall may have been a step entry or an extramural pit not related to the pit house. The pit measured 67 by 60 cm and was 29 cm deep. The bottom of the pit was 45 cm above the surface of the floor. Although the north-central roof support post for the pit house (see below) might have obstructed access at this point in the north wall, it also would have assisted entry and egress by providing a sturdy hand-hold. A 45 cm step is a high one but a 50 cm step is worse, and a 75 cm step is virtually impossible for small kids and for short or elderly adults.

The fire pit was just south of the center of the room. The pit was shallow, almost circular, and measured 40 by 45 cm by 7 cm deep. It was dug into sterile soil, then lined with small fragments of tabular rock. The pit fill was gray from charcoal staining; it contained charred remains of maize, mesquite, prickly pear, goosefoot, and other seeds and juniper, pinyon, and saltbush fuelwood fragments.

A shallow pit of unknown function was found in the east-central part of the room, next to the east wall. It was circular, basin-shaped in profile, and measured 49 by 50 cm by 12 cm deep. The sides and bottom were unplastered sterile soil with protruding small rocks. The pit fill was a continuation of the structure fill but also contained economic plant food remains (maize, pinyon, mesquite, saltbush, prickly pear, purslane, cheno-ams, and others) and fuelwood (pinyon, juniper, unspecific conifer, and saltbush).

Six interior holes for roof support posts were found in the floor, but they formed only part of what was probably a symmetrical arrangement. The missing post holes may indicate that posts rested on the surface of the floor in its northeast corner, in the east-central part of the floor near the east wall, in the southeast corner, and in the southwest corner (see the discussion for one of the main support posts for Pueblo Room 31 [Feature 31]). If vertical posts were placed at these locations, the weight of the roof probably would have kept them from slipping. The post holes that were found varied in size, from 12 by 15 cm to 21 by 22 cm across and from 5 to 24 cm deep. The post at the center of the west wall was partly set into the wall, creating a vertical groove to the top of the caliche.

Chapter 8

THE PUEBLO

This small building included 10 to 12 rooms clustered into a compact, almost square unit. Four complete rooms were completely excavated and three others were partly excavated. Sadly, the pueblo had been severely disturbed by diggers who apparently had used a combination of hand tools, a backhoe, and reportedly dynamite. In addition, the room in the northwest corner of the pueblo (Feature 24) was partly destroyed by erosion (it was located at the edge of the alluvial terrace). In retrospect, given the depths of the floors in Rooms 31 and 32, the unexcavated rooms probably were more intact at the floor level than initially supposed. But time ran out.

Most of the architectural variation in the pueblo involves construction details for the walls, so this variation will be described first. Descriptions of the excavated and tested rooms will follow.

Variations in Wall Construction

Although a certain amount of rock rubble occurred in the fills of the rooms and at the bases of walls outside the rooms, the quantities of rocks found indicated that walls were not built of masonry to their full height. This assumes, of course, that the building had not been robbed of stone for use elsewhere, following abandonment of the site. If stone robbing did take place, it probably was in the late 1800s or early 1900s, because only one other pueblo of a comparable age occurs nearby. From surface indications, that site appears to have even less rock in it than Abajo. If the upper walls at Abajo were not made of stone, then other possibilities are adobe or jacal or a combination of techniques.

Most walls had stone footings, but the north wall of Pueblo Room 17b was evidently pure adobe. The footings for a given room were not necessarily made in the same way, and a given wall might display one, two, or more footing construction approaches along its length. The hodge-podge nature of the footings, even within a single wall, indicates that the variations had more to do with available materials than with a desire to make footings in different ways.

Lower wall materials included rock slabs, blocky rocks, small rock fragments of various sizes and shapes, as well as adobe mortar. None of the rocks had been shaped or otherwise modified, but rather were of the sort referred to as “field stones.” Types of stone were not systematically recorded but most, if not all, were limestone or dolomite from the site environs.

Paired vertical rock slabs served as the basal elements of most but not all walls. In some cases, a wall base had vertical slabs on one side and other types of rock (blocky ones, for instance) on the other. All walls also had at least a few courses of horizontally laid rocks on top of the vertical slab bases (Figures 9 and 10). The courses might consist of blocks or slabs that might or might not be as wide as the wall. In the latter case, two smaller rocks might be used to achieve the span. Otherwise, the lower walls consisted of tabular fragments placed horizontally as veneers, with most of the wall consisting of mud and small rock fragments of various shapes.

Figure 9. East wall of Pueblo Room 17b. Note the vertical slabs at the base of the wall, topped by several courses of masonry using a core and veneer technique.

Figure 10. Top of the east wall of Pueblo Room 17b. Note the core-and-veneer technique, with adobe and rock fill between horizontally laid rocks.

In Chaco Canyon the last variation is known as the core and veneer technique, with either a solid core or a fill core (Lekson 1986, Figure 2.50). However, the core and veneer walls at Abajo lack the decorative qualities for which Chaco is so famous.

Completely Excavated Rooms

Pueblo Room 17b (Feature 17b)

Pueblo Room 17b (Figures 11 and 12) was not rectangular; the north wall was much longer than the south wall, and the west wall was angled to compensate. Details of each wall are: north wall, 4.30 m long, 20 to 25 cm thick, and 11 cm high; south wall, 3.55 m long, 30 cm thick, and 55 cm high; east wall,3.07 m long, 40 cm thick, and 54 cm high; west wall3.40 m long, 25 cm thick, and 25 cm high. The original wall heights and the construction materials are uncertain. Judging by the lack of main support post holes in the floor, the roof was supported by beams that spanned the room, but again we have no direct evidence of the details.

Pueblo Room 17b had two doors, both slightly off center in the north and south walls. The north door, which connected Room 17b with the outdoors, was 48 cm wide, began at floor level, and apparently never had a tread-stone. The south door, which connected Room 17b with interior Room 27, was 53 cm wide, began 27 cm above floor, and had a small tread-stone (29 by 29 by 9 cm) in the center of the sill (Figure 11).

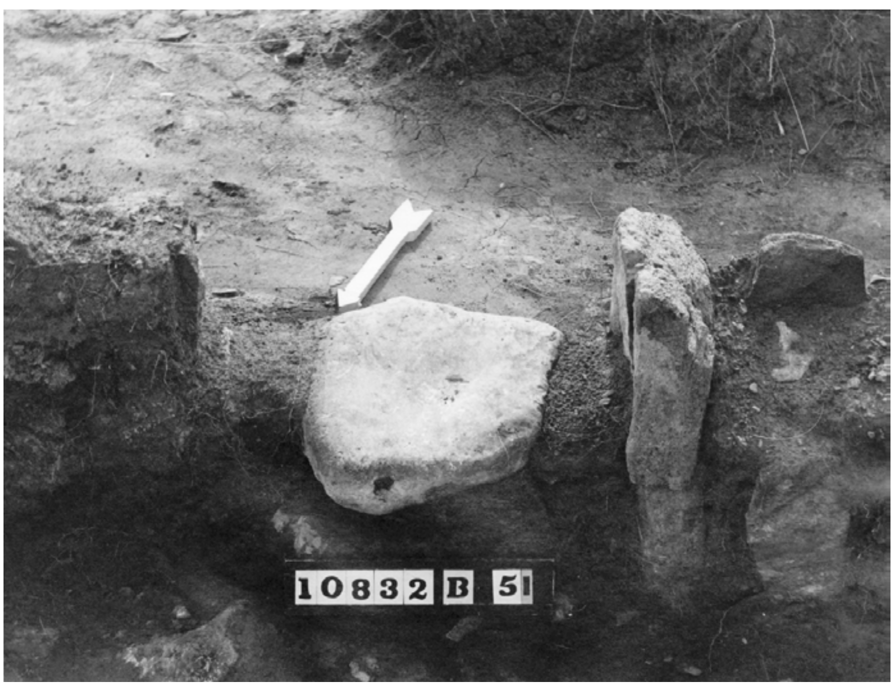

Figure 11. Pueblo Room 17b, tread-stone of door in south wall. Looking south.

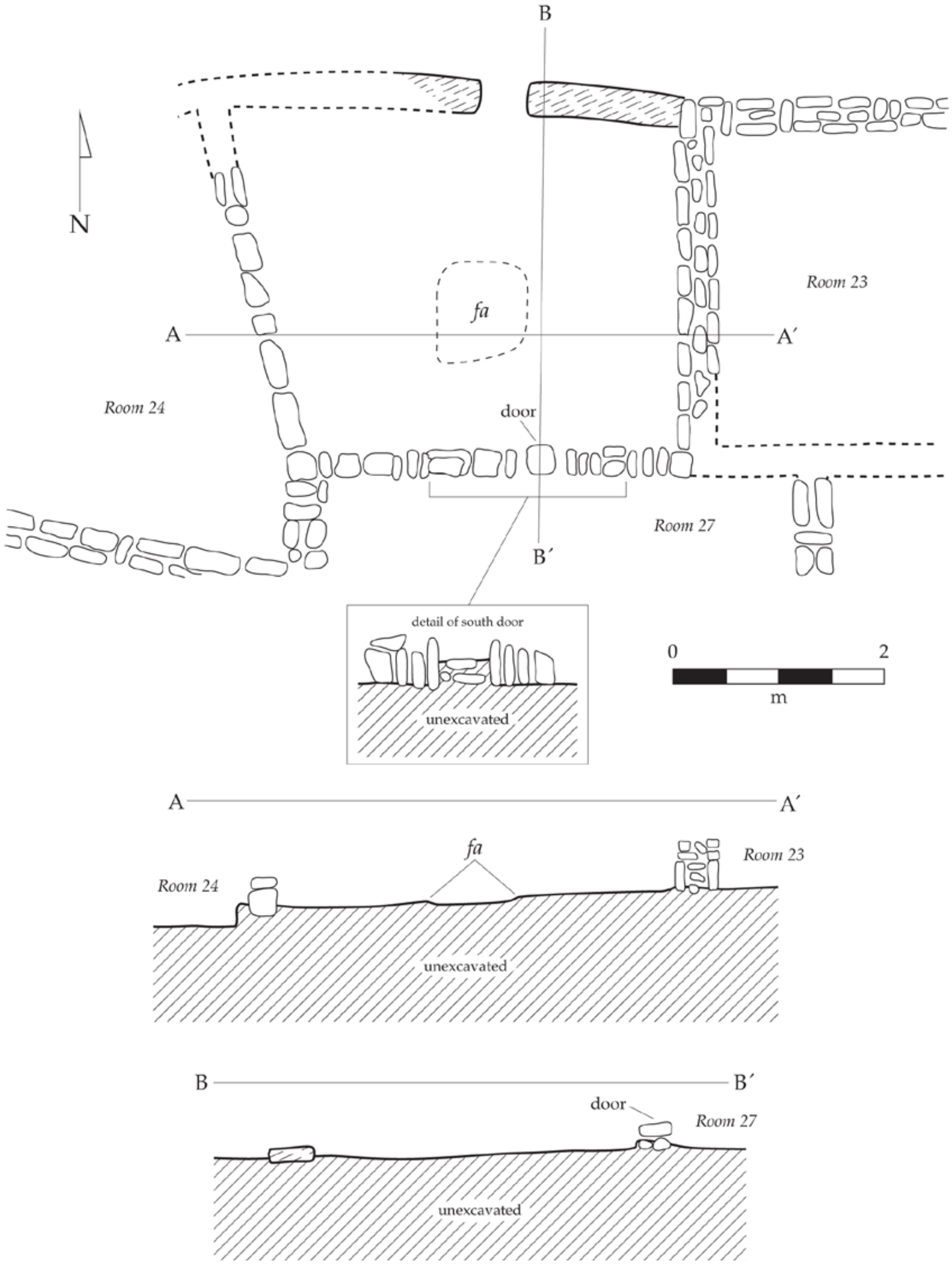

Figure 12. Pueblo Room 17b, plan and cross-sections. fa= fire area.

The floor was packed earth or mud with a low clay content and was at approximate aboriginal ground level. The floor was bumpy, with protruding rocks, but more or less level. The floor area was about 12.5 m^2.

One floor feature, a fire pit, was present. Located in the approximate center of the room, the fire pit was large, shallow, more or less square, and measured 100 by 84 cm by 3 cm deep. It was dug into the floor. The fill was gray from charcoal staining and included corn remains and fragments of ash tree fuelwood.

The lower fill and floor fill of the room were brown soil with abundant rock and gravel. Cultural materials included small red adobe lumps, charcoal staining, burned rocks, small pieces of charcoal, potsherds, stone artifacts, etc. but were few in number.

Pueblo Room 23 (Feature 23)

Pueblo Room 23 was more or less rectangular (Figure 3). Details of each wall are: north wall, 3.80 m long, 57 cm thick, and 35 cm high; south wall, ca. 3.50 m long (removed by a combination of vandalism and mistakes during excavation); east wall, 3.10 m long, 40 cm thick, and 54 cm high; west wall, 3.20 m long, 25 cm thick, and 54 cm high. Floor area was about 11.5 m^2. The original wall heights and construction materials are uncertain. Judging by the lack of main support post holes in the floor, the roof was supported by beams that spanned the room, but again we have no direct evidence of the details.

The floor of this somewhat rectangular room was difficult to define because the floor lay just below the modern ground surface and because when the room was first opened the weather turned wet and cold, making definition extremely difficult. The floor was at approximate aboriginal ground level; it was bumpy, especially with protruding rocks, but more or less level. The floor appeared to have been finished with 5 to 10 cm of packed earth or a brown-gray mud with a low clay content.

One floor feature, a fire pit, was present. The fire pit was in the south-central portion of the room, was small and circular, and measured 39 by 38 cm by 20 cm deep. It was dug through the floor plaster and into the aboriginal ground surface but was not plastered. The fill was stained gray from charcoal. No economic species are listed for this hearth.

The lower fill and floor fill of the room were brown soil with abundant rock and gravel. Slight charcoal staining was present throughout but sherds and other cultural items were scarce.

Pueblo Room 31 (Feature 31)

The plan of this room fits the U.S. definition of a trapezium: a four-sided figure with no sides parallel (Figures 13–15). Details of each wall are: north, 4.50 m long, 40 cm thick, and 80 cm high; south, 3.80 m long, 32 cm thick, and 93 cm high; east, about 4.65 m long, of unknown thickness, and about 90 cm high; west, 4.70 m long, 27 to 38 cm thick (tapered north to south), and 70 cm high. Floor area is about 14.6 m^2. The walls may or may not have been full-height masonry.

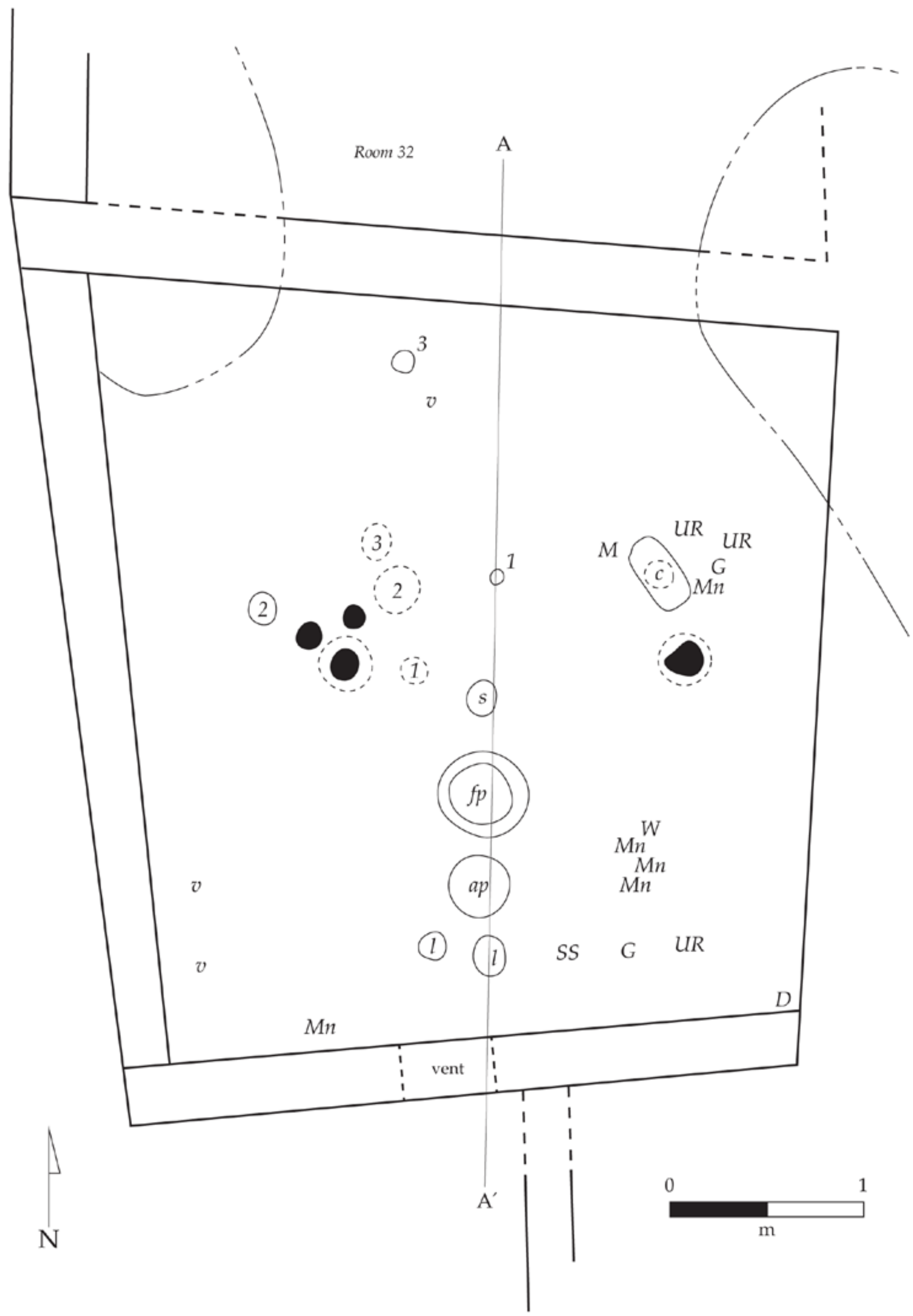

Figure 13. Plan of Pueblo Room 31. Floor features: ap = ash pit;; c = lithic cache pit with stone cover; fp = fire pit; l = ladder and/or deflector post; s = “sipapu”; solid circle = post hole; solid circle with dashed outline = main support post with adobe collar (west one with two auxiliary support posts); open circle = pit; dashed circle= pot rest or floor depression. Artifact symbols: D = drill; G = ground stone; M = metate; Mn = mano; SS = arrow shaft smoother; UR = unmodified rock; v = partial vessel (crushed); W= whistle.

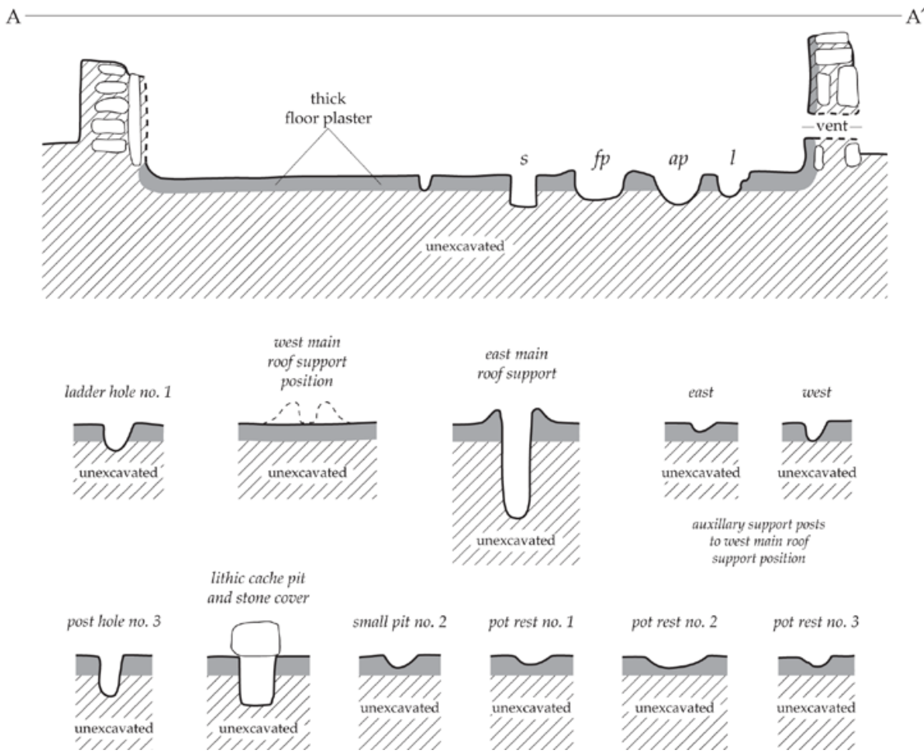

Figure 14. Pueblo Room 31 cross-sections. The location for the A–A′ cross-section is shown in Figure 13. ap= ash pit; fp= fire pit; L= ladder hole (or deflector post hole); s= “sipapu.”

Figure 15. Pueblo Room 31, looking south. Note the slightly misshapen opening of the ventilator in the south wall (in the upper center of the photograph).

A collapsed vent situated west of center of the south wall opened to the outdoors about 15 cm above the estimated aboriginal ground surface (Figure 15). The vent measured 53 cm wide and about 18 cm high; the bottom was 22 cm above the floor surface (i.e., the floor was below the aboriginal ground surface). The opening was slightly offset from the floor features defining the central axis of the room and to compensate, the post holes for the ladder or deflector were angled slightly.

The room floor was level and rested on caliche, 25 cm below the floor of Room 32. The depth of the floor from the modern surface was 90 to 95 cm. The floor was a 2 to 10 cm thick layer of carefully prepared gray adobe placed on the sterile substrate. Sixteen floor features and a number of floor contact artifacts were present.

Two main posts for roof support were centrally located. The west post position was indicated by the scar from a circular collar of adobe on the floor. In the center of this collar were two small holes for the two-pronged end (probably naturally formed) from a limb or trunk that had served as the west roof support post. It appears that the post was too short to place in a hole and had to be secured *on* the floor to provide sufficient ceiling height. The outside diameter of the adobe collar was 30 cm, but because it had broken away (during removal of the post?), its height is unknown.

Six small depressions formed an irregular arc around the base of the west roof support post. Most were so shallow that they did not reach the sterile soil beneath the floor plaster (which was 10 cm thick). Some or all of these holes may have been involved in propping the roof-support post, or some of them may have had other functions. The two holes closest to the roof support post (immediately north and northwest of it) measured 11 by 14 cm by 5 cm deep and 10 by 9 cm by 8 cm deep. A third hole, farther to the northwest, measured 10 by 9 cm by 8 cm deep. Three small depressions east and northeast of the post measured 14 by 14 cm by 4 cm deep, 14 by 19 cm by 5 cm deep, and 25 by 27 cm by 5 cm deep. These last three could also have been pot rests (shallow depressions that kept pottery vessels upright).

The east main roof support post was seated in a hole with an adobe collar. The opening at the top of the collar measured 36 by 29 cm. Near the bottom of the hole, the diameter was 12 by 17 cm. Total depth of the hole, from the top of collar to the bottom of the hole, was 44 cm. The thickness of the floor plaster, plus collar height, was 12 cm.

A third hole, this one close to the north wall in the north-central part of the room, may have held an auxiliary post for propping up a sagging roof. The hole measured 11 by 11 by 16 cm.

The fire pit, located in the south-central part of the room, was circular; it measured 35 by 33 cm and was 18 cm deep. It was dug into the sterile substrate and left unplastered except for an adobe coping or collar formed by a rise in the floor plaster. The outside diameter of the coping was 53 by 50 cm. The fire pit fill was stained gray from charcoal and included maize remains, goosefoot seeds, and fragments of ash tree fuelwood.

A circular pit south of the fire pit was in the right place to serve as a so-called ash pit, a temporary holding pit for ash removed from the fire pit. The ash pit measured 35 by 33 by 20 cm and was not plastered.

A pair of small-diameter holes situated between the ash pit and the ventilator opening probably served one of two functions (or both functions?). They could have anchored the bottoms of a two-post ladder for room access. Or they may have held posts for a deflector, to prevent air rushing in through the vent from directly reaching the fire in the fire pit. The holes for the ladder or deflector measured 14 by 16 cm by 10 cm deep and 22 by 18 cm by 14 cm deep.

A small hole was present in the floor north of the fire pit. The hole was in line with the fire pit, the ash pit, the ladder or deflector holes, and the vent. The hole's position was perfect for a sipapu (an opening to the underworld through which ceremonialists can contact ancestors). The hole measured 17 by 18 cm by 21 cm deep. The hole did not contain clean sand or other ritual closing material or items that would help confirm its use as a sipapu. Instead, the hole had been left open and had filled with the same material (including a few potsherds), as the rest of the room.

A small hole north of the east main-roof-support post hole may have been a cache pit; it contained several chert flakes. The pit had been covered with a partly shaped, rectangular slab of rock that measured 40 by 16 by 5 cm.

A small hole was found north of the center of the room, not far from the possible sipapu. The hole measured 7 by 8 cm by 6 cm deep. Although the hole was on the central axis of floor features, its purpose is unknown.

Artifacts and other objects were recovered from various places on the floor. These included fragments from three partial and complete (?) El Paso Polychrome vessels, a metate, five manos, a chipped stone drill, a shaft smoother, a whistle, two pieces of ground stone, and three unmodified rocks. All of these items were clustered near the southwest and southeast corners of the room, or in the east-central part of the room surrounding the rock-covered cache pit.

Part of the roof had burned, leaving minimal but useful evidence of roof construction. The roof had been supported by the two main posts set on or into the floor near the center of the room (see above), with one main beam that extended from the west wall to the east one. Secondary beams must have extended from this main beam to the north and south walls (but the number and sizes of the secondary beams could not be determined). The secondary beams were covered with a layer of small-diameter round poles or *latillas*, then by a layer of reeds and finally by a final layer of dirt or mud. The lack of doors in the walls of the room indicate that access to Room 31 was through a roof hatch, probably located over the fire pit.

The fill of Room 31 consisted of two units, each of which accounted for roughly half of the 1 m depth from modern surface to floor. The upper half was homogeneous dirt with a medium to heavy charcoal staining and a few wall rocks. Few artifacts were recovered from this unit. The lower half consisted of fallen wall rocks and burned remnants of the roof. Again, sherds and other artifacts were few in number.

Pueblo Room 32 (Feature 32)

Pueblo Room 32 had a trapezoidal shape (Figures 16 and 17). The north wall was 3.83 m long and 55 cm high; it consisted of two sections. The eastern section included a lower part that was 58 cm thick (a double thickness wall) and an upper part that was 30 cm thick (a single thickness wall). The western section was 38 cm thick. Details of the other walls are: south, 4.70 m long, 44 cm thick, and 65 cm high; east, 4.05 m long, of unknown thickness, and about 65 cm high; west, 4.05 m long, 35 cm thick, and about 45 cm high. Floor area was about 17.4 m^2. The walls may or may not have been full-height masonry.

The floor was 5 or so cm below the aboriginal ground surface and 50 to 70 cm below modern ground surface. The floor, which was in good condition, was a 2 to 10 cm thick layer of carefully prepared gray adobe placed on caliche. The floor was smooth and sloped slightly downward from south to north. The eastern part of the floor was slightly depressed, possibly due to settling fill in an underlying pit or pit house (we lacked the time to investigate the possibility). Four features were present in the floor; a fifth had been destroyed by looters.

Three main post holes for roof support were found near the corners of the room, about 1 m in from their respective walls. A fourth one was missing because of a looters' pit in the northeast quadrant of the floor. The measurements of the three surviving post holes were: northwest, 18 by 22 cm by 61 cm deep; southwest, 17 by 19 cm by 62 cm deep; southeast, 16 by 18 cm by 25 cm deep. Fragments of decayed posts were recovered from the southwest and the northwest post holes.

The fire pit, in the north-central part of the room, was almost circular, had vertical sides, and measured 42 by 46 cm by 19 cm deep. The fire pit was dug into sterile soil and was plastered with 3 to 5 mm of mud. The fire pit fill was gray from charcoal staining and included maize remains and juniper, pinyon, and ash tree fuelwood fragments.

Part of the roof had burned, providing limited evidence on roof construction. The roof was supported by the four main posts near the corners of the room. Four main beams spanned pairs of adjacent posts. From these main beams, secondary timbers of unknown number and spacing extended to the four walls. These in turn must have been covered by small-diameter round poles (*latillas*) or possibly split poles (*rajas*), probably followed by a layer of reeds and, lastly, a layer of dirt or mud.

The absence of doors in the walls indicates that entry into Room 32 was through a hatch in the roof, probably located over the fire pit. Three sections of small-diameter beams (40 to 60 cm long, 8 to 10 cm diameter) and two large fragments (20 by 50 cm and 50 by 50 cm) of split juniper wood recovered from the roof fall (in the floor fill and floor contact levels) may have been hatch and hatch-cover components. These wood elements were recovered within 1.5 m of the south wall, which at first glance is disconcerting. However, most or all of the unburned wood must have been salvaged after the roof collapsed. At that time, non-desirable remnants of the roof would have been cast to one side—so that burned, unusable hatch elements could have ended up well away from where they might have been expected.

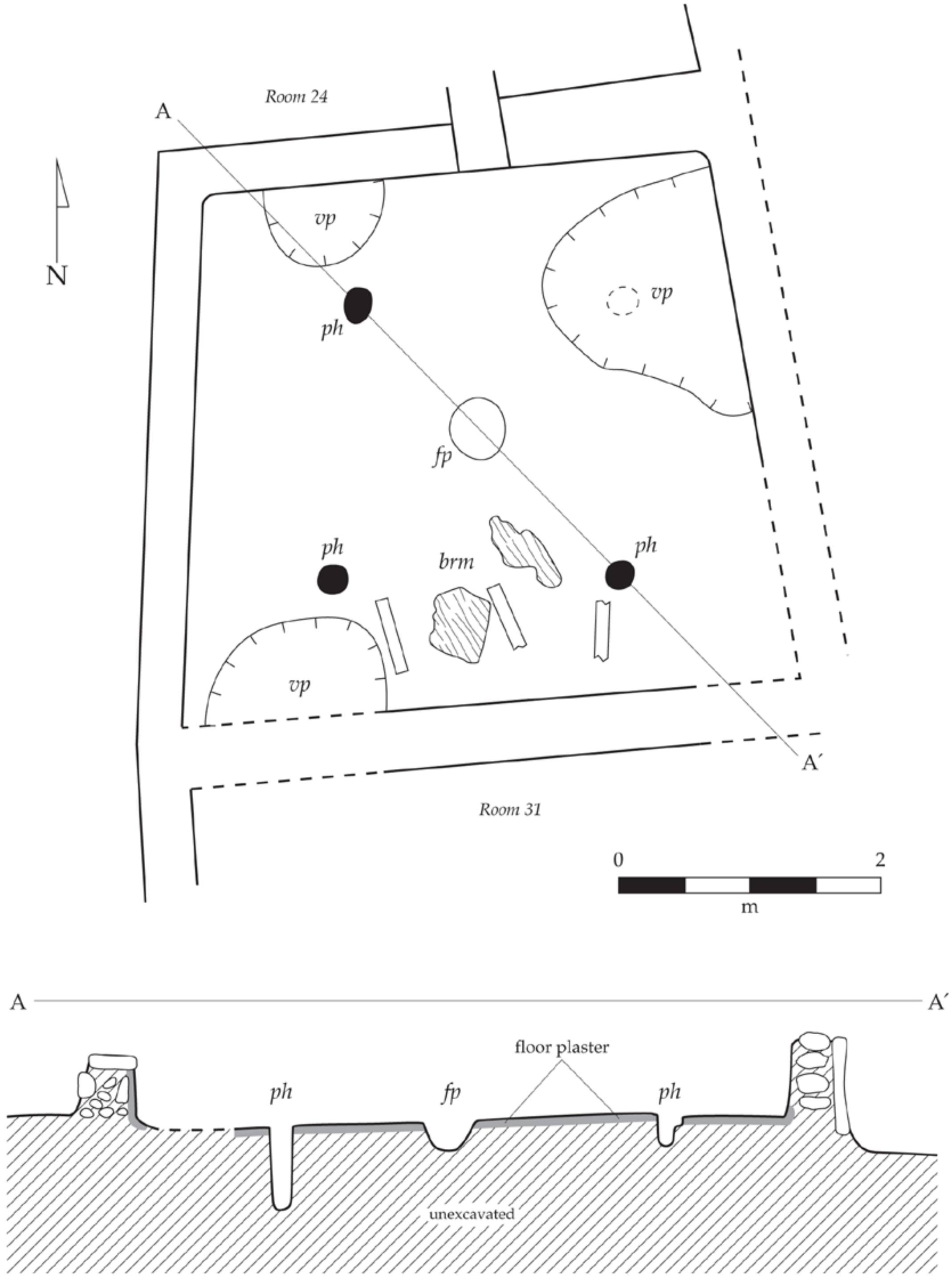

Figure 16. Pueblo Room 32, plan and cross-section. ph = post hole; fp = fire pit; brm = burned roof material (beams, bark) on floor; vp = vandal's pit; dashed circle = position of probable post hole.

Figure 17. Pueblo Room 32, looking northwest.

The absence of ladder holes suggests that the lower end(s) of a ladder probably rested directly on the floor.

The fill of Pueblo Room 32 consisted of two units. The upper 30 cm of fill was homogeneous, slightly charcoal stained, and included few cultural items (pieces of adobe, rocks, potsherds, etc.). The lower 30 to 40 cm of fill was essentially the same but included more rocks. Numerous burned roof fragments were also present, including the possible roof hatch and hatch cover elements mentioned earlier. In general, few sherds or other cultural items were recovered from this unit.

Partly Excavated or Tested Rooms

Pueblo Room 24 (Feature 24)

This room was at the northwest corner of the pueblo, next to the terrace edge, and was exposed to severe erosion. Only the south wall, part of the east wall, and the southeast corner of the room interior had survived. The deepest remaining fill was along the south wall. Most of the floor, much of the fill, and all of the west and north walls were missing (Figure 18).

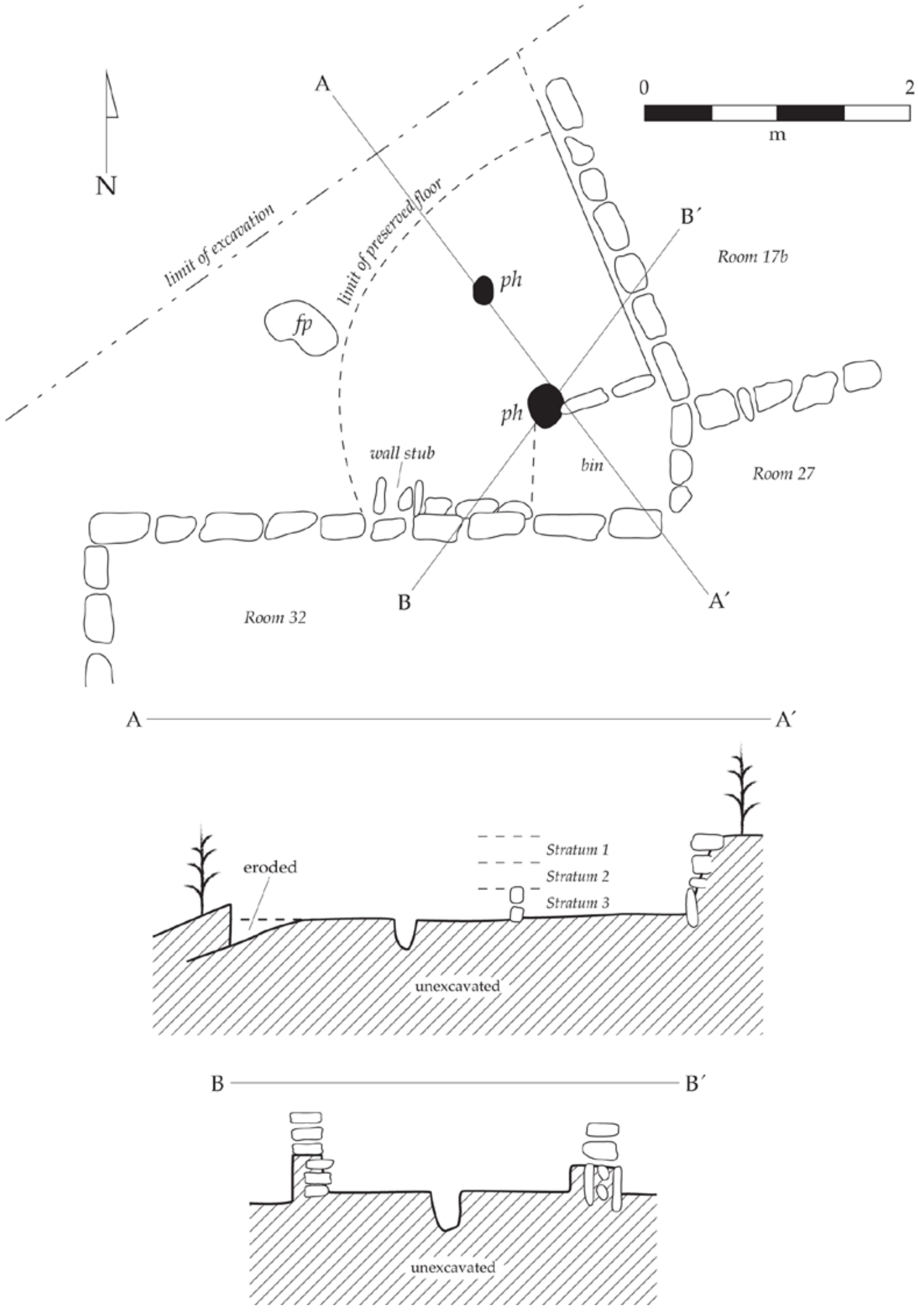

Figure 18. Pueblo Room 24, plan and cross-section, showing rock walls and adobe walls. fp = fire pit; ph = post hole.

The south wall was 4.40 m long (to the corner of the building; the location of the southwest corner is unknown) and 55 cm high. The wall was composed of two sections. The eastern section had a lower part that was 58 cm thick (a double thickness wall) and an upper part that was about 30 cm thick (a single thickness wall). The western section was is 38 cm thick. The dividing point between the two wall sections was at the abutment scar from a dismantled wall that had protruded northward into what is now Room 24. The abutment scar was 35 cm wide and consisted of two vertical, parallel rock slabs (see the discussion of the construction sequence, below).

The incomplete east wall was 3.50 m long, 25 cm thick, and 25 cm high. The floor area cannot be calculated because of the incomplete preservation of the room. The walls may or may not have been full-height masonry.

One, possibly two floors were present. A possible upper floor or use surface is described below, as part of the description of room fill. The definite floor was the lower one; it was a 2 to 10 cm thick layer of carefully prepared dark gray-brown adobe (with white specks) placed on sterile soil. The floor was well-preserved except near where the room had eroded away. The floor sloped downward slightly from south to north. The eastern part of the floor was slightly depressed, possibly due to settling of fill in an underlying pit or pit house (we lacked the time to verify this proposition).

Four features were present in or on the lower floor, with an unknown number missing due to the erosion that destroyed about half of the floor.

A hole for a main roof support post was found near the southeast corner of the room, about 1 m in from the walls. The post hole measured 25 by 25 by 30 cm deep. The corresponding post also served as a support for a corner storage bin (see below).

One small auxiliary post hole was found about 1 m north of the main roof support post and 1 m from the east wall. The post hole measured 15 by 15 cm by 21 cm deep; a red adobe chunk, found 15 cm below the floor, may have served as a post seat.

The fire pit, near the presumed center of the room, was a shallow, L-shaped depression in the upper floor; it measured 48 by 20 to 40 cm by 5 cm deep and was unplastered. The fill was gray from charcoal staining and included maize remains, mesquite seeds, and juniper fuelwood fragments.

A storage bin was built into the southeast corner of the room. It was formed by a low, narrow, rock wall set in mud and aligned between the east wall and the main roof support post. No corresponding wall was found enclosing the west end of the bin (between the post and the south wall), but one could have been missed during excavation. The interior of the bin measured 90 by 100 by 80 cm, providing about 0.7 m^3 of storage. The bin fill was part of Stratum 3, described below.

The fill in the surviving corner of the room was comprised of three identifiable strata. They are described from uppermost to lowermost

Stratum 1 was 12 to 20 cm thick; it was loose light brown soil with rocks and gravel, slight charcoal staining, and occasional thin ash lenses. Small to moderate numbers of sherds and stone artifacts were found.

Stratum 2 was 6 to 18 cm thick, with an average thickness of 10 cm. The stratum consisted of moderately packed red adobe with a few rocks, pebbles, and pieces of gravel, along with some cultural material. Stratum 2 may have been laid down intentionally, to create a floor or use surface, but perhaps it was instead a layer of roof fall.

Stratum 3 had an average thickness of 25 cm. It consisted of loose light brown soil with rocks, pebbles, and gravel. Charcoal staining was slight to almost non-existent. Sherds, stone artifacts, and other cultural items were less plentiful than in the other two strata.

Pueblo Room 26 (Feature 26)

The fill of Pueblo Room 26 was severely disturbed by looters, who destroyed the northwest and southwest corners of the room (Figure 3). Our initial work in the room was directed toward defining the room limits and the degree of subsurface disturbance. Starting at the looter's pit in the northeast corner, we used a trench (about 1 m wide and 20 to 25 cm deep) to search for the room's north wall. Instead we confirmed that the north wall no longer existed, at least not at the shallow depth of the trench. (Nor was the wall found during excavation of Pueblo Room 23 to the north.) After reaching the looter's pit near the northwest corner of the room, the trench turned south along the west wall. The trench was 3.75 m long when the available time ended.

At a point 2.5 m from the assumed location of the northwest corner, a wall stub was discovered projecting eastward from the west wall. A short side excavation extending eastward from this point found no continuation of the wall, suggesting that this wall had been dismantled during a remodeling episode. (A similar wall stub was found in Pueblo Room 24.) If the space north of the stub had functioned as a room prior to the remodeling, Pueblo Room 26 would have been the smallest room encountered in the pueblo by our excavations. Its size would have been about 3 m east-west by 2.5 m north-south. Work on this trench ceased before another cross wall could be found to the south.

The fill encountered during the trenching in Pueblo Room 26 was like the fill in the rest of the site: a loose, light brown sediment with many rocks, pebbles, and gravels, with a slight charcoal stain, and with sparse sherds, stone artifacts, and other cultural items. Small chunks of red adobe were scattered throughout.

Pueblo Room 27 (Feature 27)

As happened with Pueblo Room 26, much of the fill of this room had been disturbed by looting. In the available time, the entire north wall was exposed in a trench that was about 1 m wide and 20 to 25 cm deep. Pueblo Room 27 measured 3.95 m east-west. The fill was the same as that described for Room 26.

Building Sequence of the Rooms in the Pueblo

Our limited excavations and the effects of looting preclude a reconstruction of the exact building sequence for the pueblo. Given that building's small size, it would be natural to expect that the entire building was raised in a single event by a single group, but it is still desirable to know the details. This is especially true because we have a few indicators of remodeling, and thus, for more than one building episode.

Our most extensive excavation effort exposed details of five outer rooms. Two precisely placed looters' pits in the room's southwest and southeast corners combined with our own excavation mistake to remove the south wall of Pueblo Rom 23 before we discovered its existence. As a result, I cannot state how Pueblo Room 23 related to Pueblo Room 26, the next room to the south, except to note that the east walls of both rooms were part of the same construction event. However, the fact that the west walls of the rooms do not align suggests that Pueblo Room 23 postdated a construction event that involved Pueblo Rooms 26 and 27. The pause between the two events (construction of Pueblo Rooms 26 and 27 and then of 23) could have been as short as a day or two or as long as weeks, months, or years.

The room junctures of Pueblo Rooms 17b, 24, 27, and 32 comprise the bulk of our evidence for remodeling. The east half of the south wall of Pueblo Room 24 displayed super-positioning in the form of a double-width wall below and a single-width wall above. This segment stopped at a wall stub that jutted northward into what became Pueblo Room 24. Unfortunately, we found no clue as to the original configuration and associations of the wall represented by this stub. Was it to be the original west wall of Pueblo Room 17b? If so, was it torn down in favor of what became the west wall of that room? Or was an earlier room present where we defined Pueblo Rooms 17b, 24, and the north end of Pueblo Room 27? (A similar wall stub was also found in Pueblo Room 26, but its implications, beyond being evidence of remodeling, were not worked out by the time work ended.)

At some point, Pueblo Room 17b was attached to Pueblo Rooms 23 and 27. The west wall of Pueblo Room 17b jutted outward (northwest) at an odd angle from the west wall of Room 27. The fact that the north wall of Pueblo Room 17b was all adobe, rather than stone-footed like the other rooms, hints that it was almost an afterthought, or perhaps the final enclosure of an open space between Rooms 23 and 24. Also, Pueblo Room 27 had a doorway in its north wall, and the adobe wall of Pueblo Room 17b also had a doorway, suggesting that the two represent an original passage to the outdoors. This interpretation is problematic, as prehistoric pueblo-dwellers rarely had ground level doors through exterior walls. (The reasons for this preference can only be guessed at, but the possibilities include (1) as a safety measure against potential enemies, (2) to curtail rodent and wild animal intrusions, or (3) to control small children, especially at night.

The construction sequence for Pueblo Rooms 31 and 32 was obscured by the looters' pits that destroyed the corners of their shared wall. However, it is clear from the non-alignment of the west and east walls of both rooms that the walls, and therefore the rooms, represent separate construction events, making it unlikely that the two rooms were built at the same time. But here as well, the delay between the construction of these two rooms could have been very short. About all we can say is that Pueblo Room 32 was built before Pueblo Room 24.

In summary, we lack the data needed to reconstruct the building sequence for the pueblo at Abajo de la Cruz. It is likely that the earliest rooms to have been built were not excavated and that the rooms that we did excavate include the last ones built. We cannot be certain whether the entire pueblo was built more or less at once, or was added to gradually. However, as will be discussed later in this report, the totality of the recovered evidence indicates that the use or uses of this particular landform were not long-term or intensive in nature.

Chapter 9

EXTRAMURAL FEATURES

Features found outside structures include two storage pits, seven fire pits, five small ash-filled pits, seven caliche borrow pits, and an alignment of four posts.

Storage Pits

Two and possibly three storage pits were discovered during trenching of the flat area east of the pit houses and pueblo which constituted the actual habitation area within the site. The placement of the storage pits away from the structures probably means one of three things: (1) the pits did not belong to the same occupation(s) as the structures, (2) the pits were used by the occupants of the structures but it was not important to place them near the structures, or (3) the pits belonged to the occupants of the structures but were placed away from the structures in order to hide their contents from thieves. This last interpretation relates to the possibility that the site was not inhabited year-round.

Storage Pit 13a (Feature 13a) and Possible Pit 13b (Feature 13b)

The shapes of Storage Pit 13A and Possible Pit 13B were not clear-cut, due to later quarrying of caliche for making construction mud (adobe) or rodent activity or both (Figure 19).

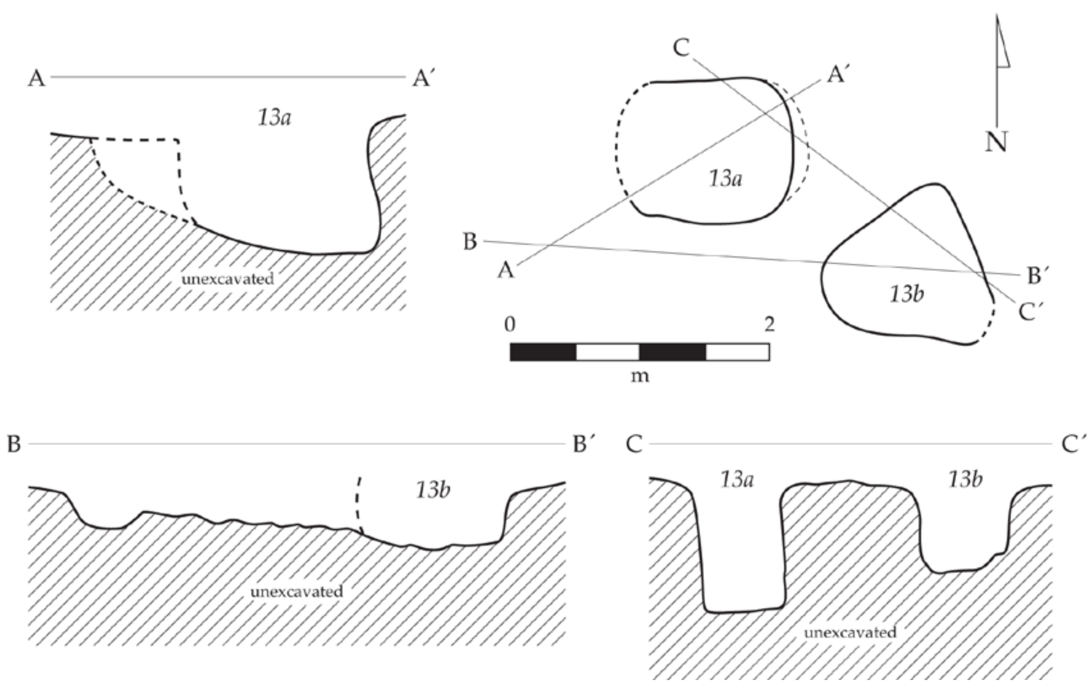

Figure 19. Storage Pit 13a and Possible Pit 13b, plans and cross-sections.

Storage Pit 13a was dug into caliche. It may have been oval in plan, but never had a flat bottom as might be expected. It may have measured about 1.10 by 1.50 m; the depth varied from about 0.75 to 1.02 m. The sides were nearly vertical or even slightly undercut. The pit was unplastered, and caliche pebbles and cobbles protruded through the walls and bottom of the pit. The fill was light brown dirt with occasional rocks, pebbles, and pieces gravels, was not charcoal-stained, and produced few sherds and other artifacts.

Possible Pit 13b was similar to Pit 13A but was more irregular in plan. It measured about 1.15 by 1.60 m and was about 0.65 m deep. The pit fill and cultural contents resembled those of Storage Pit 13a.

Storage Pit 14 (Feature 14)

This pit was much more regular in plan and profile than the Feature 13 pits (Figures 20 and 21). The unplastered sides were more or less vertical, and the bottom was flat and finished with 5 to 8 cm of mud plaster. The pit measured 1.45 by 1.65 m by 62 cm deep. The fill was much the same as described for the Feature 13 pits: light brown dirt with a few rocks, pebbles, and pieces of gravel, with only slight charcoal stains and few sherds and other cultural items. Charcoal flecks were noted in the lowest fill.

Hearths and Fire Pits

All seven extramural hearths and fire pits at the site were of sizes indicating use by a single family or other small group. Two types were present: with and without rocks. In hunting and gathering sites east of the mountains of southeastern New Mexico, small hearths with rock heating elements indicate older occupations (Archaic period and early pottery periods), while those lacking rocks indicate more recent occupations (early to late pottery periods) (Wiseman 2015:249).

Since we lack radiometric dates for the LA 10832 fire pits, we cannot state with certainty whether the temporal and cultural implications are the same for Abajo as they are in southeastern New Mexico. However, given the many Archaic style points recovered from the site, the rock hearths might belong to a component that predated the structures and painted pottery types.

Rock Hearth 3 (Feature 3)

Rock Hearth 3 is a shallow circular pit excavated into caliche and lined with rock fragments (Figure 22). It measures 56 by 59 cm by 10 cm deep. The fill, brown dirt stained gray by charcoal dust, included pieces of charcoal, burned rocks, white ash, and at least one maize cob. The top of the caliche matrix was 17 cm below the modern surface.

This feature was more carefully prepared than the other rock hearths at LA 10832. It was also more formal than most rock hearths found at hunter-gatherer sites in southeastern New Mexico and therefore probably was not contemporary with, or functionally equivalent to, those hearths. Rock Hearth 3 was very similar to the fire pit in Pit House 28 at Abajo, so perhaps the rock hearth belonged to the inhabitants of that structure.

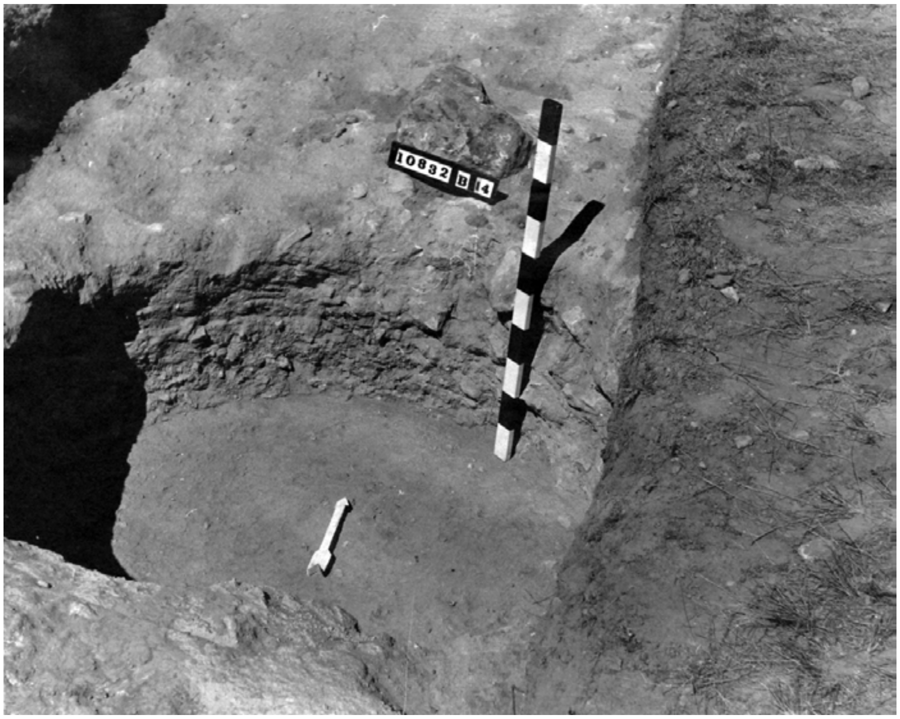

Figure 20. Storage Pit 14, looking north.

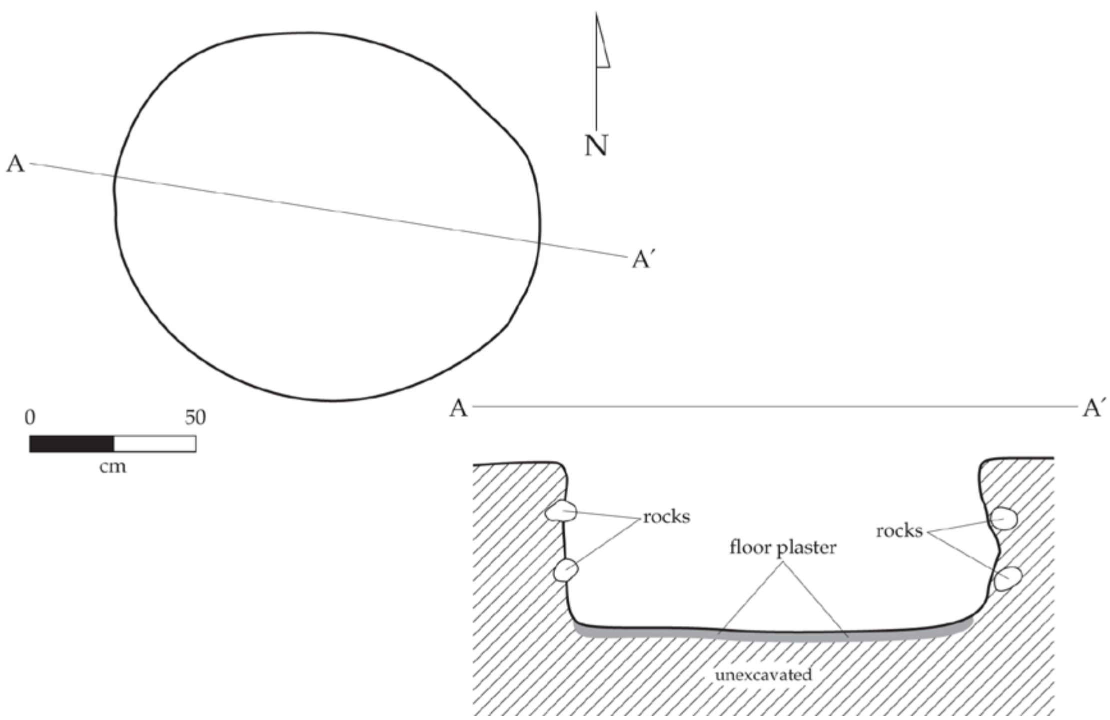

Figure 21. Storage Pit 14, plan and cross-section.

Figure 22. Rock Hearth 3, looking west.

Rock Hearth 11 (Feature 11)

Rock Hearth 11 is a classic example of a more-or-less-circular, on-the-ground (the aboriginal ground surface, that is) rock hearth so common east of the Guadalupe Mountains. Although partly disturbed prior to discovery, its original size can be estimated: 50 by 50 cm and 7 cm thick. The rock hearth began 12 cm below the modern surface and ended 22 cm above the caliche, thereby marking the aboriginal ground surface in this part of the site. The fill among and surrounding the rocks of the hearth was heavily charcoal stained and contained small pieces and flecks of charcoal and burned rock. The fill was some of the darkest encountered at LA 10832.

Rock Hearth 18 (Feature 18)

Rock Hearth 18 was another more-or-less-circular collection of burned rocks. It was in a vaguely defined, shallow depression, which probably was scooped out to remove loose surface soil and expose a more compact surface (Figure 23). The hearth measured 69 by 77 cm and was 11 cm deep. The fill was loose, soft brown dirt with pebbles and pieces of gravel and was lightly charcoal-stained. Occasional small pieces of charcoal, measuring up to 1 cm across, were also present. Small numbers of sherds and flakes were recovered from the fill. Like Rock Hearth 11, this hearth was also very similar to the rock hearths that characterize sites east of the mountains.

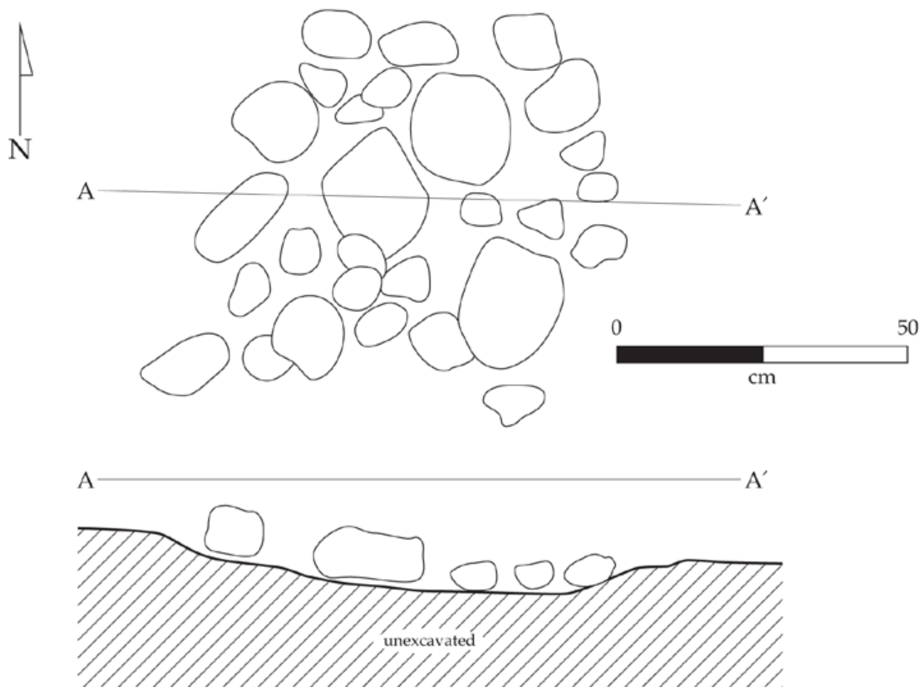

Figure 23. Rock Hearth 18, plan and cross-section.

Rock Hearth 22 (Feature 22)

Like Rock Hearth 18, Rock Hearth 22 was a more-or-less-circular collection of burned rocks in a shallow, vaguely defined, scooped out depression (Figure 24). The measurements are 85 by 85 cm and 10 cm in depth. Light charcoal staining and minimal small pieces and flecks of charcoal were observed here and there among the rocks but were not evenly distributed throughout. A few sherds and lithics, plus one corn cob, were recovered from the fill.

Non-Rock Hearth 15 (in fill of Borrow Pit 15 [Feature 15])

The presence of a non-rock hearth in the upper fill of Borrow Pit 15 was attested by a discrete lens of charcoal next to the east face of the borrow pit (Figure 25). Next to the charcoal lens, the caliche face of the borrow pit had turned pink from the heat of the fire. No traces of a fire pit were detected. The hearth measured 48 by 42 cm by 8 cm thick. Sherds, stone artifacts, animal bone, and other cultural materials were present above, around, and below the hearth, but none could be unequivocally associated with it.

Non-Rock Fire Pit 20 (Feature 20)

Non-Rock Hearth 20 was a well-defined, basin-shaped pit dug into caliche and filled with the soft brown fill typical of the site. The fill was strongly charcoal stained, with a few small fragments of charcoal (Figure 26). It was oval in plan, measuring 57 by 48 cm by 9 cm deep. This hearth was like the non-rock hearths so common in hunter-gatherer sites in southeastern New Mexico.

Figure 24. Rock Hearth 22, looking east.

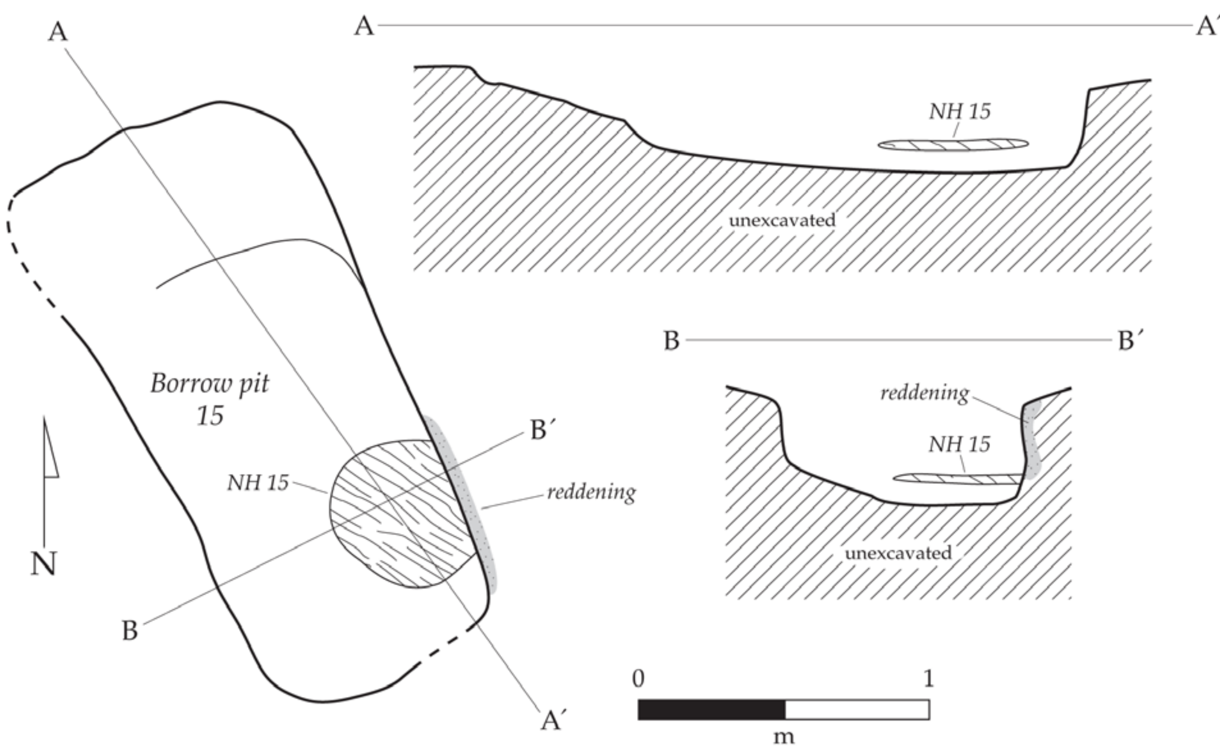

Figure 25. Non-rock Hearth 15, plan and cross-section. NH 15 = Non-rock Hearth 15.

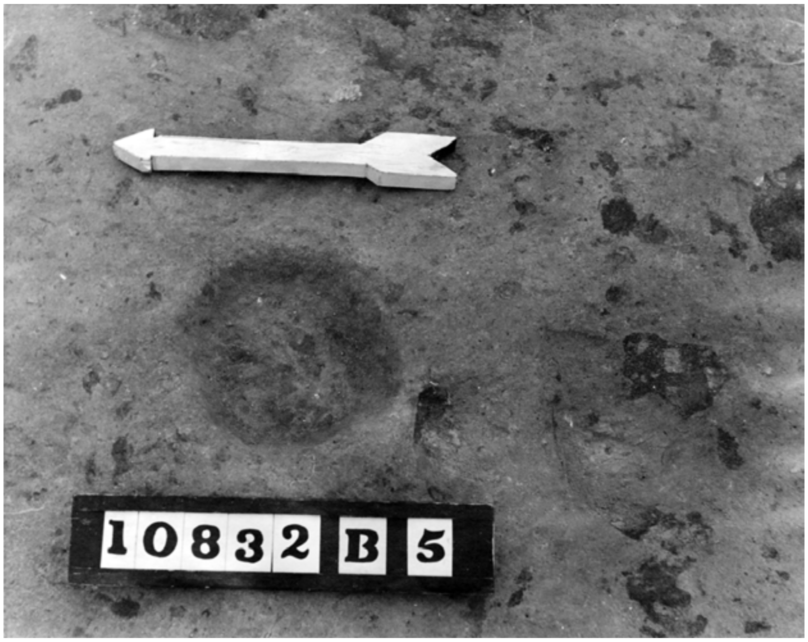

Figure 26. Non-rock Hearth 20, looking east.

Partial-Rock Fire Pit 21 (Feature 21)

This oval hearth was a well-defined pit with nearly vertical sides and a slightly concave bottom (Figure 27). It measured about 60 by 42 cm and was 9 cm deep.

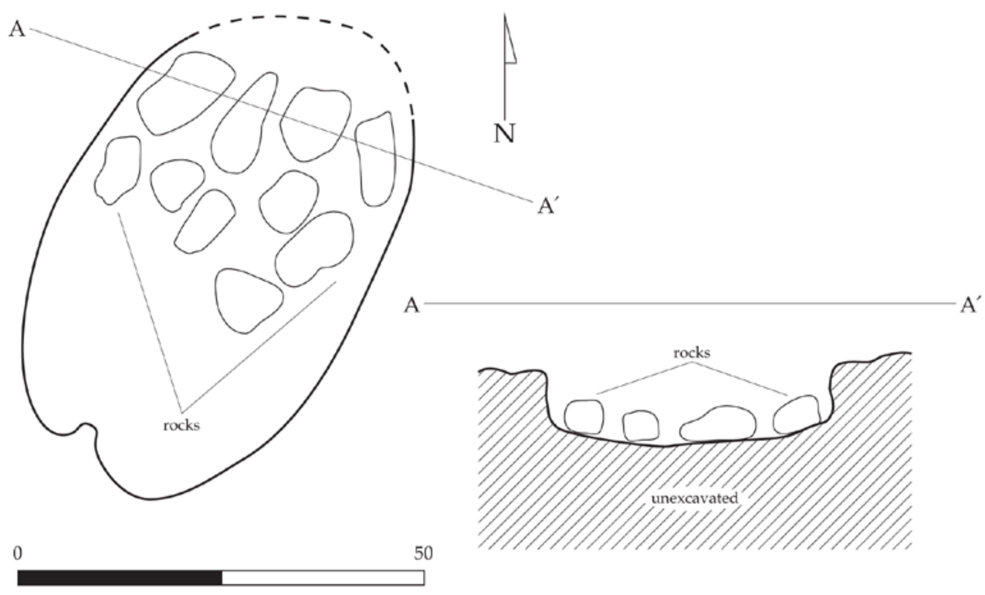

Figure 27. Partial-rock Hearth 21, plan and cross-section.

The fill was about evenly divided into two parts, with the north half including burned rocks and the south half lacking them. Otherwise, the fill throughout was charcoal-stained, sometimes heavily, and included small rock fragments, pieces of gravel, and pieces of charcoal up to 3 cm long and 2 cm in diameter. East of the Guadalupe Mountains, a hearth of this sort would be called a non-rock hearth—the 10 rocks that were present did not constitute the major component of the fill.

Small Ash-Filled Pits

Five small pits—Features 7–10 and 16—had been dug into caliche and filled with ashy dirt (Figure 28). Four were circular and one (No. 10) was oblong. Feature 7 measured 19 by 19 cm by 7 cm deep, Feature 8 measured 15 by 16 cm by 10 cm deep, Feature 9 measured 10 by 11 cm by 7 cm deep, and Feature 16 measured 18 by 20 cm by 11 cm deep. The fifth, Feature 10, measured 14 by 29 cm by 13 cm deep. Their fills were essentially the same: loose to somewhat compact ashy gray dirt with a few charcoal flecks and the usual pebbles and pieces of gravels derived from the local sediment. One (Feature 7) also contained two sherds and a flake. While they seemed too small to be effective for heating or lighting features, such functions cannot be ruled out.

The name applied to them at the time of excavation, "ash deposit pits," derived from several much larger pits found east and south of the kiva in Plaza C in the late prehistoric village of Sapawe (LA 306) in north-central New Mexico. At the time, this huge pueblo was being excavated by field schools directed by Florence Hawley Ellis of the University of New Mexico. The pits at Sapawe were 30 to 35 cm in diameter and about as deep, were 5 to 10 m from the kiva, and had been packed to the top with pure white ash, presumably from the fire pit of the kiva. Dr. Ellis had been told by one of her Pueblo Indian informants to look for such pits, because they should be there. The purpose of the pits was to properly dispose of the sacred ashes from the kiva.

It is a stretch of the imagination to conclude that the ash-filled pits at Abajo de la Cruz served the same purpose, so the question of function remains unanswered. The fills of these features clearly differed from the overlying soil, and the pits were prehistoric. But what was their purpose?

Caliche Borrow Pits

Six caliche borrow pits— Features 12b–12e, 15, and 29—were excavated, either in whole or in part (Figures 3 and 29). All but one (Feature 15) were grouped near the pit houses and the pueblo. Their sizes and shapes varied considerably. As the south ends of Strip Trenches 1 and 2 were being opened (along with the strip between them), a large area of the underlying caliche was found to include holes of unknown configuration, extent, and depth. Segregating collections into meaningful units became the name of the game. Eventually, we discovered that one pit house (12a) was within the complex of holes, but it was not until each part of the area had been excavated to sterile soil that we discovered the true nature of the disturbance of the caliche. Add in the work of burrowing rodents, and our confusion was complete.

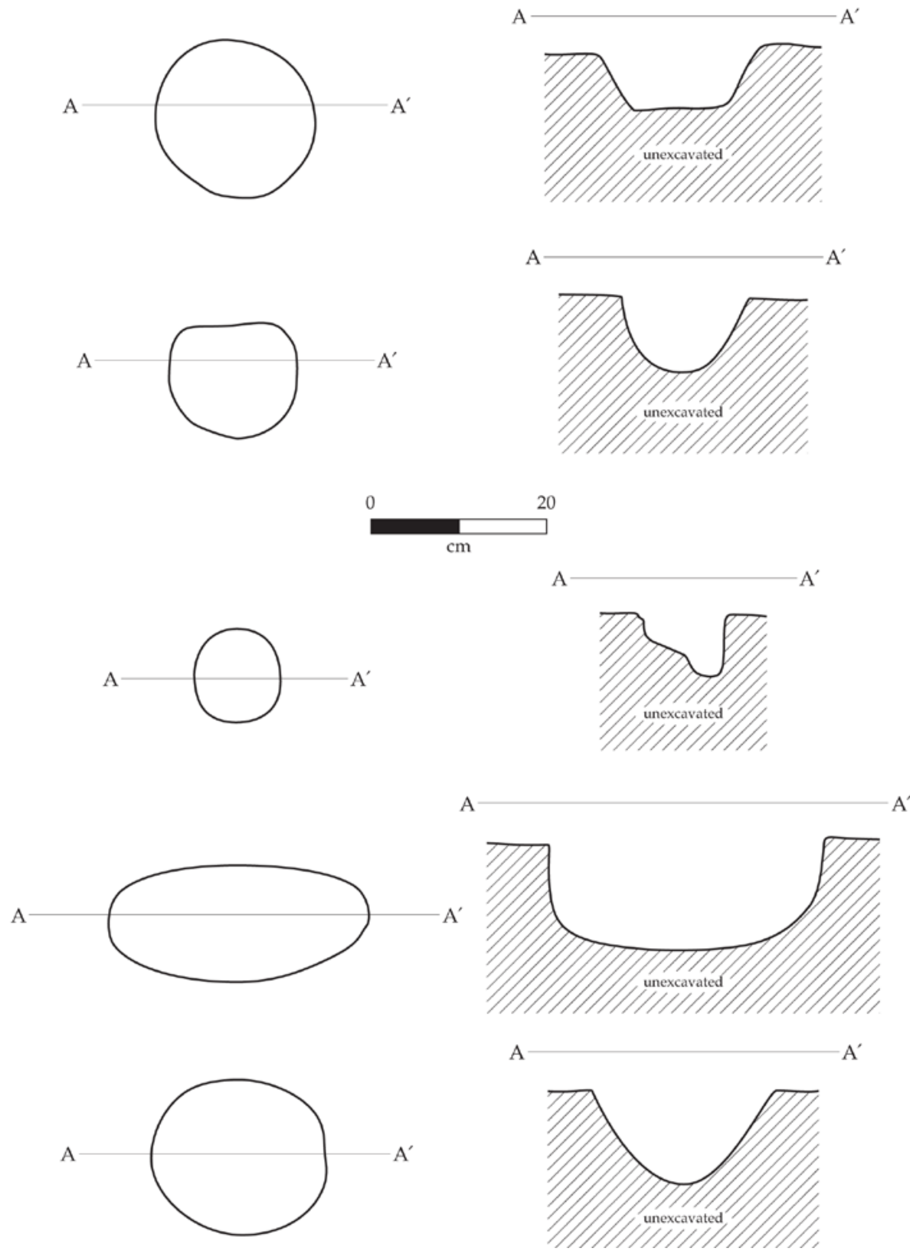

Figure 28. Small ash-filled pits, plans and cross-sections. Top to bottom: Features 7, 8, 9, 10, and 16 .

Figure 29. Caliche Borrow Pits B, C, and D. Looking southeast from Pit House 28 (dark triangle in the lower right corner of the photograph). Pit House 13a is at the center of the left edge of the photograph.

By the end of the fieldwork we exposed a series of small holes that had been dug in order to extract caliche for use in preparing mud mortar. This mortar was used to seat the stones of the wall footings and as finishing coats of mud (plaster) on floors and walls. While most of this mortar appears to have been used on or in the pueblo rooms, a few other places (such as the bottoms of Pit House 28 and Storage Pit 14) also appear to have benefitted. Being low spots in the ground, the borrow pits then became receptacles for trash.

While we did not collect the measurements needed to calculate the amount of caliche removed from the borrow pits, we have good data for two of the better-defined examples, Borrow Pits 15 and 29. Because of their small sizes and definite shapes, they *may* represent single mining episodes. Borrow Pit 15 measured 92 by 207 cm by 36 cm deep, for a volume of roughly 0.69 cubic meter. Borrow Pit 29, in the bottom of the Borrow Pits 15b–15d complex, measured 85 by 130 cm by 18 cm deep, for a volume of roughly 0.20 cubic meter.

Line of Posts (Feature 30)

Rotted basal remnants of four wood posts were found in the south end of Strip Trench 4. The top ends of the remnants were partly charred, suggesting that the upper parts of the posts had burned away. The diameters were 12, 7.5, 7.4, and 4–5 cm. The spacing between varied from 77 cm to 1.54 m. The total length of the alignment was 3.15 m. The bottoms of the posts rested in fairly compact caliche.

Almost no unburned wood survived in demonstrably prehistoric contexts, so it seems quite likely that this alignment of posts dated to the late 1800s or early 1900s. The function of the alignment is unknown. The presence of prehistoric artifacts near the posts, both on and below the modern surface, can be attributed to general scattering of prehistoric trash across the site rather than being related to the placement of the posts.

Chapter 10

MATERIAL CULTURE

Two types of material culture are examined in later chapters. Pottery other than worked sherds is discussed in Chapter 11. Chipped stone manufacturing debris is examined in Chapter 12.

Projectile Points

Forty-six projectile points were recovered from Abajo de la Cruz. Of these, 35 are arrow points and 11 are Archaic dart points (Table 3).

Table 3. Projectile Point Data.
(Dimensions in mm; weights in grams)

No.	Prov.*	L.	W.	Th.	Wt.	Matl.**	Percent Complete (Comment)
				Unnotched Triangular Arrow Points			
6	4 s	17	9+	3	0.3	b Ct	98% (small part of base missing)
11	12 f	16+	10	2.5	0.3+	m g Ct	70% (tip missing)
13	12 s	16+	9+	2	0.1+	d g CT	75% (tip and part of base missing)
20	12c bf	13+	7+	2	0.3+	b Ct	50% (tip and base missing)
21	12c bf	18+	7+	2+	0.4+	l g Ct	50% (base missing)
23	12c bf	14+	10	2.5	0.2+	l g Cl	95% (tip missing)
25	12c bf	16+	9+	2.5+	0.4+	d g Ct	50% (base missing)
30	15 f	16+	12+	2.5	0.5+	b Ct	60% (tip missing)
31	15 f	16+	10.5	2.5	0.2+	b Ct	60% (tip missing)
33	15 f	11+	8+	2.5	0.2+	b Ct	30% (tip and base missing)
351	5 f	16+	11+	2.5	0.3+	b Ct	80% (tip and part of base missing)
361	5 f	12+	11	2.5	0.3+	b Ct	70% (tip missing)
37	15 f	14+	9+	2.5	0.4+	b Ct	50% (tip and base missing)
38	15 f	15	10+	1.5	0.1+	b Ct	98% (part of base missing)
401	5 f	4+	9+	2.5	0.2+	b Ct	70% (tip and part of base missing)
411	5 f	11+	7+	2.5+	0.2+	b Ct	25% (tip and base missing)
47	24 ff	15+	12.5	2.5	0.3+	w Ct	70% (tip missing)
48	24 fc	23	10.5+	2.5	0.2+	b Ct	98% (part of base missing)
52	28 f	15+	11	3	0.4+	d g Ct	70% (tip missing)
56	28 f	12+	10+	3.5	0.5+	d g Ct/Cl	60% (tip and part of base missing)
57	28 f	17	9	2.5	0.3	l g Cl	100%
58	28 f	13+	9+	3	0.5+	w Cl	90% (tip and part of base missing)
59	28 f	18+	9+	2.5	0.4+	c b O w/ b st	90% (tip and part of base missing)
60	31 ff	24	9	3.5	0.8	l g Cl	100%
?	28 ff	15+	9+	2+	0.3+	b Ct	50% (base missing)

Table 3. Projectile Point Data.
(Dimensions in mm; weights in grams)

No.	Prov.*	L.	W.	Th.	Wt.	Matl.**	Percent Complete (Comment)
Side-Notched Arrow Points							
7	12 f	25+	13	3.5	0.8+	m g Ct	90% (tip missing)
12	12 s	23+	12.5	3.5	0.9+	m g Ct	95% (part of base missing)
27	12c bf	28+	10	3.5	0.5+	m g Ct	70% (tip missing)
43	19 f	19+	14.5	3.5	0.9+	md g Ct	70% (tip missing)
45	23 f	21+	9+	3.5	0.7+	l g Ct	70% (tip, stem, and base missing)
54	28 f	32+	15	3.5	1.3+	md g Ct	95% (tip and part of base missing)
55	28 f	27.5	8.5+	2.5	0.6+	b Ct	95% (part of base missing?)
Residual Group of Arrow Points							
4	1 s	15+	17+	3	?	?	60% (tip and base missing)
18	12b f	22+	16	4	1.2+	m bn Ct	80% (base missing)
42	19 f	22.5	15	4.5	1.4+	m g Ct w/ sp	95% (part of base missing)
Archaic Dart Points							
1	surf.	23+	22	4.5	2.3+	t & l g Ct	60% (part of blade, base missing)
3	surf.	26+	19+	6	3.4+	w Qt	90% (stem and base missing)
5	2 s	29+	21	6	2.9+	md g Ct	98% (tip was reworked)
8	12 f	26+	21.5	6.5	3.0+	bd gn St	70% (part of blade, base missing)
9	12 f	41	28.5	6.5	4.3	d g Ct	100%
15	12 bf	33	22.5	6	3.4	l g Ct	100%
17	12 bf	24+	16+	4.5	1.6+	l g Ct	45% (part of blade missing)
22	12c bf	15+	17+	5	1.3+	b Ct	40% (blade missing)
26	12c bf	26+	21+	7	3.4+	m bn Ct	80% (blade was reworked)
44	19 f	13+	23+	5+	1.8+	fp Ct	40% (blade missing)
51	28 f	36+	27.5	5+	5.6+	d r Ct	70% (stem and blade missing)

* Provenience codes: bf = bottom fill; f = fill, fc = floor contact; ff = floor fill; s = stripping; surf = surface

**Material codes: Cl = chalcedony; Ct = chert; O = obsidian; Qt = quartz; St = siltstone; bd = banded; c = clear; d = dark; l = light; m = medium; md = medium-dark; w/ = with; b = black; bn = brown; fp = fingerprint; g = gray; gn = green; r = red (burned?); t = tan; sp = specks; st = streaks.

Arrow Points

Two basic types of arrow points and one residual group were represented at Abajo. The most common type was a small, delicate, unnotched triangle that would be called Fresno in Texas. The other, less common type is the side-notched Washita/Harrell. The third group is a heterogeneous assemblage of arrow-point-size specimens reworked from larger bifaces and biface fragments.

The 25 Fresno points (see Figure 30a–c) are delicate, having been made from small, thin flakes. The most frequent material is black chert, followed by other cherts, chalcedony, obsidian, and cherty chalcedony (Table 4). Most are fragmentary, making determinations of length and width somewhat problematic.

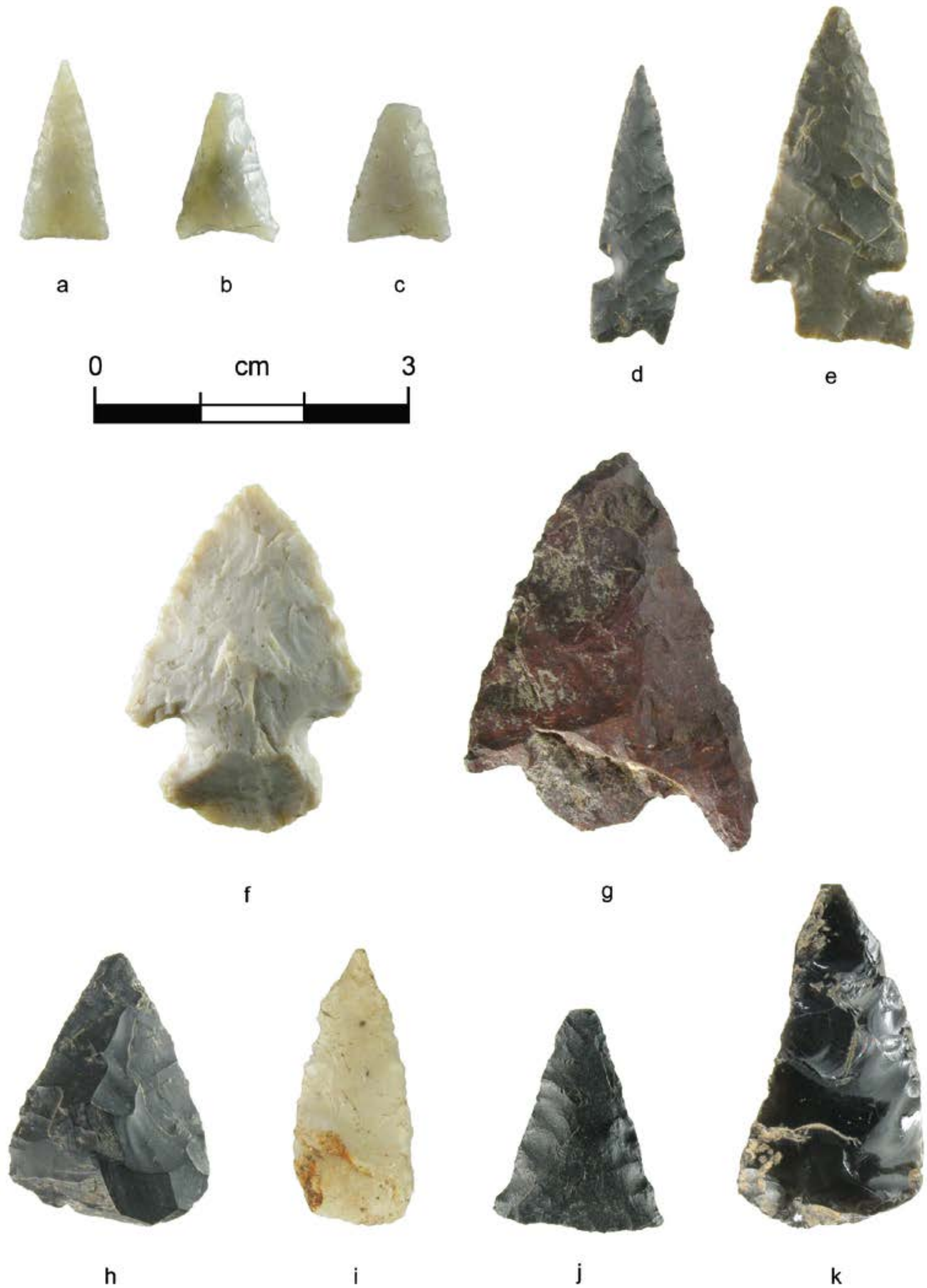

Figure 30. Projectile points and other chipped bifaces.

Table 4. Comparison of Arrows and Biface Manufacturing Reject Material.

	Unnotched Arrow Points	**Side-Notched Arrow Points**	**Biface Reject Material**
Dimensions			
Length:			
Mean	19.2 mm	?	24.9 mm
Range	15–24 mm	?	17–34 mm
Number	5	1	7
Width:			
Mean	10.6 mm	13.0 mm	14.7 mm
Range	9–12.5 mm	10–15 mm	8–22 mm
Number	8	5	10
Thickness:			
Mean	2.6 mm	3.4 mm	3.6 mm
Range	1.5–3.5 mm	2.5–3.5 mm	2–7 mm
Number	21	7	15
Materials			
Black chert	13	1	10
Other chert	6	6	10
Chalcedony	4		2
Cherty chalcedony	1		
Obsidian	1		
Total	25	7	22

The seven side-notched arrow points (Figure 30d–e) are a strange group that lacks anything approaching standardization other than fitting the general descriptions of the Washita and Harrell point types. Some are short and wide, others long and slender. Interestingly, all but one are made of some shade of gray chert; the exception is made of black chert. All are fragmentary

The three members of the residual group are included in this category because they appear to be “finished” arrow points that could have served as weapons prior to breakage or loss. All appear to have been made from fragments of larger bifaces or tools.

Archaic Dart Points

Ten of the dart points are sufficiently complete to permit confident assignment to type (Figure 30f, g). One is a basal fragment of either an Early Archaic Bajada point or a Middle Archaic San Jose point. Nine points are basally notched or corner-notched Late Archaic points assignable to the Ellis, Ensor, and Hueco types or related types.

Bifacial Manufacturing Debris

Twenty-two fragments of bifaces display characteristics of breakage or rejection during manufacture (Figure 30h–k; Table 5).

Table 5. Biface Manufacturing Reject Material Data.
(Dimensions in mm; weights in grams)

No.	Prov.*	L.	W.	Th.	Wt.	Matl.**	Percent Complete (Comment)
Probable Arrow Point Preforms Discarded during Thinning							
2	surf.	16+	13+	4+	1.0+	w Ct	70% (tip missing)
16	12 ff	21+	16+	4+	1.4+	b Ct	98% (tip missing)
49	25 f	19+	15+	3+	0.8+	w Ct	98% (tip missing)
Projectile Point or Preform Fragments							
10	12 f	19+	13+	3+	1.1+	b Ct	50% (base missing)
19	12c ff	12+	10+	3	0.7+	d g Ct	30% (tip and base missing)
24	12c ff	14+	10+	5+	1.0+	l g Ct	35% (tip and base missing)
46	24 ff	12+	12+	3	1.0+	l g Ct	30% (most of base missing)
53	28 f	15+	12+	2+	0.8+	b & c Cl	50% (tip and part of base missing)
Projectile Point Manufacturing Reject Material							
	s	23+	14+	3	1.0+	b Ct	50–75% (base missing; bulb of force at tip)
	s	22	15	3	0.8	b Ct	100% (site-struck flake)
	12c ff	21+	15	3	1.1+	b Ct	75% (tip missing)
	12 s	31	20	5	2.6	m g Ct	100% (with black streaks)
29	15 f	21+	15+	3	1.1+	m & dg Ct	75% (side-struck flake)
32	15 f	19	12	3	0.6	b Ct	100% (crudely formed)
34	15 f	11+	15	3	?	d g Ct	30% (upper blade missing; with black streaks)
39	15 f	?	?	?	?	b Ct	15% (crudely formed)
	17 f	20+	10	3	0.5+	b Ct	75% (tip missing; bulb of force at base)
	28ff	17	8	2	0.2+	m g Ct	90% (part of base missing)
	31 ff	26	11	2	0.6	l g Cl	100% (bulb of force at tip)
	31 lc	34	22	7	4.9	b Ct	100% (side-struck flake)
	32 ff	25	19	7	2.7	b Ct	100% (crude; bulb of force at base)
	32 ff	16+	10+	4	0.6+	w Ct	% = ? (practice piece?)

* Provenience codes: f = fill; ff = floor fill; lc = lithic cache in floor; s = stripping; surf. = surface.
** Material codes: Cl = chalcedony; Ct = chert; d = dark; l = light; m = medium; b= black; c = clear; g = gray; w= white.

In many cases, these items might be covered by the term “preforms.” Others may be indeterminate fragments of projectile points. At least one may have been a practice piece worked by a student knapper. The most frequent material is black chert, followed by other cherts and chalcedony.

Discussion

Common causes for discarding items during manufacturing include breakage, problems thinning the item, and insurmountable flaws in the material. In other cases, final work is deferred for any number of reasons, the item is set aside, and it is never finished or lost and enters the archaeological record. Then the archaeologist finds it and must analyze it. Because flintknapping is a specialized area of knowledge, many archaeological crew members doubling as lab analysts are unable to make appropriate distinctions and fail to establish whether the items are finished products or were unfinished and lost or discarded.

These problems are amplified for the production of projectile points, a multi-stage process characterized by two or more steps that can be fairly discrete. The more steps involved, the more room there is for uncertainty as to whether an item is a finished product or represents late stage manufacture. The problem is also exacerbated by later breakage that had little or nothing to do with the manufacturing process. This is especially common when the difference between a finished item and late stage manufacture is one of final thinning or notching.

One way to deal with the problem is to compare the dimensions of items that are clearly finished projectile points with those thought to represent some stage of manufacture. While this approach does not guarantee success, it can support categorizations derived by other means. Data to this end are presented in Table 4. As is shown, presumed rejected, partly manufactured bifaces are longer, wider, and thicker than both the unnotched triangular projectile points and the side-notched projectile points. While errors in assignment may have been made, assumptions as to the probable "function" of biface reject materials are fairly well supported by these data.

Black chert was the preferred material for making unnotched triangular points, with other cherts being a second choice. The biface production reject material, however, is evenly represented by both materials. As one possible explanation, the "other" cherts were more susceptible to breakage during manufacture. Unfortunately, the sample size of side-notched arrow points is very small, so any such conclusions are tentative.

The projectile points and biface manufacturing reject material were recovered from 23 separate proveniences at Abajo de la Cruz. The only concentrations of such items were in the primary refuse deposits in the fills of Feature 12 (8 proveniences, including Pit Rooms 12a and 28) and Borrow Pit Feature 15 (2 proveniences). Finds of one to three items each were made in the remaining 13 proveniences, including the site surface and the strip trenches.

What is herein called "unnotched triangular arrow point" (or Fresno point in Texas) is the dominant projectile point recovered from the several El Paso phase villages in the Alamogordo and White Sands areas of New Mexico (Lehmer 1948). Those points are the same thin, very delicate examples as were recovered from Abajo de la Cruz.

Grinding Equipment

Manos

Eighteen complete and fragmentary manos were recovered from Abajo de la Cruz. Although no Archaic-style one-hand manos were present, the specimens included examples that fall within both the one-hand and the two-hand size categories used by Southwestern archaeologists (Figures 31 and 32). All but three of the manos are tabular in longitudinal cross-section. The three exceptions are much thicker and therefore classifiable as loaf-shaped manos.

Figure 31. Manos, one-hand size.

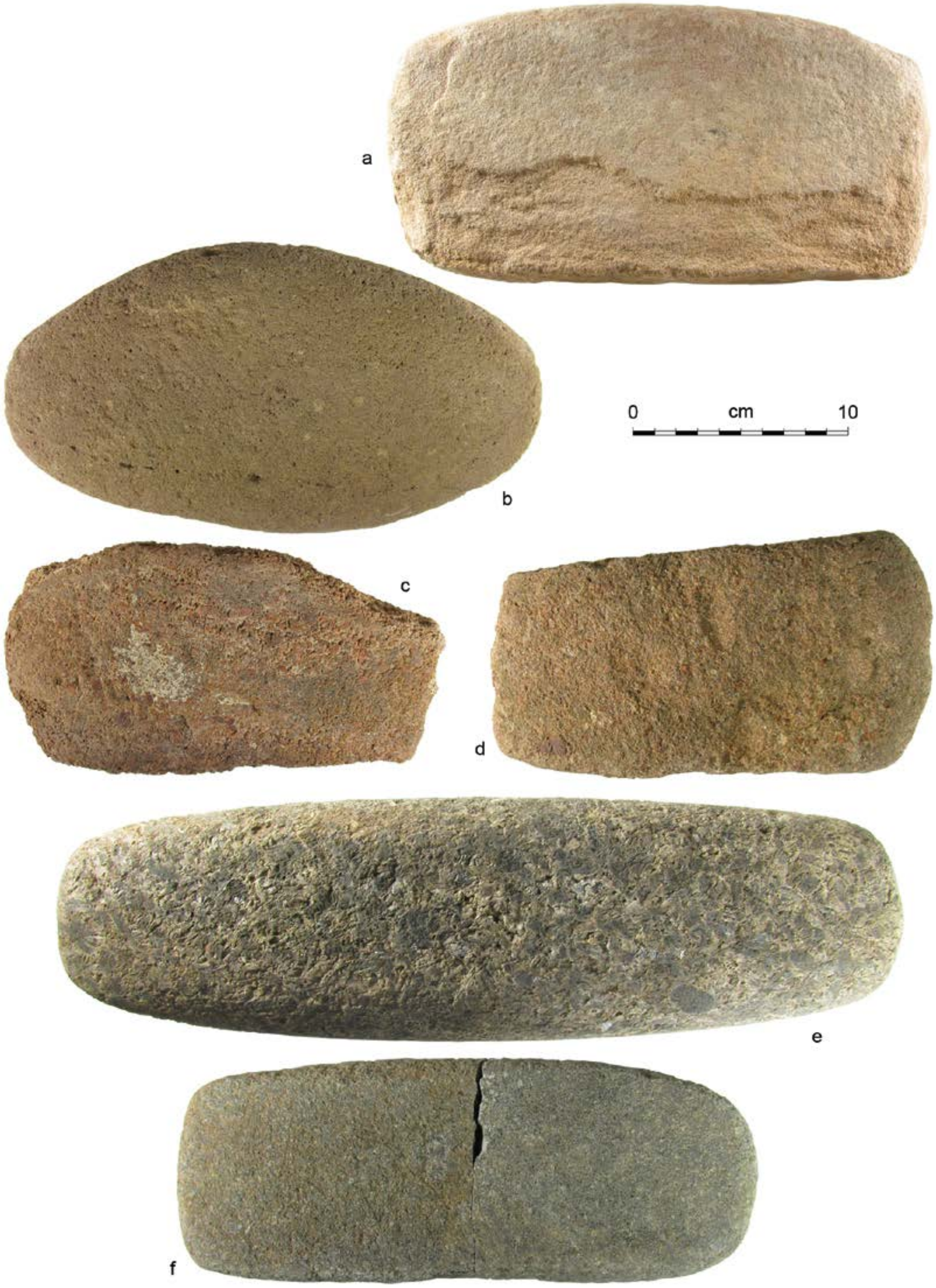

Figure 32. Manos, two-hand size. Examples a–d and f: two-hand type.
Example e: loaf type.

Natural cobbles of the appropriate size and shape were selected for use as manos. The primary modification was preparing one or two grinding surfaces. Otherwise the cobbles were used almost unmodified, except perhaps to shorten cobbles that were too long for the metates on which they were to be used. The procedure for shortening these manos was to grind (and peck?) one or both ends. Few have modified edges, and only one has a modified surface opposite the grinding surface that was not used as a second grinding surface. The grinding surfaces were mostly well-formed through use, but none of the manos were used to the point of "exhaustion" (too worn for further use). The smallest mano appears to have been a recycled end fragment of a larger mano.

Manos were made from both sedimentary and igneous cobbles (Table 6). Four varieties of sandstone and three types of igneous rock are represented.

Table 6. Rock Types Represented by Manos.

Material	Count
Sedimentary Rocks	
Reddish sandstone	2
Coarse/very coarse reddish sandstone	6
Off-white sandstone	1
"Dirty" sandstone	1
Subtotal	10
Igneous Rocks	
Hornblende diabase	3
Fine-grained diorite	1
Orthoclase hornblende monzonite porphyry	3
Subtotal	7
Total	17

The complete Abajo manos display a range of lengths and weights (Table 7). Some fragmentary examples nonetheless preserve their entire original width and thickness, increasing the available data. While the sample size is too small for detailed analysis, the values for width and thickness do cluster to a degree. For width, the values hint at the presence of two modes (Table 8).

The average mano length in the Abajo de la Cruz assemblage is 169.9 mm, with the largest mano measuring 250 mm long. Setting aside concerns about sample size, these figures place the Abajo assemblage within Hard's (1990, Table 10.4) second highest category for maize dependence. That category suggests moderate to high dependence on maize (between 35 and 75 percent of caloric intake). Subsequent studies by Hard and his colleagues (1996) confirm his initial findings even though they use mano grinding surface areas rather than mano length. Although some have challenged the results of Hard's study (e.g., Adams 1999), I continue to see his ideas as useful insights into the role of maize in the diets of Southwestern farmers.

Table 7. Manos.

(Dimensions in mm; weights for complete examples in grams; one grinding surface unless two are indicated.)

Prov.	Type	L.	W.	Th.	Wt.	Material	Proportion present, comments
2 s	2	165+	115	44		Hornblende diabase	1/2 to 2/3; shaped all over
4 s	1	165	122	35	1191	Reddish sandstone	Complete; partly shaped
4 s	1	148	92	45	1095	Coarse red sandstone	Complete, but was longer at one time.
5 s	2	224	113	49	1985	Hornblende diabase	Complete; ends squared as only modifications to general shape
6 s	1	120	108	46	822	Off-white sandstone	Complete except for one end split off due to use as hammer
6 s	1	89	93	60		"Dirty" sandstone	**2 grinding surfaces.** Incomplete, once part of a two-hand type mano, lightly used
12 s	?	66+	94	60		Orthoclase hornblende monzonite porphyry	Medial fragment
12 s	2?	95+	70+	56+		Hornblende diabase	End fragment of a loaf-shaped mano; edges and non-ground surfaces shaped
12 f	2?	102+	104+	38+		Fine-grained diorite	Badly weathered end fragment
12 f	?	65+	81+	53+		Reddish sandstone	Small medial fragment
12 f	2?	60+	54+	55+		Not identified	End fragment of a loaf-shaped mano; very narrow grinding surface; roughly shaped overall
12 ff	2?	127+	120+	35		Very coarse sandstone	End fragment
12c ff	2?	108+	69+	56+		"Dirty" sandstone	Loaf-shaped mano with very narrow grinding surface
17b f	2	183	99	48	1351	Very coarse red sandstone	Complete; unmodified except for grinding surface
17b f	1	95+	111+	38+		Very coarse red sandstone	All edges shaped; fits fragment listed next.
17b f	1	105+	60+	43		Very coarse red sandstone	All edges shaped; fits fragment listed previously
25 f	1	155+	110	51		Orthoclase hornblende monzonite porphyry	Mano or mano blank, very slightly used, probably complete
31 fc	2	250	96	38	1814	Orthoclase hornblende monzonite porphyry	In two pieces but complete when refitted; roughly shaped edges
31 fc	2	180	99	66	2155	Very coarse red sandstone	Complete; unmodified except for one end and grinding surface

Table 8. Manos: Summary Statistics.

	Length	Width	Thickness	Weight
Number used	8	11	13	7
Mean	169.9 mm	103.7 mm	47.7 mm	1487.6 gm
Median	161 mm	107.0 mm	51 mm	1488.5 gm
Mode(s)		19–100 mm; 108–115 mm	43–51 mm	
Range	89–250 mm	92–122 mm	35–66 mm	822–2155 gm

Metates

Two complete and five fragmentary metates were recovered from Abajo de la Cruz. Three varieties are represented: basin (n=3), trough (n=2), and slab (n=2) (Figures 33 and 34). The definition of slab metate used here follows Southwestern archaeological usage in that the grinding surface covers the surface of the stone. The curious thing about the two Abajo slab specimens, however, is that the grinding surfaces are both slightly depressed 5 to 7 mm towards the centers, rather than being evenly ground across the stone. One might ask whether they should be considered to be slab metates or very large, poorly developed basin metates.

The primary effort in making all of the metates was to fashion the grinding surfaces. In some cases, the sides, ends, and bottoms of the stones were modified to reduce or eliminate unwanted projections. This was done by flaking, or by pecking and grinding, or both. However, little effort was expended in such cases, and all of the specimens retain most of the original shapes of the stones.

Materials used for the Abajo metates include fine, light gray sandstone; coarse reddish-gray sandstone; limestone; and vesicular limestone. The measurements for the two complete metates are as follows.

A limestone trough metate (FS 17b-22) measures 385 by 325 by 130 mm overall. The grinding surface measures 365 by 235 by 50 mm. The trough is open at both ends.

A slab metate of very coarse sandstone (FS 31-40) measures 460 by 300 by 130 mm overall. The grinding surface measures 390 by 260 mm.

The proveniences of the metates are as follows:

Two basin metate fragments, possibly from the same metate: Strip Trench Feature 4 fill.

Basin metate fragment (FS 27-1): Pueblo Room 27 fill (from wall construction?).

Trough metate, complete (FS 17b-22): floor of Pueblo Room 17b.

Trough metate fragment (FS 28-81): Pit House 28 fill.

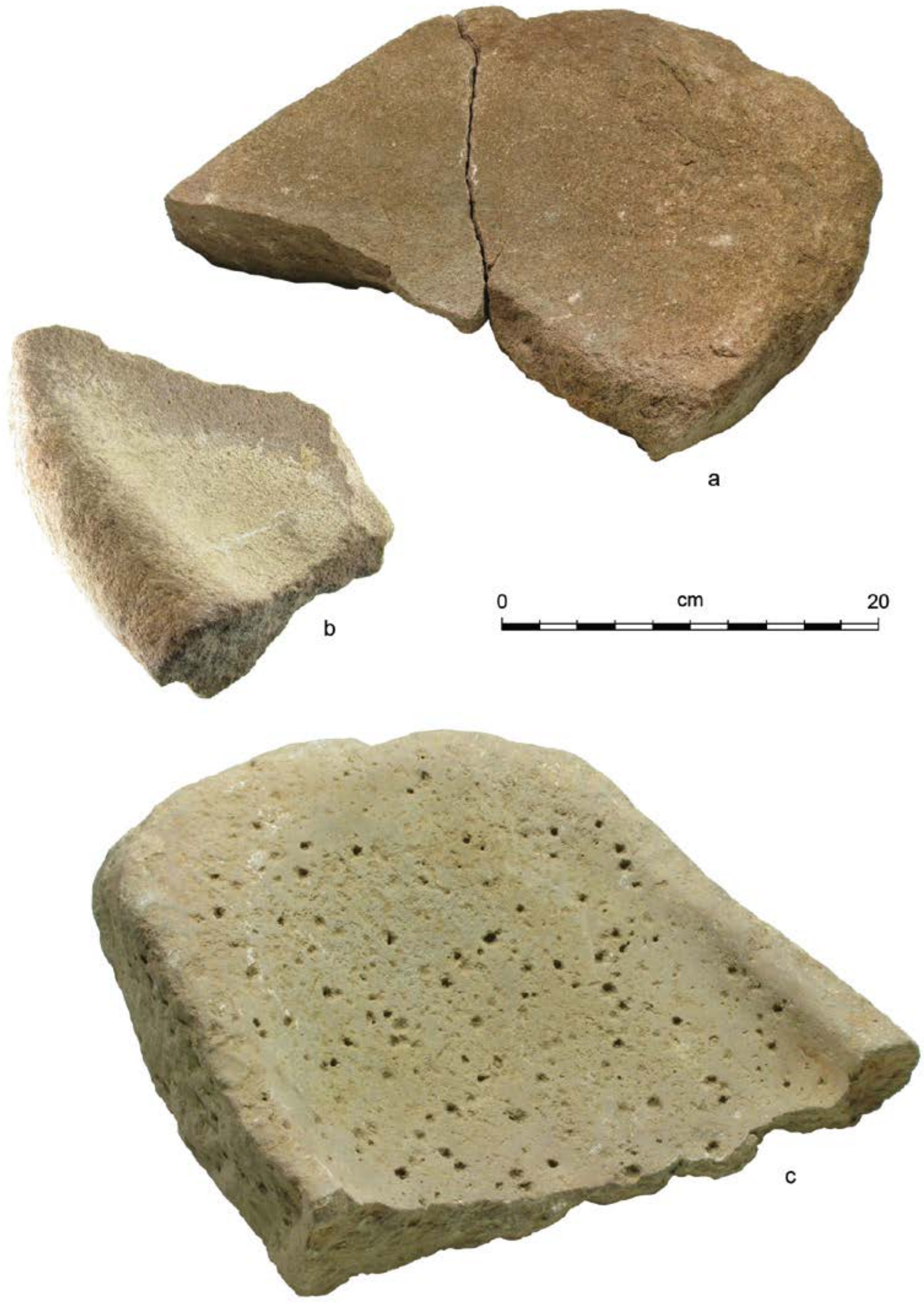

Figure 33. Metates. a, b: basin type. c: one-end-closed trough type.

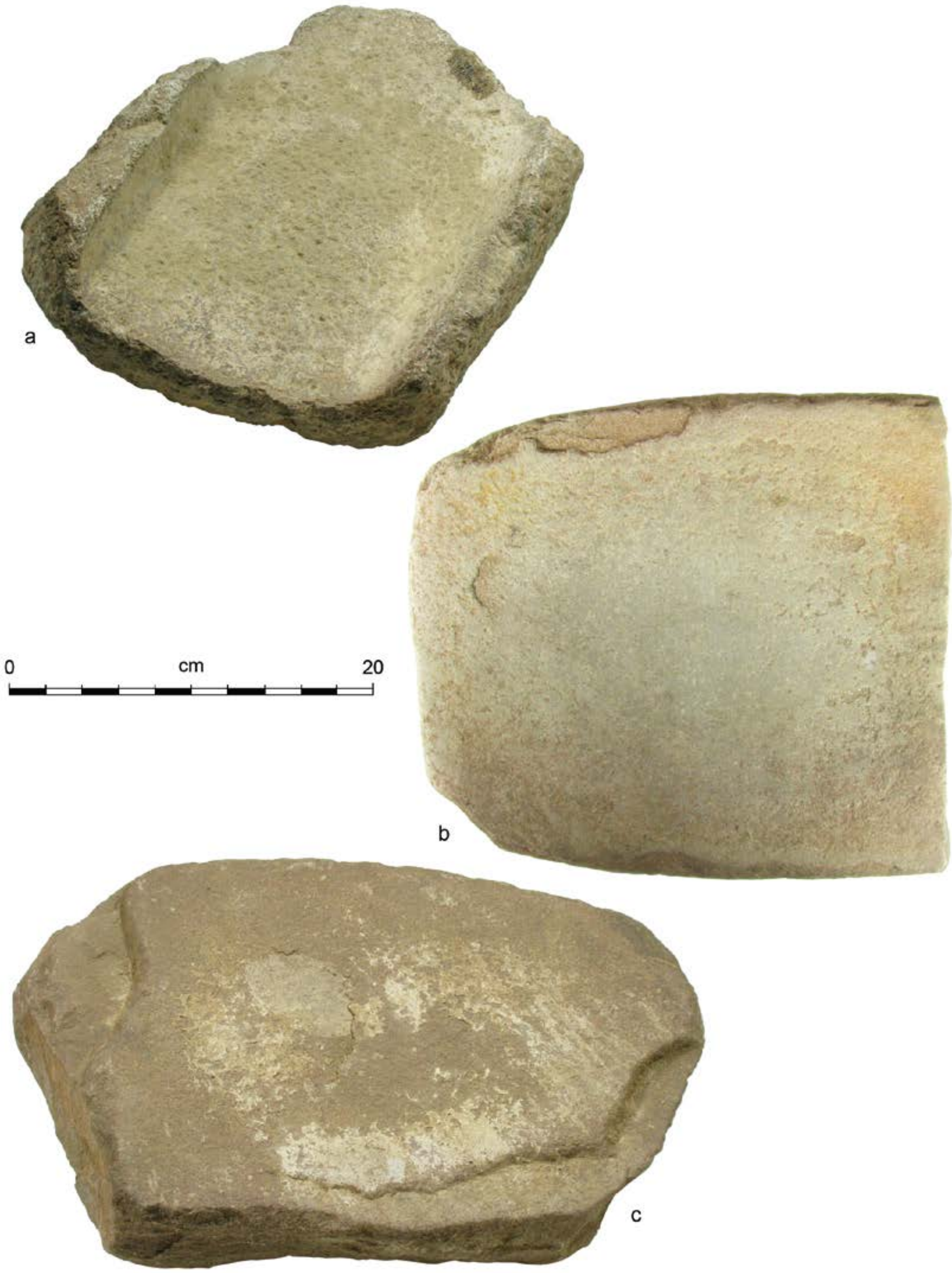

Figure 34. Additional metates. a: trough type. b, c: basin or slab type.

Slab metate fragment (FS 31-37): floor of Pueblo Room 31.

Slab metate, complete (FS 31-40): floor fill of Pueblo Room 31 (fallen from roof?).

The presence of well-developed examples of basin, trough, and slab metates at Abajo de la Cruz is interesting—not only because of the mixed technology they represent (especially given the very small sample size) but also because of the results from a recent study of complete and near-complete metates from the Otero, Lincoln, Chaves, and Eddy Counties (Wiseman 2012). That study, involving close to 250 specimens, found that the vast majority of metates and grinding surfaces were small-basin and large-basin metates. True trough metates and true slab metates are comparatively rare and may be from the latest contexts in south-central and southeastern New Mexico sites. The data from Abajo de la Cruz are consistent with these findings, though the mix of types in what appears to be a short-lived occupation is curious and may reflect a transition to the then-latest technology.

Miscellaneous Artifacts

Wood Ball

A fragment of a wood ball is at least partly charred. About two-thirds of the ball has survived. The wood may be juniper. The ball measures about 57 mm in diameter and came from the fill of Pueblo Room 31.

Arrow-Shaft Straightener

A small gray quartzite cobble was fashioned into a single-groove arrow-shaft straightener (Figure 35a). The cobble was almost fully modified by pecking and grinding to an oval plan shape, with a flat bottom and convex top. Total size is 88 by 66 by 41 mm. The groove measures 56 by 11 by 5 mm. The arrow-shaft straightener was recovered from the floor of Pueblo Room 31.

Triangular Stone

A tabular piece of limestone has two natural acute angles and one rounded side created by chipping (Fig. 35b). The overall dimensions are 170 by 154 by 49 mm. A natural hole (33 mm in diameter, 21 mm deep) in one face extends about halfway through the stone. When found, the stone had been burned and was broken into two pieces. Its function is unknown. The stone was recovered from the floor fill of Pit House 12a.

Axe

The blade of a ground stone axe was recovered from Feature 4 stripping fill. The axe, made from fine-grained diabase, broke at the fully encircling hafting groove. The total remaining artifact is 208 mm long, with 5 mm of that consisting of the partial groove. The blade is 95 mm wide and 35 mm thick next to the groove.

Figure 35. Two stone artifacts. a: arrow-shaft straightener. b: triangular stone.

Choppers

Two naturally elongate pieces of cryptocrystalline limestone, one with a triangular cross-section and the other with a diamond-shaped cross-section, have one edge each that was bifacially flaked to form chopping or cutting edges. Both of these edges were dulled by pounding. The specimen with the triangular cross-section measures 91 by 50 by 33 mm, and the one with the diamond-shaped cross-section is 76+ by 77 by 49 mm. The first was recovered from the floor fill of Pit House 12a, and the second came from the bottom fill of Borrow Pit 12c.

Drills

The three drills recovered from Abajo include two complete and one fragmentary specimens (Figure 36 and Table 9). At least two types are represented, one with an expanded or "wing-tip" proximal end and one with a straight proximal end. All three were expertly made of black chert using very careful, fine, pressure-flaking. On one specimen, the final flaking was done at an oblique angle reminiscent of, but much finer than, Eden variety late Paleoindian points. One displays fairly heavy use along the edges, but the other two display little or no use.

Figure 36. Two types of drill.

Table 9. Three Black Chert Drills.
(Dimensions in mm)

Prov.	L.	W.	Th.	Description
17 b f	47	4–7	2–6	Complete; slightly tapered shank is diamond-shaped in cross-section; non-expanding proximal end; delicate pressure flaking; edges display fairly heavy bidirectional use; dull tip
28 f	29+	6–7	3–4	Medial shank fragment; lenticular cross-section; very delicate oblique pressure flaking; edges show little use
31 fc	56	3–14	2–7	Complete; slightly tapered shank is diamond-shaped in cross-section; expanding proximal end; delicate pressure flaking; made from a flake, with the platform and bulb of percussion made into the proximal end; edges display little or no use; dull tip

Flake Cache

The eight flakes shown in Figure 37 were recovered from a small pit in the floor of Room 31 . The pit had been covered with a rock, indicating that the pit was an intentional receptacle and that the eight flakes were intentionally cached. Seven of the flakes are unmodified. The eighth is triangular; one edge was partly unifacially flaked to give the piece its triangular shape. All eight flakes measure about 2 by 3 cm and are made from medium-gray to black chert. The significance of this pit and its contents is unknown.

Figure 37. Flakes from a cache pit in the floor of Room 31.

Hammerstones

Thirteen rocks used for battering were recovered from Abajo (Table 10). Shapes include spherical, ellipsoidal, tabular, and half-cylindrical. Most were well used over their entire surface, but some are battered on only the edges or the ends or both. The hammerstones were made from quartzite and limestone. Weights vary from 85 to 1333 g, with an average of 468 g. Probable uses include flint knapping and "sharpening" (pitting) of mano and metate grinding surfaces.

Table 10. Hammerstones.
(Dimensions in mm; weights in grams)

Prov.*	Type**	L.	W.	Th.	Wt.	Material, comments
2 s	t	102	78	61	680	Light gray quartzite; well used over entire surface
2 s	s	66	62	60	312	Cryptocrystalline limestone; well used over entire surface
4 s	t	77	63	46	298	Purple quartzite; well used over entire surface
6 s	s	97	85	77	808	Black cherty limestone; slightly used
9 b f	e	111	79	69	808	Purple quartzite; well used over entire surface
12 s	hc	84	53	37	255	Cryptocrystalline limestone; slight use at both ends
12a f	t	67	62	42	255	Purple quartzite; well used edges
12 ff	s	78	73	68	411	Dark purple quartzite; well used ridges
17b ff	s	72	56	52	311	Purple quartzite; well used ridges
24 f	e	57	41	28	85	Cryptocrystalline limestone pebble; both ends used
25 f	t	74	71	47	298	Gray-brown quartzite; well used
28 ff	t	131	115	68	1333	Cryptocrystalline limestone; one end battered
31 s	t	68	64	42	241	Gray quartzite; well used edges

*f = fill; ff = floor fill; s = stripping. **e = ellipsoidal; hc = half cylinder; s = spherical; t = tabular.

Informal Tools

Thirteen flakes of black chert (n=6), light to medium gray chert (n=5), obsidian (n=1), and fine, light gray quartzite (n=1) have one to four edges modified by use-wear (Figure 38b and e). Two have sharp, delicate points that would have served well as tiny gravers or perforators (Figure 38a and c). Most flakes retain their bulbs of percussion (or force). Flake sizes range from 19 to 54 mm long, 14 to 38 mm wide, and 3 to 13 mm thick. The flakes came from nine proveniences.

Ornaments

Six complete or fragmentary ornaments were recovered from Abajo (Table 11). Two are *Olivella* shell beads, three were made from freshwater mussel shell, and one is a tufa tubule.

Figure 38. Informal tools. a, c: gravers. b, e: "knives." d: faceted stone used as a source of red paint.

Both *Olivella* shells are missing their spires. This common finding leads most archaeologists to suggest (or imply) that the spires were ground off by bead makers in order to string the shells on necklaces. Unless microscopic grinding striations are observed on the shells, this assumption is probably not warranted. I have picked up *Olivella* shells from a beach at Mazatlán, on the west coast of Mexico, that naturally lacked their spires. Thus, at least some *Olivella* beads naturally came ready to string. Not knowing this at the time of the project, I did not look for such striations on the Abajo specimens.

Although the tufa specimen is well polished, the ends do not display unmistakable signs of modification, leaving an interpretation of this item as an ornament open to question. The tufa tube would have been collected locally from the alluvium of Tuly Creek, after forming in a prehistoric swamp a short distance downstream from Abajo (see Chapter 3).

Table 11. Ornaments.
(Dimensions in mm)

Prov.	L.	W.	T.	Description
Surf.	11+	10+	1.5	Carved shell fragment, probably the head of an animal (an eye is present)
Surf.	14	6.5	6	*Olivella* shell with spire missing
12 f	28	10	9.5	Tufa tubule with well-polished surfaces; ends not modified; polish could have been due to water action.
24 ff	12+	7	6	Fragment of *Olivella* shell with spire missing
28 ff	12+	6+	2	Oval bead (?) of freshwater mussel shell; hole in larger end; broken edges appear to have been slightly smoothed by grinding.
28 ff	9+	8+	2	Small fragment of freshwater mussel shell

Plaster Polishing Stones

Three fragments of cobbles evidently represent stones used to smooth or "polish" floor (and wall?) plaster. The two limestone specimens and one orthoquartzite specimen have use facets on one face and parts of one or both ends. Lengths vary from 74+ to 107+ mm, widths from 43+ to 59+ mm, and thicknesses from 43+ to 51+ mm. All three appear to be about 40 to 50 percent complete. The proveniences are: Feature 5 stripping, Borrow Pit 15 fill, and Pit House 28 floor fill.

Whistle

A 95 mm long section of large bird bone (eagle or turkey?) has both ends ground smooth and a single hole at the mid-point of the concave side. The outside diameter of the tube varies from 10 to 11 mm. A slightly smaller diameter bone tube has been snugly inserted into one end of the larger tube, with its exterior end flush with the outside of the larger tube and its inside end partly occluding the hole. The length of the smaller tube is 52 mm, and its diameter is 8 mm.

Worked Sherds

Seven sherds of pottery constitute two groups of items (Figure 39). Two have acute-angle working edges for use as tools. The remaining five sherds had their edges ground, creating conventional shapes including circular, oval, and rectangular.

A Three Rivers Red-on-terracotta sherd, with one edge ground into an acute angle from both faces of the sherd, is 92 mm long and 36 mm wide (Figure 39e). Its working edge, 85 mm long, appears to have been straight when created. Subsequent use made that edge uneven. All other edges of this tool were shaped by grinding; those edges were strongly convex (as opposed to a flat surface perpendicular to the faces of the sherd). The working edge is still sharp enough to cut soft materials. This worked sherd came from Room 31 floor fill.

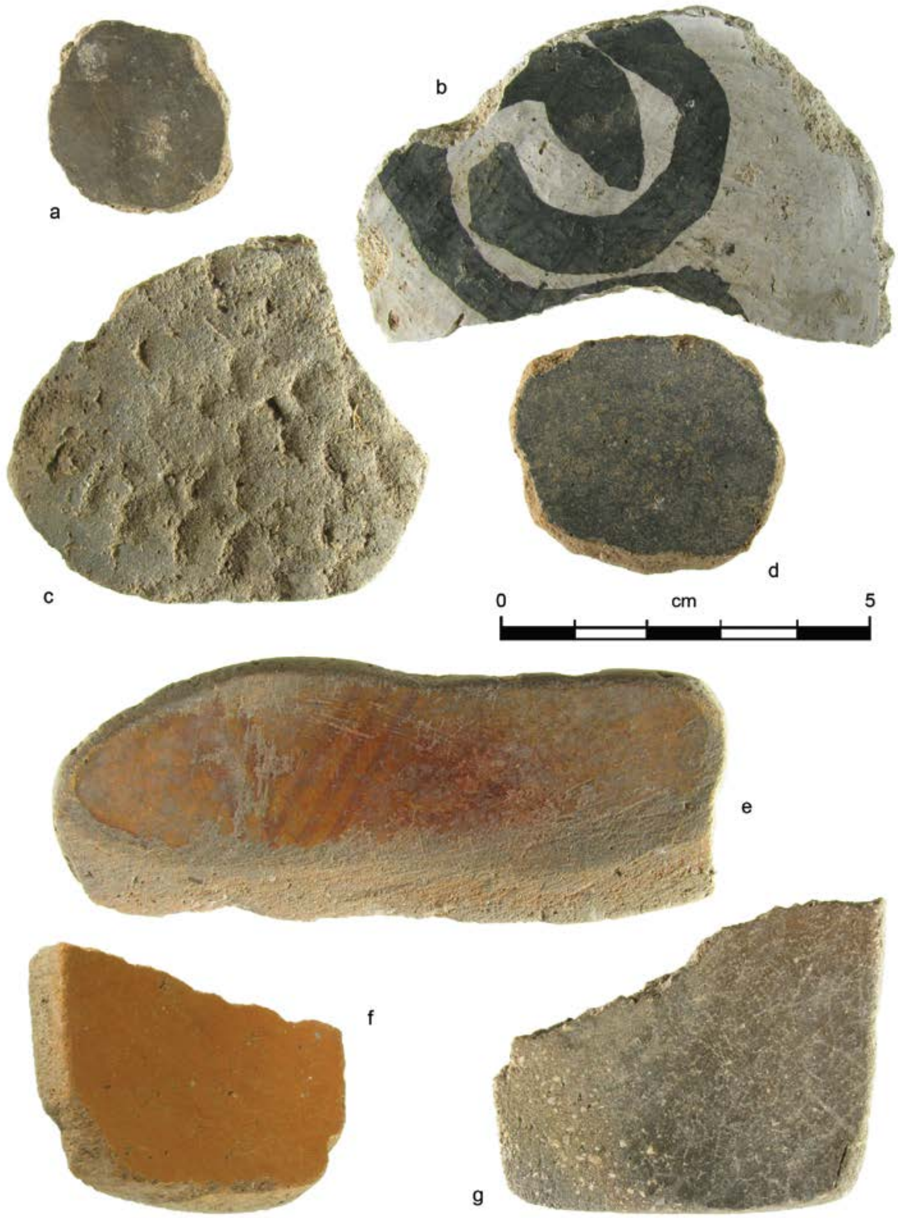

Figure 39. Worked sherds and sherd tools. a, c, d, f, g: worked sherds. b, e: sherd tools.

The working edges of the other sherd tool display acute angles created by flaking from both faces of the sherd (Figure 39b). The sherd was from the bottom of a Chupadero Black-on-white bowl; originally it was round but currently it is fragmentary, so it is unclear how much of the edge was worked. The fragment measures 72 by 38 mm. Although the worked edges are somewhat ragged because of the shaping technique, they are still sharp enough to cut soft materials. This worked sherd came from Pit House 28 fill.

Three worked sherds were roughly edge-ground into circular to oval shapes (Figure 39a, c, and d). The two smaller examples, made from sherds of Jornada Brown, measure 25 and 38 mm in maximum diameter. The third example, made from a Seco Corrugated sherd, is missing part of its greatest diameter; the remaining diameter measures 55 mm. The use or uses of these items are unknown. The proveniences are: Pit House 28 floor fill, Strip Trench 2 fill, and Feature 12 overburden fill, respectively.

While the last two worked sherds are fragmentary, evidently they were rectangular when complete (Figure 37f and g). One was made from either Three Rivers Red-on-terracotta or Lincoln Black-on-red and the other was made from Jornada Brown. The widths are 38 mm and 52 mm respectively. The use or uses of these items are unknown. The proveniences are Strip Trench 4 fill and Strip Trench 6 fill, respectively.

Pigments and Possible Pigments

Nine objects or groups of fragmented and powdered mineral were recovered from a variety of proveniences.

Red

One small rock, a second small piece of material, and a powdered reddish clay were all recovered from the site. Of these, only the first two items display use as sources of coloration.

The larger of the two discrete items, FS 21-5, is a large pebble with two well-developed grinding facets that form an acute angle at one end of the stone (Figure 38d). When rubbed against a white sheet of paper, the easily removed material gives a Munsell value of 2.5YR5/8 (red). The pebble measures 63.5 by 39.5 by 25 mm. It was collected from the fill of Fire Pit 21 in Feature 17, the strip unit along the north side of the pueblo.

The second discrete piece of red material, FS 15-5, is tabular and has one edge that may have been ground for removal of red pigment. Measuring 26 by 21.5 by 1 mm, it was recovered from the fill of Borrow Pit 15. It is so fragile that I did not attempt to remove part of it for a Munsell value determination.

The powdered red clay, FS 25-13, contains very fine silt that is easily felt by the touch but requires microscopy to see. The combination of clay and silt probably is natural, providing a clue to its as yet undetermined source. This material was recovered from the fill of the part of the Feature 25 trench south of Pueblo Room 31.

Blue

Two small pieces of an unspecified copper mineral have the same sky blue color. Neither is modified in any way. One (FS 19b-11) is hard enough to have been made into a tiny ornament; it measures 6.5 by 4.5 by 3.5 mm, and comes from the fill of Extramural Storage Pit 19b. The other, FS 24-15, is now in two pieces. The larger of these measures 9 by 9 by 2.5 mm. It came from the floor fill of Pueblo Room 24.

The probable source of these two blue mineral specimens is the copper deposit at the Virginia or Bent mine, 4.5 km upstream from Abajo. The residents of Abajo de la Cruz could have obtained the specimens at the location of the historic mine but perhaps more likely, they found them among the alluvial deposits near Abajo.

Light Gray

Small pellets (FS 24-17), tablets, and powder (FS 28-23) of light gray clay were recovered from two different locations at Abajo: the floor fill of Pueblo Room 24 and the fill of Pit House 28, respectively. The largest of the approximately 20 pellets is 16 by 9 by 7.5 mm, and the largest of the platy specimens measures 14.5 by 9 by 3.5 mm. The pellets may have taken shape as fill was being screened during excavation.

White

The mineralogy of two tiny pellets of white material (FS 24-26) was not determined. The largest pellet measures 3 mm long. Both were recovered from the fill of the lower floor in Pueblo Room 24. Like the light gray pellets just described, these pellets may have taken shape during screening of fill.

Light Yellow

Pellets and powder of a light yellow consolidated silt (FS 28-116) were recovered from the floor fill of Pit House 28. The largest pellet measures 14 by 11 by 9 mm. In this case as well, rolling around in a screen may have given the pigment pieces their pellet shape.

Other Minerals and Rocks

Selenite

A number of fragments of selenite (crystal gypsum) were recovered from several proveniences at Abajo de la Cruz. The specimens are so similar in terms of hardness, clarity, thinness, and sharpness of fracture that they almost certainly derive from a single geologic (as opposed to alluvial) source. None display modification, but their presence in the site was intentional. Their dimensions are recorded below by provenience.

Borrow Pit 15 fill: 26 by 21.5 by 1 mm.
Pueblo Room 17b fill: seven pieces; the largest measures 27 by 21 by 2 mm.
Pueblo Room 24 fill: three pieces; the largest measures 21 by 19.5 by 1 mm.
Pueblo Room 24 floor fill: two pieces; the largest measures 12 by 10 by 1.5 mm.
Pueblo Room 24 floor contact: the largest measures 10 by 9 by 1 mm.
Pueblo Room 24 bin fill (Stratum 3): 41.5 by 35.5 by 1.5 mm.

Pit House 28 fill: two pieces; the larger piece measures 24 by 20.5 by 1.5 mm.
Pit House 28 floor fill: six pieces; the largest measures 26 x 19 x 1 mm.

Yellow Siltite

A tabular fragment of a fine, yellow siltite with occasional microscopic particles of golden mica was recovered from the floor fill of Pit House 28. The fragment measures 21 by 16.5 by 8 mm, is unmodified, and represents a manuport whose intended use is unknown.

Plant Casts

Several sections of calcium carbonate ("caliche") tubules represent casts of water plants such as sedges (full length internal voids with triangular cross sections) and cattails (full length internal voids with circular to oval cross-sections) that grew in water with heavy concentrations of dissolved solids (Figure 40). Most are sections along the stems but two include the closed bottoms of the plants where the hair-like roots began (Figure 40a and b). None displays evidence of modification by humans, yet all are manuports. Their source is probably the alluvium that formed in the swamp behind the former natural dam along Tularosa Creek (see Chapter 2).

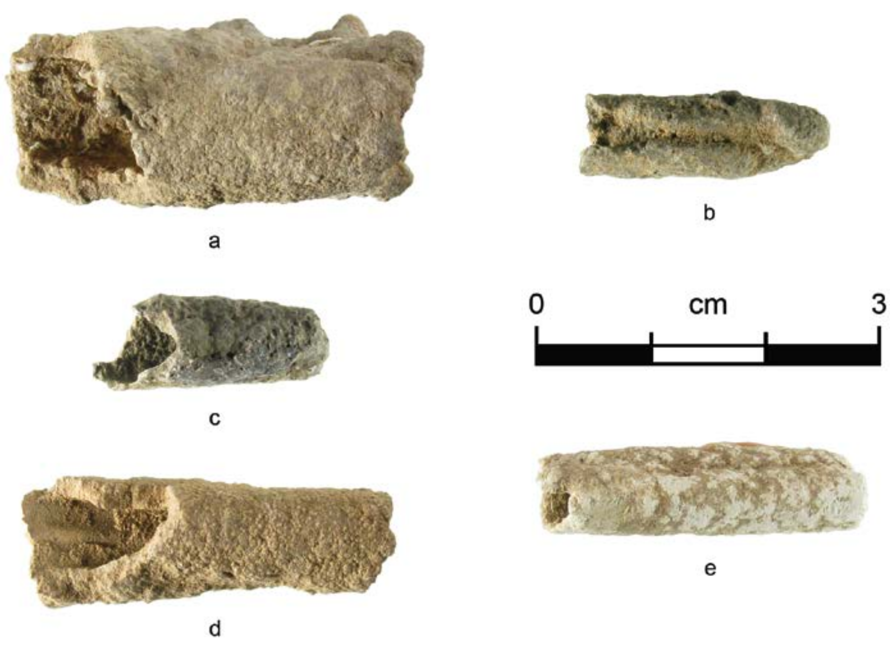

Figure 40. Unmodified caliche plant casts.

The proveniences, interior cross-section shapes, and external dimensions of each specimen are as follows.

Feature 12 Cluster fill	Triangular	32 by 11 by 17 mm
Feature 12 Cluster fill	Triangular	22 by 9 by 8 mm
Feature 12 Cluster fill	Triangular	24 by 9 by 8 mm
Feature 12 Cluster fill	Round	11.5 by 7.5 by 7 mm
Extramural Pit 13 fill	Triangular	21 by 7 by 5 mm; rounded, closed base
Pit House 28 fill	Circular	13 by 5 by 5 mm
Pit House 28 fill	Oval	36 by 16.5 by 14.5 mm
Pueblo Room 31, lower fill	Triangular	28 by 8 by 8 mm
Pueblo Room 31, lower fill	Triangular	20 by 8 by 7.5 mm; rounded, closed base

Fossil

A single fossil bivalve fragment in its rock matrix was recovered from the site surface. It is too fragmentary to identify as to species or formation of origin. It is unmodified.

Chapter 11

POTTERY

The pottery of Abajo de la Cruz is fairly characteristic of prehistoric assemblages from south-central New Mexico (Table 12). The primary constituents are plain brown cooking and storage ware (primarily Jornada Brown) and Chupadero Black-on-white and Three Rivers Red-on-terracotta as the primary service wares. El Paso Polychrome is the most numerous and important secondary ware, and there are many minimally represented local and imported wares. Among the local examples of minor wares are red-washed or red-slipped brown wares, smudged brown ware, San Andres Red-on-terracotta, Lincoln Black-on-red, and an incised or punctate brown to reddish pottery resembling Playas Red pottery from northern Mexico but made in the Sierra Blanca (Wiseman 1981). The imported types include Playas Red Incised and an unspecific Casas Grandes polychrome from northern Mexico; a Tularosa-like black-on-white, Wingate Black-on-red (?), St. Johns Polychrome, and Heshotauthla Polychrome from west-central New Mexico; Snowflake Black-on-white from east-central Arizona; Reserve or Tularosa indented corrugated, Seco Corrugated, Los Lunas Smudged, and Pitoche Rubbed-Ribbed from southwestern and west-central New Mexico (west of the Rio Grande); and an unidentified black-on-white pottery type. A few sherds of Corona Corrugated represent the Gran Quivira country of central New Mexico east of the Rio Grande. Most of these imported wares are represented by single vessels.

In the sections that follow, some pottery types are treated cursorily, while others are treated in some depth. The decision to focus on certain types more closely was based on personal interest and the need to describe details (such as variation in surface colors) not commonly included in analyses of certain pottery types from southeastern and south-central New Mexico. The added details satisfy two purposes: more thorough description of the pottery types concerned and, for the serious student, a better idea as to what variation I include when assigning potsherds to specific types.

In the tables that follow, specific sherds are identified by numbers assigned during the analysis. These numbers refer to their proveniences, a concordance list for which is provided in the appendix.

Jornada Brown

Far and away the most common pottery recovered from the excavations at Abajo de la Cruz is Jornada Brown.

Bowls

The plain "brown" bowl sherds typed here as Jornada Brown are treated somewhat independently from the Jornada Brown jar sherds because many have light-colored surfaces (brownish-orange to orange or terracotta) suggesting that they could also be typed as Three Rivers Red Ware.

Table 12. LA 10832 Pottery Distributions.

Provenience	Chupa-dero B/W	Three Rivers R/T	Jornada Brown	El Paso Poly-chrome	El Paso Brown	Indent. Corru-gated	Red Wash or Redware	Incised or punctate	Minor Types	Total
Pit Houses										
PH 12a lower fill	178	212	834	92	8	12	15	37	2 smudged brown, 1 San Andres R/T, 1 Chihuahua poly., 2 intrusive indented corr., 5 B/W	1399
PH 12a floor fill					21		2		2 smudged brown, 1 San Andres R/T	23
PH 28 fill	37	53	192	23	80	1	12	3	1 St. Johns B/R or Poly., 1 Wingate (?) B/R, 1 intrusive indented corr.	404
PH 28 floor fill	107	98	635	31	5	4	10	5	5 smudged brown, 2 Heshotauthla B/R or Poly., 1 intrusive indented corr.	903
Pueblo Rooms										
Rm. 17b fill	2	2								4
Rm. 17b floor fill	1		6	2	7	1				17
Rm. 23 fill	9	5	24	1		1	1	2		43
Rm. 24 general fill	49	20	98	22	23	1	3			216
Rm. 24 Stratum 1	1	1	2	2	1					7
Rm. 24 Stratum 2	7	5	34	3	4					53
Rm. 24 floor fill	7	13	54	10	3	2	8	2	1 smudged brown	100
Rm. 24 floor contact	1	1	3		1				1 San Andres R/T	7
Rm. 26 general fill	2	1	4	1						8
Rm. 27 general fill	1	2	12			1				16
Rm. 31 backhoe backdirt	3	6	33	1	8					51
Rm. 31 upper fill	15	14	86	24	9	1	2	2		153
Rm. 31 lower fill	10	11	72	6		1			3 Tularosa style B/W	103
Rm. 31 floor contact	2	2	15				1			20
Rm. 32 upper fill	9	22	108	40	40	4				223
Rm. 32 floor fill	10	14	68	12	10	1	1	1		117
Rm. 32 floor contact	3	4	11							18
Extramural Features										
Pit 13a fill			1	1						2
Pit 13b fill		1	2							3
Pit 14 fill			1	1	1					3
Pit 14b bottom fill				1						1

Table 12. LA 10832 Pottery Distributions.

Provenience	Chupa-dero B/W	Three Rivers R/T	Jornada Brown	El Paso Poly-chrome	El Paso Brown	Indent. Corru-gated	Red Wash or Redware	Incised or punctate	Minor Types	Total
Feature 19 fill	15	31	128	6	9	2	5	3		199
Feature 18 rock hearth	2		12	3	1			1		19
Ash Deposit Pit 9	1	4	59	2						66
Borrow Pit 12 bottom fill	29	9	48	6	52		4	4	1 smudged brown	153
Borrow Pit 15 fill	16	64	133	6	1	4				224
Borrow Pit 22 fill	8	4	28	1		1			1 intrusive indented corr.	43
Strip Trenches:										
Feature 1	26	27	63	13	19	1	2	3	1 smudged brown, 1 St. Johns B/R or Poly., 1 Lincoln B/R	157
Feature 2	95	123	396	40	54	6	11	9	1 smudged brown, 1 Chihuahua poly., 1 intrusive indented corr.	737
Feature 4	36	30	121	35	15	2	5	4	2 smudged brown	250
Feature 5	63	67	283	17	14	7	10	2	1 Heshotauthla B/R or Poly.	464
Feature 6	38	39	141	4	6	2	2	2	1 smudged brown, 2 Chihuahua poly., 1 Lincoln B/R	238
Over Feature 12	94	129	289	58	101	1	19	13	1 smudged brown, 1 St. Johns B/R or Poly., 1 Chihuahua poly., 1 unident. B/W	708
Over Feature 13	11	12	22	5	4		4	1		59
Feature 20			5		1		1			7
Feature 25 fill	16	30	125	16	15	1	2	1	1 smudged brown	207
Over Feature 28	27	48	181	10	22	3	12	4		307
General site surface	48	81	97	8	26	1	11	4	1 smudged brown, 1 Heshotauthla B/R or Poly., 2 Snowflake B/W	280
Total	979	1185	4426	503	561	61	143	103	17 smudged brown, 2 San Andres R/T, 4 Heshotauthla B/R or Poly., 2 St. Johns B/R or Poly., 1 Wingate (?) B/R, 2 Snowflake B/W, 5 Chihuahua poly., 6 intrusive indented corr., 3 Tularosa style B/W, 6 unident. B/W, 2 Lincoln B/R	8012
Percentage	12.2%	14.8%	55.2%	6.3%	7.0%	0.7%	1.8%	1.2%	0.6% (50 total)	100.0%

Some also have brown to dark brown surface colors, as indeed they should in order to be typed as Jornada Brown. But instead of displaying discrete colors, many sherds display ranges of colors due to differential circulation of oxygen within "kilns" during firing. In areas of the "kiln" where free oxygen circulated at the end of the firing, surfaces turned "orangish" or fully orange. In areas where free oxygen was lacking (such as on the other side of the same vessel), a brown or even gray color was produced. Where the two conditions met on the same side of the vessel, colors quickly transition from one to the other.

To complicate matters further, large numbers of true Three Rivers Red Ware sherds—in the form of San Andres and Three Rivers red-on-terracottas—are also present in the site assemblage. For the most part, these sherds display the ware's characteristic orange surfaces and red designs. But even on these painted bowls, large surface areas of bowl interior sides and bottoms lack designs. Unless a sherd from these areas is at least 3 to 4 cm across, one cannot be certain whether it came from a painted bowl or an unpainted one. It is quite clear from clay and temper characteristics that the Three Rivers series developed out of Jornada Brown, so it is not surprising that we have encountered this typological dilemma. The common threads go beyond paste and temper to include wall thinning, surface finish, and rim treatments, as is discussed in more detail below.

Consistent with these comments, sherds have been classified as representing Jornada Brown bowls if they lack any sign of painted coloration on their interior surfaces or rims. Their Munsell Soil Color values can be various shades of gray (dark gray to gray to pinkish gray), brown (very dark grayish brown to dark brown to brown to light brown to reddish brown to light reddish brown), red (yellowish red), and yellow (reddish yellow) or any combination of these colors and shades on the same surface.

Characteristics of the unpainted bowl sherds (typed here as Jornada Brown) *in the Abajo assemblage* are as follows.

Ten variations of tempering materials were noted among the Jornada bowl sherds. All are crushed igneous rocks available on the slopes and peripheries of Sierra Blanca and are described in A. H. Warren's chapter. The variations can be reduced to two general groups: those that contain gray feldspars and those that do not. This division is of interest because of the distinctiveness of the gray feldspars and the desire to pinpoint their place or places of origin in the Sierra Blanca. Limited field reconnaissance by the writer has found some rock outcrops bearing mostly gray feldspars in the road cuts of New Mexico State Road 532 between Alto and the Sierra Blanca sky area on the east side of Sierra Blanca. However, judging from the variety of crystal forms of the gray feldspars and their accompanying minerals in many or most sherds (especially the white and off-white feldspars, which are actually the dominant minerals in many sherds that contain the gray variety), more sources must be represented in the Abajo sherds. I suspect that some of those sources occur along the south and west faces of Sierra Blanca but short of extensive geologic reconnaissance, other clues might be found in pottery assemblages from sites in those areas. Hence my particular interest in they gray feldspars from Abajo de la Cruz, which is south of Sierra Blanca.

In light of the preceding statements, it is interesting that of the 46 Jornada bowl rim sherds, one-third (16) contain gray feldspar but in only two of them are the gray feldspars dominant.

Sherd exteriors are unevenly thinned (in cross-section they often undulate vertically, across the coils) and unevenly smoothed. The exteriors show numerous shallow, narrow, more or less parallel grooves caused by systematic stroking with a polishing stone (but the resulting surface is not always lustrous). Sherd interiors are evenly smoothed and almost always polished, but are not necessarily lustrous or shiny.

Sherd exteriors are often fire-clouded and otherwise a mottled black and gray to brownish, due to limited oxidation at the end of the firing process. The colors of sherd interiors tend to be more consistent, with browns to "orangish" browns and light oranges ("terracotta") being common.

Because the interior and exterior surfaces of individual sherds frequently display differences in colors and shades of colors, color was recorded for each surface of each sherd. These were then graphed and compared for both interior and exterior surfaces (Figure 41). The results show that various shades of browns account for more 60 percent of the colors on both interior and exterior surfaces of bowl sherds. Many fewer examples of grays are present, followed in descending order by reds, blacks, and yellows.

In profile, rims are simple, direct, and usually parallel sided. On occasion, the vessel thickened slightly as the rim was approached, then tapered immediately at the lip. Lips are squared or somewhat squared (Figure 42).

No bowl sherds are large enough to indicate bowl shapes clearly. The sherds suggest bowl forms that are moderately deep to very deep relative to the circumferences.

Wall thickness was measured on 42 rim sherds. Generally speaking, the average thickness of a bowl starts at a point 1 to 2 cm below the lip. Thicknesses range from 5 to 8 millimeters, with a strong mode (38 percent) at 5.5 mm. Examples greater than 7 mm are uncommon in the sample.

Four sherds are large enough to indicate approximate orifice diameters. These are (with provenience/analysis numbers in parentheses): 14 cm (No. 16); 28 cm (No. 37); and 30 cm (Nos. 61 and 81). Two basic sizes appear to be represented—small and large—but the sample is too small to be considered definitive.

Jars

Jar forms are rarely noted among Three Rivers Red-on-terracotta vessels and related locally made painted wares. This simplifies the typological problems encountered with bowl sherds, as I discussed in the preceding section. Basically, all plain brown ware jar sherds can be assumed to belong to one of the brown ware types—Jornada, El Paso, South Pecos, and such—unless paint is noted on the surfaces.

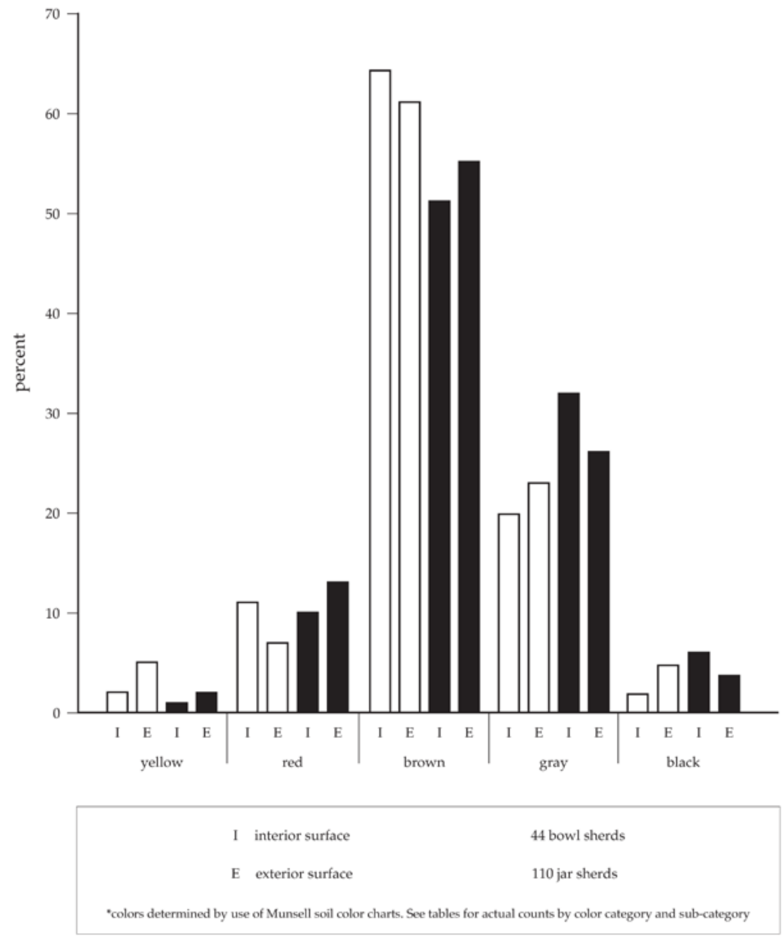

Figure 41. Comparison of surface colors of Jornada brown bowls (open) and jars (solid).

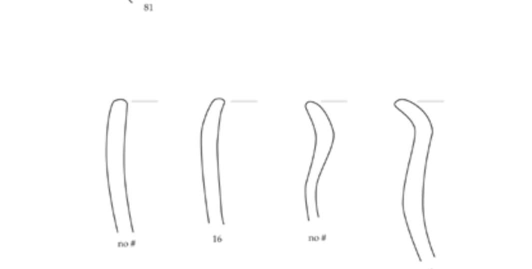

Figure 42. Jornada Brown bowl rim profiles.

It should be borne in mind that the following discussion is based primarily on rim sherds. These jars have short necks and everted rims (more like the vessel shapes of Corona Corrugated? See Hayes et al. [1981, Figure 86] in particular), the finishing details (especially smoothing and polishing in the cramped in-curved portion on the exterior surface) are not as well done as on the more open surface areas below the necks. Also, none of the rim sherds is particularly large, in terms of the distance from the lip to the opposite end of the sherd. On the smallest sherds, the shortest distance is approximately 2 cm. On the largest, it is 8.5 cm.

Nineteen variations in tempering materials were noted among the Jornada jar sherds from Abajo. As with the bowl sherds, all are crushed igneous rocks available on the slopes and peripheries of the Sierra Blanca and are described in A.H. Warren's chapter.

Eleven of the temper categories, comprising 69 sherds, include gray feldspar (56 percent of jar rim sherds). However, only two categories, comprising 12 sherds, have gray feldspar as the dominant mineral. The remaining jar sherds (55, or 44 percent of all Jornada jar sherds) lack gray feldspar. One sherd contains a well-rounded gray feldspar grain that almost certainly represents water-worn sand. This grain may represent a natural constituent in the clay, as none of the other temper in this sherd is water-worn.

In summary, 85 bowl and jar rim sherds of Jornada Brown contain gray feldspar, but only 14 have gray feldspar as the dominant mineral. These figures represent 50 percent and 8 percent, respectively, of the study sample of bowl and jar rim sherds of Jornada Brown. Thus, less gray feldspar is present in the Jornada Brown from Abajo than I was anticipating for an assemblage derived from a site immediately south of the Sierra Blanca.

Jar exterior sherds are evenly smoothed and almost always well polished (though not necessarily lustrous or shiny). The exteriors display numerous shallow, narrow, more or less parallel grooves caused by systematic stroking with a polishing stone. Jar interior sherds are evenly smoothed and almost always polished (though not necessarily lustrous or shiny) below the lips, often as well as or better than the exterior surfaces of the same sherds.

Several combinations of surface finish were recorded during analysis. Two analytical categories are concerned with surface erosion or use wear (or both) and are not considered in the following summary. The remaining categories of surface finish of intact surfaces are, in descending order of importance (with percentages, exterior/interior): polished, lustrous (38/44 percent); polished, slightly lustrous (18/18 percent); streaky polish, non-lustrous (14/10 percent); streaky polish, slightly lustrous (10/8 percent); polished, non-lustrous (7/4 percent); smoothed (4/5 percent); and other (9/11 percent).

The categories comprising "other" are: (1) polishing grooves, non-lustrous; (2) polishing grooves, lustrous; (3) poorly smoothed, streaky polish, lustrous; (4) undulating surface, scrape marks, polishing marks; (5) lightly scraped, polished, non-lustrous; (6) deep scrape marks, polished, slightly lustrous; and (7) pitted, polished, lustrous.

Jar sherd exteriors are often fire-clouded; often, the exteriors are mosaics of black and gray to brownish, colors that are due to limited oxidation during firing. Occasional reddish and rare yellowish colors indicate the presence of more oxygen. Interiors are uneven in color, which ranges from medium brown to “orangish”-brown and light orange (“terracotta”); lighter colors are generally limited to the uppermost 1 to 2 cm below lips because of the eversion of the rim.

As with the bowls, the interior and exterior surfaces of individual jar sherds frequently display differences in colors or shades of colors. Accordingly, colors were recorded for each surface of each sherd, and these values were then graphed (Figure 41). Various shades of brown account for 50 to 54 percent of the colors on both interior and exterior surfaces of jar sherds. Many fewer examples of gray sherds are present, though they are more frequent than on bowls. A few examples of red, black, and yellow sherds are present (in descending order of frequency).

In profile, rims are simple, everted, usually parallel sided, with generally rounded or somewhat squared lips (Figure 43).

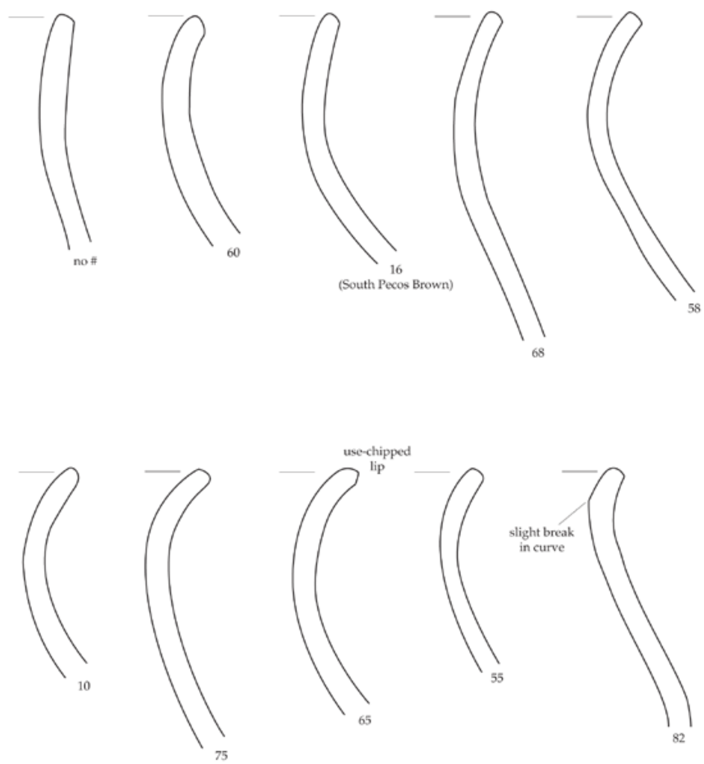

Figure 43. Jornada Brown jar rim profiles.

The sample lacks very large rim and body sherds, so I can only suggest that the standard jar form is globular or nearly so, with a short, everted neck and rim. This form is very similar to, and perhaps derived from, that of the Corona Corrugated jars shown in Hayes et al. (1981, Figure 86).

Wall thickness was measured on 122 sherds in the jar rim sherd sample. Generally speaking, sherd thickness is somewhat greater in the curve of the neck but immediately changes to a consistent thickness at the juncture of the neck and body. Values from this latter area range from 4 to 8.5 mm with a strong mode at 5.5 to 6.0 mm (26 and 23 percent, respectively, for a total of 49 percent). Examples less than 5 mm thick and greater than 7 mm thick are uncommon, at least in the sample.

The 20 sherds large enough to provide reasonable estimates indicate the following orifice diameters (with provenience or analysis numbers in parentheses): 16 cm (Nos. 1, 5, and 58); 17 cm (no number); 18 cm (Nos. 1, 10, 10, 65, and 75); 20 cm (No. 68 and no number); 22 cm (Nos. 3, 16, 55, 60, 77, and 82); 24 cm (Nos. 56 and 81); and 26 cm (No. 8). Diameters on the order of 18 to 22 cm are most common in the study sample.

South Pecos Brown

Fourteen jar rim sherds and one bowl rim sherd are South Pecos Brown. An additional three jar rim sherds possess characteristics of both South Pecos Brown and Jornada Brown and are termed South Pecos/Jornada Brown. This combination of attributes from the two types has been noted in other site assemblages and can be expected simply because South Pecos Brown almost certainly derived from Jornada Brown (Jelinek 1967). Elsewhere I discuss this phenomenon in some detail (Wiseman 2003:31–32). Predictably, the various attributes of the South Pecos Brown sherds from Abajo (surface finish and color; wall thickness, rim profiles, and general vessel shapes) are well within the ranges of values for Jornada Brown bowls and jars.

Red-Slipped Sherds of the Jornada-Three Rivers Tradition

The Sierra Blanca country was the homeland of peoples who developed the Three Rivers Red Ware tradition from the Jornada Brown Ware tradition, and vessels with very light-colored (usually light orange or terracotta) surfaces are common in the latter half of the prehistoric pottery-making period of the region. Mera (1943) posited that the original inspiration for the Three Rivers tradition developed from the central Mogollon progression from brown to red-slipped to red-painted types (e.g., Alma Plain to San Francisco Red to Mogollon Red-on-brown). Mera's supposition still appears to be true. As the reconstruction goes in the Sierra Blanca, the sequence seems to be Jornada Brown, red-slipped "brown" or terracotta (Bussey et al.'s [1976:80–86] Jornada Red), Broadline Red-on-terracotta, San Andres Red-on-terracotta, Three Rivers Red-on-terracotta, and finally Lincoln Black-on-red. But this proposed sequence is anything from certain: we lack accurate dating for the introduction and duration of all of the red-slipped and painted types. Given the occurrence of virtually all of these types throughout the second half of the prehistoric pottery-making sequence, it seems that once a variation was conceived and made, at least small amounts of it were made pretty much up until the end of pottery-making in the region about A.D. 1400.

Three Rivers Red-on-terracotta and Lincoln Black-on-red appear to be the only two types that were made often enough to comprise noteworthy percentages of later-dating assemblages (after A.D. 1200, if not earlier) and to be traded widely. All other types in the proposed sequence always seem to have been made only in small quantities. Thus, virtually every late assemblage, particularly larger ones such as Abajo de la Cruz, have a few sherds each of Jornada Red

(red-slipped or red-fired, in part), Broadline Red-on-terracotta, and San Andres Red-on-terracotta, as well as large amounts of Three Rivers Red-on-terracotta and a variable presence (if late enough) of Lincoln Black-on-red.

Many late assemblages also tend to include unpainted terracotta sherds. Each suspected plain terracotta sherd must be carefully searched under magnification to be certain that it lacks vestiges of red slip or red designs because the red paint often failed to adhere to vessel surfaces (i.e., was "fugitive"). At least two conditions led to the loss of the red paint: (1) the color was added after firing and therefore could rub off during handling; (2) the potters were unable to find a red pigment that worked well with the clays being used, such that even if the red was applied prior to firing, it did not adhere properly. This same problem also resulted in the occasional sherd or vessel on which the coloration fades in and out due to variation in the thickness of the application, making it difficult or impossible to ascertain whether the vessel had been slipped or had painted designs.

Also, assemblages like the one from Abajo can contain both red-slipped sherds and sherds turned red during firing. In the latter case, the degree of redness can vary with the amount of iron oxide in the clays and the amount of oxygen circulating among the pots during the final stages of firing. That is, the higher the iron content of the clay and the more oxygen present at the end of the firing, the brighter and clearer the light orange (terracotta) or orange-red color of the vessel surfaces. During analysis, it can be challenging to distinguish a red-slipped or red-painted surface from a reddish but unslipped and unpainted surface.

In the analysis reported here, I focused on sherds that retain (sometimes very minimally) evidence of having had a red slip or red designs. (As was alluded to above, it is often impossible to determine whether a trace of red pigment on a sherd represents a slip or a design.) Attributes monitored include paste texture and color, temper composition, slip colors on both the interior and exterior surfaces, sherd (vessel wall) thickness, and vessel shape (jar or bowl). In many cases, careful inspection of sherd surfaces had to be made with the aid of magnification (usually 10 power) in order to determine whether red pigment was present. Only rim sherds larger than a nickel (21 mm diam.) were subjected to the full analysis.

For curation, all sherds were bagged separately according to the following groups: jar rim sherds, jar body sherds, bowl rim sherds, bowl body sherds, the "too smalls" (bowl and jar, rim and body), and indeterminate red-slipped or red-fired sherds. Sherds were considered too small to analyze when it would be impossible to remove an edge nip for viewing the paste and temper and still preserve the sherd and its provenience number.

Jar and Bowl Rim Sherds

Twenty-four rim sherds (12 jar, 12 bowl) and 58 body sherds (42 jar, 16 bowl) belong to what appears to be a locally made (Sierra Blanca region) red-slipped ware. The quality of the slip on these sherds varies greatly, from only the slightest remaining trace to a carefully polished, brightly colored, mostly intact slip that made for an "eye-dazzler." Most sherds, however, can only be described as unspectacular. The red slip appears to have covered the entire outer surfaces of vessels but only the uppermost 1 to 2 cm of the interior surfaces. Surface polishing also varies from perfunctory to well executed.

An additional five rim sherds appear to represent vessels of Playas Red imported from regions to the west and southwest. Those five rim sherds are not discussed here.

As expected, the pastes of all but one of the 12 jar rim sherds have the fine, granular texture typical of Jornada Brown pottery. The one exception has a slightly blocky, more compact paste often seen in sherds usually typed as South Pecos Brown. Paste colors and the clarity of those colors also vary (again, as would be expected) but are mostly medium-dark to dark. Colors include gray, grayish-brown, reddish-brown, brownish-red, and black. Sherds with black pastes are either black from surface to surface or have thin, lighter-colored margins next to one or both surfaces.

Tempering materials vary as well. All but one include feldspars as the primary minerals, especially those that are off-white and light gray to medium gray in color. Two sherds and possibly a third contain medium gray feldspar that appears to belong to the Sierra Blanca gray syenite complex. A few have clear feldspars. Accessory minerals vary from none to quartz, to red or black bits (or bits of both colors) that can be iron minerals of different valences, to members of the hornblende or augite families. In one sherd the most numerous grains are red bits (earthy hematite or ochre) and in another the dominant mineral is quartz. All of these temper variations probably derive from Sierra Blanca igneous formations.

Determinations of surface colors were made using the Munsell Soil Color system. Because so many color determinations were made over several weeks for several different pottery types recovered from Abajo de la Cruz, it was impractical to make the comparisons in bright sunlight as is preferred according to the Munsell instructions. In order to reduce variations in readings, all determinations were made under the same lighting, in this case a combination of indirect natural light and light provided by a fluorescent, non-color-corrected tube. The resulting Munsell readings were: red, 45 percent; weak red, 30 percent; reddish-brown, 15 percent; dark brown to brown, 6 percent; and very dark gray, 3 percent.

Vessel wall thickness was measured to the nearest 0.25 mm for 12 jar rim sherds and seven bowl rim sherds. The range for jar sherds is 4.5 to 6.5 mm, with eight sherds (66 percent) falling between 5.0 and 6.0 mm. All bowl sherds fall within the 5.0 to 6.0 mm range.

Only two general shapes of vessels could be ascertained because almost all of the sherds are small. These shapes are jars (at least one with an orifice diameter of about 6 to 8 cm) and what appear to be bowls of moderate depth compared to their diameters (no orifice measurements). All jar rims with what appears to be the full mouth and neck contour appear to be jars whose rims were moderately everted (probably closely matching the degree of eversion seen in the indented corrugated jars recovered from Abajo, and in Playas jars in general). However, the necks are somewhat taller than those of Playas jars.

Three Rivers Red-on-Terracotta

Three Rivers Red-on-terracotta is the second most common pottery type in the Abajo de la Cruz assemblage, after Jornada Brown. All of the sherds are from bowls; no jar sherds are present in the Abajo assemblage. Three Rivers Red-on-terracotta jar sherds are rare in the archaeological record.

Three Rivers Red-on-terracotta clearly derived from Jornada Brown: the paste and temper of both types are essentially the same. The primary differences between the two types are the average surface colors (brown and dark brown versus orange to light orange, but see the previous discussion for Jornada Brown), vessel forms (Jornada is mostly jars, Three Rivers mostly bowls), average temper grain sizes (fine versus finer), and the fact that Three Rivers has painted designs. The Abajo assemblage also contains examples of sherds, especially bowl sherds, lacking red slips or painted designs, which are difficult to assign to Jornada Brown, Three Rivers Red-on-terracotta, or Red-Slipped /Jornada Red.

Since the Three Rivers sherds recovered from Abajo are characteristic of the type, the analysis undertaken here focuses on only three attributes: presence/absence and nature of gray feldspars in the temper, sherd thickness, and the number of painted lines located below and parallel to the rims on bowl interiors. A general description of the Three Rivers sherds from Abajo is also included because some of the variability observed in these sherds, while fairly typical of the type from other sites and areas, are rarely if ever mentioned by other analysts.

As with the Jornada Brown from Abajo, we can ask whether gray feldspar occurs more frequently and as the dominant mineral in pottery from sites along the southern periphery of the Sierra Blanca (thereby suggesting that this area is the center for the use of such temper, a question posed for the Jornada Brown as well). Vessel wall thickness (an attribute also considered for Jornada Brown) further illuminates the postulated relationship between Jornada and Three Rivers. I recorded the numbers of painted lines below but parallel to the rims of bowls because my preliminary study of the sherds led me to wonder whether differences in those numbers might be significant. In the process I learned that the painters of the designs had difficulties organizing and connecting those below-the-rim elements with the bundles of lines that strike down into and across the bottoms of the bowls to create the distinctive Three Rivers Design Style.

The Three Rivers Pottery from Abajo de la Cruz

It is appropriate to provide general descriptive remarks about the Three Rivers Red-on-terracotta pottery from Abajo because so many of these details are not provided by most analysts. The details should assist others in making more secure identifications of Three Rivers in their study samples. My remarks focus on coloration and vessel wall thinning.

A minority of Three Rivers sherds in the Abajo assemblage show that the coil meshing and wall thinning process was highly successful. That is, the potter performed her work thoroughly and diligently, resulting in walls in which the coils were completely meshed, evenly thinned, and smoothed. But sometimes the potter was content to sufficiently mesh the coils to provide a bond strong enough to resist breakage along coil lines but did not thin the walls to ensure an even thickness. On bowl exteriors, wall thickness can vary 2 mm or more between a coil and its juncture with adjacent coils, leaving horizontal “ribs” that follow the individual coils. Was this ribbing intentional for decorative or functional (a better grip?) reasons, or was it merely due to a lack of concern? Not only did this treatment leave “valleys” between the coils, but the thinning of the upper edge of the last coil resulted in a tapered rim.

Lip treatments vary from rounded to slightly flattened to squared to slightly squashed (the last leaving small ridges on the inner or outer or both edges of the lips, that can be likened to the lower edges of flat automobile tires).

In some cases the exterior surfaces, whether ribbed or not, were smoothed by the potter's hand and in others it was polished with a stone. In the latter instances, at least some of the polishing left multiple shallow grooves or polishing marks in the surface of the clay. Again, was this an intentional decorative effect? Bowl interior surfaces were uniformly smoothed and polished.

The color of both the interior and the exterior surfaces of Three Rivers reveals much about the desired colors and the degree of success in attaining them. The preferred colors for interior surfaces were bright and clear oranges and orange-reds. The range of Munsell values measured for the sherd interiors is 5YR 6/7 (reddish yellow) to 2.5YR 5/6 (red). However, failures to attain good results are common, for dingy colors (light to medium yellow-brown, gray-brown, and dark gray) occur quite regularly on interior surfaces. Exteriors are almost always characterized by these misfired colors, not infrequently due to fire-clouding caused by the settling of fuel against the vessel towards the end of the firing. Mottled color patterns ranging from orange through the dark, dingy colors just mentioned are very conspicuous on the exteriors of large sherds and complete vessels.

Over the years of working with pottery from southeastern New Mexico I have become impressed with the variation in surface colors of Three Rivers Red-on-terracotta and Lincoln Black-on-red, its successor. The surfaces of Lincoln Black-on-red sherds that I recovered from the Baca site (or Baca Sawmill site, LA 12156; Wiseman 1975; Kelley 1984) in Lincoln county north of the village of Lincoln are quite red to orange-red in color. Sherds of both Three Rivers Red-on-terracotta and Lincoln Black-on-red recovered from the sites of Rocky Arroyo (Wiseman 2013), the Fox Place (Wiseman 2002), and Henderson (Wiseman 2004) at Roswell in Chaves county are dominated by orange and yellow-orange colors. Were it not for the black paint of the designs, the sherds from the latter sites would be classifiable as Three Rivers Red-on-terracotta on the basis of surface colors alone. As for the Three Rivers Red-on-terracotta sherds from Abajo de la Cruz, the surface colors are generally redder than those for the Roswell sites but not as red as those for the Baca site.

Clearly, some factor accounts for these differences in surface colors. For years I have suspected that the color differences might be attributable largely to the availability and selection of clays. Clays with substantial amounts of iron compounds would yield redder pastes and vessel surfaces under oxidizing firing conditions. Conversely, clays containing small amounts of iron would produce more orange or yellower pastes and surfaces. A question that has been ever present in my mind is whether the potters from some sites, such as the Baca site, might have been amending their clays with powdered hematite or some other iron compound. If so, what would that amendment look like in the paste of a sherd?

Although I did not systematically investigate this attribute in the Abajo assemblage, I did note on several occasions that very small particles of iron compounds are prominent in some Three Rivers Red-on-terracotta bowl rim sherds. Occasional small bits of these iron particles are frequently found to be natural constituents of Sierra Blanca igneous rocks. However, it is obvious that the numbers of these iron particles in many of the Abajo sherds are much higher than I am used to seeing in Three Rivers Red-on-terracotta from other sites. In fact, these iron particles are sometimes the dominant grains among the temper particles. In one sherd, there is a noticeable difference in the number of iron particles present between one coil and an adjacent coil. Depending upon the specific sherd and the variations in paste colors (mottling) created by variable access to oxygen during the firing process, these grains can be bright red, brown, or black, three of the four basic oxidation states of iron. These colors reflect substantial differences in circulating oxygen on a tiny scale during the firing. A study of this question should be quite profitable if applied to the Three Rivers and Lincoln sherds from the Baca and other sites just mentioned.

Detailed Analysis Sample

Eighty-seven bowl rim sherds of Three Rivers Red-on-terracotta were selected for the more detailed analyses that follow. Many more rim sherds are present within the assemblage but were eliminated from the analyses for a variety of reasons—chief among them, the fact that some sherds are too small to permit removal of edge-nips to view temper or to obtain the number of painted lines below the rim. Others are too badly burned or misfired to permit accurate observations. And, as was mentioned, on many sherds the paint did not adhere sufficiently to permit study of design elements and configurations. In many cases, only tiny traces of paint could be detected, even using a microscope at 30 power magnification. In such cases it is unclear whether the traces represent slips (as in Jornada Red) or painted designs.

As I stated earlier, I hope to identify the primary production area for pottery made with crushed Sierra Blanca gray syenite. Obviously, one of the better clues would be where such rock is found in nature. However, geologists rarely mention the colors of feldspars in the rocks they describe, and a mere recitation as to whether the feldspars are sodic, calcic, or potassic is not nearly specific enough to be useful. This is especially true for the Sierra Blanca country of south-central Lincoln and northern Otero counties of New Mexico. The Sierra Blanca is home to a myriad of variations in rock genesis, texture, composition, and color, especially for the feldspar-rich syenites and monzonites, so the potential exists, then, for identifying specific localities for ceramic production. This appears to be especially true with regard to Sierra Blanca gray syenite.

Analyses of tempering materials in Jornada Brown, Jornada Red, and Playas Group pottery, all of which were conducted on the materials from Abajo de la Cruz prior to this analysis of Three Rivers Red-on-terracotta, have convinced me that gray feldspars, especially those that are very light gray, and whether translucent or fairly opaque, probably occur fairly widely and not just in Sierra Blanca gray syenite. Up until March 2014 I was uncertain about this issue and I tended to assign virtually all gray feldspars that I saw in the pottery of southeastern New Mexico as being derived from Sierra Blanca gray syenite. Now I am pretty well convinced that this is an error and, starting with the soon-to-be-related analysis of the Three Rivers Red-on-terracotta from Abajo, will reserve the "Sierra Blanca" designation for those gray feldspars that are opaque, strongly gray, and have either hematite rosettes on the crystal surfaces and in fissures or a maroon cast to the gray color. The best examples of Sierra Blanca gray syenite crystals are generally larger and much better formed that other temper constituents with which they might occur. As always, I remain in the debt of the late A. H. Warren for having pointed out the presence and significance of this particular material in some of the potsherds from Sierra Blanca region sites, especially as regards the type South Pecos Brown first defined by A. J. Jelinek (1967).

For a long time I was also bothered when Sierra Blanca gray feldspar crystals were seen as minor components of the temper in many sherds because neither they nor the rest of the temper grains were at least partly rounded (as if they were stream sand). However, I had not considered the possibility that the Sierra Blanca grains might have derived from the manos and metates used to grind the temper, and that Sierra Blanca gray syenite was not necessarily the specific rock being ground to provide the temper. Thus, the Sierra Blanca gray syenite in those particular sherds was probably incidental. To be sure, I have seen manos and a few metate fragments made from Sierra Blanca gray syenite. While it is entirely possible that this definition is too restricted, it does underline the strong necessity for locating and documenting the full range of Sierra Blanca gray syenite rocks in order to sharpen our perceptions, analyses, and interpretations.

In accordance with the preceding discussion, I noted the presence or absence of gray feldspars in the Three Rivers Red-on-terracotta bowl rim sherds. For those occurrences that fit the strict description of Sierra Blanca gray syenite, this is indicated on the data sheets. Other gray feldspar variations, such as very light color, degree of translucence, and absence of rosettes or a maroon cast, are noted as non-specific gray. In some instances, grains that might be Sierra Blanca gray syenite are provided with the parenthetical note "(S.B.?)" on the data sheets.

Table 13 summarizes the observations on gray feldspars and Sierra Blanca gray syenite feldspars in the sample of Three Rivers Red-on-terracotta bowl rim sherds. While more than 60 percent of the sherds contain gray feldspars, only 14 percent contain Sierra Blanca gray syenite feldspars as just defined. Clearly, Sierra Blanca gray syenite was only minimally present in the Abajo assemblage, suggesting that this rock type may not occur in the vicinity of the site. It is possible that the low-level presence of Sierra Blanca gray syenite in the sherds is due to the use of manos and metates made of Sierra Blanca gray syenite, rather than because those particular vessels were made elsewhere in the region.

Vessel Wall Thickness

As I stated previously, Three Rivers Ware developed from Jornada Brown. Here I am interested in examining vessel wall thickness in Jornada Brown and Three Rivers Red-on-terracotta because the shift from the former to the latter supposedly involved a refinement of certain aspects of Jornada, among them a slight thinning of the vessel walls. Perhaps because Jornada Brown vessels are mostly large jars, vessel walls were fairly thick. Three Rivers vessels are mostly bowls that are definitely smaller than Jornada jars, and presumably did not require equally thick walls.

However, the comparison of wall thickness between the two types was not as straightforward as might be expected. As I mentioned earlier, many Three Rivers Red-on-terracotta bowl sherds from Abajo display incompletely thinned coils on the exteriors. Accordingly, the greatest thickness, rather than an average of the thickest and thinnest values, is used in the following analysis.

Table 13. Gray Feldspar Temper in Three Rivers Red-on-Terracotta Bowl Rim Sherds.

No. of Grains of Temper	0	1 or 2	3–6	7–12	Domi-nant	Total
All Gray Feldspars						
Number of sherds	32	26	22	6	1	87
Percent	37%	30%	25%	7%	1%	100%
Sierra Blanca Gray Feldspar Only						
Number of sherds		5	7			12
Percent (of all gray feldspars)		6%	8%			14%

Eighty-seven Three Rivers Red-on-terracotta bowl sherds range in thickness from 4.8 to 8.0 mm, with a strong mode at 5.5 mm (n = 32, or 38 percent). As was noted in the study of Jornada Brown jar rim sherd thickness, the value for that type has a strong mode at 5.5 to 6 mm (26 and 23 percent respectively, for a total of 49 percent), meaning that the average Three Rivers Red-on-terracotta bowl is only slightly thinner-walled than the average Jornada Brown jar. This difference probably reflects the fact that the Jornada jars are larger on average than the Three Rivers bowls.

Designs

The unusual Three Rivers Design Style is found on Three Rivers Red-on-terracotta and some Lincoln Black-on-red vessels (see Mera and Stallings 1931, especially Plates III and IV; Stewart 1979, 1983). Its two primary characteristics involve "bundles" or groups of thin, parallel lines. Such bundles of lines run parallel to and just below the rims of bowls. Additional bundles of lines leave the rim bundle and strike across the bottom of the bowl, rejoining the rim bundle on the other side. There are many variations on this theme, some being very simple and involving few line bundles and others being quite complex. The number of lines in a given bundle varies from two to as many as six or seven.

As a rule, few if any solid elements (usually triangles) are added to the design. When they do occur, they are usually appended to the outside lines of bundles. The designs of several complete and partial bowls are depicted in Figure 44. Unfortunately, this figure lacks detail and many of the line bundles appear as solid lines. Four illustrations (Figure 44e, g, h, and l) are exceptions in that the lines are solid lines rather than bundles of lines. However, the overall layout of the designs is the important feature of this figure.

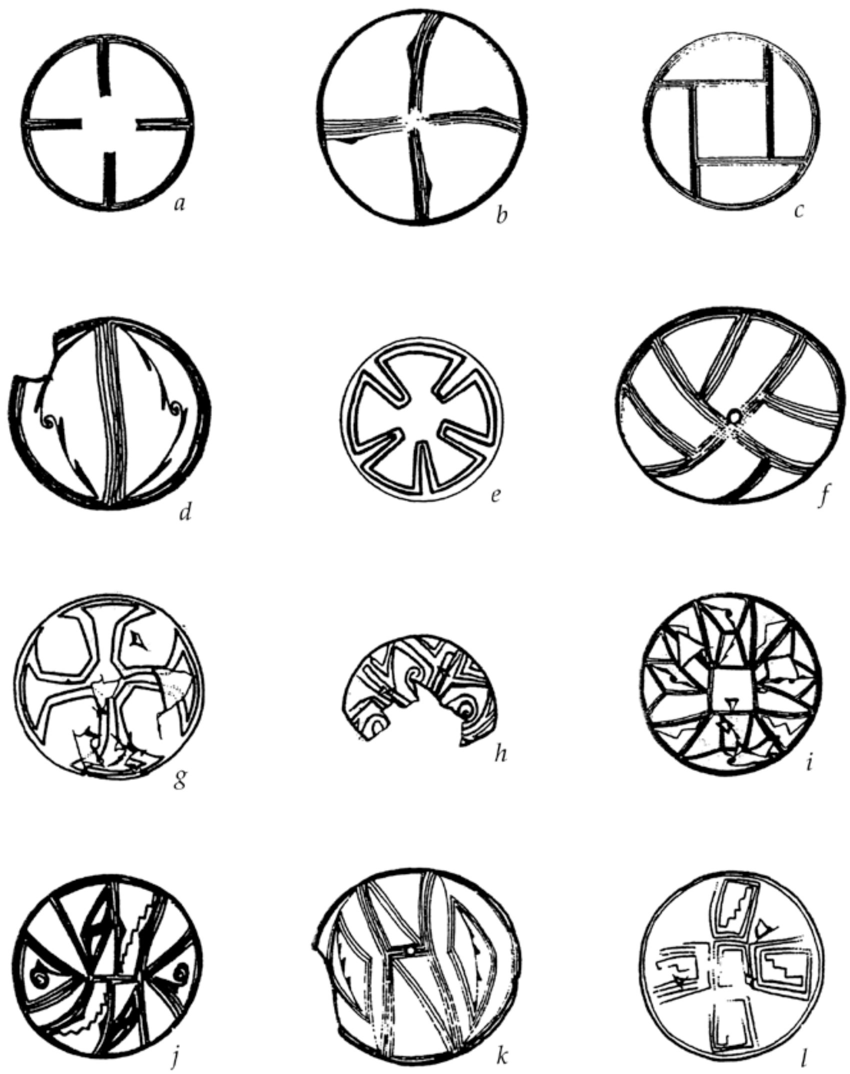

Figure 44. Examples of complete Three Rivers Red-on-terracotta bowl designs. Adapted from Stewart 1983, Figures 3–5.

The study of the Abajo assemblage of Three Rivers Red-on-terracotta was necessarily restricted to rim sherds because no complete or restorable vessels were recovered from the site. However, and as I mentioned earlier, many bowl rim sherds are present, making it possible to study rim designs and the junctures where line bundles depart from the rims, striking downward towards the bottoms of the bowls. Thus, it is possible to examine the differences in the numbers of lines in the rim bundles and the details of the departure points for the bottom bundles. During this study I became aware of just how many mistakes can be made by the potters in drafting the designs. We can ask whether the observed frequency of these mistakes is normal or abnormal for the pottery type.

Analysis

As I began working with the Three Rivers Red-on-terracotta sherds I became intrigued with the fact that the number of lines in the below-rim line bundles varies widely. Several other aspects of the designs next to rims also became obvious: variation in line thickness, draftsmanship, and the organization of the departure point where the line bundles leave the rim and dip downward into the bottom of the bowl. Mistakes are common, and procedures for producing the designs vary. Examples of selected rims are presented in Figure 45. These rims provide examples of the below-rim line bundles, some of the drafting (layout) cues, some of the drafting mistakes, and several of the solid elements present within the assemblage. Figure 45 provides the analysis number of the sherd (numeric) and the figure designation (a letter).

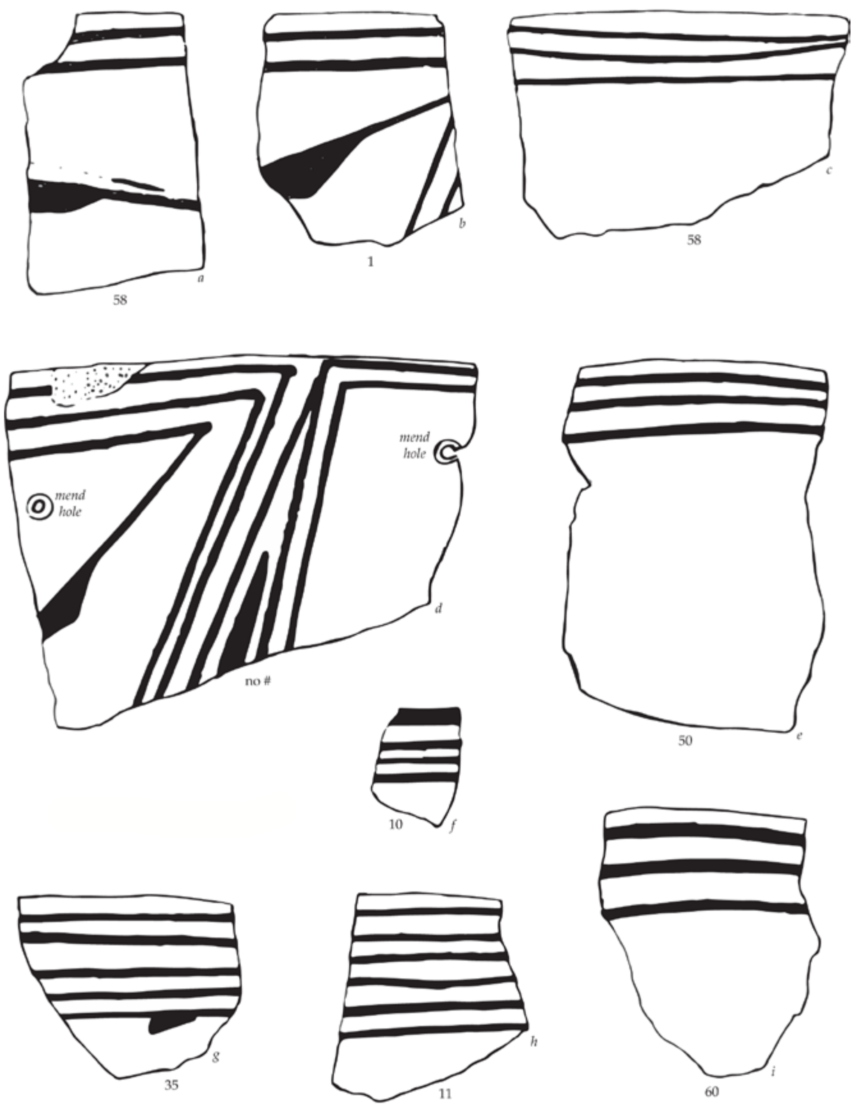

Figure 45. Three Rivers Red-on-terracotta bowl rim sherds, showing variations in designs. Sherd 58 (a) is 5.8 cm tall; other sherds are drawn to the same scale.

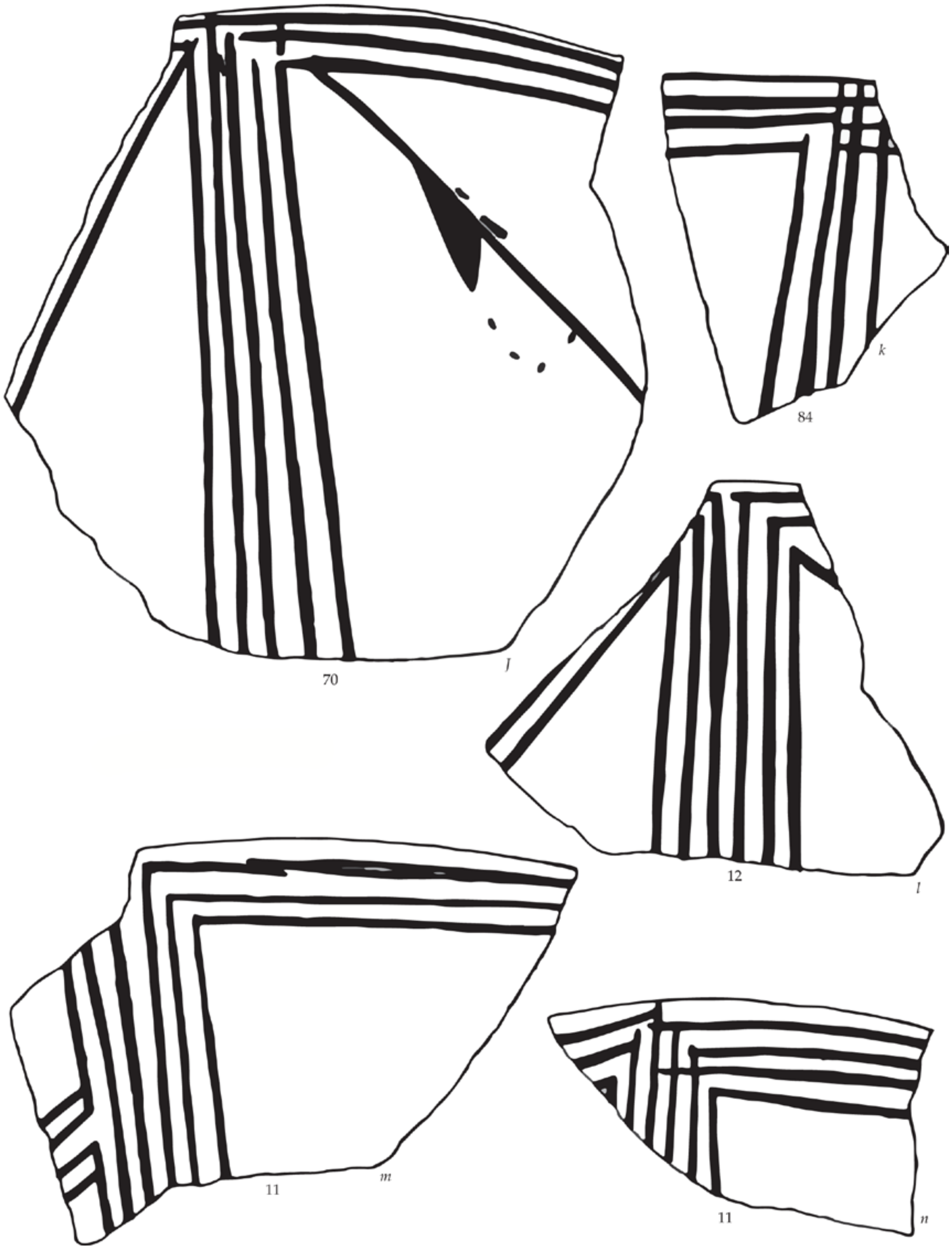

Figure 45, continued. Three Rivers Red-on-terracotta bowl rim sherds, showing variations in designs. Sherd 70 (l) is 12.5 cm tall; other sherds are drawn to the same scale.

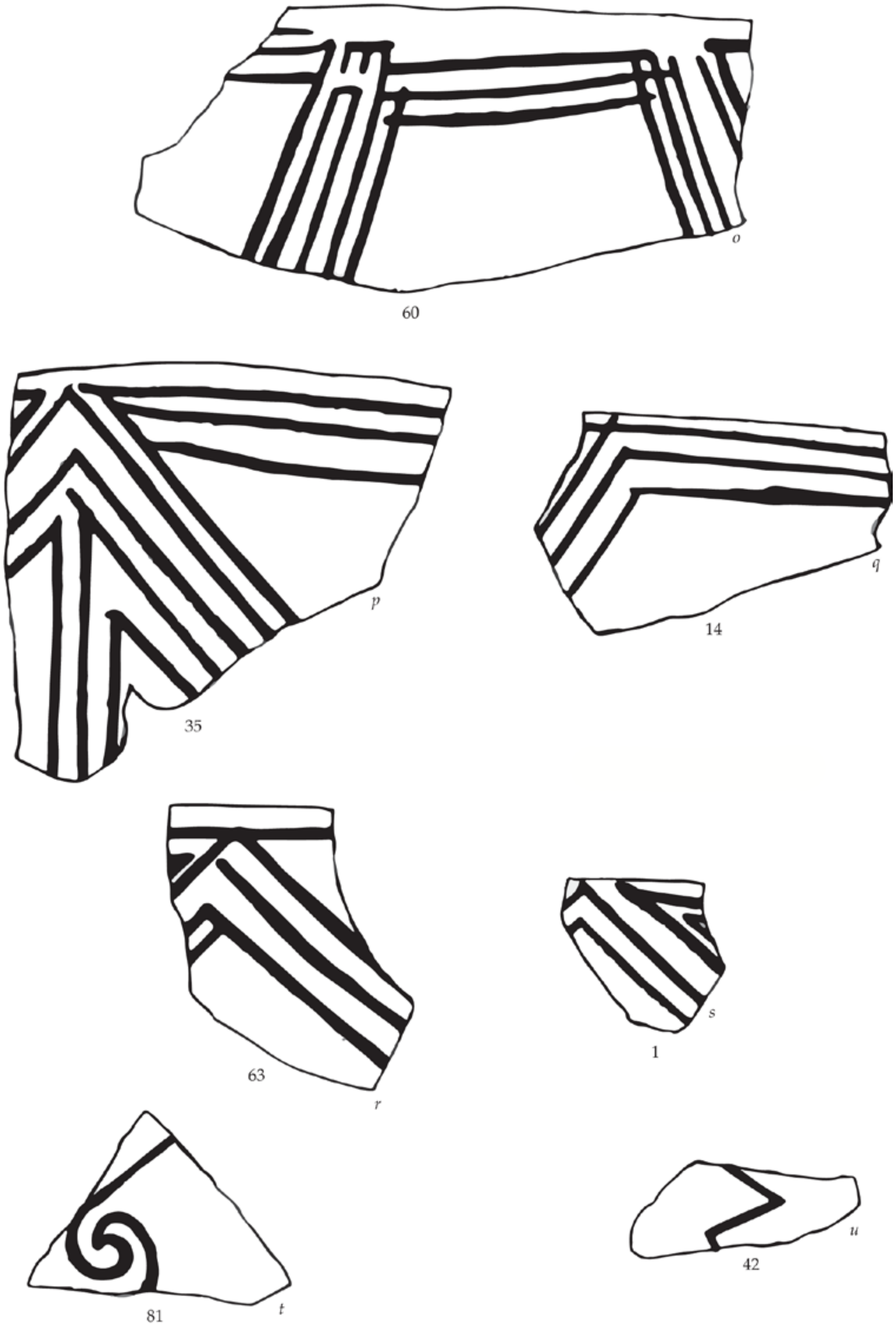

Figure 45, continued. Three Rivers Red-on-terracotta bowl rim sherds, showing variations in designs. Sherd 35 (p) measures 7.4 cm across at the rim; other sherds are drawn to the same scale.

The number of lines comprising the below-rim bundle ranges from two to six. The vast majority have three lines (n = 67, or 77 percent), while two-line bundles account for 10 sherds (11 percent), four-line bundles account for six sherds (7 percent), five-line bundles for two sherds (2 percent), and six-line bundles for a single example (1 percent). Curiously, one sherd (Figure 45d) has both two- and three-line bundles below the rim. If the number of lines in each below-rim bundle has a symbolic and/or social meaning, it is currently not clear. As will be illustrated shortly, painting mistakes are especially common in the Abajo assemblage. While this is merely an impression, this is the second assemblage in which I have noticed the severity of the problem (see Wiseman 2002).

Draftsmanship ranges from quite good to poor, with the norm being imperfect. The rare good examples have consistent line width, both within individual lines and among all lines in the design. None is perfect, however. Most sherds display a certain carelessness regarding consistency of line width (Figure 45k), straightness, keeping lines parallel, and spacing (Figure 45c). Other problems include line overlaps at corners (Figure 45d, j– l, n–q), incomplete connection of lines that are supposed to form corners (Figure 45j, o), corner overruns (Figure 45n, o), and failure to make precise paint-overs on lines (Figure 45l, m, q). In some cases, initial layout guide lines are still evident (see the line on Figure 45a and the triangle on Figure 45j). Design layout mistakes at bundle departure points are especially amusing (Figure 45d, k, n–p, r).

In addition, the desired effect appears to have been as follows: as segments of the below-rim bundle approached each other, they should turn downward in unison. That is, for three-line rim bundle, a six-line downward bundle was generally desired (Figure 45m). However, the Abajo sherds display a number of apparent failures to achieve this desired effect (Figure 45d, j, k, n, o). In other cases, the painter attempted to use the descending bundles to form a chevron at the departure point, whereby the topmost line touches the rim or an uppermost line in the below-rim bundle (Figure 45p, r). In both instances in the Abajo assemblage, the chevron design was botched.

Another problem with the Abajo Three Rivers vessels is the poor quality of the paint, the generally poor bonding between the paint and the slip, and the inability (or lack of care) on the part of the painter to apply a consistent thickness of paint. Within a single line, visibility can range from well-defined to ghostly. As I mentioned, in the worst cases sherds must be inspected under magnification and intense light to ascertain where paint is present and where it is not. If it is present, it is not always clear whether the pigment had been applied as a slip or as a design. This proved to be a fairly serious problem throughout the analysis, especially when discerning whether a bowl belongs to the red-lipped variety of Three Rivers Ware (see next section).

Three Rivers Red-Lipped Terracotta

Although the term "Three Rivers Red-Lipped" probably should not be added to lists of Southwestern pottery types, I employ it here for convenience, including in the description and discussion that follow. As the term implies, the rim sherds of these bowls indicate that the complete vessels lacked both red slip and red painted designs on the interior surfaces. Apparently, the only paint on the vessels was to be found as a solid red line on the lip of the rim of the bowl. Otherwise, all other characteristics of Three Rivers Red-on-terracotta vessels apply to these sherds and vessels.

Here again, one must grapple with whether the interior surface of bowls was provided with an overall slip, or with a painted design, or neither; pigments were not always long-lasting. In some cases the pigment did not adhere to the vessel surface. In others the fault may have lain with the potter, who did not stir the paint mixture frequently enough to ensure a proper mix of paint and fluid. For Three Rivers in general, bowl interiors must be closely inspected under magnification (usually 30 power) and intense lighting to detect any traces of red pigment. And, given the tiny red bits of iron compounds that are common in at least some Three Rivers pastes, the analyst must be aware that they can mimic, and be confused with, traces of paint. Only after considering these issues can the analyst be certain that a bowl was never slipped or painted. And, of course, only very large body sherds and sufficiently large rim sherds can be used in this exercise, to ensure that one is not viewing an unpainted area within a design and that the otherwise undecorated bowl actually has a red line on the lip of the rim.

Detailed Analysis

Twenty bowl rim sherds were found to be of sufficient size and state of preservation for detailed analysis along the same lines for as the regular Three Rivers Red-on-terracotta sub-assemblage.

Analysis of gray feldspar as temper in the red-lipped sherds included the same categories as for the regular Three Rivers. The values for each category are: no gray feldspar, four sherds (20 percent); 1 or 2 grains, eight sherds (40 percent); 3 to 6 grains, five sherds (25 percent); 7 to 12 grains, one sherd (5 percent); and dominant, two sherds (10 percent). Of these, only two sherds (one with 1 or 2 grains and the other with 3 to 6 grains) contained probable examples of Sierra Blanca gray syenite. Given the smaller size of the Red-Lipped sub-assemblage, all of these values compare favorably with those of the regular Three Rivers Red-on-terracotta, except that a larger percentage of the Red-Lipped variety sherds have gray feldspar (80 percent as opposed to 63 percent).

Seven sherds (35 percent) are 6 mm thick, five sherds (25 percent) are 5 mm thick, and the rest (40 percent) are 4 mm thick or less. Thus, the Red-Lipped rims are generally a little thicker than both regular Three Rivers Red-on-terracotta (38 percent at 5.5 mm thick) and Jornada Brown (a single mode including 26 percent at 5.5 mm thick and 23 percent at 6 mm thick, for total of 49 percent).

The only pigment on Red-Lipped specimens consists of a red painted line along the top of the rim (e.g., along the lip). The analyst must be aware that while the line probably extended continuously around the orifice, it may not have been preserved in its entirety. Thus, the entire rim sherd has to be scrutinized under magnification to document the presence of pigment. And, as is always the case with the Three Rivers wares, the pigment might be maroon, red, or dark brown ("dried blood").

Chupadero Black-on-White

Thanks to instrumental neutron activation analysis (INAA), we are now obtaining excellent information on the places of manufacture for numerous Southwestern and Texas pottery types, including Chupadero Black-on-white (Creel et al. 2002a). One of the two main production regions identified thus far for Chupadero is also the area where it was made the longest, the Gran Quivira region (or Salinas district) of central New Mexico. A second production area, long suspected on the basis of petrographic studies, is the Capitan–southern Jicarilla Mountains area of south-central Lincoln county. Two of the more stunning findings of this study were: (1) most of the Chupadero made in the Gran Quivira region was used there (very little was traded to other regions); (2) most of the Chupadero recovered from far-flung areas was made in the Capitan–Jicarilla region. One dissatisfying result is that 22 percent of the study sample of Chupadero was not accounted for in the reference data base. This problem is even more acute when one is considering specific sites. For instance, 67 percent of the sampled Chupadero from the Bonnell site remains unassigned (Clark 2006:152, Table 6.3)! The analysts expect these exceptions will eventually be assigned to the two main sources once the database is sufficiently large. However, the general figure for unassigned sherds (22 percent) and the specific figure for the Bonnell site (67 percent) seem too large to me, and I suspect that one or more additional places of manufacture will be discovered.

Prior to publication of the Creel et al. study, Mark Ennes (1999) suggested that Chupadero was made on the margins of the Tularosa basin well south of the Capitan–Jicarilla region. However, his comparative samples from several locations along these basin margins have compositions similar to those of igneous rocks farther north in the Capitan–Jicarilla region. Ennes did not include comparative samples from the Capitan–Jicarilla region in his study, so we must hold off accepting his conclusions until this oversight can be corrected.

Bowl to Jar Sherd Ratios

Were more Chupadero Black-on-white jars made than bowls? Most archaeologists who note this apparent preference also remark that more jars were traded than bowls. However, they usually do not allow for the difference in sizes of bowls versus jars and therefore the "average" number of sherds into which each may break. Casual observation of complete bowls and jars of Chupadero over the years leads me to suggest that the "average" jar probably has twice as much ceramic fabric as the "average" bowl. Thus, when considering bowl and jar sherd ratios and using them as indices of "popularity," one should probably divide the jar figure in half to provide rough equivalencies of vessels. Abajo de la Cruz produced 283 Chupadero bowl sherds and 702 jar sherds, so dividing the latter number in half results in the ratio 283:351. Thus, the Chupadero assemblage probably had four bowls for every five jars. In all likelihood, bowls and jars were both desired forms at Abajo.

Chupadero Painted Designs

As far as I know, no one has made a serious study of Chupadero painted designs. It is clear the type encompasses a variety of elements, motifs, and patterns. Perhaps the most quickly recognized motif consists of opposed, angular solid and hatched areas within panels. In the characteristic rendition of this motif, the solid and hatched elements join at their points (described, for example, as "tips touching") (see Hayes et al. 1981, Figures 92–94 and Farwell et al. 1992, Figures 40, 43, and 45). While this motif is by no means restricted to Chupadero Black-on-white (see Wiseman 1986), it seems that very few hatched-and-solid motifs on Chupadero lack this feature. One surprise for those who familiar with Chupadero's hatched-and-solid motif is the fact that a number of complete and nearly complete vessels have designs composed entirely from solid elements (for instance, Kelley 1984, Plates 3b, 63a, 64a, and 81a).

In the absence of complete and nearly complete vessels in the assemblages from most sites, what can be done concerning the study of designs? A novel approach used in the current study is to score each Chupadero sherd according to whether it lacks design altogether (unpainted portions of painted vessels) or has design fragments that consist of solids only (including thin or thick lines or both), hachures only, or a combination of solids and hachures. In this manner, we can at least learn something from the relative frequency of each category. The resulting comparative data may eventually permit us to characterize Chupadero design assemblages throughout the region where Chupadero is a major pottery type. In the study I also scored the sherds by vessel form (bowl versus jar).

The results for the sherds from Abajo de la Cruz are summarized in Table 14. As can be seen, jars appear to have significantly more undecorated space than do bowls. Both vessel forms have an heavy emphasis on solid elements, including both thick and thin lines. Bowls appear to have more space devoted to hatched and solid-and-hatched motifs.

Table 14. Design Study, Chupadero Black-on-White Pottery.

Vessel Form	No Paint	Solids Only	Hatched Only	Solids and Hatched	Total
Bowl	48	146	41	72	307
Row Percent	15.6%	47.6%	13.4%	23.5%	100.0%
Jar	317	393	68	104	882
Row Percent	35.9%	44.6%	7.7%	11.8%	100.0%
Total	365	539	109	176	1189
Row Percent	30.7%	45.3%	9.1%	14.8%	100.0%

Chupadero as a Superior Container for Liquids

At Abajo, Chupadero Black-on-white was the third most common pottery type and the second most common painted type. It was also one of the most widely traded prehistoric Southwestern types and has been found from at least as far west as southeastern Arizona to as far east as the Southern Plains of Texas, Oklahoma, and Kansas. To my knowledge, no one has ever tried to explain the popularity of the type, but part of the reason for its widespread distribution may be its superiority to the indigenous pottery of the Sierra Blanca country.

Chupadero is clearly better than Jornada Brown and Corona Corrugated at holding water or other liquids, without being damaged by those liquids. Although I know of no experiments that support this assertion, years of washing sherds of all types have shown me that, when soaked in water during the washing process, most Chupadero sherds hold up extremely well while the sherds of all other local types, including Jornada Brown, tend to disintegrate after as little as 10 or 15 minutes. This is not to say that Jornada and Corona cannot be used for cooking—they can, and were—but for best preservation, they must be used for the purpose at hand, then emptied and dried. (I suspect that Jornada and Corona had highly polished interior surfaces to reduce penetration by liquids, as well as for ease of cleaning.) It should also be noted that rather late in the occupation of the Sierra Blanca, and especially in the Roswell Oasis (Wiseman 2013), El Paso Polychrome jars apparently became the favored cooking vessels.

Chupadero Black-on-white occurs in a characteristic olla form: a spherical body with a very small diameter neck and mouth. Thus vessel form, combined with the typically hard paste, seems especially well adapted for holding and transporting water or other liquids.

"El Paso Brown"

The Abajo de la Cruz pottery assemblage includes 561 sherds that possess the characteristics of El Paso Brown as defined by Lehmer (1948, Appendix 2). Given the late occupation date for Abajo, El Paso Polychrome should have replaced El Paso Brown at the site. Of course, we have no reason to assume that every vessel made of El Paso paste was painted, for a potter could have decided to skip that step for various reasons. However, the more likely source of the sherds is the fact that the painted designs and slipped surfaces of almost all complete El Paso Polychrome jars cover only the upper one-third to one-half of the vessels. Thus, significant numbers of sherds representing the bottom portions of polychrome jars are plain brown and generally conform to the description of El Paso Brown. Since probably all of the plain brown sherds with El Paso paste are from the bottoms of El Paso Polychrome jars, in Table 12 the "El Paso Brown" sherds appear in a column next to the one for El Paso Polychrome.

About half of the "El Paso Brown" sherds display some surface polishing, an attribute that is not listed by Lehmer as a characteristic of El Paso Brown (but see below). This point has caused a great amount of confusion among archaeologists working in the El Paso region, as they have noticed at least some degree of polishing on some sherds of El Paso paste pottery from their sites. Among other consequences, most archaeologists who have worked in the El Paso region but not in the northern Sacramento Mountains and Sierra Blanca country of south-central New Mexico believe that Jornada Brown does not exist. Instead, the erroneous conclusion has arisen that all plain brown pottery from sites in that mountain area should be classified as El Paso Brown and, through implication, that the use of "Jornada Brown" should be discontinued (e.g., Hasbargen and Railey 2008). *Nothing can be further from the truth*.

El Paso Polychrome

The work at Abajo de la Cruz yielded 503 painted sherds of El Paso Polychrome (EPP). The 561 sherds described in the previous section are most likely from the lower, unpainted portions of EPP vessels.

Four kinds of data were recorded for the El Paso Polychrome jar rim sherds: rim profiles (illustrations and measurements for calculating yet another version of the Rim Sherd Index, or RSI), jar orifice diameters, surface finish, and tempering materials. In addition, I addressed the question of whether El Paso Polychrome was made in the Sierra Blanca country of northern Otero and southern Lincoln counties, New Mexico.

Jar Rims

Decades of work in the El Paso region have demonstrated that the profiles of El Paso Polychrome jars yield important chronological data, especially when large sample sizes are involved. Starting with Michael Whalen and his staff (West 1982; Whalen 1981) and continuing with Seaman and Mills (1988), Myles Miller (1995), and now John Speth and his students (Speth and LeDuc 2007), various projects have worked with this notion and demonstrated its efficacy.

Initial approaches to dating EPP involved both jar and bowl rim profiles, but Seaman and Mills (1988:169–171) showed that combining jar and bowl sherds in a single data set is misleading; the trends can be different and bias the results. Here I deal with jar rims.

As they approach the lips, the earlier EPP jar walls from Abajo de la Cruz are parallel-sided to slightly thickened, and are straight to slightly everted. The later jar walls evolve from the earlier ones by having slightly to decidedly thickened walls that become increasingly everted through time. However, a study by Miller (1995:215) indicated that thinner and thicker walls (immediately below rims) both occur in late EPP, so wall thickness probably has no real chronological implications.

My experience with the Abajo de la Cruz sherds suggests that during the period when "classic" EPP was made, potters followed two production paths. First, they continued to make jars with slightly to moderately thickened rims (Figure 46**)**. I suspect that these jars tended to be smaller than those of the second production path.

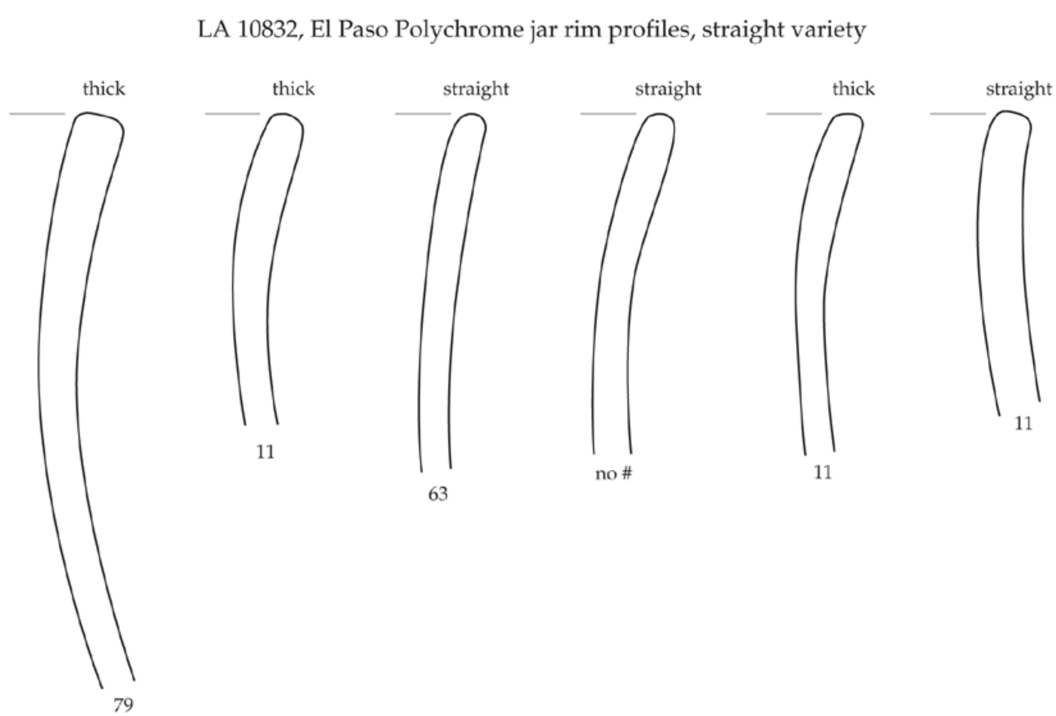

Figure 46. El Paso Polychrome rim profiles.

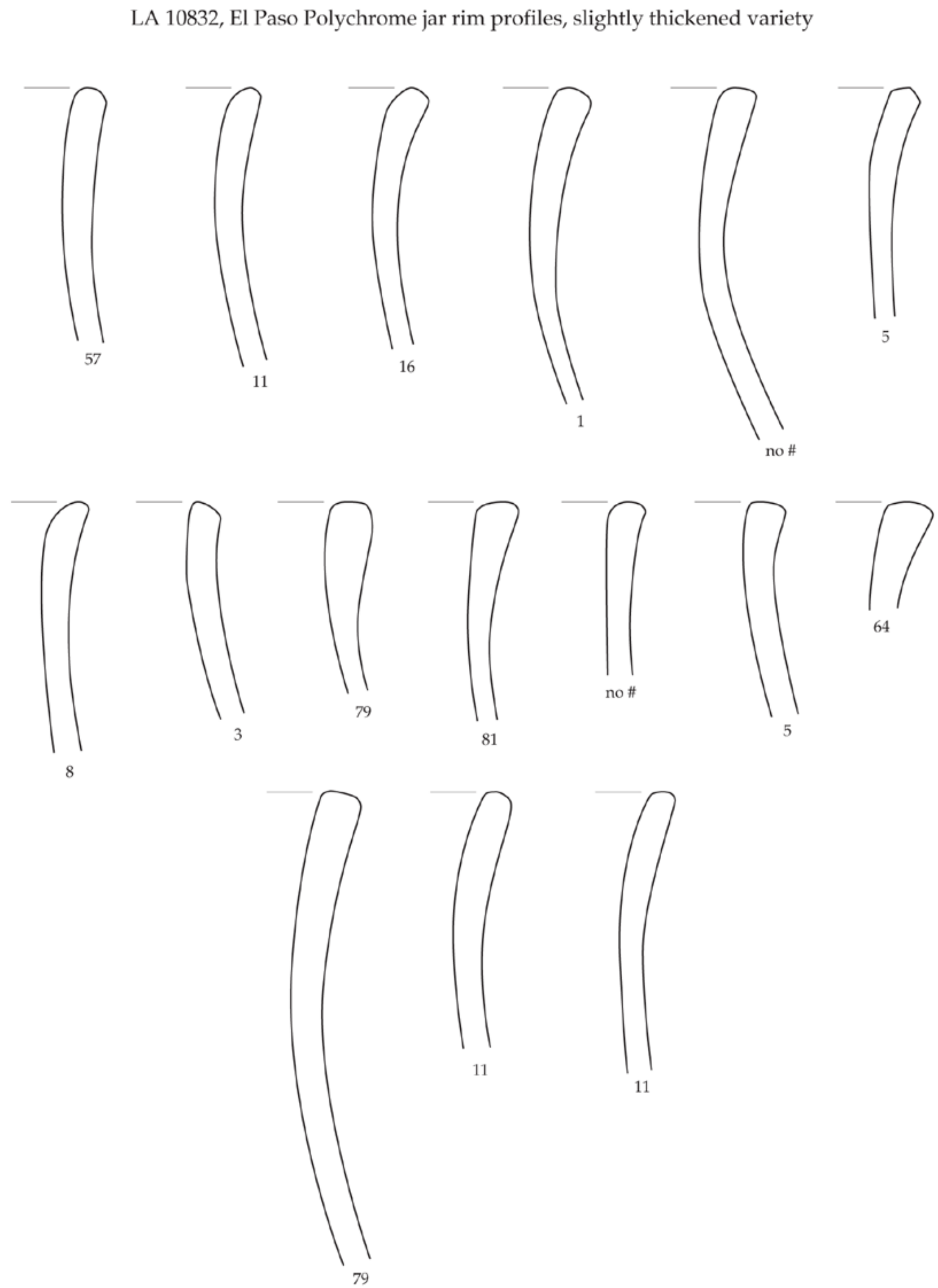

Figure 46, continued. El Paso Polychrome rim profiles.

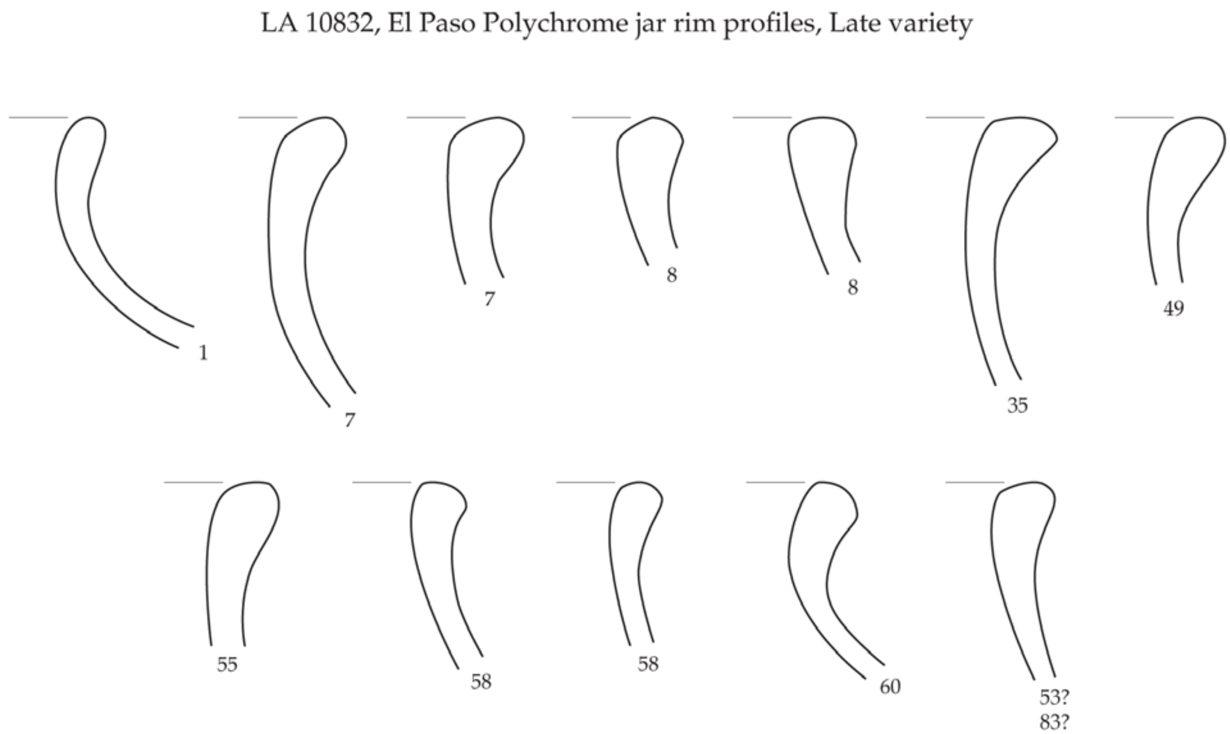

Figure 46, continued. El Paso Polychrome rim profiles.

The second production path, discovered through visual studies of rim profiles coupled with calculations of the Rim Sherd Index (RSI), involve changes in wall thickness from the bottom of the vessel to the rim. The vessel wall is thickest at the bottom of the jar. The wall thins slightly until it reaches the point where the jar is widest. Above that point thinning continues and as a result, the upper vessel wall is quite thin compared to the bottom and lower wall. At a point several centimeters below the rim and lip—here called the "re-thickening point"—the wall starts to thicken, presumably to strengthen the vessel's lip and rim. Through time, the potters apparently realized that the re-thickening point could be moved upwards, closer and closer to the lip. By the end of this trend, the re-thickening point was so close to the lip (within 1 cm or so) that the lip profile takes the shape of a comma. The uppermost wall thickness can be as little as 3 mm while the lip itself is as much as 10 to 11 mm thick.

At least four tangible benefits would derive from the trend: (1) the center of gravity of the jar would remain low (or moved lower as the upper walls grew thin?); (2) the bottom part of the jar was still strong enough to support the contents; (3) the amount of fuel needed to fire the upper portion of the jars diminished, and (4) larger and larger vessels could be made because of the lessening of the weight of the upper walls.

A Comment on RSIs

The observations in the preceding paragraphs came from my experience with grouping EPP jar rims based on visual examination of their profiles. The idea of the upwardly moving re-thickening point came about when I calculated the RSIs for the Abajo EPP rims and found that the calculations for some of the sherds did not agree with my visual examinations.

Several variations for calculating RSIs have been used over the years (see Speth and LeDuc 2007:35 for a summary). I have chosen to modify the technique yet again by taking measurements at the 20 mm point, rather than at the 15 mm point, in order to capture more of the variation introduced by the upward movement of the re-thickening point (as defined in the previous section). Also, I have used the 2 mm value in the numerator and the 20 mm value in the denominator; the original technique reverses these roles.

When the results are plotted, it is obvious that the Abajo sample represents a continuum of RSI values (Figure 47). A possible break at about RSI = 0.55 suggests that an extreme form of rim thickening can be distinguished from the general pattern. Previous studies have documented that this extreme form occurs at the late end of the El Paso Polychrome production span, and the form is frequently used to classify pottery assemblage as late. However, as I discussed earlier, these rims might be contemporary with rims with more usual degrees of thickening. Miller (1995:215) has previously suggested this to be the case.

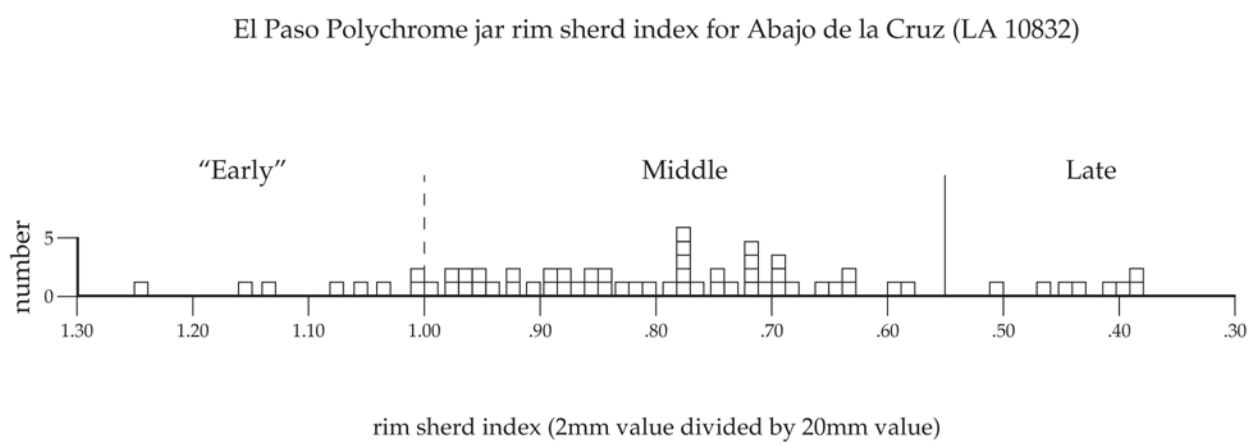

Figure 47. El Paso Polychrome jar rim sherd index for Abajo de la Cruz.

The suggestion that an early form is denoted by parallel-walled rims does not seem to be warranted. Interestingly, a few Abajo rims are slightly tapered. However, the tapering is not as extreme as is found among some of the earliest plain El Paso Brown vessels (Miller 1995, Figure 27). It is also possible that the Abajo sherds with tapering rims are from vessels with re-thickening points located well below the lower ends of our sherds, resulting in an erroneous impression that the rims should be classified as tapered.

Local Production of EPP?

Was some EPP made in the northern Sacramento Mountains or in the Sierra Blanca (or both)? To investigate this question, I conducted two studies on the El Paso wares from Abajo. The first looked at the surface finish of unpainted El Paso ware sherds, and the second looked at the tempering materials in painted El Paso Polychrome jar rim sherds.

As I mentioned, one ever-present problem faced by archaeologists has been distinguishing El Paso Brown from Jornada Brown. By definition, the surface finish of El Paso Brown is supposed to be "smooth matte" (Lehmer 1948, Appendix II). Evidently, this statement has been interpreted to mean that the surfaces cannot have been polished with a pebble. The surface finish of Jornada Brown, in contrast, is defined as showing "the effects of polishing, though varying in degree from fairly glossy to perfunctory" (Mera 1943:12; description abstracted from Jennings 1940:5–6). Study of the sherd will usually and easily solve the problem of polish versus no polish, but only if done under magnification. In any case, archaeologists working in the El Paso area have consistently encountered brown ware sherds that possess surface finishes ranging from smooth but dull (non-shiny) to various degrees of shiny—hence the problem.

My experience in working with pottery from both the El Paso region and the Sacramento Mountains–Sierra Blanca area, especially with the aid of 30 power magnification and bright illumination, has found that many collections of sherds identifiable as El Paso and Jornada browns and polychromes illustrate a wide range of surface finish characteristics that belie "eyeball" distinctions between "polished" and "unpolished" made in the field. The clays themselves, how they react to firing, and the potters' manufacturing processes all make critical contributions to the characteristics of pottery surfaces (Shepard 1968:122–125; 186–193). Among other concerns, a surface can be polished without becoming lustrous.

And, as always, the analyst must first be certain that the surface being observed is intact and has not been altered by use-wear or weathering or both, as those processes can mask or eliminate the evidence for a given surface treatment. Post-depositional weathering is an especially common problem for surface sherds in southern New Mexico and west Texas, where wind-borne sediments can sand-blast the surfaces of sherds. Moreover, those sherds can be exposed and reburied on one or more occasions in the centuries between disposal and archaeological study. Even excavated sherds must be evaluated for degree of preservation, under laboratory conditions, before reliable observations and interpretations can be rendered.

With these caveats in mind, I divided body sherds of "El Paso Brown" into two piles, one with non-lustrous surfaces ("regular," meaning "at first glance, unpolished") and the other with lustrous surfaces ("polished"). As I mentioned earlier, my primary goal in this particular inquiry was to determine whether a clear-cut distinction exists between the two classes of surface finish (unpolished versus polished), so that sherds can be divided in terms of that distinction before considering regions of manufacture or potting traditions or both. The background to this concern was, of course, the notion that the unpolished sherds might have been made in the basins of the El Paso region while the polished sherds might have been made in the Sacramento Mountain– Sierra Blanca country.

Even without resorting to systematic microscopic examination of each and every sherd for surface condition (weathered or use-worn versus unweathered or non-use-worn) and finish characteristics, it immediately became evident that the sherd surfaces display a near-continuous spectrum of conditions ranging from destroyed to perfectly preserved. Of the sherds with intact surfaces, characteristics range from bumpy (due to the coarseness of temper grains that protrude through unfloated surfaces) to finely floated (surfaces that hide all but the largest temper grains). Other observed characteristics include occasional remnants of tool marks (such as those created by scraping and temper-grain dragging, resulting in a few limited deep linear scratches, especially on interior surfaces); consistent, thorough, and widespread scrape marks (left by scraping tools); and systematic, parallel, linear grooves (either lustrous or non-lustrous) left by polishing stones. Some surfaces appear to have been compacted by thorough use of polishing stones, such that all grooves were eliminated. In this last instance, the resulting surface may be non-lustrous, slightly lustrous, or fully lustrous. When polishing was perfunctory, the polishing grooves are haphazardly placed, often crisscrossing each another at widely varying angles. And even these grooves may be non-lustrous, slightly lustrous, or lustrous and therefore visible to the unaided eye. The welter of outcomes expressed on the surfaces of these sherds is truly amazing, and they cannot divided according to the single criterion of unpolished versus polished.

A simple result underscores this conclusion. The two initial groups made from the 561 sherds included 57 proveniences that produced either "regular" El Paso Brown or Polychrome, "polished" El Paso Brown or Polychrome, or both. Of these, 19 produced one or the other variety but not both. More important, the proveniences that produced only one variety of El Paso Brown or Polychrome account for 33 sherds (4.6 percent of the total). Thus, more than 95 percent of the sherds of the two groups co-occurred in the same proveniences, indicating that the two groups may well have belonged to the same vessels rather than to separate vessels. If true, the differences in surface finish (polished or unpolished) may relate to position of the treatment on the vessel (middle sides, lower sides, bottom) rather than to separate vessels from different potting traditions.

Tempering Materials

Examination of 64 EPP jar rim sherds revealed the presence of a small number of mineral types but an almost endless variety of combinations of those minerals within the study sample. The details of just how many rock types are present, the identification of the specific rocks involved, and their possible points of origin should be worked out by a petrographer.

The primary minerals noted in the Abajo EPP sherds include feldspars of various colors, quartz in at least two forms, iron compounds (red "ochre") as small bits, unspecified mafics ("black bits"), and gold biotite (mica). The colors of the feldspars include white (porcelain-like), off-white (ivory, light tan, very light gray), gray, and colorless (clear). The two general forms of quartz are clear (especially when intertwined with white feldspar) and clear or frosted individual grains (crystals that lack facets, instead being mostly rounded like sand grains). At least two different minerals appear to constitute the mafics (in addition to biotite): one or more members of the hornblende or augite families, and magnetite. Most of the time these grains are too small to identify confidently at 30 power (diameters) under the microscope. Some of the mafics (or "black bits") appear to be differentially oxidized iron compounds: certain sherds contain black, brown, and red examples, corresponding to the oxidation states of the sherd cross-sections in which they occur.

Tempers characterized by rounded quartz grains may indicate an origin in the basins of the El Paso region. Sherds in which quartz is absent or rare may have been made in New Mexico's Sierra Blanca. A third rock type, represented by brownish-gray and gray feldspars, may also derive from the Sierra Blanca, but the colors, shapes, and sizes of the crystals do not match the gray syenite from that region. Careful petrographic work, the assembly of good comparative collections through field work, and the composition studies such as neutron activation analysis would be of great benefit here.

Summary and Conclusions

A study of El Paso Polychrome sherds from Abajo de la Cruz indicates that for any thorough examination, the surfaces of sherds must not be use-worn, eroded, or washed off in the laboratory. As a rule, excavated sherds are more likely to have intact surfaces than sherds from site surfaces.

The intact sherd surfaces from Abajo embody a wide variety of states of smoothing and polishing, which may or may not result in a lustrous finish. These states of preparation often vary over a vessel; interior surfaces can differ from exterior ones, and upper parts, lower parts, and bottoms of jar exterior can also vary. A variety of surface states can and often do occur in samples from a single provenience, suggesting that different finishes may derive from the same vessel. The traditional assumption that El Paso sherds are unpolished and Jornada sherds are polished is, at the very least, an oversimplification.

Tempering materials suggest that El Paso Polychrome in the Abajo assemblage derives from two regions: the basins around El Paso and the high country of the northern Sacramento Mountains and the Sierra Blanca (northern Otero County and southern Lincoln County). However, petrographic and instrumental studies will be necessary to provide a more conclusive answer.

In conclusion, between the finding that (1) the nature of the surface finish on El Paso and Jornada vessels was less critical and less definitive than originally thought, and (2) Sierra Blanca rocks were used in the manufacture of some vessels otherwise fitting the description of El Paso Polychrome, it is a virtual certainty that examples of El Paso Polychrome vessels were made in the Sierra Blanca highlands. The question then becomes, just who were the producers of the Sierra Blanca versions of El Paso Polychrome. Were they Glencoe potters of the southern Sierra Blanca? Or were they El Paso region potters who moved out of the basins and into the Sierra Blanca?

Indented Corrugated

This short study encompassed Reserve or Tularosa utility pottery, Seco Corrugated, Los Lunas Smudged, Pilares Rubbed-Ribbed, and Corona Corrugated. The study was prompted by two concerns: (1) identification of the sherds as part of understanding the site and its occupants, and (2) the puzzling number of so-called "campsites" in southeastern New Mexico, east of the Sacramento–Guadalupe mountain chain, that have yielded indented corrugated pottery sherds in assemblages otherwise dated before A.D. 1225 (the start date for production of Corona Corrugated and, for that matter, well before the start of Ochoa Corrugated). While these early corrugated sherds are reported in the literature, I have not had the opportunity to examine them myself, so their occurrence in early contexts puzzled me. Because the Abajo assemblage contains such a wide variety of surface treatments, I hoped that it would enlighten me as to the source or sources of indented corrugated sherds other than Corona Corrugated. Not inconsequential to this inquiry is my impression that the prehistoric inhabitants of the Sierra Blanca region might have made small numbers of indented corrugated pots. Thus the quest began!

All of the indented corrugated sherds in the Abajo de la Cruz assemblage are brown wares, and they embody a variety of corrugation techniques. The sherds have been categorized into five pottery types, one combination category, and one residual category (Table 15).

The five named pottery types are Corona Corrugated, Los Lunas Smudged, Seco Corrugated, Pitoche Rubbed-Ribbed, and Tularosa Filet Rim. With one exception, these types are represented by only a few sherds. The larger number of Seco Corrugated sherds is attributable to the fact that most appear to represent a single vessel.

The most numerous indented corrugated sherds are Reserve or Tularosa utility wares. This approach is used here because of the difficulties in separating the types defined by Rinaldo and Bluhm (1956): Reserve Plain Corrugated, Reserve Indented Corrugated, Reserve Punched Corrugated, Reserve Incised Corrugated, and Tularosa Patterned Corrugated, plus smudged varieties of each. My approach is less problematic than first appears because those types appear to have virtually no diagnostic value in terms of time; instead the suggested date ranges largely overlap. The outside dates proposed for these types are ca. A.D. 950 to 1250, with the major overlap of types between 1000 and 1200 (Rinaldo and Bluhm 1956). Recent dates for Reserve Indented Corrugated suggest that that type, and perhaps two or more of the series, was made as late as A.D. 1300 (Laumbach and Laumbach 2013:90–91). Also, instrumental neutron activation analysis shows that the Reserve Indented Corrugated was made as far east as the eastern bajada of the Black Range (Laumbach and Laumbach 2013:91–92). The examples from Abajo de la Cruz may well have come from there, as opposed to the Reserve area farther to the northwest.

On a more practical plane, separation of the four Reserve types from the one Tularosa type was bedeviled by the small sizes of the sherds and by the lack of a clear division in the sizes and depths of the indented corrugations. Instead, there is a continuum from the largest and deepest indentations (belonging to the Reserve part of the series) to the smallest and shallowest ones (the Tularosa part of the series). Also, the sherds are generally too small to provide room for more than one corrugation pattern per sherd, preventing the identification of any Tularosa Patterned Corrugated pottery in the assemblage.

None of the sherds displays either incised lines or punctate marks over the indented corrugations, characteristics evidently restricted to the Reserve end of the series.

The residual category of sherds from Abajo comprises those too small to categorize. All are brown wares and all contain the tempering materials defined for the Reserve or Tularosa group, so probably all belong in that category. However, their exterior surfaces are insufficiently preserved and too small for adequate characterization.

Table 15. Corrugated Pottery: Types, Tempering Materials, and Proveniences.

Pottery Type or Category	Temper	Provenience Concordance Number*
Corona Corrugated (n = 2)	Quartz mica schist	36, 79
Los Lunas Smudged (n = 4)	Variety of tuffs Rhyolite?/tuff?	1, 32, 77 82
Pilares Rubbed-Ribbed (n = 1)	Sand and tuff	60
Seco Corrugated (n = 12)	Rhyolitic tuff Monzonite? (Incl. med. gray and white sparkly)	3, 12, 23, 58, 78, 78, 78, 79, 85 1, 2, 11
Tularosa Fillet Rim (n = 1)	Tuff	10
Reserve/Tularosa Series (n = 31)**	Tuff/Rhyolitic tuff Sparse, fine tuff Rhyolitic tuff with green crystals*** Sandstone Monzonite? Angular to sub-rounded rock (paste too dark to identify)	1, 1, 5, 5, 8, 10, 10, 56, 58, 58, 60, 63, unk 4, 11, 13, 21, 30, 58, 60, 60, unk, unk, unk unk 8, 40, 83, unk 1 64
Too small to identify by type (n = 20)	Tuff Sparse, fine tuff Fine tuff and sand Rhyolitic tuff with green crystals*** Sandstone Monzonite? Angular to sub-rounded rock (paste too dark to identify)	10, 58, 58, 58, 60, 74 5, 75, 83, unk 79 5, 63 5, 74 17, 77 5, 11, 18

*By sherd. The numbers are the sequential numbers assigned to proveniences. Sherds that were not stamped (mostly because of the thoroughness of smudging and polishing of interior surfaces are listed as “unk” for unknown.

**But no punched, incised, or patterned sherds present.

***Presumed to represent one or more of the following minerals commonly found in igneous rocks: apatite, olivene, epidote.

Five or possibly six general types of tempering materials were observed in the Abajo sample: tuffs, rhyolitic tuffs, "monzonite," quartz mica schist, sandstone, and unidentified angular to sub-rounded rock By far the most common materials are tuff and rhyolitic tuff. Petrographic analysis would be needed to confirm the identifications, but what can be seen under 30 power microscopy makes it clear that several different tuffs and rhyolitic tuffs are represented. It is almost certain that these tuffs derive from southwestern New Mexico, where their use as tempering materials in pottery was common (Wilson and Warren 1972).

The possible monzonite is problematic. The mostly white and off-white feldspars in those sherds are virtually identical to the feldspars noted in what here is termed rhyolitic tuff. This fact raises the possibility that the more numerous crystals in the "monzonite" examples are merely from rhyolitic tuffs with large numbers of phenocrysts of this mineral. Occasional small grains of tuff were noted in the "monzonite" examples, supporting this idea.

One or two of the "monzonite" sherds of Seco Corrugated contain a few crystals of a medium gray feldspar in addition to the off-white ones. Although these gray crystals are opaque, they are lighter in color than the gray syenite of the Sierra Blanca of Lincoln county. Nor do they possess any hint of the surface rosettes common to that syenite. Seco Corrugated was first recognized in sites in the vicinity of Truth or Consequences (Wilson and Warren 1973) and presumably was made in that region but west of the Rio Grande (see Laumbach and Laumbach 2013 for an in-depth discussion).

Several sherds containing rhyolitic tuff temper also displayed low numbers of lath-like, clear to translucent, apple-green crystal fragments. I suspect they are apatite or epidote, common minerals in some igneous rocks.

Another variation within the overall tuff category is sand and tuff. In two sherds, the rounded sand grains may represent natural constituents in the clay used in the pots. One of the sherds is Pitoche Rubbed-Ribbed, the other a "too small" sherd. Pitoche was made and used primarily in the Socorro to Acoma region of central and west-central New Mexico.

Quartz mica schist occurs in sherds that also possess the characteristically sloppy indented corrugations of Corona Corrugated (Hayes et al. 1981). This type is the primary utility ware made and used in the Gran Quivira region of central New Mexico and in Lincoln phase sites of the Sierra Blanca region of south-central New Mexico. Apparently, the schist comes from the Manzano mountains, some distance northwest of Gran Quivira.

Six sherds in the Reserve-Tularosa series and "too smalls" category contain crushed sandstone. The source or sources of the vessels represented by these sherds are unknown and could be almost anywhere in New Mexico. Given the overall nature of the sherds, a source in west-central or southwestern New Mexico is most likely.

Four sherds in the Reserve-Tularosa series and "too smalls" category are tempered with angular to sub-rounded rock of unknown type. In most cases, the pastes of these sherds are heavily carbonized, making identification of the rocks impossible without the aid of petrography. However, one of the sherds has a light paste, showing that the rocks and rock fragments are dark and therefore do require petrographic examination for identification.

Summary and Conclusions

The indented corrugated pottery from Abajo de la Cruz consists entirely of imported brown ware types. Named types and groups, in order of frequency, include Reserve or Tularosa utility ware, Seco Corrugated, Los Lunas Smudged, Pitoche Rubbed-Ribbed, and Corona Corrugated. Most are from Mogollon sources west of the Rio Grande but one type, Corona Corrugated, derives from east of the Rio Grande, in the central part of the state well north of Abajo. The most numerous sherds, representing the Reserve-Tularosa utility group, embody a variability in indentation types and patterns that, given the overall low number of sherds, is remarkable. None of the sherds are definitely attributable to manufacture in the Sierra Blanca country of south-central New Mexico.

None of the indented corrugated vessels represented by the Abajo assemblage was made locally. (A local variety of Corona Corrugated, with crushed alaskite temper, was made in the Jicarilla and Capitan mountains just north of Sierra Blanca and has been recovered from other sites in the region [Wiseman 2002:87], but no alaskite was noted in any indented corrugated sherd from Abajo de la Cruz.) With the exception of two sherds of Corona Corrugated from central New Mexico, all of the indented corrugated sherds identified from Abajo were made west of the Rio Grande.

Based on ceramics, Abajo de la Cruz dates to A.D. 1250–1300. The fact that even that late, indented corrugated pottery was being imported from the west and north suggests that indented corrugated sherds from earlier "campsites" east of the Sacramento–Guadalupe mountain chain were probably also imported from the far west. If so, the occasional occurrence of indented corrugated sherds in early contexts (preceding the start of Corona Corrugated about A.D. 1225) might be explained. The tempering materials of these "early" sherds from the campsites need to be examined under laboratory but for now, their presence in those sites *might* be explained. Heretofore, I was quite puzzled about the association of early campsite pottery assemblages with corrugated pottery, for their presence brought into question the dating of Corona Corrugated, the type that I had assumed they represented.

Alma Plain

A single jar rim sherd of Alma Plain was recovered from Strip Trench/Zone Feature 2 fill. The temper appears to be tuff. The surfaces are polished, lustrous, and brown (Munsell 7.5YR 5/2 and 5/3).

Playas Group

Playas Group pottery, generally known to Southwestern archaeologists as Playas Red or Playas Red Incised, is a very interesting ware. Archaeologists will generally state that Playas belongs to the large set of prehistoric wares made in the northwestern quadrant of the Mexican state of Chihuahua, particularly at and around Paquimé or Casas Grandes. Charles Di Peso (1974) assumed that Playas was made throughout the Medio period, which he dated from A.D. 1060 to 1340. While several archaeologists have suggested revised dates for the Medio period, the dates of A.D. 1200 or 1250 to about 1500 offered by Dean and Ravesloot (1993) are more likely correct.

It seems unlikely that all pottery types assigned to the Medio period were made over the entire span of the period, nor that each type had the same beginning and end dates. At a minimum, two factors militate against this idea. The first is that, certainly among the painted polychrome types, the designs display serious differences in composition and execution, suggesting at least some degree of development from the simpler styles to the presumed latest one, Ramos Polychrome. The second is that some of the simpler polychrome styles (Babícora, for instance) tend to show up as trade wares in earlier sites of the Sierra Blanca region of south-central New Mexico, while Ramos tends to show up in slightly later ones.[1]

Sherds of Playas pottery seem almost to have a life of their own in the Sierra Blanca. That is, they almost always occur in large numbers, are found both with and without the Chihuahua polychromes, and occur in both earlier and later contexts. Abajo de la Cruz is an excellent example where the context is earlier; there, the Playas sherds outnumber the Chihuahua polychromes by 20 to 1.

This brings up the question of where Playas pottery was made. The original assumption by many if not all archaeologists was that it was produced at Casas Grandes sites and perhaps Casas Grandes "outlier" sites (the latter including, for instance, sites in far southwestern New Mexico, that were originally known as Animas phase but are now assigned to the Black Mountain phase). Since those early days, two studies have started sorting out production areas and sources. Using x-ray florescence (XRF), Bradley and Hoffer (1985) have shown that the Playas pottery in their sample may have been made in at least four or five places: Casas Grandes (Paquimé) and Janos in northwest Chihuahua, the El Paso area, the Hueco and southern Tularosa Basins, and the Sierra Blanca region of south-central New Mexico. Using INAA, Creel et al. (2002b) have added the Black Mountain phase sites of the Mimbres valley (especially the Old Town site) and possibly the WS site (along the San Francisco River in southwest Catron County) to the list. The authors state that "Compositional diversity is greater within the Playas type than within either Chupadero Black-on-white or El Paso Polychrome," two types used across southern New Mexico, west Texas, and northern Mexico (Creel et al. 2002b:41). This suggests to me that several more production areas for Playas will eventually be discovered. An additional important detail derived from the INAA study is that Playas from some (many?) of its source areas was traded widely.

Taking a lead from observations over the years, I decided to analyze the Playas pottery from Abajo according to design characteristics. I had gained the sense that Playas assemblages from different sites show the same range of design techniques but that some techniques were more common at some sites than at others. The three primary techniques represented at Abajo are gouged, stylus-punctate, and incised-line; they are described in greater detail below. Two minor decorative types, represented by one sherd each, are also present. No sherd bearing two or more of these techniques is present in the Abajo assemblage, suggesting that the three primary techniques occur separately on their respective vessels. Most of the sherds are fairly small, however, so this

[1] A shrewd observation on the author's part. Since this paragraph was written, archaeologists working in northwest Chihuahua have increasingly concluded that while production of Babícora and similar polychromes began about A.D. 1200 or slightly later (deriving from earlier Casas Grandes types), Ramos Polychrome was not first made until about A.D. 1300. —*Series editor*

conclusion must remain a suggestion and not a fact. After all, large sherds and complete vessels recovered from Paquimé show that more than one technique can be found on the same vessel.

Most but not all vessels made using the three major techniques were slipped with either a fugitive red (possibly applied before firing, rather than afterward as the term usually implies) or a more permanent (fired-on) red pigment.

A total of 113 Playas sherds of all decorative types was recovered at Abajo. Counts by design types are: gouged, n = 65; stylus-punctate in a herring-bone pattern, n = 41; incised-line, n = 17; short incised lines in a herring-bone pattern, n = 1; and lines of punctate impressions, n = 1. Undecorated sherds from the bottoms of vessels were not included in this study, because Playas sherds cannot always be segregated from red-slipped Jornada–Three Rivers sherds.

The steps in manufacturing the three primary design types can be summarized as follows:

Gouged Design
Vessel formed;
partially dried;
surface polished;
partially dried again;
designs made in hardened surface;
vessel fully dried;
fired (both surfaces mostly brown)

Stylus-Punctate
Vessel formed;
designs made in wet surface;
surface polished after variable drying time (causing distortion of design);
vessel fully dried;
fired (exterior reds and browns; interiors mostly brown)

Incised Line
Vessel formed;
designs made in wet surface;
vessel partially dried;
surface polished;
vessel fully dried;
fired (exterior mostly red; interior mostly brown)

Four general production areas are indicated for the Playas sherds from Abajo de la Cruz.

- Sierra Blanca region of south-central New Mexico (n = 16); indicated by Sierra Blanca gray syenite in the temper; all examples have stylus-punctate designs.

- Southwestern New Mexico (n = 7); indicated by tuff and/or rhyolitic tuff temper; all have incised-line designs.

- Northern Mexico? (n = 9); indicated by very fine temper grains, clear-fired paste colors, and somewhat thicker vessel walls; all have stylus-punctate herring-bone designs.

- Various (Sierra Blanca or northern Mexico or greater El Paso area)? (n = 81); indicated by combinations of tempering materials, most of which could be from closely related igneous rocks; temper grains vary from medium to large, often with at least some small grains. Some are almost certainly from the Sierra Blanca, others possibly from northern Mexico, yet others from the greater El Paso region. Paste colors are mostly medium to dark grays and browns, vessels walls are generally thin, surface colors are variable, and all three primary design styles are represented.

Playas Manufacturing Techniques

Gouged designs are shown in Figure 48a–c. In terms of manufacturing techniques, these are the most curious designs. They are found on exterior surfaces only. The vessels were formed, allowed to dry to leather hard, then moistened as needed to permit stone polishing, usually of both the inside and outside surfaces. Once the vessel was again partly dry, the designs were gouged into the exterior. (At this point the clay had dried to a variable depth but was still damp enough that the tool could remove very small, thin, irregular pieces of clay.) The resulting gouges take two shapes. One is a triangle that is deepest along the short leg of the triangle and shallowest towards the opposite point. The effect seems to be one of stab-and-flick-sideways, creating a hole reminiscent of a comet and its tail. The gouges are usually arranged in rows, with the gouges from row to row being staggered rather than aligned vertically. The other shape is roughly rectangular, with the gouge being of roughly equal depth from end to end. The tool used to gouge the vessel left a void with rather smooth contours if the clay was fairly wet, or irregular contours if the clay was drier.

The cross-sections of both shapes are similar and clearly divulge the manner of the formation of the gouge mark. The surfaces display a very thin line or “skin,” probably because the surface was polished prior to gouging, compacting the surface particles to a greater degree than the particles deeper in the clay. The edges of the gouged “skin” do not end precisely at the gouge, instead reminding me of the broken shell of a hard-boiled egg. In the sloppiest examples the loss of “skin,” rather than being confined to the gouge, peeled over a wider distance and intruded into one or more additional gouges.

Once the design was complete, the vessel was fully dried and fired. The resulting interior and exterior surfaces were mostly brown.

One of the first impressions gained when viewing Playas sherds from Abajo is that the designs vary in depth: some are deeply impressed while others are shallow. I measured this attribute and found that on the gouged-design sherds, 95 percent are shallow (ca. 0.5 mm), and 5 percent are deep (ca. 1 mm).

The stylus-punctate design is shown in Figure 48d. Once the vessel was formed, a tool with a shaped end or point was used to punch holes into the wet clay. On all sherds that are large enough, the punctate elements are carefully organized and executed, resulting in herring-bone patterns that wrap horizontally around the vessels. The degree of wetness or dampness of the surfaces varied, resulting in greater or lesser obliteration of the designs. On 46 percent of the sherds, designs were shallow (ca. 0.5 mm) and on 44 percent they were deep (ca. 1 mm). Two percent were very deep (ca. 1.5 mm) and 8 percent were extremely deep (2–4 mm). Once the punctate design was completed, the vessel was allowed to dry for variable periods, then surface polished, partly flattening the punctate elements. The vessel was then fully dried and fired; the resulting exterior surfaces had red and brown colors while the interiors were mostly brown.

Incised-line designs are shown in Figure 48e and f. Once the vessel was formed, designs were made in the wet clay. These designs consist of multiple, shallow, carefully carved straight lines that parallel one another to form hachured triangles and perhaps other forms. For the most part, the individual incisions are smooth troughs with rounded bottoms and sides.

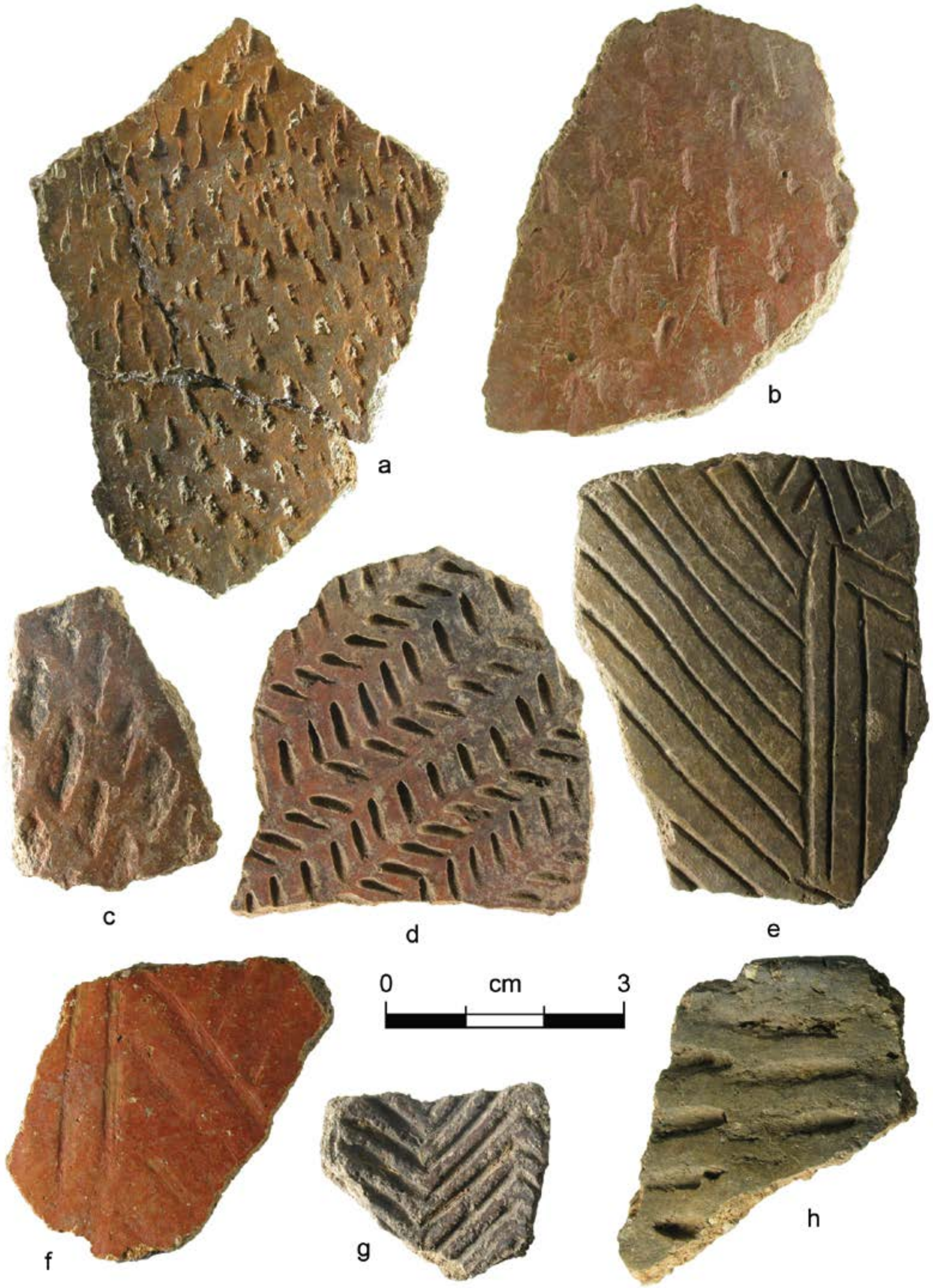

Figure 48. Design variations on Playas Group sherds.

Most Abajo sherds are too small to reveal much about the patterns, but they probably mimic designs commonly found on whole and partial Playas vessels recovered from other sites. More care was used during polishing to avoid obliterating the design than was the case with the stylus-punctate vessels. On 91 percent of the sherds, design depths are shallow (ca. 0.5 mm), on 9 percent they are deep (ca. 1 mm). Once the design was in place and the vessel was polished, the vessel was fully dried and fired. The resulting exterior surfaces were mostly red, while the interior surfaces were mostly brown.

Figure 48g shows the technique resulting in short incised lines in a herring-bone pattern. In terms of depth and definition, the incisions in this variety are like those of the incised-line designs, but they are short and arranged as is shown in the figure.

Figure 48h shows the technique resulting in lines of punctate elements. In terms of depth and definition, the incisions in this variety are like those of incised-line designs, but they are short and arranged in lines as is shown in the figure.

Paste Colors and Color Zonation

Although paste colors and the presence or absence of color zonation were not systematically monitored, my analysis left me with some definite impressions. While there are some exceptions, paste colors tend to be mostly medium to dark grays and browns. Some pastes are black. Most show variable amounts of carbon, resulting in hazy colors that are difficult to relate to the Munsell standards. Most sherds also have slightly zoned coloration; in those sherds two colors are present, usually as shades of the same color (due to carbon; for instance, dark brown and very dark brown).

Very few Playas Group sherds in the Abajo assemblage have clear colors (i.e., devoid of carbon-induced haze) and many or most of these are thought to be from vessels made in the Paquimé–Janos region of northwest Mexico. An earlier study (Wiseman 2002:91–95) found that, in general, type sherds of Playas pottery from Casas Grandes, deposited by Charles Di Peso at the Laboratory of Anthropology in Santa Fe, have well-fired, clear paste colors. These contrast sharply with most of the Playas sherds in the Abajo assemblage. The difference is all in the firing regime: one of sufficient temperature and length of time will burn out all residual carbon, resulting in clear colors. The "zoned" effect previously referred to reflects the degree of oxidation well within the clay versus at and near its surface. In incompletely fired vessels, color zones are smeared, that is, there is not a clear transition between one color and the next. Color zones in well-fired vessels are much more discrete, that is, they have fairly well-defined changes in color from one oxidation zone to the next. Sherds bearing clear, colored pastes, zoned or not, are discussed in a later section on possible Casas Grandes examples.

An interesting twist on zonation of the paste occurs in "El Paso or El Paso-like" paste. Seen in cross-section, this zoned paste has a well-defined very dark gray to black core framed by well-defined, medium reddish-brown or brown margins next to the surfaces. These margins, often about 1 mm thick, are generally clear colors, resulting in a decided "sandwich-like" appearance to the paste. In such cases the firing temperatures were sufficiently high to eliminate most or all of the carbon from the surface layers, but the firing time was too short to produce a zone of gray color, however thin, that transitions to the carbon blackness of the core. The sharp contrast created by the hot but short-lived fires, between the red surfaces and the black cores, is so stark that it immediately commands the analyst's attention.

We cannot automatically assume that sherds with "El Paso-like" pastes were made by potters who also made El Paso Polychrome. Creel et al. (2002b:41) categorically state that in their sample, the characteristics of the Playas sherds do not overlap with those for El Paso Polychrome. They evidently believe that the makers of El Paso Polychrome and of Playas Red Incised were different people. However, one must remember that their sherd samples are fairly small and do not necessarily represent the full range of Playas pottery.

Eleven Playas sherds from Abajo de la Cruz possess El Paso-like pastes (Table 16). Ten have mineral temper suites that could all derive from the same basic rock source. However, the eleventh has a rhyolitic tuff temper from a different rock type and a different source. While it is possible that the first rock type is from the Sierra Blanca of south-central New Mexico, the source of the rhyolitic tuff probably indicates manufacture west of the Rio Grande in southwestern New Mexico. Just what is the significance of the El Paso-like paste in these Playas sherds? Can it be used to identify prospective regions of manufacture?

Table 16. Playas Group Sherds Displaying El Paso-like Pastes.
(G = gouged; IL = incised line)

Provenience (Provenience Code)	Design Type	Slipped?	Temper (in order of abundance)
Pit House 12 a floor fill (83)	G	Y	Off-white, white, and translucent feldspars; red bits; other
Pit House 28 fill (79)	G	Y	Light gray and off-white feldspars; quartz; black bits*
Strip Zone 2 fill (77)	IL	Y	Rhyolitic tuff; clear quartz
Feature 12 stripping (1)	IL	Y	White and off-white feldspars; clear quartz, black bits*
Feature 12 stripping (2)	G	Y	Off-white and translucent feldspars, clear quartz
Feature 12 fill (5)	G	Y	Off-white, white, light to medium gray, orange, and clear feldspars; mafics
	G	Y	Off-white and clear feldspars; clear quartz
	G	Y	Off-white and translucent feldspars; clear quartz; black bits*
	G	Y	Off-white and light gray feldspars
Borrow Pit 12c, bottom fill (82)	IL	Y	Off-white and clear feldspars; clear quartz
Borrow Pit 12e, bottom fill (34)	G	Y	Off-white and white feldspars
	G	N	Off-white feldspar; clear quartz

*"Bits" are very tiny grains of earthy or metallic minerals.

Temper Characteristics

Tempering materials were examined using a binocular microscope set at 30 power, with light from a fiber optic illuminator. Polarized lenses were not used. For the most part, observations were made of freshly nipped sherd edges that measured at least 0.5 to 1 cm long. As will be seen, the approach led to the tentative identification of relatively few types of minerals but in a bewildering number of combinations. One problem, discovered partway through the process, is that not all types of minerals in a given sherd are necessarily visible in the nipped edge; some show up only on the sherd surfaces (especially tiny mineral fragments present only in trace amounts, such as mica and other mafic minerals). Clearly, the use of other techniques (petrographic thin sections using polarized light, x-ray fluorescence, neutron activation analysis, microprobe analysis, etc.) is highly desirable for increasing the accuracy and completeness of mineral and rock inventories. This is especially true for sorting out the types of feldspars.

Five genres of minerals were identified in this study (in order of general abundance): feldspars, quartzes, iron compounds ("ochre"), mafics (pyroxenes, amphiboles, magnetite, etc.), and micas (in this case, biotites). Unidentified components were also occasionally observed and recorded as "other." When unusual phenomena concerning the paste and tempering particles were observed (sharp color zonation of the paste, clear paste colors, unusually finely ground temper particles, etc.), notes were added on a sherd by sherd basis.

Seven sherds containing either tuff or rhyolitic tuff are not included in the list of minerals just provided; they probably originated in southwestern New Mexico and are treated separately below.

Because the list prepared for the sherds bearing gouged designs is so lengthy, it is used here for illustrative purposes (Table 17). The temper categories are arranged first by the dominant mineral or minerals in the sherd. In almost every case, those consist of one or more feldspars. Distinctions are based on the degree of transparency (opaque, translucent, clear) and on color. The latter category includes off-white (meaning any or all of the following: ivory, very light gray, very light brown, etc.), white, light gray, and medium gray.

Table 17. Temper Categories for Playas Pottery with Gouged Designs.

Temper	With Slip (n = 65)	Without Slip (n = 16)
Off-white Feldspar Dominant		
Very finely ground, with clear quartz	X	
Finely ground, with quartz	X	
Medium ground, no accessory minerals		X
Medium ground, with orange feldspar		X
Medium ground, with quartz	X	
Medium ground, with quartz sand		X
Medium ground, with clear quartz	X	
Medium ground, with clear quartz; in El Paso-like paste		X
Medium ground, with clear quartz and quartz sand	X	
Medium ground, with clear quartz and "other"	X	
Medium ground, with clear quartz, black bits, and red bits	X	
Off-white and White Feldspars Dominant		
No accessory minerals; in El Paso-like paste	X	
With translucent gray feldspar	X	
With light gray feldspar	X	
With gray, orange, and clear feldspars and mafics; in El Paso-like paste	X	
With clear feldspar and black bits	X	

Table 17. Temper Categories for Playas Pottery with Gouged Designs.

Temper	With Slip (n = 65)	Without Slip (n = 16)
With clear feldspar, clear quartz, and black bits		X
With clear feldspar, clear quartz, and mafics	X	
With translucent feldspar and clear quartz	X	
With translucent feldspar and rare black mica	X	
With quartz	X	X
With quartz and black bits		X
With clear quartz	X	
With dark brown “other,” gold mica, and hornblende?	X	
Off-white and Light Gray Feldspars Dominant		
No accessory minerals	X	
No accessory minerals; in El Paso-like paste	X	
With translucent feldspar	X	
With translucent feldspar and quartz		X
With some medium gray feldspar	X	
With some medium gray feldspar and clear quartz		X
With quartz	X	X
With clear quartz		X
With clear quartz and red bits	X	
With clear quartz and dark gray-brown “other”	X	
With red bits and quartz?	X	
With red bits and black bits		X
Off-white and Medium Gray Feldspars Dominant		
No accessory minerals (1 example)	X	
With clear quartz (1 example)	X	
With miscellaneous sand (1 example)	X	
Off-white and Translucent Feldspars Dominant		
No accessory minerals	X	
With white feldspar	X	
With light gray feldspar	X	
With medium gray feldspar and clear quartz	X	
With orange feldspar	X	
With orange feldspar and clear quartz	X	
With clear quartz	X	X
With clear quartz; in El Paso-like paste	X	
With clear quartz and black bits; in El Paso-like paste	X	
With quartz sand and red bits and black bits	X	
With red bits	X	
With red bits and “other”; in El Paso-like paste	X	
With black bits	X	
Off-white and Clear Feldspars Dominant		
No accessory minerals	X	
With clear quartz; in El Paso-like paste	X	
With quartz and black bits	X	
With red bits and black bits		X

Table 17. Temper Categories for Playas Pottery with Gouged Designs.

Temper	With Slip (n = 65)	Without Slip (n = 16)
White and Off-white Feldspars Dominant		
With light gray and translucent feldspars	X	
With quartz	X	
With clear quartz	X	
With “other”	X	
Light Gray and Off-white Feldspars Dominant		
With white feldspars and quartz; in El Paso-like paste (1 example)	X	
With quartz and black bits (1 example)	X	
Light and Medium Gray Feldspars Dominant		
With finely ground Sierra Blanca syenite? (1 example)	X	

A rare sherd has a mineral suite dominated by quartz, but none of these sherds bear gouged designs so the quartz-dominant category is not included in the table.

It seems obvious at this level of analysis that many of the temper categories listed in Table 17 derive from the same rocks or from related groups of rocks. This outcome is due to the mineral variety being so limited and because some categories are represented by as few as one or two sherds and others by half a dozen sherds. In general, the primary igneous rocks comprising the Sierra Blanca are similarly dominated by feldspars, chiefly in the form of monzonites, syenites, latites, and aplites. The trouble is, these types of rocks are common in the Southwest. Thus, while the congeries of attributes for most of the Abajo Playas sherds suggests that they were made in or near the Sierra Blanca, more discriminatory techniques are needed to determine the places of manufacture of most of the vessels represented by the sherds. For the time being, we can conclude that most of the Abajo specimens were probably not made in the Casas Grandes region of northern Mexico.

In 1981 I published a short paper naming and describing a Sierra Blanca variety of the type (Wiseman 1981). That description was based primarily on A.H. Warren’s work on Playas sherds with gray feldspar temper recovered from Glencoe phase sites in the upper reaches of the Rio Bonito (Warren 1992 and personal communication with RNW on several occasions between 1979 and 1985). In her report for the upper Bonito project, Warren describes the gray feldspar found in some Jornada Brown (and Playas) as follows:

> The major temper type of Jornada Brown [from the upper Rio Bonito sites] is identified as hornblende syenite of the Sierra Blanca area. The rock is characterized by light gray to lavender or pink feldspar grains (Jornada type 5A). Variations noted include white or cream feldspar and, more rarely, abundant inclusions of gold mica [Warren 1992:195].

To my eye, the intensity of gray color of the feldspar, as seen in examples of the gray syenite in manos and rock outcrops on the east side of Sierra Blanca Peak, can be characterized as a *medium* gray. Importantly, I have seen varieties of Sierra Blanca gray syenite in rock outcrops and manos that lack hornblende. However, for years I included lighter gray feldspars in what I thought was the distinctive syenite of the Sierra Blanca. Problems began arising when I studied the type sherds for Playas that Charles Di Peso had deposited at the Laboratory of Anthropology in Santa Fe (Wiseman 2002:91). In one of the sherds I noted the presence of several grains of what I consider to be a light gray feldspar and a single grain of a medium gray feldspar. This last grain closely matched the opacity and intensity of grayness of, and therefore could have been derived from, Sierra Blanca gray hornblende syenite/gray syenite. The others are a little more problematic, as will be discussed shortly.

Another part of the problem is, some light gray feldspars that I have seen through the years are actually slightly translucent, rather than opaque like the rock samples I have seen in the Sierra Blanca gray syenite and gray syenite with hornblende laths. To round out my discussion of the problem, I should mention two other factors of concern: (1) the biasing effects of dark paste colors in which some of these (and translucent) feldspars occur and (2) the use of manos and metates made of Sierra Blanca gray syenite to grind other types of rock for temper. Thus, the issue of gray feldspars in pottery of the Sierra Blanca region is a complicated one. The identification of Sierra Blanca gray syenite and hornblende syenite or “generic” gray syenite temper in vessels made in this region is not straightforward or easy and should be approached with caution.

Accordingly, I will add a note regarding the terminology I used for gray feldspars during my study of the Abajo sherds. I intentionally used three terms, very light gray, light gray, and medium gray. *Very light gray* refers to the light-colored, translucent grays that probably do not derive from Sierra Blanca gray syenite and can, in some cases and then only with some difficulty, be identified as gray once the background color of the clay in the paste has been considered. On occasion, grains of this color are also found intermixed with other colors of feldspars, such as ivory and cream-colored, usually included in the “off-white” category in my notes on individual sherds.

Light gray includes feldspar grains that are obviously gray irrespective of paste clay color, yet are not as dark as the medium gray, opaque feldspar that I know derives from Sierra Blanca gray syenite. But in view of Warren’s description, provided above, are these grains possibly derived from that source? I cannot claim to have seen the full range of variability in the source rocks and therefore cannot say for certain whether they are.

Finally, the *medium gray* category indicates that these feldspars, and the sherds in which they occur, probably derived from Sierra Blanca gray syenite and gray hornblende syenite. In cases where the medium gray feldspars are the dominant or only temper grains, I presume that Sierra Blanca gray syenite was the rock being ground for temper. Where they are in the minority, or occur only rarely, I tend to assume that the grains got into the paste because manos or metates (or both) of Sierra Blanca gray syenite were used to grind the tempering material. Either way, pots containing medium gray feldspar were probably made in the parts of the Sierra Blanca where the gray syenite and gray hornblende syenite are to be found.

With these comments in mind, a look at Table 18 reveals that 38 sherds of most design types contain Sierra Blanca gray syenite as the dominant tempering mineral (n = 17) and light to medium gray feldspars as secondary minerals (n =22). These represent 15 and 19 percent of the sherds identifiable as Playas in the Abajo Playas assemblage.

Table 18. Playas Group Sherds with Suspected Sierra Blanca Temper.
(Gray syenite or gray hornblende syenite, at least in part)

Provenience (Provenience Code)	Design Type*	Slipped?	Minerals (in Order of Abundance), Comments
Medium gray (Sierra Blanca) Syenite Feldspar Dominant (n = 7)			*Minerals listed below are the accessory minerals.*
Pit House 28 fill (74)	SP	N	With off-white feldspars, clear quartz, mafics, and red bits
Pueblo Room 23 fill (13)**	SP	Y	With black bits and red bits
Pueblo Room 31 Upper Fill (64)	SP	Y	With clear quartz
Pueblo Room 31 Upper Fill (64)	SP	Y	
Borrow Pit 12c bottom fill (82)	SP	N	With mafics and clear quartz
Borrow Pit 12c bottom fill (82)	SP	N	With off-white feldspars and red bits
Strip Zone 1 fill (12)	SP	N	With gray crystalline aggregate, mafics, and red bits
Strip Zone 2 fill (57)	SP	Y	With “Other”
Strip Zone 4 fill (8)	SP	N	In partly zoned paste
Strip Zone 5 fill (58)	SP	Y	With red bits and black bits
Feature 12 stripping (1)	SP	Y	With light gray, off-white and orange feldspars, clear quartz, and red bits
Feature 12 stripping (1)	SP	Y	
Feature 12 stripping (1)	SP	N	
Feature 12 stripping (2)	SP	Y	With light gray and off-white feldspars and red bits
Feature 12 fill (5)	SP	Y	With mafics and clear quartz(?)
Feature 17 stripping (81)	SP	Y	With red bits
General surface (4)	SP	Y	With clear quartz and “other”
Light and Medium ...			
Pit House 12a floor fill (83)	G	Y	Off-white and light to medium gray feldspars, clear quartz, and red bits
Pit House 12a floor fill (83)	G	N	Finely ground light and medium gray feldspars
Pit House 12a floor fill (83)	SP	Y	Off-white and light to medium gray feldspars and red bits
Pit House 12a floor fill (83)	SP	Y	Light gray feldspar and “other”
Pit House 12a floor fill (83)	SP	Y	Off-white and medium gray feldspars and red bits
Pit House 28 stripping (78)	G	N	Off-white and light to medium gray feldspars and clear quartz
Pit House 28 fill (74)	G	Y	Off-white and medium gray feldspars
Pit House 28 fill (79)	G	Y	Light gray and off-white feldspars, quartz, and black bits

Table 18. Playas Group Sherds with Suspected Sierra Blanca Temper.
(Gray syenite or gray hornblende syenite, at least in part)

Provenience (Provenience Code)	Design Type*	Slipped?	Minerals (in Order of Abundance), Comments
Pueblo Room 23 fill (13)**	SP	Y	Medium gray and white feldspars, mafics, red bits, and black bits
Borrow Pit 12c bottom fill (82)	SP	Y	Light to medium gray and off-white feldspars, mafics, red bits, and black bits
Borrow Pit 12c bottom fill (82)	SP	Y	Light to medium gray and off-white feldspars
Mystery Pit 19 fill (36)	G	Y	Off-white, translucent, and medium gray feldspars and clear quartz
Feature 12 stripping (1)	SP	Y	Light to medium gray, white, and clear feldspars and red bits
Feature 12 stripping (1)	IL	Y	Off-white, clear, and light to medium gray feldspars
Feature 12 stripping (30)	SP	Y	Off-white and light to medium gray feldspars, mafics, and red bits
Feature 12 fill (5)	SP	Y	Light to medium gray and off-white feldspars, mafics, red bits, and black bits
Feature 12 fill (5)	SP	Y	Red bits, black bits, light to medium gray and clear feldspars, and clear quartz
Feature 12 fill (5)	SP	Y	Red bits and off-white and light to medium gray feldspars
Feature 17 stripping (81)	SP	Y	Light and medium gray feldspar, mafics, black bits, and quartz(?)
Trench 25 fill (17)	P in L	N	Medium and translucent gray feldspars, mafics, and “other”
General Surface (4)	SP	Y	Light to medium gray and off-white feldspars, red bits, and black bits
No specimen number	G	N	Off-white and light to medium gray feldspars and clear quartz

*G = gouged; IL = incised line; SP = stylus punctate; P in L = punctate elements in line.
**Jar neck sherds that conjoin. Note the differences in temper.

An additional 21 sherds (19 percent) containing only light gray feldspar may or may not have been tempered with Sierra Blanca gray syenite. Thus, at least some of the Playas sherds represent pottery vessels made in the Sierra Blanca. I suspect that yet other Playas sherds were also made there, but confirmation will require instrumental analysis.

Surface Characteristics

No attempt was made to discriminate degrees of surface polish on the Playas sherds from Abajo. All of the sherds have polished surfaces both inside and out unless they are use-worn or eroded. What differs among them is whether the surface is lustrous or not especially so and, in the case of the sherds with stylus punctate designs, whether the designs were partly or heavily distorted by polishing the clay while it was wet to partly dry.

Contrary to expectations, not all of the Playas sherds have slipped and decorated surfaces. Also, slipped or unslipped, not all of the decorated surfaces are red. In fact, among the Playas sherds from Abajo, most are not any shade of red. Furthermore, the pigment used in the slips is most often fugitive, meaning that on many slipped sherds, most of the red color was lost—during use, as the sherds lay on or in the ground, or as the sherds were washed following excavation.

Accordingly, if one is to determine whether a Playas sherd was slipped, the surfaces must be carefully searched under magnification, with special attention to the bottoms and sides of the individual tool marks. Many a time I found only a tiny (smaller than a pinhead) remnant of bright red pigment on the inside surface of a design element, thanks to magnification and bright lighting! But many of the sherds are not red at all, so I continue to use the term Playas Group rather Playas Red or Playas Red Incised.

When slips are present, in all but two or three instances those slips were applied only to the exteriors of the vessels. On the exceptions, both surfaces were slipped, with the interior slip extending a few centimeters below the rim.

One curious effect, possibly intentional, occurs on several sherds: dark gray decorated surfaces with bright red punctate marks, that is, the only red is in the tool marks themselves. The visual effect is stunning.

Table 19 summarizes the Munsell values for the slipped surfaces of each design type. The results are most interesting: sherds bearing incised lines have the highest percentage of red values, about equal percentages of brown and gray values, and no black surfaces. The surfaces of stylus punctate sherds have similar values. The surfaces of the gouged design sherds differ widely from the other two, with most (69 percent) scoring in the brown values and few scoring in the reds.

The results for the interior surfaces are interesting as well. Again, the incised-line design sherds have the highest percentage of red values (though the percentage is much lower than for the exterior surfaces). The other factor that stands out, and that is shared by all three design styles, is that the brown values account for most of the sherds.

Table 19. Surface Colors of Playas Group Sherds with Slips.

	Gouged	Stylus Punctate	Incised Line
Exterior Surfaces			
Reds	7	16	8
Percent	11%	38%	47%
Browns	45	15	5
Percent	69%	37%	29%
Grays	12	8	4
Percent	18%	20%	24%
Black	1	2	
Percent	2%	5%	
Total	65	41	17
Percent	100%	100%	100%
Interior Surfaces			
Reds	1	3	3
Percent	1%	8%	19%
Browns	34	29	8
Percent	58%	81%	50%
Grays	18	4	3
Percent	31%	11%	19%
Black	6		2
Percent	10%		12%
Total	59	36	16
Percent	100%	100%	100%

Vessel Wall Thickness

Sherd thickness measurements were taken to the nearest 0.25 mm. Larger sherds were measured at several points around their peripheries and the average value was recorded. Sherds the size of a nickel were measured in one or perhaps two places. The results are presented in Figure 49. The gouged-design sherds have a very strong single mode between 4.5 and 5.5 mm. This same mode appears to hold true for the incised-line sherds, but in that case the sample size is small and the curve not so pronounced. The curve for the stylus-punctate group is similar in that the single mode starts at 4.5 mm, but it extends to 6 mm; the peak of the mode at 5.5 mm indicates that these sherds tend to be slightly thicker than those of the other two design styles.

Vessel Forms

Little can be said about vessel forms for the Abajo Playas assemblage because few of the sherds are diagnostic as to shape. Most of those are body-neck juncture sherds that are too small to reveal meaningful shape information. However, two sherds conjoin to adequately reveal the shape of the vessel: a rather small, squat jar with a comparatively large out-curving mouth. The actual rim is missing. This vessel fragment has a stylus punctate design and comes from the Feature 17 strip zone (the work area outside but next to Pueblo Rooms 17b and 23).

Thickness (mm)	Gouged (n = 81)	Stylus Punctate (n = 52)	Incised (n = 23)
3.50	xx	x	x
3.75	x		
4.00	xxx		xx
4.25	xx	x	
4.50	xxxxx xxxxx xxxxx x	xxxxx	xxxx
4.75	xxxxx xxxxx xx	xxx	xxxxx x
5.00	xxxxx xxxxx xxxxx xx	xxxxx xxxxx	xxx
5.25	xxxxx xxxxx x	x	xxx
5.50	xxxxx xxxxx xxx	xxxxx xxxxx xxxx	xxx
5.75	x	xxx	
6.00	xx	xxxxx xxxxx x	
6.25	x	x	
6.50		x	x
6.75			
7.00		x	

Figure 49. Histograms of Playas Group vessel wall thicknesses.

Playas Pottery with Casas Grandes-like Attributes

Nine Abajo de la Cruz sherds share certain characteristics with type sherds of Playas Red Incised from Casas Grandes, provided to the Laboratory of Anthropology by Charles Di Peso from his excavations at Casas Grandes (see Wiseman 2002:91–92) (Table 20). All share the stylus punctate design, have finely ground temper, and have clear-fired paste colors (including zoned pastes). Four of the sherds from Abajo are generally thicker (6+ mm) than what is typical for the sherd assemblage as a whole (4.5–5.5 mm), an attribute I consider important for identifying possible Casas Grandes-made Playas (see Wiseman 2002:91–92). Seven of the nine sherds have evidence of red slips, with several of the latter being quite obvious (as opposed to mostly fugitive slips). All of the sherds have at least a few light to medium gray grains of feldspar temper, and one contains gray feldspar that could well be from Sierra Blanca gray syenite. All this raises a couple of questions. Were some of these vessels traded from northern Mexico? Or, especially with regard to the vessel containing what appears to be Sierra Blanca gray syenite, could it have been made by an immigrant potter from northern Mexico? Unfortunately, only one of the sherds came from a specific provenience (the bottom fill of Borrow Pit 12c).

Playas Pottery from Southwestern New Mexico

Seven sherds, all with incised-line designs (six slipped, one not slipped) contain either tuff or rhyolitic tuff temper with quartz phenocrysts (Table 21). On all of the sherds the incisions are shallow (less than ca. 0.5 mm).

Table 20. Playas Pottery with Casas Grandes-Like Attributes.

Provenience	Slipped?	Thickness (mm)	Temper in Order of Abundance; Comments
Borrow Pit 12 c Bottom Fill (82)	Y	5.5	Light gray and off-white feldspars; clear quartz
Strip Zone 1 fill (3)	Y	6.5	Light gray, medium gray, and off-white feldspars; mafics; red bits
Strip Zone 1 fill (12)	Y	5	Brown bits and red bits; light to medium gray feldspar; crystalline rock
Feature 12 stripping (2)	Y	7	Brown bits and red bits; gray, off-white, and red feldspars
Feature 12 stripping (2)	N	4.5	Gray feldspar; clear quartz; light gray paste
Feature 12 fill (5)	N	5	Red bits; off-white to light gray crystalline rock with mafics
Feature 17 stripping (81)	Y	6	Gray and clear feldspars; red bits
Feature 17 stripping (81)	Y	6	Gray and clear feldspars; orange quartz; red bits
Feature 28 stripping (78)	Y	5.5	Sierra Blanca (?) syenite (medium gray feldspar); mafics; red bits

Table 21. Playas Sherds Probably from Southwestern New Mexico.

Provenience	Temper	Surface Colors (Munsell)		Thickness (mm)
		Exterior	Interior	
With Red Slip (Color Value with Asterisk is for Slip)				
3	Tuff?	7.5 YR 4/3*	5YR 4/1	5.25
38	Rhyolitic tuff, clear quartz	5 YR 5/4*	7.5 YR 6/3	4.5
77**	Rhyolitic tuff with clear quartz, in an El Paso-like paste	10 R 4/8*	10 R 4/8*	4.75
82(3)**	Rhyolitic tuff with clear quartz, in an El Paso-like paste	10 R 4/8*	10 R 4/8*	4.75
Unslipped				
5	Tuff?	5 YR 3/1	5 YR 4/1	4.5

**Probably same vessel

Tuff or tuff rhyolite temper (or both in combination) in Mogollon pottery is fairly safely attributable to an origin in southwestern New Mexico, based on numerous petrographic studies and the fact that igneous rocks of these compositions figure so prominently in the geology of that region.

Imported Pottery

Typical of late-dating prehistoric sites in south-central New Mexico, Abajo de la Cruz produced a number of types of pottery representing disparate parts of the ancient Southwest (Table 22). The regions represented include central New Mexico (Socorro Black-on-white, including early Socorro); west-central New Mexico (Reserve-Tularosa and Tularosa Black-on-white, St. Johns Black-on-red and Polychrome, Reserve Smudged, and probably the smudged brown plain and corrugated sherds that were not typed); east-central Arizona (Snowflake or Pinedale Black-on-white); southwestern New Mexico (Mimbres Black-on-white and Seco-like plain brown); and the state of Chihuahua in northern Mexico (Babícora and Carretas polychromes).

All of the St. Johns sherds have light-colored pastes, suggesting an origin south and west of Zuni. All also have thin paints that, in the thickest spots, display a tendency toward vitrification, indicating that the paints were made with a glaze recipe or one closely resembling such recipes. St. Johns sherds bearing glaze paint designs are generally thought to date late in the production span for the type, or about A.D. 1250 to 1300.

Notably absent are the Salado polychromes of southwestern New Mexico and the Rio Grande Glazes of north-central New Mexico. Types belonging to these series, especially Gila Polychrome and Rio Grande Glaze A Red (Agua Fria Glaze-on-red), are consistently found in the latest-dating sites of the Sierra Blanca region (e.g., Kelley 1984).

Comments on the Pottery Assemblage

The Abajo pottery assemblage as a whole conforms to the definition of a middle Glencoe phase assemblage (Figure 50). It compares especially well with several sub-assemblage curves for individual house fills at the Glencoe and Crockett Canyon sites (Figure 51). That is, the Abajo assemblage is relatively late but is not among the latest for the phase because it lacks Rio Grande Glaze A Red. It does have three sherds of Lincoln Black-on-red, however. (It is precisely this presence of Lincoln Black-on-red in the absence of Rio Grande Glaze A Red that makes me think that Lincoln may have started a little earlier than Rio Grande Glaze A Red.) The essential characteristic of all Glencoe assemblages, including the middle sub-phase, is a clear dominance of Jornada Brown and decidedly smaller percentages of the other primary types, Three Rivers Red-on-terracotta, Chupadero Black-on-white, and El Paso Polychrome. Although the relative percentages of these four primary pottery types shift somewhat throughout the middle to late Glencoe, the imported pottery types, which always occur in very small but consistent numbers, are the most reliable indicators of time and permit us to discriminate among the sub-periods of the long-lived Glencoe phase.

But does this similarity of the Abajo pottery assemblage to the middle Glencoe phase pottery assemblage indicate that Abajo should be classified as a Glencoe site? A comparison of the Abajo architecture with that of the Glencoe in general and the middle Glencoe specifically suggests that the answer to this question is no. I return to this subject later in this report.

Table 22. Imported Pottery Recovered from Abajo de la Cruz.

Type (Comments)	No. of Sherds	Provenience
Mimbres B/W (all same bowl?)	3	Pit House 28, upper fill
Reserve-Tularosa B/W (all same bowl?)	3 1	Pueblo Room 32, lower fill Pueblo Room 31, floor contact
Tularosa B/W (ladle)	1	Pit House 28, upper fill
Tularosa B/W	1	Borrow Pit 12c, bottom fill
Tularosa B/W (carbon paint)	1	Feature 12 borrow pit cluster overburden
Snowflake-Pinedale B/W (same jar?)	1 1	General surface Strip Zone 5 fill
Cibola White Ware (2 or more vessels)	3 1	Feature 12 overburden Extramural Pits 13a and 13b, overburden
Early (?) Socorro B/W (same jar)	1 1	General surface Trench 25 (west of pueblo)
Socorro B/W (same jar)	2	Strip Zone 2 fill
Reserve Smudged (3 different vessels)	1 1 1	General surface Strip Zone 2 fill Feature 12 borrow pit cluster overburden
Western smudged plain brown, very fine temper (Alma Plain?)	1 1	Strip Zone 4 fill Unknown provenience
Western smudged plain brown, medium temper (Seco Corrugated? Same vessel)	1 1	Borrow Pit 22 fill Pueblo Room 24, Stratum 3, floor fill
Smudged corrugated brown with coarse feldspar temper	1	Unknown provenience
Smudged, otherwise plain brown vessel with rounded sand temper	2	Pit House 28, upper fill
St. Johns Black-on-red or Polychrome or both (three or more bowls)	1 1 1 1 1 1 3	General surface Strip Zone 1 fill Feature 12 borrow pit cluster overburden Strip Zone 17 fill (north of pueblo) Pueblo Room 17b, floor fill Pit House 12a, floor fill Pit House 28, upper fill
Pinedale Black-on-red (same bowl?)	1 1	Strip Zone 5 fill Strip Zone 17 fill (north of pueblo)
Unidentified black-on-red	1 1	General surface Pueblo Room 24 fill
Babícora (?) Polychrome (probably same vessel)	1 1	Strip Zone 6 fill Pit House 28 upper fill
Carretas (?) Polychrome (all same vessel)	1 1 1 2	Feature 12 borrow pit cluster overburden Feature 12 fill Strip Zone 6 fill Strip Zone 17 (north of pueblo)
Total number of sherds	50	

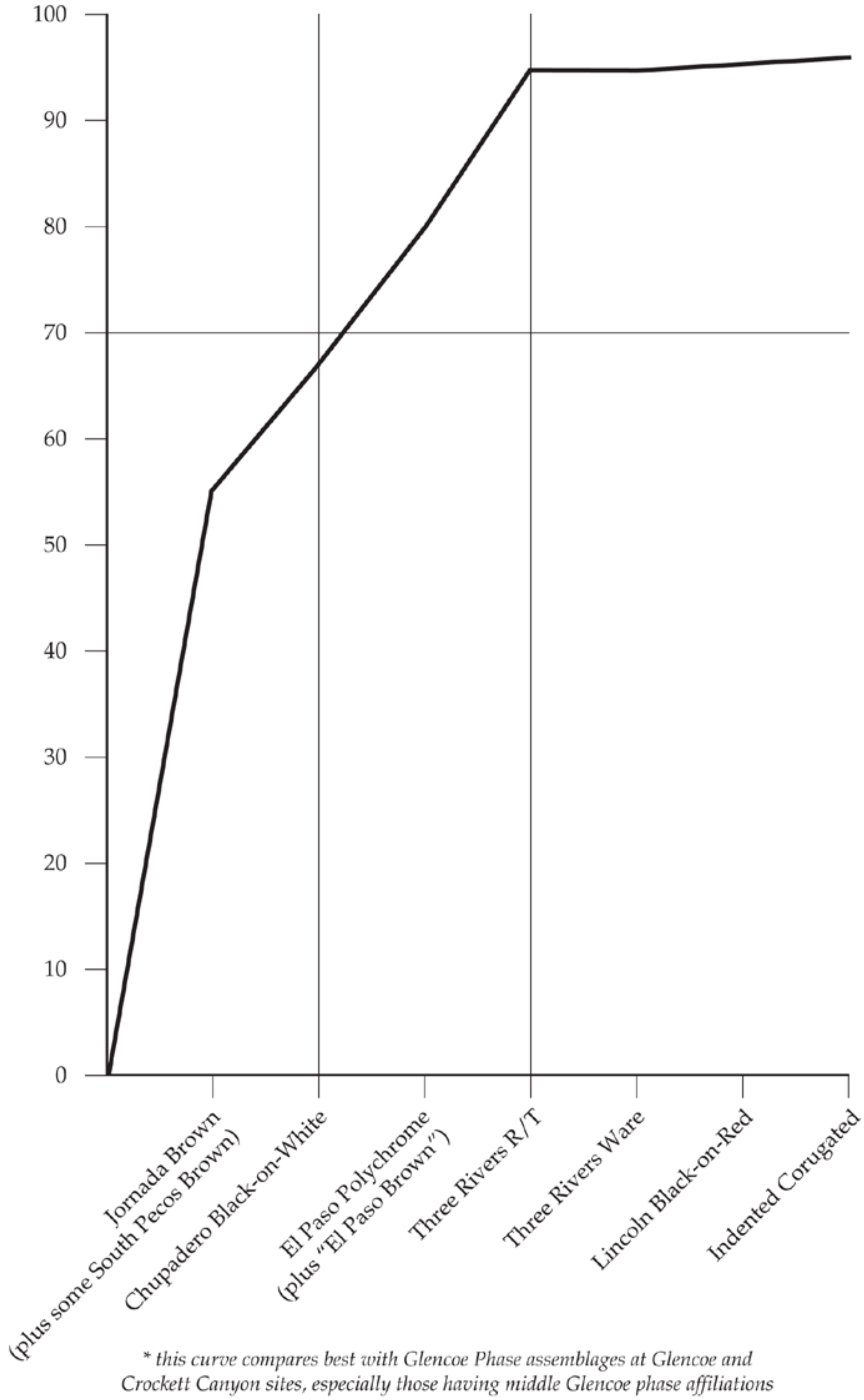

Figure 50. Cumulative curve of major pottery types from Abajo de la Cruz.

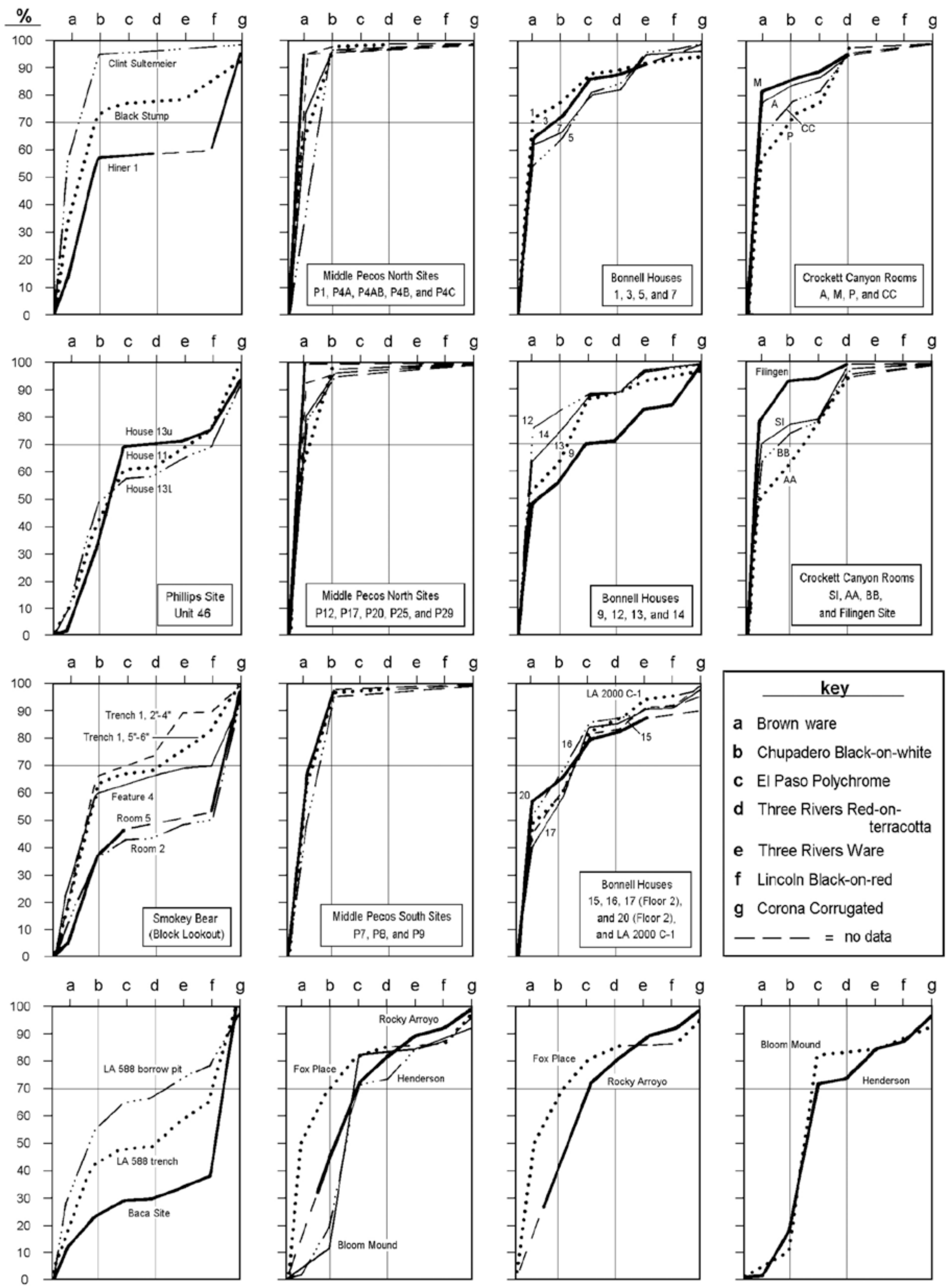

Figure 51. Cumulative curves of major pottery types for selected regional sites. From Wiseman (2002, Figure 61).

Another important factor to note about the Abajo pottery assemblage is that Three Rivers Red-on-terracotta is well represented at Abajo and was probably made at or near the site. This finding agrees well with other data that suggest that Three Rivers was made by the population living on the eastern, and now southern, outskirts of the Sierra Blanca (compare with Wiseman 2004, Table 3.15).

The results also seem to conflict with the idea of a direct linkage between the production centers for Lincoln Black-on-red. At present, and in the absence of specific studies, the best known *potential* production locations for Lincoln Black-on-red might be two or three specific Lincoln phase pueblos—the Phillips site (see Kelley 1984:221), the Baca or Baca Sawmill site (LA 12156; Wiseman 1975), and possibly the Salas site (a late component of the Priest Canyon site, LA 588; Wiseman 1975). These sites are in an area extending from the Rio Bonito north to the southern Jicarilla mountains (that is, in Lincoln phase territory). Since the Glencoe and Lincoln "cultures" differ from each other in important ways (yet are similar in others) and may even represent two different ethnic or social groups (Wiseman 2013, n.d. b), the possibility of a shift of pottery-making individuals from one "culture" or ethnic group to another is intriguing. Future studies of this notion should be most interesting!

One of the several surprises from the excavations at Abajo de la Cruz is the finding that the corrugated utility sherds comprise a wide variety of types—from Pilares Rubbed-Ribbed and Los Lunas Smudged from northern west-central New Mexico to the Reserve-Tularosa utility group and Tularosa Fillet Rim from west-central New Mexico, to Seco Corrugated from south-central New Mexico. Prior to the analysis I had expected that these sherds would represent either Corona Corrugated from central New Mexico (the Gran Quivira region east of the Rio Grande) or an unnamed type or types made locally in imitation of Corona Corrugated, or both.

To be sure, two of the Abajo sherds are Corona, but, as I just stated, none of the other sherds was made east of the Rio Grande as far as I know. The typology used here is based on surface characteristics (especially the techniques used to produce the distinguishing corrugations for the named types) plus temper. Thus, the corrugated pottery, like the painted imported types listed elsewhere, reflect the widespread exchange networks typically seen in late sites of south-central and southeastern New Mexico. In contrast, the corrugated pottery that typifies Lincoln phase sites (in Lincoln county, north of Abajo) is mostly, if not solely, Corona Corrugated.

While the pottery assemblage can be characterized as middle Glencoe, the architecture is decidedly Lincoln phase in character, leading to the question of how this situation could exist. I will explore that apparent contradiction later in this report.

Chapter 12

CHIPPED STONE MANUFACTURING DEBRIS

Material Types

The lithic materials used for making chipped stone tools at LA 10832 include a limited number of rock types but seemingly endless variation in texture and shades of color. We are talking about rocks that are mostly sedimentary in origin, and the primary sources are evidently in almost every geologic formation exposed in the west face of the Sacramento Mountains, south and southeast of Abajo (Pray 1961). These formations are of Permian, Pennsylvanian, and Mississippian age. Perhaps the best way to make note of the variations expressed in the collections from Abajo de la Cruz is simply to list them on the basis of macroscopic examination.

In the list that follows, the use of "chert" and "chalcedony" follows the general guidelines used by geologists in the field. In such usage, chert is a crypto-crystalline siliceous rock that is opaque except at the thinnest of edges. Chalcedony is also crypto-crystalline and siliceous but is translucent.

Cherts

Solid shades:

Black is the most common solid shade at Abajo de la Cruz. It is highly variable in texture and somewhat less so in color. Textures range from very fine crypto-crystalline (about 5 percent of the pieces) to a very fine quartzite or siltite. The coarser varieties intergrade, often in the same piece if large enough. Color is mainly black but can also be a very dark gray; usually, color is solid but occasionally the colors occur together in streaks.

Dark Gray is not to be confused with the dark gray variety of the "black" chert just described; usually crypto-crystalline.

For the most part, Dark Red pieces may be heavily oxidized gray chert.

Off-white pieces are "dirty" in appearance but may also be tannish.

Other observed shades include Medium-Dark Gray, Medium Gray, Light Gray, Grayish-Brown, Grayish-Yellow, Greenish-Gray, Tan, White, Medium Brown, Yellow-brown, and Rose.

Mixed shades:

Medium and Dark Gray involves gradation between the two shades, as does Light and Medium Gray.

Medium Gray with Black Streaks involves sharp distinctions between the two shades. The same is true for Medium Gray with White Specks, Tan and Light Gray, and Medium Gray & Medium Greenish-Gray. On Red and Gray pieces, the two shades are also fairly sharply defined.

For Light Gray with Rose Tinge, the rose tinge occurs toward the edges and may indicate that the piece was heat treated.

“Fingerprint” or “zebra” chert is also known as San Andres chert.

“Algal” indicates microscopic silicious structures that may be fossil algae.

The variations on “Alibates-like” almost certainly are not true Alibates “flint” because the edges of the flakes are translucent. Otherwise, the maroon-red and very light gray mottled colors faithfully mimic Alibates.

Textures that pertain to most of the above:

Very Smooth and Shiny pieces account for 5 percent or so of the total.

Fairly Smooth but Dull pieces are quite common, as are Grainy like Siltstone.

Two textures were described as grainy. One is Grainy like Fine Sandstone. The other is Grainy but with Edges that Appear Melted. In the latter, the cement may be calcium carbonate rather than silica, or perhaps the rock formed from a precipitate. These specimens remind me of what one geologist called “limey chert.”

Chalcedonies

The categories used are: Black and Clear, Light Gray, White, and White and Orange.

Rock Quartz

The only category used is White.

Limestone or Dolomite

This group was categorized as Light Gray or Medium Gray.

Obsidian

Whether flakes, formal artifacts, or shatter, the obsidian from Abajo de la Cruz usually measures 2 cm or less across. The obsidian was categorized as Clear Black, Hazy Gray (caused by very fine ash-like inclusions), Semi-Translucent Black with Ash-Streaks, and Solid Black (opaque; one example has a remnant of a water-worn rind).

The Assemblage

The chipped stone debris is summarized in Table 23. The Abajo assemblage of 1,461 pieces of lithic chipping debris includes four main forms: cores, flakes (mainly from core reduction), biface thinning flakes, and shatter. Of these, 64 percent are Black Chert in its many textural variations.

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Feature 0, Surface						
Black to gray chert	2	101	1			104
Black to gray chert (biface fragment?)					1	1
Light to medium gray chert		6				6
White chert		6				6
Gray and white chert		3				3
Off-white (tan) chert		2				2
Gray chalcedony		1				1
Black fossiliferous chert		1				1
Dark gray and tan chert		1				1
Burned gray (?) chert		3				3
Limestone or dolomite		1				1
Small flake, misc. material					1	1
Feature 0 Totals	2	125	1	0	2	130
Feature 1, Strip Trench						
Black to gray chert		20				20
Gray and red chert				1		1
Yellow and medium gray coarse quartzite		1				1
Limestone or dolomite		1				1
Feature 1 Totals	0	22	0	1	0	23
Feature 2,Strip Trench						
Black to gray chert	1	34				35
Light gray chert		1				1
Burned gray chert		2		1		3
Dark gray and brown chert		1				1
Limestone or dolomite	2	2				4
Feature 2 Totals	3	40	0	1	0	44
Feature 4, Strip Trench						
Black to gray chert	2	29				31
Tan and black to gray chert				1		1

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Medium to dark gray chert		1				1
Light gray chert		1				1
Speckled gray chert		1				1
Dark gray-brown chert		1				1
Gray and black chert		1				1
Burned gray chert		4				4
Burned white chert		1				1
Dark gray quartzite		1				1
Fine medium gray quartzite		1				1
Coarse medium gray quartzite		1				1
Very coarse dark gray quartzite		1				1
Feature 4 Totals	2	43	0	1	0	46
Feature 5, Strip Trench						
Black chert	3	17				20
Dark gray chert	2	1				3
Limestone or dolomite	2	1				3
Obsidian, hazy		1				1
Feature 5 Totals	7	20	0	0	0	27
Feature 6, Strip Trench						
Black to gray chert	2	15				17
Light to dark gray chert	1	9				10
Mottled gray chert		1				1
Rose chert		1				1
Yellow-brown chalcedonic chert			1			1
Black rhyolite	1					1
Limestone or dolomite	1	2				3
Feature 6 Totals	5	28	1	0	0	34
Feature 8, Ash Pit						
Obsidian, clear black	0	0	1	0	0	1

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Feature 12, Combined Borrow Pits						
Black to gray chert	1	111	3	2		117
Heavily patinated gray chert		1				1
Light to medium gray chert	1	8	4			13
Burned gray chert		2	2			4
Yellow-gray chert		2				2
Gray and yellow-brown chert	1					1
Rose and white chert		1				1
Off-white chert		1				1
"Algal" chert		1				1
Medium gray chalcedonic chert (biface fragment)					1	1
Gray chalcedonic chert			1			1
Medium to dark gray chalcedony		1				1
Alibates-like chalcedonic chert			1			1
Dark gray siltite	1					1
Limestone or dolomite		3				3
Feature 12 Totals	4	131	11	2	1	149
Pit House 12a Floor Fill						
Black to gray chert	2	53		6		61
Light to dark gray chert		16				16
Burned gray chert		1				1
White chalcedonic chert		2				2
Limestone or dolomite		8				8
Material not identified		5				5
Pit House 12a Floor Fill Totals	2	85	0	6	0	93
Borrow Pit 12b Bottom Fill						
Black chert		6				6
Light gray-brown chert		3				3
Medium to dark gray-brown quartzite		1				1
Limestone		3				3

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Borrow Pit 12b Bottom Fill Totals	0	13	0	0	0	13
Borrow Pit 12c Bottom Fill						
Black to gray chert	2	69		4		75
Light to dark gray chert		12	2			14
Fingerprint chert				1		1
Gray chalcedonic chert		5				5
Brown-gray rhyolite with pink feldspar		1				1
Dark gray to black siltite		1				1
Limestone or dolomite		10				10
Borrow Pit 12c Bottom Fill Totals	2	98	2	5	0	107
Borrow Pit 12d Bottom Fill						
Gray chert		1				1
Fingerprint chert		1				1
Limestone		1				1
Borrow Pit 12d Bottom Fill Total	0	3	0	0	0	3
Borrow Pit 12e Bottom Fill						
Black to gray chert		4				4
Mottled gray chert		1				1
Opaque black obsidian		1				1
Borrow Pit 12e Bottom Fill Total	0	6	0	0	0	6
Extramural Storage Pit 13 Fill						
Black to gray chert	1	4				5
Dark gray-brown chert (pebble core)	1					1
Medium gray-brown siltite		1				1
Extramural Storage Pit 13 Fill Total	2	5	0	0	0	7
Extramural Storage Pit 14 Fill						
Black to gray chert	0	1	0	0	0	1
Borrow Pit 15 Fill						
Black to gray chert	2	83*	*	2		87
Light, medium, and dark gray chert	7	3*	*	2		12

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Mottled gray chert		3				3
Miscellaneous gray and brown chert		6				6
Off-white and light brown chert		1				1
White chert		1				1
Gray-brown chalcedonic chert		2				2
Gray chalcedony		12*	*			12
Dark gray-brown hornfels (?)		1				1
Limestone or dolomite		1				1
Obsidian, clear black and streaky black			2			2
Borrow Pit 15 Fill Totals	9	113*	2	4	0	128
*Core reduction flake count includes one or more biface thinning flakes.						
Strip Zone 17 Fill						
Black to gray chert	3	27	15	2		47
Medium gray chert		3	3			6
Medium gray-brown chert		1				1
Burned gray chert		1				1
Mottled yellow and gray chert		1				1
Off-white chert		4				4
Light to medium gray chalcedony		2				2
Black rhyolite		1				1
Strip Zone 17 Fill Totals	3	40	18	2	0	63
Pueblo Room 17b Fill						
Black chert	1	1				2
Light to dark gray chert		2				2
Medium gray chalcedonic chert		1				1
Pueblo Room 17b Fill Totals	1	4	0	0	0	5
Pueblo Room 17b Floor Fill						
Black chert		3				3
Gray chert		1				1
Pueblo Room 17b Floor Fill Totals	0	4	0	0	0	4

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Pueblo Room 17b Fire Pit Fill						
Dark gray and brown chert	0	1	0	0	0	1
Feature 18, Extramural Rock Hearth Fill						
Black chert	0	1	0	0	0	1
Feature 19, Mystery Depression Fill						
Black or gray chert (tiny flakes)		15*	*			15
Light to dark gray chert (tiny flakes)		17*	*			17
Mottled gray chert		3				3
Miscellaneous gray chert (tiny flakes)		6*	*			6
Burned gray chert			1			1
Medium gray-brown chert		2				2
Gray-yellow chert			1			1
Yellow-brown chert			1			1
Red, yellow, and gray chert		1				1
Light and dark rose chert (tiny flakes)		3*	*			3
Off-white chert (tiny flakes)		4*	*			4
White chalcedonic chert			1			1
Light gray chalcedony			1			1
Obsidian, hazy gray to black			1			1
Feature 19 Totals	0	51*	6	0	0	57
*Core reduction flake count includes one or more biface thinning flakes.						
Feature 20, Extramural Fire Pit Fill						
Black chert	1					1
Limestone	1					1
Obsidian, clear black		1				1
Feature 20 Totals	2	1	0	0	0	3
Feature 21, Extramural Fire Pit Fill						
Black chert	0	1	0	0	0	1
Feature 22, Extramural Rock Hearth Fill						
Black to gray chert	3	0	0	2	0	5

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Pueblo Room 23 Fill						
Black to gray chert		8				8
Mottled gray chert		1	1			2
Medium gray chalcedonic chert		1				1
Pueblo Room 23 Fill Totals	0	10	1	0	0	11
Pueblo Room 24 General Fill						
Black to gray chert		4				4
Mottled gray chert		1				1
Obsidian, hazy (pebble)		1				1
Pueblo Room 24 General Fill Totals	0	6	0	0	0	6
Pueblo Room 24 Fill, Stratum 2						
Black chert		3				3
Medium gray chert		1				1
Mottled gray chert		1				1
Pueblo Room 24 Fill, Stratum 2 Totals	0	5	0	0	0	5
Pueblo Room 24 Fill, Stratum 3						
Black to gray chert		5				5
Gray chert		1				1
Pueblo Room 24 Fill, Stratum 3 Totals	0	6	0	0	0	6
Pueblo Room 24 Floor Fill						
Black chert	0	7	0	0	0	7
Pueblo Room 24 Floor Contact						
Black chert	0	1	0	0	0	1
Trench 25 Fill						
Black chert	4	21*	*			25
Mottled gray chert		2				2
Dark gray-brown chert		1				1
Red and gray chert				1		1
White and off-white chert		2				2
Dark brown siltite	1					1

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Black rhyolite (?)		1				1
Trench 25 Fill Totals	5	27*	*	1	0	33
*Core reduction flake count includes one or more biface thinning flakes.						
Pueblo Room 26 Fill						
Black chert	0	1	0	0	0	1
Pueblo Room 27 Fill						
Black chert		2				2
Dark brown chert		1				1
Pueblo Room 27 Fill Totals	0	3	0	0	0	3
Pit House 28 Overburden						
Black to gray chert	1	16				17
Medium gray chert		3				3
Tan chert		1				1
Fingerprint chert		1				1
White and orange chalcedony		1	1			2
Gray quartzite		1				1
Limestone or dolomite		2				2
Obsidian, clear black			1			1
Pit House 28 Overburden Totals	1	25	2	0	0	28
Pit House 28 Fill						
Black to gray chert	3	123				126
Various gray and brown cherts		13				13
Fingerprint chert				1		1
Various cherts (small flakes)		36				36
"Algal" chert		4				4
Light to dark gray chalcedonic chert		5				5
Medium gray chalcedony		1				1
Medium gray and rose chalcedony		4				4
Light to dark gray quartzite		13				13
Various coarse materials		9				9

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Unidentified materials (small flakes)		25				25
Various materials			16			16
Limestone or dolomite	1	40				41
Obsidian, clear black		1				1
Alibates-like material			1			1
Pit House 28 Fill Totals	4	274	17	1	0	296
Pit House 28 Floor Fill						
Black to gray chert	1	24	1			26
Gray and black chert		1				1
Medium to dark gray chert		5				5
Medium gray chert		1				1
Dark gray to brown chert		1				1
Medium gray and red chert		1				1
Gray and white chert		1				1
Rose chert			1			1
Fingerprint chert		1				1
Gray chalcedony		2				2
Fine-grained black quartzite		1				1
Medium gray quartzite		1				1
Limestone or dolomite		1				1
Pit House 28 Floor Fill Totals	1	40	2	0	0	43
Pueblo Room 31 Overburden						
Black chert	0	1	0	0	0	1
Pueblo Room 31 Upper Fill						
Black to gray chert		5				5
Dark gray siltite		1				1
Pueblo Room 31 Upper Fill Total	0	6	0	0	0	6
Pueblo Room 31 Lower Fill						
Black chert		7		1		8
Off-white chert		1				1

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Medium gray chalcedonic chert		3				3
Pueblo Room 31 Lower Fill Totals	0	11	0	1	0	11
Pueblo Room 31 Floor Contact						
Black chert		1				1
Fine-grained, light gray siltite		1				1
Pueblo Room 31 Floor Contact Totals	0	2	0	0	0	2
Pueblo Room 31 "Sipapu" Fill						
Black to gray chert		1				1
Dark red to black chert		1				1
Mottled medium gray siltite		1				1
Pueblo Room 31 "Sipapu" Fill Totals	0	3	0	0	0	3
Pueblo Room 32 Fill						
Black to gray chert		11				11
Medium gray chert		2				2
Pueblo Room 32 Fill Totals	0	13	0	0	0	13
Pueblo Room 32 Floor Fill						
Black chert		10				10
Dark gray chert, streaked		3				3
Off-white chert		2				2
Light to medium gray chalcedonic chert		1				1
Dark gray chalcedonic chert		1				1
Pueblo Room 32 Floor Fill Total	0	17	0	0	0	17
Pueblo Room 32 Floor Contact						
Black chert	0	2	0	0	0	2
Unknown Provenience						
Black chert	2	6				8
Mottled gray chert		1				1
Fine-grained medium gray quartzite		1				1
Unidentified greenish-gray stone		1				1
Unknown Provenience Totals	2	9	0	0	0	11

Table 23. Distribution of Chipping Debris Categories.

Material (Comments)	Core	Core Reduction Flake	Biface Thinning Flake	Shatter	Other	Total
Site Totals*	**60**	**1305***	**64***	**29***	**3**	**1461**

*The original tally of core reduction flakes included some biface thinning flakes, so the total for core reduction flakes is high and the total for biface thinning flakes is low. The total for shatter is also low, based on the approach used to identify debris among the coarser-grained materials.

The remainder of the debris is a seemingly endless variety of cherts, siltites, quartzites, limestones, dolomites, and even a couple of igneous materials, all occurring in small numbers.

Aside from the Black and Dark Gray material categories, which are local to the west side of the Sacramento mountains (Pray 1961), and obsidian, I do not know which, if any, of the materials are available locally and which were imported. One material that stands out looks very much like Alibates "flint" (silicified dolomite) from the Texas Panhandle north of Amarillo. However, all of the examples of this material are clearly translucent along their edges, which is *not* a characteristic of Alibates. For these items I coined the term "Alibates-like." While the several varieties of obsidian were imported, the source areas have not been determined by instrumental analysis.

Were the core reduction flakes recovered from Abajo produced at the site? One way of addressing this question is to look at the cores from the site. At the very least, eight materials were brought into the site in core form: the 60 cores include the black to gray chert, various shades of gray chert, dark grayish-brown chert, gray and yellowish-brown chert, dark gray siltite, dark brown siltite, black rhyolite, and limestone or dolomite. In addition, a half-pebble of hazy black obsidian, with an obvious cortex, may have been brought to the site as a complete pebble.

Very few artifacts appear to have been heat treated to improve their knapping qualities. The 18 items displaying the effects of heating are mostly the finer quality materials, raising the possibility that at least some of them were heated under circumstances unrelated to knapping.

Biface manufacturing was undertaken at Abajo de la Cruz, as evidenced by the presence of biface thinning flakes in 16 material types. The latter include black chert, gray chert of various shades, mottled gray chert, grayish-brown chert, grayish-yellow chert, yellow-brown chert, rose chert, off-white chert, gray chalcedonic chert, yellow-brown chalcedonic chert, light gray chalcedony, white chalcedony, white and orange chalcedony, clear black obsidian, streaky black obsidian, and the Alibates-like material.

Summary of Chipped Stone Technology at Abajo de la Cruz

In spite of only limited use of screens to sift fill at Abajo, 1,461 pieces of knapping debris were recovered. The four major debris categories represented by this collection are cores, core reduction flakes, biface thinning flakes, and shatter. The primary material used is a highly variable black to dark gray silicious stone that ranges in texture from cryptocrystalline (the definite minority) to fine siltite or very fine quartzite that is herein termed "black chert." The balance of the materials represented derives from a variety of cherts, chalcedonic cherts, chalcedonies, siltites, quartzites, rhyolites, unidentified igneous materials, and limestones or dolomites. Each of these materials occurs in small quantities, with the finer-textured examples being the least numerous. Many of the materials were clearly brought to the site and developed into cores for flake production. Many additional materials are represented by biface thinning flakes, indicating that biface production was an important activity, especially involving many of the finer quality materials. Although some evidence for heat treating of materials prior to knapping is evidenced in the assemblage, this technique does not appear to have been a major aspect of the artifact production process.

Chapter 13

MACROBOTANICAL REMAINS FROM LA 10832[1]

Richard I. Ford

The Museum of New Mexico submitted 32 lots of carbonized archaeological plant materials to the Ethnobotanical Laboratory for identification and interpretations. Since these items were visually observed in the field during excavation, the initial sorting did not require the microscopic separation of flotation samples. All materials were readily identified without the aid of a binocular microscope. However, their identification was confirmed by comparison with contemporary plant collections and taxonomic features dependent upon the microscope. The collection included corn (21 lots), mesquite pods containing beans (four lots), reedgrass culms (four lots), and an unidentified herbaceous stem (four lots). The specimens were from the site LA 10832.

Zea mays (corn)

The charred remains of corn were represented by two cob shanks (4-11 and 28-99), a small section of stalks (4-11), corn cobs, broken cupules, loose kernels, and a large (17.6 g) piece of ground corn meal. The last item is particularly unusual.

The presence of cobs without kernels, cupules, shanks, and a stalk are to be expected since these items when dry are used for fuel even at contemporary Pueblos. Those recovered from LA 10832 were in the general fill, do not appear to have received any special treatment with their disposal, and probably were discarded trash. Their use as a fuel is suspected.[2]

The corn grown by the inhabitants of LA 10832 is rather archaic in appearance. The cobs have an oval cross-section, are cigar-shaped, and have a mean maximum diameter of only 15.9 mm, with a range of 8.7-29.0 mm. Half (50 percent) of the 16 measurable cobs have 10 kernel rows, 18.75 percent have 8 rows, the same percentage have 12 rows, and 12.5 percent have 14 rows. The cupules are only 7.4 mm wide on the average and 4.5 mm high. These dimensions correspond well with the small, crescent-shaped kernels. No complete cob was in the assemblage. This Chapalote-derived corn is not as developed as was maize grown farther north in the Rio Grande valley during the same period.

The mass of charred ground corn meal is most unexpected. Usually, grinding stones are found associated with cobs and we are left to assume that the corn was ground into a meal or *masa*. In this case, we have direct evidence that the kernels were reduced to a flour (28-100).

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[1]The original report was prepared by Dr. Richard I. Ford in the mid 1970s (as UMMA Ethnobotanical Laboratory Report No. 481, 1975). It is included here with slight changes in format and very minor editing. I (RNW) greatly appreciate his contribution to this project. My comments are included as footnotes.

[2]Charred cob fragments were indeed recovered from several fire pits at LA 10832 (RNW).

Prosopis juliflora (mesquite)

Four broken pods containing 2 to 4 beans were recovered from different proveniences (12-4, 12-26, 12-28, and 28-75). Mesquite grows in the immediate vicinity of the site today and may have at the time the site was occupied. This tree is particularly valuable to native peoples today for food, medicine, and firewood, and it undoubtedly was in the past as well. In the present example, the honey-flavored pods and seeds were collected, presumably to be ground into an edible flour for cooking or mixed with water for drinking. Although mesquite may have been locally available, it is not dependable from one year to the next. The pods may be available in late summer one year but virtually absent the next. Consequently, since corn was grown, the mesquite was probably supplemental to the corn crop.

Phragmites communis (reedgrass)

This important long-culmed grass has not been reported from the site area by Tierney (this volume), and may not grow in the region at present. However, its presence in the fill (4-12, 12-45, 32-8, and 32-18) suggests that it was used for construction and most likely was locally available in the past. The implication of this discovery is that a previously annual water supply provided reedgrass for thatch, arrow shafts, and other utensils.[3]

Herbaceous Stem

This unidentified stem also came from the fill and in two situations in association with reedgrass (4-12, 25-12, 28-24, and 32-8). It may have been an additional thatch.

Summary

Corn cobs were the most conspicuous botanical material recovered, undoubtedly because they had been used for fuel. How important maize was in the prehistoric diet cannot be appraised with the evidence at hand. One means of preparing the kernels was by grinding, and their corn subsistence was supplemented by mesquite pods and beans. The plant communities were not quite the same as today at the time of occupation because reedgrass apparently grew nearby, which it does not do now.[4]

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[3]See Warren's chapter regarding the former presence of a swamp in the vicinity of the site, as demonstrated by caliche casts of sedge and cattail in alluvial strata and the recovery of examples of such casts from archaeological deposits in LA 10832 (RNW).

[4]See the next chapter for other species recovered by the flotation technique (RNW).

Chapter 14

PLANT REMAINS FROM THE BENT AND ABAJO DE LA CRUZ SITES, OTERO COUNTY, NEW MEXICO[1]

Paul Minnis, Daniel Swan, and Leslie Raymer

Introduction

Water-screened samples from two archaeological sites in Otero County, New Mexico, were analyzed at the University of Oklahoma. Eight samples were from the Bent site (LA 10835 [see Wiseman 1991]), and 17 samples were from the Abajo de la Cruz site (LA 10832). The LA 10835 samples were sorted by Laboratory of Anthropology staff and identified at Oklahoma. The material from LA 10832 were both sorted and identified at Oklahoma.

Both sites are located along the Rio Tularosa near the modern settlement of Bent. Here, the Rio Tularosa flows through the Sierra Blanca bajada. The elevation is approximately 5750 feet, and the vegetation can be characterized as juniper-desert shrub assemblage. The floral diversity of the region is summarized by Tierney (this volume).

LA 10832 consists of a 10 to 12 room pueblo, of which five rooms were excavated. In addition, two pit houses, hearths, and extramural pits were excavated. Wiseman (1979) estimates that this site dates to A.D. 1250–1300.

LA 10835 appears to be a dual component site (A.D. 800–1000 and A.D. 1100–1200). A two-room field house and several bell-shaped pits were excavated at this site.

Methods and Initial Results

Two types of macro-plant remains were studied, “seeds” and wood charcoal. Initial analysis consisted of sorting the samples from LA 10832 and the removal of anything that was not identified as contamination or wood charcoal. This step was omitted for the LA 10835 samples, as they were sorted in New Mexico. A subsample of up to 20 pieces of wood charcoal was identified from the LA 10832 samples. No wood charcoal specimens were submitted from LA 10835. Identification of “seeds” and wood charcoal was accomplished with the aid of identification manuals and an extensive comparative collection of modern plants.

The samples to be sorted were passed through nested geological screens, and each fraction was sorted under low magnification. The material which passed through the 0.3 mesh screen was not sorted, as it is unlikely that identifiable plant remains would have been present. In some cases,

[1]Prepared by Dr. Paul E. Minnis and two students in the mid 1970s (as University of Oklahoma Ethnobotanical Laboratory Report No. 7, 1982). The report is included here with changes in format and minor editing. Their contribution to this project is greatly appreciated (RNW).

the total sample was quite large. For efficiency, these large samples were randomly divided using a riffle-type sample splitter. Using the provenience codes listed in Table 24, those subsampled fractions are noted and corrected for in Table 25. Thus, if three seeds of a particular type were found in half a sample, Table 25 lists six from that sample.

Table 24. Provenience Codes for LA 10832.

Provenience-Specimen No.	Feature Description	Provenience within Feature
3-1	Rock Hearth 3	Fill
10-2	Ash Deposit Pit 10	Fill
11-2	Rock Hearth 11	Fill
12A-61 (?)	Pit House 12a	Probably fire pit fill
13B-4	Borrow Pit 13B	Bottom fill
14-2	Storage Pit 14	Floor fill
15-13	Non-Rock Hearth 15	Fill
17B-30	Pueblo Room 17B	Hearth fill
18-3	Rock Hearth 18	Fill
20-3	Non-Rock Fire Pit 20	Fill
21-4	Non-Rock Fire Pit 21	Fill
22-7	Borrow Pit	Fill
24-32	Pueblo Room 24	Fill of lower floor fire pit
28-78	Pit House 28	Fire pit fill
28-79	Pit House 28	Fill of large floor pit
31-27	Pueblo Room 31	Fire pit fill
32-22	Pueblo Room 32	Fire pit fill

Wood charcoal identifications are presented in Table 26. The uncharred seeds from LA 10832 are enumerated in Table 27. Both charred and uncharred seeds were recovered from LA 10835; they are listed in Table 28.

In order to go beyond simple enumeration of type recovered, “quantitative” techniques must be employed. There are no such standard techniques used in paleoethnobotany. The technique used here is a sample presence-absence frequency notation (percentage of samples containing each taxon). Thus, a relative comparison of ubiquity of plant remains is presented. Whatever measure is used must be interpreted with caution, as the presence of plant remains is influenced by many factors for which we have little analytic control (e.g., deposition, preservation, and recovery). The rationale for the quantitative comparison used here is presented in Minnis (1980).

Table 25. Charred Plant Remains from LA 10832.

Provenience Code	3-1	10-2	11-2	12A-61	13B-4	14-2	15-13	17B-30	18-3	20-3	21-4	22-7	24-32	28-78	28-79	31-27	32-22
Sample size (l)	1.2	1.9	0.2	4.7	3.8	3.8	3.8	2.8	0.2	3.3	4.3	4.0	3.8	4.7	4.7	3.8	3.8
Weight (g)	242.5	10.5	13.6	44.6	34.3	8.5	79.5	22.3	11.3	145.1	138.0	40.8	38.2	47.9	19.0	38.4	48.0
Percent sorted	25	100	100	50	100	100	50	100	100	100	30	50	30	100	100	100	25
Maize cob	60	21	5	22	11	59	280	18	22	287	57	76	9	107	55	16	16
Maize kernel			5			1	2			7		4	3	3	2		
Maize leaf							1										
Cucurbit rind							2										
Pinyon shell															1		
Mesquite							14			7	6	4	9	7	1		
Four-wing saltbush															1		
Grape					1												
Prickly pear							6					8		4	1	1	
Hedgehog cactus												26					
Purslane					1				1						1		
Goosefoot														1		1	
Cheno-Am															1		
Embryo*		3					2							4	1		
Unknown seed							8	1		2	3	1		2			

*Cf. Capparidaceae

Table 26. Wood Charcoal Identified from LA 10832.

Provenience Code	3-1	10-2	11-2	12A-61	13B-4	14-2	15-13	17B-30	18-3	20-3	21-4	22-7	24-32	28-78	28-79	31-27	32-22
Juniper, n = (grams)		3 (0.1)	20 (1.0)	3 (0.1)	3 (0.1)	4 (0.1)	9 (0.5)		8 (0.8)		5 (0.3)	12 (0.5)	20 (0.8)	5 (0.5)	3 (0.2)		8 (0.4)
Pinyon, n = (grams)	20 (4.3)	3 (0.1)		17 (0.7)			5 (0.3)		5 (1.7)	5 (0.9)	14 (0.8)			4 (0.3)	14 (0.7)		5 (0.1)
Conifer, n = (grams)	1 (0.1)								4 (0.5)		1 (0.1)				1 (0.1)		
Ash, n = (grams)								20 (1.5)	2 (0.1)			5 (0.5)				20 (5.6)	3 (0.1)
Saltbush, n = (grams)					2 (0.1)					15 (2.4)		3 (0.3)		11 (1.1)	2 (0.1)		
Monocot, n = (grams)							2 (0.1)										
Diffuse porous, n = (grams)							4 (0.3)		1 (0.1)								

Table 27. Uncharred Plant Remains from LA 10832.
(Proveniences not listed did not yield uncharred plant remains.)

Provenience Code	**3-1**	**10-2**	**11-2**	**12A-61**	**13B-4**	**14-2**	**18-3**	**22-7**	**28-78**	**31-27**
Euphorbia	16	2		2	17	4		4	1	2
Goosefoot					1				1	
Pigweed								2		
Purslane									1	
Carpetweed			2							
Kallstroemia					1					
Grass floret						1	1		1	
Unknown seed									1	

Table 28. Charred and Uncharred Plant Parts from LA 10835.

Provenience Code	**7A-7**	**7B-7**	**8-3**	**9-4**	**13-4**	**19-3**	**20-3**	**22-2**
Charred								
Maize cob	76	46		44	17		17	
Maize kernel	1				4*	2*		
Mesquite		1						
Juniper twig					1			
Pine bark				3		4	4	
Miscellaneous	53	42			3	10	3	
Unknown seed	1							
Uncharred								
Euphorbia				4	26		1	4
Pigweed/Cheno-Am		1	1			1	1	
Unknown seed						1		
Bone fragment		2				2	1	1
Shell fragment	6	3			8	5	2	
Rodent feces						1	1	

*Two fragments from 19-3 and both fragments from 20-3 appear to be maize kernel fragments, but are too small to allow positive identification.

Discussion of Results

Seeds

The term “seed” is used here in more of a popular fashion than a botanical one. Fruits and other reproductive structures are used under this term. Both charred and uncharred seeds were recovered from both sites. Following the guideline that “*unless there is a specific reason to* *believe otherwise*, only charred seeds should be considered prehistoric" (Minnis 1981:147), only the charred seeds from the two sites will be discussed here.

LA 10835 yielded 209 charred seeds, as well as other charred plant remains (Table 25). Only three identifiable types were found: corn cob fragments (cupules), corn kernel fragments, and a mesquite seed. Most likely, the corn cupules, if not the corn kernels, represent the use of cobs as fuel. However, this material does present indirect evidence for the consumption of maize. Mesquite is a major resource for those Southwestern groups which live within its range. Very little can be said about the ethnobotanical assemblage from LA 10835 because of its small number of samples and the paucity of remains recovered.

The inventory of charred seeds from LA 10832 is more diverse. In these 17 samples, 1,280 charred seeds were found. Fifteen analytic taxa are present (Table 28). An average of 75 seeds was present in each sample, but there was a great deal of variation in those numbers. Furthermore, the samples were of different sizes, ranging from 0.2 to 4.7 liters. There is little relationship between sample size and the number of seeds recovered ($r^2 = 0.22$).

Plant remains are very commonly from cultivated plants, particularly corn. A cultivated cucurbit rind was found. Beans most likely were being cultivated, and their absence may be due to the low probability of preservation. The remains of naturally available resources are those which would be expected, given the site setting. Many of the recovered taxa are quite common from archaeological sites in the Southwest (e.g., prickly pear, hedgehog cactus, goosefoot, Cheno-Ams). All of these potential resources were available in the immediate vicinity of the site. At present, pinyon is present in higher elevations and within a reasonable distance for exploitation.

The most striking pattern from the LA 10832 assemblage is the few seeds from weedy plants. Seeds from goosefoot, pigweed, and purslane are often the most abundant seeds recovered from Southwestern sites, particularly sites of agricultural peoples. The under-representation of these seed types at LA 10832 is very unusual. Is this pattern due to problems in the recovery technology used, or does it reflect the absence of these plants in the environment? Possible explanations for this pattern can be suggested. Perhaps there was a lack of these weedy species in the vicinity of the site. The plants may have been present but were not used by the prehistoric occupants of LA 10832. Alternatively, the recovery technology was not suited for the recovery of small seeds. We have no way with the present data to determine the cause of this pattern.[2]

As we mentioned earlier, there are no standard, well-developed quantitative techniques for macroplant analysis. We prefer to use very simple methods such as comparing the number of samples in which a particular taxon is found. Ideally, this technique is best for comparison of single types between assemblages and not for comparison of different types within the same assemblage. As an illustration, Figure 52 shows the ubiquity values for the taxa recovered from LA 10832. Although the differences between types cannot be used to demonstrate that more common resources were used more than others, this graph does show that substantial differences between the frequency of various plant types exist. Maize remains and mesquite are present in many samples, whereas the other types are recovered from many fewer samples.

[2]This phenomenon has since become fairly common in archaeological plant assemblages from basin sites in southern and southeastern New Mexico (Toll 1983) (RNW).

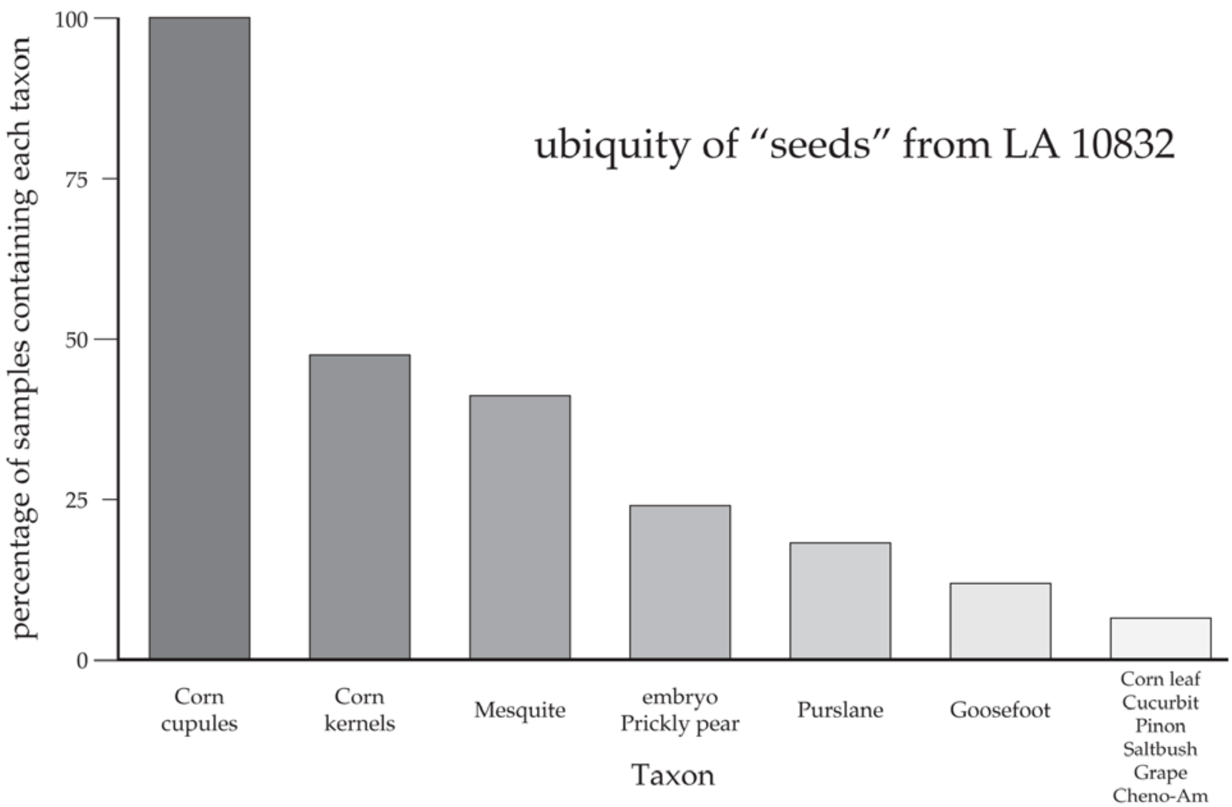

Figure 52. Ubiquity of "seeds" from LA 10832.

The distribution of these plant remains in relation to the deposit contexts is not very informative. There are no clear distributions of certain remains being found in only certain types of features (e.g., hearths). Most likely, prehistoric trash deposition behavior randomized the distribution of plant remains.

At the broadest level, we can confidently state that the occupants of both sites were farmers (with both corn and cucurbit from LA 10832). A wide range of naturally convenient plant resources was available to the prehistoric peoples in the area. Although it is quite likely that the presence of these resources in water-screened samples is indicative of their use, it must be remembered that this is an assumption.

The closest comparison for this macroplant assemblage is with material recovered by flotation from the Three Rivers site (LA 4921), another site in Otero County (Minnis 1978). The seeds recovered from this site are largely the same as recovered from LA 10832: corn cupules and kernel fragments, a prickly pear seed, and some mesquite. The major difference is the large number of goosefoot and pigweed seeds from LA 4921.

Wood Charcoal

Wood charcoal remains from the 17 LA 10832 samples were identified. In all, 292 individual fragments of wood were identified into seven types (Table 26). One type, diffuse porous wood, represents wood which could not be specifically identified. Most contexts (hearths) suggest that this wood represents the use of wood as fuel. Although corn cobs probably were used as fuel, those remains will not be discussed here.

Juniper is the most commonly identified wood; it is present in 77 percent of the samples and is represented by 103 specimens. Pinyon is present in 59 percent of the samples, and 92 pinyon specimens were identified. Pinyon wood fragments tend to be larger than juniper specimens. These two taxa account for two-thirds of the wood identified. The two woods are the most common fuelwoods found in archaeological sites in the Southwest. Juniper and pinyon have very similar heat values, though they differ in burning characteristics. Saltbush is found in five samples.

Two characteristics of this wood assemblage are unusual. First, there is a large number of ash fragments (50 pieces in five samples). Ash tends to be found along drainages. The large number of ash specimens may indicate that today's Rio Tularosa riparian community is different from that of the past. Tierney (this volume) lists the present day woody plants of the Rio Tularosa as cottonwood and saltcedar (the latter being a historic introduction). The lack of cottonwood remains from the wood charcoal assemblage, and the apparent lack of ash today, may indicate a change in floodplain woody vegetation from the past to the present.

The second interesting pattern is the lack of mesquite wood. Mesquite seeds were quite common in samples, suggesting that mesquite was present prehistorically. This pattern may indicate that mesquite was not very common around the site, and that the prehistoric peoples traveled to gather seeds but not mesquite wood. On the other hand, mesquite wood may not have been used, even if it was present. Mesquite is an excellent firewood, and we doubt that it would have been ignored if present within a convenient distance from the site. We know that the mesquite distribution has increased dramatically within historic times. Perhaps mesquite was less common around the site prehistorically. As availability seems to be a major factor in the use of woods by those who rely on wood for fuel (Agency for International Development 1980), the difference between the ubiquity of mesquite seeds and the lack of mesquite wood may well reflect changes in the density and distribution of this plant.

As with seeds, there is not a clear relationship between the types of features from which samples were taken and the types of wood present. As well, most samples contained more than one type of wood. Again, trash deposition behavior may mask any selective use of specific wood types for particular functions.

Again, the closest comparison of the LA 10832 wood assemblage is that with the Three Rivers site (Minnis 1978). Seventy-six individual wood identifications were made for material from this site. Six taxa were present: juniper, ponderosa pine, oak, saltbush, mesquite, and an unknown type. The types and frequencies of wood from this site differ from LA 10832. Different availability and use patterns probably account for these differences.

Summary

The analysis of macroplant remains from these two sites, particularly LA 10832, gives us insights into the use of various botanical resources by prehistoric peoples in Otero County. A mixed economy of farming and the collection of various naturally available resources is indicated. The lack of weed seeds may indicate minimal environmental disturbance by these people, a general lack of these species in the natural environment, a lack of their use, or biases due to the recovery techniques employed. The natural resources represented by the remains from the two sites are all present in the region today.

The woods identified from LA 10832 are present in the vicinity of the site, except for ash. Possible changes in the riparian vegetation may be indicated, as is a possible change in the distribution and density of mesquite. The most commonly recovered wood types, juniper and pinyon, were commonly used fuelwood in the prehistoric Southwest.

While this assemblage is quite small, and conclusions are necessarily speculative, this analysis indicates that several unusual patterns may be the result of environmental changes through time or unusual economic activities on the part of the prehistoric occupants of the Rio Tularosa region. Only further research will allow us to make more definitive conclusions about these possible processes.

Glossary

Common Name	Scientific Name
Ash	*Fraxinus* sp.
Bean	*Phaseolus communis* (and others)
Cactus family	Cactaceae
Carpetweed	*Mollugo verticillata*
Cheno-Am	*Chenopodium* and *Amaranthus*
Conifer	Gymnosperm
Corn cupule	*Zea mays*
Corn kernel	*Zea mays*
Cottonwood	*Populus* sp.
Cucurbit	*Cucurbita* sp. (cultivated)
Embryo	Seed coat missing (embryo looks like Capparidaceae)
Euphorbia	*Euphorbia* sp.
Goosefoot	*Chenopodium* sp.
Grape	*Vitis arizonicus*
Grass floret	Gramineae
Hedgehog	*Echinocereus* sp.
Juniper	*Juniperus* sp.
Kallstroemia	*Kallstroemia* sp.
Mesquite	*Prosopis glandulosa*
Monocot	Monocot

Common Name	Scientific Name
Mustard family	Cruciferae
Pigweed	*Amaranthus* sp.
Pinyon	*Pinus edulis*
Prickly pear	*Opuntia* sp.
Purslane	*Portulaca* sp.
Saltbush	*Atriplex canescens*
Saltcedar	*Tamarix pentandra*

Chapter 15

SUMMARY OF FAUNAL IDENTIFICATIONS

The following identifications were made by Maurice Heller, a student of Dr. Arthur H. Harris at the University of Texas at El Paso, in 1975. Heller's analysis sheets are in the site files at the Archaeological Records Management Section, located at the Laboratory of Anthropology in Santa Fe. The analysis sheets list each taxon to the lowest possible level of identification, plus information on element, end (proximal, distal, etc.), and side. Table 29 provides his counts by taxon.

Table 29. Faunal Taxa.

Taxon	Number	Percent
Sylvilagus (cottontail)	227	46
Lepus (jackrabbit)	47	10
Leporid (rabbits)	14	3
Odocoileus (deer)	9	2
Antilocapra (antelope)	1	< 1
Antelope, sheep, or goat	1	< 1
Artiodactyla (deer or antelope)	10	2
Lynx rufus (bobcat)	1	< 1
Taxidea taxus (badger)	1	< 1
Carnivore	1	< 1
Neotoma albigula (woodrat)	11	2
Prairie dog or ground squirrel	1	<1
Geomyidae	8	2
Dipodymys (kangaroo rat)	2	< 1
Criecetidae (mice)	1	< 1
Meleagris (turkey)	1	< 1
Lophortix or *Callipepla* (quail)	1	< 1
Passeriformes (starling size)	1	< 1
Aves (egg shell fragment)	1	< 1
Unknown	154	31
Total	493	100

Heller also made determinations of the minimum number of individuals (MNI) represented by each taxon (Table 30). I greatly appreciate Maurice's gratis contribution to this project.

Table 30. Minimum Number of Individuals.

Taxon	MNI
Sylvilagus (cottontail)	17
Lepus (jackrabbit)	4
Odocoileus (deer)	1
Antilocapra (antelope)	1
Artiodactyla (deer or antelope)*	2
Lynx rufus (bobcat)	1
Taxidea taxus (badger)	1
Neotoma albigula (woodrat)	3
Geomyidae	2
Dipodomys (kangaroo rat)	1
Cricetidae (mice)	1
Meleagris (turkey)	1
Lophortix or *Callipepla* (quail)	1
Passeriformes (starling size)	1

*One young, one very young

Chapter 16

COMMENTS ON THE FAUNAL REMAINS FROM LA 10832[1]

Jonathan C. Driver

LA 10832 was excavated in 1972 by R. Wiseman (Wiseman 1975) as part of a highway salvage project. The site is in the Rio Tularosa Valley, on the western margins of the Sierra Blanca massif, NNE of Alamogordo. Excavations revealed a small pueblo and associated pit houses, probably dating to the thirteenth century A.D.

Approximately 500 bones were recovered during excavation, and were identified by M. Heller. Identifications are on file at the Laboratory of Anthropology, Museum of New Mexico. Recent analysis of other collections in the Sierra Blanca area (Driver 1984, 1985; Speth and Scott 1985) provides a regional background against which the assemblage from LA 10832 can be assessed. The following comments are based upon a brief analysis of data derived from Heller's original identifications.

Taxa Present

The following identifications were made by Heller: *Lophortyx* (quail), *Meleagris* (turkey), small passerine, *Sylvilagus* (cottontail), *Lepus* (jackrabbit), large sciurid (either prairie dog or ground squirrel), Geomyidae (pocket gopher), *Dipodomys* (kangaroo rat), Cricetidae (mice), *Neotoma* (pack rat), *Taxidea taxus* (badger), *Lynx rufus* (bobcat), Artiodactyla (probably either antelope or deer), *Odocoileus* (deer), *Antilocapra* (antelope), and *Homo sapiens* (human). Most of these are represented by a few bones, and only cottontail, jackrabbit, deer, and antelope warrant further discussion. (I have discussed problems in interpreting the taphonomy of Sierra Blanca sites elsewhere; see Driver 1985). None of the taxa represented are unexpected, given the results from other studies of animal remains in this region.

Assemblage Characteristics

The main feature of interest at LA 10832 is the preponderance of Lagomorpha (cottontail and jackrabbit) in the assemblage. I have compiled the following figures from Heller's original data, using the following guidelines: (a) no bones are considered identified unless an element is specified, e.g., "Sylvilagus (?) long bone fragment" are excluded from my counts; (b) I have included Heller's category "large mammal ribs" with the artiodactyls, as this is presumably what they are. The resulting data are listed in Table 31.

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[1] In 1985, while preparing for a study of faunal remains from the Sierra Blanca region, Dr. Jon Driver (1985) reviewed Maurice Heller's species list for Abajo de la Cruz. He summarized his interpretations in a short manuscript, which was added to the site file at the Archaeological Records Management Section (housed in the Laboratory of Anthropology, Santa Fe). Driver's report is included here in a revised format and with minor editing. I am greatly indebted to Jon for his contributions to the project (RNW).

Table 31. Summary of Lagomorph and Artiodactyl Data from LA 10832.

Taxon	NISP	Percent
Cottontail	231	74.8
Jackrabbit	46	14.9
Unspecified artiodactyl + deer + antelope*	32	10.4
Total	309	100.0

*NISP (number of identified specimens) includes 9 deer and 1 antelope.

These data can be compared with large assemblages from the early period at the Angus site (Driver 1985; Speth and Scott 1985) and Bonnell (Driver 1985), both of which lie to the northeast of LA 10832, on the other side of the Sierra Blanca massif (Table 32).

Table 32. Summary of Lagomorph and Artiodactyl Data from the Bonnell and Angus Sites.
(Source: Driver 1985)

Taxon	Bonnell		Angus	
	NISP	Percent	NISP	Percent
Cottontail	1036	64.3	495	44.4
Jackrabbit	250	15.5	142	12.7
Unspecified artiodactyl + deer + antelope*	326	20.2	477	41.7
Total	1612	100.0	1114	100.0

*NISP (number of identified specimens) includes 152 deer and 82 antelope from the Bonnell site, 404 deer and 3 antelope from the Angus site.

The importance of lagomorphs at LA 10832 is demonstrated by comparing their frequency of nearly 90 percent at that site with about 80 percent at Bonnell and 57 percent at Angus. If one extended the comparison even further northeast, to sites north of Capitan Mountain, even lower frequencies of lagomorphs (about 11 percent at Phillips and Block Lookout) would be encountered (Driver 1985). (All figures cited refer only to the lagomorph and artiodactyl assemblage. When all species are considered, the figures will change somewhat. See Driver [1985] for details).

I have argued that the variable nature of Sierra Blanca faunal assemblages is produced by the very variable conditions of topography and biota around different sites. For example, sites north of Capitan Mountain lie adjacent to good antelope pasture, and contain considerable quantities of that species; Bonnell lies along a well vegetated valley, resulting in lagomorphs and deer as important species; the high elevation of the Angus site probably increased the importance of deer. Without more detailed knowledge of the environs of LA 10832 it is not possible for me to comment in much detail on the significance of the very high quantity of lagomorph bones. However, the following points may be worthy of further investigation:

a) It is my impression for the Sierra Blanca area that altitude is not of major significance in determining antelope presence at sites. Sites tend to have very high (greater than 50 percent) or very low (less than 5 percent) frequencies of antelope, and this seems to be related to the location of sites close to good antelope grazing areas, such as the plains north of Capitan Mountain. I would expect that LA 10832 lies a number of miles away from areas with the potential to support good antelope populations.

b) The relative lack of deer is therefore more puzzling than the relative lack of antelope. Is it possible that the site is at too low an elevation for good quantities of deer to be locally available?

c) Speth and Scott (1985) have suggested, on the basis of a rather small sample from Angus, that there was a change in hunting small mammals to large mammals. LA 10832 seems to be reasonably early, and it may be that these data are tending to confirm their suggestion. I do not agree with their conclusions (Driver 1985), but am quite ready to be convinced if better data come along.

d) Finally, it might be worthwhile considering taphonomy as a factor. Looking at the element frequencies from LA 10832 for the lagomorphs, I do not see any major differences from the lagomorph assemblages at other sites. The fact that so many lagomorph bones are broken would tend to suggest that they are not “natural” post-occupational intrusions.

Chapter 17

DATING THE OCCUPATION

Of the several types of dating that might be used to place LA 10832 in time, only one is currently available for the purpose—relative dating by means of pottery types.

Dendrochronology or Tree-Ring Dating

Ideally speaking, dendrochronology, or dating by tree-rings, is the best method for any dating task. Several "dendro" specimens were collected from different parts of the excavations, but a common problem surfaced with them, as is all too often the case for sites in southeastern New Mexico. That problem usually involves three aspects: (1) the species itself is non-datable, (2) the species is datable but the piece of wood is too small (too few rings) to date, or (3) the species is datable but is from a complacent tree. Here, "complacency" means that the tree had its roots in a perennial water supply, precluding production of rings of varying widths in response to wet or dry years. Variation in tree-ring width is essential for correlating specimens with known sequences of wet and dry periods, resulting in the assignment of a date.

In the field and the laboratory, 23 pieces of wood from Abajo de la Cruz were identified as having dendrochronological potential and were submitted to the Laboratory of Tree-Ring Research at the University of Arizona in Tucson. None could be dated. A list of the specimens, species, and proveniences can be found in Table 33.

Table 33. Non-Dating Tree Ring Specimens from LA 10832.

FS Number	Species	Provenience
10832-2-7	Pinyon, non-conifer	Trench 12, 15 cm below surface
10832-3-2	Pinyon, juniper	Hearth 3 fill
10832-12-19	Non-conifer	Pit House 12A fill
10832-12-43	Pinyon, juniper	Pit House 12A fill
10832-17-16	Pinyon, non-conifer	Pit 17B fill
10832-17-17	Pinyon	Pit 17B fill
10832-17-28	Non-conifer	Pit 17B fill
10832-24-21	Pinyon	Pueblo Room 24 fill
10832-25-1	Yucca?	Trench 25 fill
10832-31-21	Pinyon, juniper	Pueblo Room 31 floor fill
10832-32-9	Pinyon, non-conifer	Pueblo Room 32 fill
10832-32-10	Pinyon	Pueblo Room 32 fill
10832-32-11	Ponderosa pine	Pueblo Room 32 fill
10832-32-12	Ponderosa pine, pinyon, non-conifer	Pueblo Room 32 floor fill
10832-32-19	Pinyon	Pueblo Room 32 floor fill

Radiocarbon Dating

In more recent years, radiocarbon dating has come into its own as an excellent dating method, even in Ceramic period contexts. However, no money has ever been available for implementation of this technique on the Bent Project materials. If funds become available, sufficient materials from LA 10832 are on hand for the purpose.

Ceramic Cross-Dating

Ceramic cross-dating is a time-honored tradition in Southwestern archaeological studies. This method relies on identifying pottery types and associating them with absolute dates obtained elsewhere (preferably in the areas in which specific types are known to have been made). A less satisfactory approach relies on pottery types that are dated in sites and regions into which they were traded. (To a certain extent, the limitations associated with the latter approach still apply to Chupadero Black-on-white, even though the type was widely exchanged and has been recovered from multiple dated sites.) Also, even when dates are available for a given pottery type, those dates can derive from a number of techniques that, when combined, do not necessarily result in complete or well-founded dating of the type. In other words, the results vary in terms of reliability.

Perhaps the least satisfactory relative dating technique using pottery is a negative approach. That is, if prior studies of regional sites have shown that a pottery type was regularly imported to sites of a given period, and if that pottery type does not show up in the site being considered, it might be appropriate to suggest that the site was not occupied during the local appearance (or period of manufacture) of the subject pottery type. For southeastern New Mexico, I have often used this technique, specifically with regard to the absence of Rio Grande Glaze A Red and Lincoln Black-on-red. Obviously, the farther a site is from the region of manufacture, the more tenuous the inference.

For LA 10832, six types can helping us date the occupation (Table 34). In addition, this is a case where Rio Grande Glaze A Red is absent.

Chupadero Black-on-White

Chupadero Black-on-white was a major constituent of pottery assemblages in late sites in the Sierra Blanca region. Based on neutron activation studies, the type was made in at least two regions, the Gran Quivira region of central New Mexico and the Capitan-Jicarilla Mountains area of the northern Sierra Blanca region of Lincoln county. Other production areas have been proposed (Ennes 1999) but none have been confirmed as yet. One of the more curious aspects about the type is that most of the Chupadero made in the Gran Quivira region was used only there, while that made in the northern Sierra Blanca (Capitan and southern Jicarilla Mountains) was traded widely over much of New Mexico and to parts of Arizona, Texas, Oklahoma, and the state of Chihuahua, Mexico (Clark 2006; Creel et al. 2002a). Its popularity outside of the area of production probably had to do with the fact that its paste and firing regime resulted in a fairly strong ceramic that held liquids better than the other common types over that vast area, especially on the plains of eastern New Mexico, Texas, and Oklahoma.

Table 34. Pottery Types Used to Date LA 10832.
(Organized by areas of production)

Pottery Type	Dates A.D.	References
Gran Quivira Region, Capitan-Jicarilla Mountains		
Chupadero B/W	1050/1100 to 1475	Wiseman 1982, Snow 1986
El Paso and Sierra Blanca Areas (latter Lincoln County, N.M.)		
El Paso Poly., Early Rim	1000/1100 to 1250	Miller 1995
El Paso Poly., Late Rim	1250 to 1450	Miller 1995
West-Central N.M. and East-Central Az.		
Heshotauthla Poly. or B/R	1275 to 1400	Smith et al. 1966
St. Johns Poly.	1175 to 1300	Breternitz 1966
Wingate B/R	1050 to 1200	Breternitz 1966
Snowflake B/R	1100 to 1200/1300	Breternitz 1966; Oppelt 2008
Tularosa B/W style	1150 to 1300	Breternitz 1966
Sierra Blanca Area (Lincoln County, N.M.)		
Lincoln B/R	ca. 1300 to 1400	Breternitz 1966
Middle Rio Grande (Albuquerque to Socorro)		
Rio Grande Glaze A Red	1315/1340 to 1500 (?)	Habicht-Mauche 1993; Cordell and Earls 1984

In spite of its popularity and widespread distribution, Chupadero is not well dated. Its derivation, and therefore its initial date of production, are still somewhat speculative. Most researchers who have ventured opinions on the matter suggest that Chupadero developed from Socorro Black-on-white and perhaps Red Mesa Black-on-white, types that characterize central and northwestern New Mexico. A study that specifically targeted the origins of Chupadero concluded that it (as well as Socorro Black-on-white) developed from a *milieu* of pottery types in central and west-central New Mexico (Wiseman 1986), and first appeared about A.D. 1050 or 1100.

Long-standing opinions have Chupadero evolving into Tabira Black-on-white, the premier early historic painted ware of the Gran Quivira region (Mera 1931). However, not all authorities feel this way; some suggest that Tabira did not evolve from Chupadero, but was separately inspired from a western source or sources (Hayes et al. 1981). Either way, the end date for Chupadero Black-on-white is still uncertain. Hayes et al. (1981) suggest an end date of A.D. 1545. However, one carefully reasoned argument based on later excavation data from Gran Quivira suggests a shift from Chupadero to Tabira between A.D. 1450 and 1500 (Snow 1986). Based on that study, and for the time being, an end date of A.D. 1475 seems reasonable.

In summary, Chupadero Black-on-white from central New Mexico appears to have been made between A.D. 1050 or 1100 and 1475. Unfortunately, we have no data to allow an estimate of dates of production for the Chupadero made in the northern Sierra Blanca country.

El Paso Polychrome

The dating of El Paso Polychrome—made in the El Paso region of south-central New Mexico, far west Texas, and northern Chihuahua—is on better footing, thanks to intensive study of the prehistory in the Hueco Bolson on lands controlled by Fort Bliss. Myles Miller (1996) provides the most recent dating of El Paso Polychrome, which is best dated by rim profiles of jars. The best method for evaluating temporal placement of rims is the calculation of a rim sherd index. This can be accomplished in several ways (West 1982; Whalen 1981, 1993; Miller 1996; Speth and LeDuc 2007), but the results are similar.

The 95 El Paso Polychrome jar rims from LA 10832 were classified in terms of three groups: (1) *middle group*, parallel-sided (straight) rims with no outward curve; (2) *late-middle group,* slightly thickened rims on straight or slightly excurvate necks; and (3) *late group*, greatly thickened rims on excurvate necks (Table 34). The middle-late category is by far the most common in the Abajo assemblage. Interpolating liberally from Whalen (1981, Figure 7), the Abajo assemblage of El Paso jar rims appears to date from about A.D. 1200 to perhaps 1275. No tapered rims, indicative of the pre-A.D. 1200 period, are present.

Table 34. El Paso Polychrome Jar Rim Profile Categories.

	Profile Category		
Provenience	**Middle**	**Middle-Late**	**Late**
Strip Trench 1 fill		3	
Strip Trench 2 fill	1	3	4
Strip Trench 4 fill		2	2
Strip Trench 5 fill		1	4
Strip Trench 6 fill	1		
Feature 12 east-west strip		10	3
Feature 12 strip		1	
Pit 13B strip		1	
West Wall Trench (Feature 25)		3	
Pit House 28 strip		1	
Trench 17 fill		7	
Feature 19 fill		1	
Borrow Pit 12C/22 bottom fill		1	
Borrow Pit 12C bottom fill		5	
Borrow Pit 15 fill		1	
Rock Hearth 18 fill			1
Feature 12 fill		5	2
Pit House 12A floor fill		2	1
Pit House 28 fill		7	
Pit House 28 floor fill		5	
Pueblo Room 17B fill		1	
Pueblo Room 23 fill		1	
Pueblo Room 24 fill		2	
Pueblo Room 31 upper fill		3	
Pueblo Room 32 fill	1	5	
Pueblo Room 32 lower fill		2	1
Pueblo Room 32 floor fill			1
Totals (Percent)	3 (3%)	73 (77%)	19 (20%)

Details of the El Paso Polychrome that appear to have been made in the southern Sierra Blanca region of New Mexico remain to be elucidated. No dates are yet available for this variety of the type.

Pottery from West-Central New Mexico and East-Central Arizona

Four pottery types from west-central New Mexico and east-central Arizona, while represented by few sherds at LA 10832, do the most to help narrow down the potential occupation dates for the site (Table 33). Heshotauthla Black-on-red or Polychrome (it can be impossible to distinguish the types based on a few small sherds) has the latest beginning date, of A.D. 1275. Its end date of A.D. 1400 is too late to apply to LA 10832, for reasons provided below.

The unidentified black-on-white sherd with a Tularosa design style, the Snowflake Black-on-white, and the St. Johns Polychrome have end dates of about A.D. 1300. Their beginning dates, A.D. 1050 to 1175, are probably too early to apply to LA 10832.

The one sherd of Wingate Black-on-red, with an end date of A.D. 1200, may represent either an heirloom piece or a misidentification as to type (note the question mark in Table 33).

Lincoln Black-on-red and Rio Grande Glaze A Red

Only two sherds of Lincoln Black-on-red were recovered from Abajo de la Cruz, while no sherds of Rio Grande Glaze A Red (Rio Grande Glaze I) were found. The initial production of Lincoln is estimated to be about A.D. 1300. The beginning date for Rio Grande Glaze A Red has been variously placed at A.D. 1300, 1315, 1325, and 1340. Lincoln appears to have been made as late as A.D. 1400, while Rio Grande Glaze A Red may have been made as late as A.D. 1500 or so in the vicinity of Socorro. Thus, these two types suggest that Abajo de la Cruz may have been occupied as late as A.D. 1300 or a few years afterward.

Dating Summary

The occupation of Abajo de la Cruz, as deduced from the pottery assemblage, took place within the period extending from about A.D. 1200 to about 1300. The beginning date rests heavily on the preponderance of middle El Paso Polychrome jar rim forms, while the end date rests just as heavily on the *absence* of Rio Grande Glaze A Red sherds. Several other well-dated types occur as trade sherds and support the idea of an occupation during the last half of the 13th century—about A.D. 1250 to 1300 or a little later.

Other pottery types in the assemblage are too long-lived to be of more than general assistance in the dating effort.

As is discussed in other sections of this report, the actual length of the occupation of LA 10832 was shorter than the century spanned by the A.D. 1200 and 1300 bracket dates—probably much shorter. This inference is based primarily on the relatively few artifacts at the site and the presence of only light to moderate organic staining of the trash deposits. The inference reinforces the ceramic evidence that the site was occupied during the last half of the 13th century, not during that entire century.

No other dates are currently available for the site. A number of tree-ring samples proved to be undatable. However, a large number of radiocarbon dates can be obtained if funding is secured at some future date.

Chapter 18

DISCUSSION

Prior to and during the excavations at Abajo de la Cruz, several issues were added to the overall investigation strategy (that is, the "informal" research design discussed earlier in this report). The initial excavations sampled the area east of the pueblo mound in search of pit houses, extramural hearths, storage pits, trash deposits, and any other features that might be present. I also hoped to discover the eastern limits of the site, whether defined by extramural features, the extent of the trash scatter, or both. No excavations were planned for the pueblo mound; it appeared to have little potential for yielding useful data because of the vandalism it had suffered. Fortunately, this stance was later reversed and several rooms in the pueblo were excavated.

At some point, I also developed an interest in learning about the socio-economic context of Abajo. This interest took form as a site survey in the area and the gathering of data pertinent to local climate, soils, and water. But because the survey was restricted to land forms next to the Rio Tularosa and to Nogal canyon (for which, fortuitously, I had acquired high-resolution maps), the sample transect survey I had envisioned, extending from drainage divide to drainage divide, was not undertaken. Data regarding any special activity sites that the transects might have encountered are not available to round out the prehistoric socio-economic picture of the Bent area.

Our excavations uncovered two basic types of structures (pueblo and pit houses) and a pottery assemblage dominated by Jornada Brown. On the face of things, this combination of structures (especially the pueblo) and plain brown pottery does not fit any of the regional taxonomies—or does it? At the end of this discussion I look at how the remains at Abajo de la Cruz relate to other late-dating prehistoric sites in the Sierra Blanca country and adjoining Tularosa basin.

Extramural Features East of the Pueblo Mound

Excavation sampling east of the pueblo mound involved strip trenches, each 2 m wide and with a 2 m wide unstripped area between each pair of trenches. Each strip zone started at the north edge of the site, where soil began covering rocks exposed at the edge of the terrace. Although the soil contained many rocks throughout the strip trenches, the rock-to-soil ratio diminished somewhat as each strip trench proceeded southward. Nonetheless, artifacts and a few extramural hearths were recovered practically from the start.

The first strip trench was terminated prematurely after it had traversed a trash deposit and sterile-looking fill was again encountered. In retrospect, it should have been continued for another 5 to 10 meters. Strip Zones 2, 4, 5, and 6 were terminated farther south, where the soil mantle thinned considerably as the edge of the terrace was again approached. Also in hindsight, it would have been good to dig at least one more strip trench east of Strip Zone 6, but by that time we had learned that fruitful work could be done within the pueblo mound. We will never know whether that additional strip zone (or yet another) would have defined the eastern edge of the site, as the entire site was removed by the new road construction a few months later.

At any rate, by the time we excavated all of the features exposed by the strip zones, we had discovered that several types of features were scattered (but not clumped) throughout the area. Not only did we find a couple of pit houses and trash immediately east of the pueblo mound as predicted, we also uncovered extramural storage pits and rock hearths. To our surprise, several caliche borrow pits and ash deposit pits also came to light. And, to underscore the importance of extramural exploration, we found that features of several kinds were situated at least as far as 20 m from the pueblo. Except for the occasional potsherd and lithic artifact, organically stained (moderately dark, in this case) soil was absent in long stretches of Strip Zones 4 , 5, and 6 except where features were encountered. Even then, features such as Storage Pits 13a, 13b, and 14 were detected only because of downward breaks in the underlying caliche stratum. Borrow Pits 15 and 22b and the rock hearth in the upper fill of 22b were first recognized as dark stains. The totally unexpected ash-deposit pits were noted as small charcoal and ash circles penetrating the caliche stratum. Very clearly, investigations well outside obvious architectural manifestations can be rewarded with the discovery of multiple kinds of features and activity areas not represented by surface indicators.

The Socio-Economic Context

The occupation(s) of Abajo de la Cruz evidently took place during the second half of the A.D. 1200s and perhaps lasted into the early 1300s (see Chapter 17). The presence of sherds from several different St. Johns vessels (polychrome, black-on-red, or both) vessels and at least a couple of Heshotauthla vessels (again, polychrome or black-on-red or both) are good indicators for the late A.D. 1200s beginning date. Two sherds of Lincoln Black-on-red suggest a circa A.D. 1300 occupation, but an absence of Rio Grande Glaze A Red sherds suggests an end date no later than about A.D. 1325 (the inception date for this particular pottery type). The absence of Rio Grande Glaze A Red at Abajo is probably a reliable indicator for a cutoff date of the site occupation because sherds of this type plus two of its companion types, Los Padillas Polychrome and San Clemente Polychrome, have been recovered from several sites within a 2 km radius of Abajo.

With this occupation period for Abajo in mind, it is now possible to look at the question of contemporaneous or nearly contemporaneous sites in the Abajo area. The middle Rio Tularosa and lower Nogal Canyon both lie within 2 km (straight-line distance) of the site. The survey data, reported only in cursory form (Wiseman 1979), were gathered to learn about the local late prehistoric socio-economic context of Abajo. Fortuitously, the area surveyed is more or less defined by natural boundaries. The upper limit of the survey area, along the Tularosa, defines the upstream limit of the alluvial deposits that might be called the Bent segment of the valley. The former townsite associated with the Bent Mine is located at this point. The constriction of the valley at the same point separates the Bent segment from the Mescalero segment. The lower end of the survey area, along the Tularosa, ends a couple of hundred meters below the old Walker homestead. The distance from the canyon constriction just mentioned and the Walker place is about 7.6 km. Archaeological reconnaissance below (southwest) the Walker place revealed that almost no prehistoric sites are present from there down to the mouth of the Tularosa Valley at the east edge of the town of Tularosa. Lower Nogal Canyon is defined here as the part of the canyon extending from its confluence with the Rio Tularosa to Nogal Spring, a distance of about 4 km.

Most of the sites pertinent to this discussion possess surface architecture. These structures are mostly *cimiento* houses, or structures of presumed jacal construction but with rock foundations. The foundation stones are the primary indicator of the rooms, and mounded earth representing melted adobe from the jacal superstructures rarely occurs. The architecture of Abajo de la Cruz was a combination of two types: (1) *cimiento* type rock foundations with no mounding (Pueblo Rooms 17b, 23, and 24) and (2) deeper rooms with rock foundations and rock lower walls (Pueblo Rooms 31 and 32), with mounding of construction debris. Abajo even had at least one adobe wall, the north wall of Pueblo Room 17b. Thus, a variety of construction techniques was used in the area and archaeologists must consider the variations when recording surface manifestations at sites of this period.

Sites found during the survey present other interpretive challenges. Pit house occupations preceded use of the surface houses just described. At some sites, pit houses are indicated by very slight depressions several meters in diameter. At others, the presence of pit houses must be inferred from pottery types. Pure brownware sites (usually with El Paso Brown sherds) and brownware sites with very low percentages of Mimbres black-on-white sherds (style uncertain) have been recorded in the survey area. Then there are sites with demonstrated or presumed pit houses that also yield brownwares, Mimbres Black-on-white, and either or both Chupadero Black-on-white and Three Rivers Red-on-terracotta. Even more confusing, demonstrated or presumed pit house sites yielding Chupadero or Three Rivers (or both) in addition to brownwares (mostly Jornada Brown) are also present. Thus, the sites in the survey area appear to encompass the pit house horizon, transition sites with pit houses and surface structures, and sites with primarily (if not exclusively) above ground rooms (pueblos). The last site type is based on what appears to have been the latest site in the survey area, the Nogal Canyon site or LA 2335. Unfortunately, almost all of this site was bulldozed to prepare the way for modern housing before any substantive investigations could be undertaken. The architectural sequence just outlined essentially follows the cultural scheme first defined by Donald J. Lehmer (1948) for the Jornada branch of the Mogollon culture.

The surveyed sites dating to the late A.D. 1200s and early 1300s are listed in Table 35. This list also includes isolated artifact finds (IOs) of St. Johns Polychrome and Lincoln Black-on-red. Today, three of the four IOs listed here would be recorded as sites because they contain more than one or two items representing two or more pottery types or lithic materials.

Regarding sites indicating at least partial contemporaneity with Abajo de la Cruz, the survey recorded one large pueblo (LA 2335), four small pueblos (five if we count Abajo) of 5 to 15 rooms each, seven "field house" sites with one to three *cimiento* rooms each, a possible pit house site, two burned rock midden sites (concentrations that are not mounded), and four isolated features. No matter how one figures the situation, during the late 1200s the local population was quite small. Also, the Nogal Canyon site was probably the last site occupied before abandonment of the survey area by prehistoric farming peoples in the mid to late A.D. 1300s. It is also conceivable that all of these sites and manifestations were directly linked to LA 2335 and served as farm villages, field-side shelters, and special activity loci for the people living at LA 2335.

Table 35. Survey Sites Approximately Contemporary with Abajo de La Cruz.

Site No.	Description, Diagnostic Pottery Types, Comments
	Large Pueblo
LA 2335	Nogal Canyon site; ca. 100 rooms, destroyed about 1980. Lincoln B/R, Rio Grande Glaze A
	Small Pueblos
LA 10832	Abajo de la Cruz; ca. 10 rooms. St. Johns Poly or B/R or both, Heshotauthla Poly. or B/R or both, Lincoln B/R
LA 10834	5 to 15 room pueblo, construction details unknown (destroyed before 1970). Rio Grande Glaze A
LA 16835	Ca. 10 rooms, mostly adobe? Lincoln B/R, Rio Grande Glaze A, San Clemente Glaze Poly.
LA 16849	5+ *cimiento* rooms. Lincoln B/R
LA 16877, Area D	Possible small pueblo. Rio Grande Glaze A
	Surface "Field Houses"
LA 10835	2-room *cimiento* structure. Chupadero B/W, Three Rivers R/T
LA 12147	3 *cimiento* rooms in 2 structures. Chupadero B/W, Three Rivers R/T
LA 12148	Possible 1 room *cimiento* structure. Chupadero B/W, Three Rivers R/T
LA 16836	Possible 1 room *cimiento* structure. Lincoln B/R, Rio Grande Glaze A., Ramos (?) Poly.
LA 16845	1 room *cimiento* structure. Chupadero B/W, Three Rivers R/T
LA 16850	1 room *cimiento* structure. Lincoln B/R
LA 16853	1 or 2 small *cimiento* structures. Heshotauthla Poly., Gila Poly., Lincoln B/R, Los Padillas Poly. (pre-Glaze A to Glaze A)
	Pit House Site
LA 16841	Possible pit house site, no obvious surface structures. Lincoln B/R
	Non-Habitation Sites and Isolated Artifacts
LA 16837	Burned rock midden that is not annular or mounded, no obvious houses. Lincoln B/R
LA 16840	Small burned rock middens, no obvious houses. Lincoln B/R
IO-A	5 sherds of two types; Lincoln B/R
IO-B	11 sherds of four types, 2 flakes. St. Johns Poly or B/R or both
IO-I	11 sherds of at least four types, 2 flakes. Lincoln B/R
IO-2F	1 sherd, of Lincoln B/R

Why were so few people living along the middle Rio Tularosa and the lower Nogal Canyon? We currently lack the data needed to answer this question, but four directions for inquiry immediately come to mind. These are (1) what appears to be a limited amount of available farm land (along streams, at least); (2) possible natural sub-irrigation of the Nogal Canyon alluvium by Nogal Spring; (3) poor water quality in the Rio Tularosa; and (4) perhaps alluvial soils of questionable quality along the Rio Tularosa. My thoughts about each of these points are discussed in the following paragraphs.

Defining the amount of arable land required by prehistoric farmers along the Rio Tularosa, about A.D. 1300, is highly speculative at best. For instance, we do not know the growing characteristics and requirements of the corn and squash that the Abajo farmers were using. Nor do we know the details of their farming technology (whether dryland, floodwater, ditch irrigation, or some combination of these) or the percentage contribution of corn to their diet (the Abajo mano data suggest 35 to 75 percent).

Ethnographic studies suggest that groups heavily dependent on maize must farm about 0.6 ha per person (Minnis 1985:151–152). Based on the mano data, at Abajo the amount of land needed to grow enough maize might have ranged from 0.3 to 0.5 ha per person. If we estimate that each habitation room (room with a fire pit) at Abajo represents two or three inhabitants and that all but one (Room 31) of the 10 estimated rooms in the site was a habitation, the site probably was home to as few as 18 and as many as 27 individuals at its peak of use. Providing enough maize for those individuals would have required from 5.4 to 13.5 ha (13.3 to 33.4 acres) of farmland. The land indicated by the smaller figure of 5.4 ha would have been available at one or the other of two small tracts within 250 m to the north and west of Abajo (Figure 53). The land required for the larger figure, 13.5 ha, would have been a combination of the two previously mentioned tracts plus part of a very large tract 500 m farther west of Abajo.

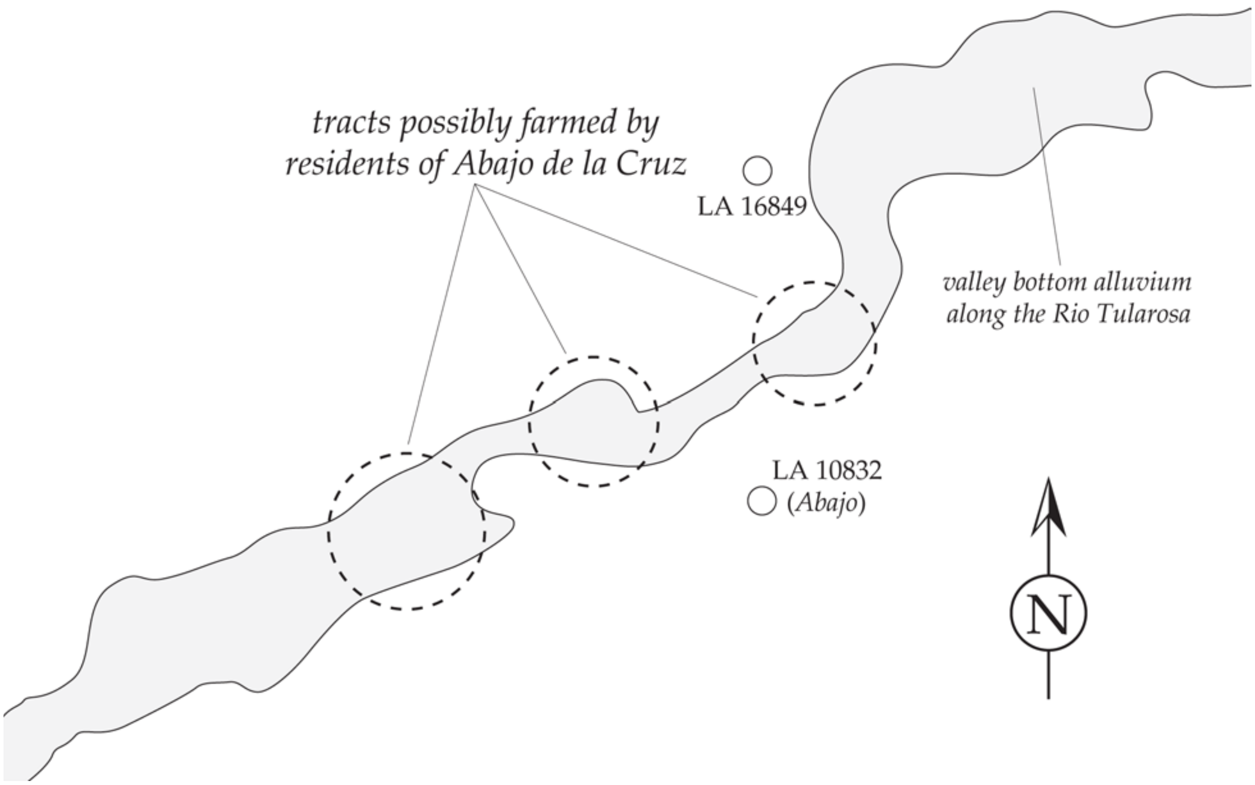

Figure 53. Alluvial tracts along the Rio Tularosa probably farmed by residents of Abajo de la Cruz.

Although the small tract north of Abajo was also within easy walking distance (and use) of the inhabitants of a contemporary small pueblo (LA 16849), the farmers at that site most likely farmed the very large tract immediately east of their village. It therefore seems quite likely that sufficient arable land was available to the residents of Abajo to meet their needs for maize (and any other cultigens such as squash). Given the arable land above and below these tracts, the middle Tularosa and lower Nogal Canyon could provide the acreage needed by the late 1200s residents of the entire community.

Historical records show that Euro-Americans successfully farmed along the Rio Tularosa into the second half of the 19th century. Specifically, in the GLO survey notes cited in Chapter 2, government land surveyors who worked there in 1866 and 1867 stated that the valley farm land was first rate. However, we have no details as to just how well the crops were doing, how long the historical farms had been in operation, whether any amendments (fertilizers) were used to maintain soil fertility, or a host of other factors needed to judge the long term success of the enterprise. Thus, to say that the valley is no longer being farmed in the vicinity of Abajo means little. We do not know at this juncture whether modern residents are simply no longer interested in farming or if some objective change put an end to the farming. Whatever the cause or causes, the land surveyors' comments about first rate soils is something of a surprise, given modern soil survey data.

As is related in Chapter 2, Pena and Aztec soils characterize the arable soils near Abajo. The surface layer (A1) of Pena soils is generally good for farming, but is shallow (0 to 23 cm below surface). The next 13 cm (23 to 36 cm below surface) of the Pena soils are clayey The Cca soil starts at a depth of only 36 cm (about 14 inches) below the surface. Derr (1981) describes it as "massive, hard, firm, ... strongly calcareous; moderately alkaline." The C horizon of the Aztec soils is even shallower, starting at a depth of about 20 cm. Derr (1981) describes these soils as having "about 20 percent large crystals and soft masses of gypsum; strongly calcareous; moderately alkaline."

If the corn and squash cultivated by the inhabitants of Abajo were adapted to either or both of these soils, the crops probably would have done well.. The fact that the residents of Abajo were using an antiquated form of corn compared to that used by contemporary peoples of northern New Mexico and southern Arizona (see Chapter 13) suggests that this variety coped best with the available soils. These plants would have had to have shallow rooting depths and perhaps short above ground masts. They would have been hardy plants indeed!

At first blush, Nogal canyon appears to be a fertile valley. The lower part of the canyon includes Nogal Spring, which flows abundantly even today. The valley is fairly broad, flat floored, with an even gradient throughout its lower reaches. After working in the area over a period of years, I became aware that Nogal spring, if not contained within a well-maintained channel, has a tendency to sub-irrigate an unknown amount of the valley bottom below the spring. Today, in collapsed horse and cattle hoof prints, the water level can be seen 25 to 30 cm below the ground surface—a depth that can wreak havoc with the roots of cultigens like corn. It is not clear whether this condition of sub-irrigation continues to the mouth of the canyon but if it did so in prehistoric times, it should have affected any attempts at farming. Today, the valley is used for growing grass and pasturing horses, but at one time it had orchards and at least some farming.

The last consideration is water. As Chapter 2 describes, the Rio Tularosa appears to conduct plenty of water. The main question about this water is its quality. Clearly, prehistoric and historic peoples used that water for both farming and household purposes. However, because of its rather distasteful nature and laxative effects, use of this water required a period of adjustment. Would not that requirement have impeded settlement by people searching for new land? Was the middle Rio Tularosa valley less attractive for that reason? The presence of a number of brownware period settlements along the Bent section of the valley indicates that people had been long accustomed to the deleterious affects of the water for decades or centuries prior to the founding of Abajo de la Cruz and its sister and successor communities. Thus, water quality was probably only part of the reason why the late prehistoric population was lower than might otherwise be expected.

Another point of interest: Abajo and its two sister communities are the farthest downstream in the Bent section of the Tularosa. All other sister and successor communities (the larger part of the contemporary population) are upstream, along the river and in Nogal Canyon. In view of this, and especially since the upstream communities are closer to or inside the edge of the mountains, perhaps the air temperature gradient was also an important factor in the distribution of the late prehistoric population. This factor could have been important to people as well as to plants, although other, contrary factors such as cold air drainage could have been at play as well.

Suffice it to say that at present, we lack the data needed to explain why late prehistoric populations along the middle Rio Tularosa and Nogal Canyon were smaller than might be expected. This is especially vexing given the attractiveness and presumed desirability of the area as a living space for humans.

Abajo de la Cruz and the Cultural Taxonomy of South-Central New Mexico

South-central and southeastern New Mexico (basically from the Rio Grande east to the New Mexico-Texas state line, and from U.S. Highway 60 south to the Rio Grande and beyond at El Paso) is an enormous area—it measures about 290 by 390 km (180 by 240 miles) and includes about 111,900 km^2 (43,200 square miles) of land. It should not be surprising that the prehistoric material culture of such a "super-region" varied across space as well as through time. Donald Lehmer (1948) first formulated two sequences for the western third of the super-region and called it the Jornada branch of the Mogollon culture. Since 1948, other investigators, working in the central and eastern parts of the super-region, have encountered cultural manifestations that differ somewhat from Lehmer's Jornada branch (Corley 1965; Jelinek 1967; Kelley 1984; Leslie 1979).

However, most archaeologists who have come along since then treated the cultural remains of the entire super-region as belonging to the Jornada branch of the Mogollon (or as Jornada Mogollon, for short). If this approach was ever justified, it no longer is. The super-region involves several major biotic provinces (including the Chihuahuan Desert), large mountain masses (notably the chain formed by the Gallina, Jicarilla, Capitan, Sierra Blanca, Sacramento, and Guadalupe mountains), and the Southern Great Plains. As archaeologists we should expect the prehistoric residents of such a vast and varied landscape to have devised several ways of acquiring food and otherwise coping with their natural setting. More recent studies further suggest that some of the known material attributes in the super-region are due to different cultural origins and relationships (and perhaps ethnicities) both within and outside the super-region. While this site report is not the place to discuss these phenomena except as they relate directly to Abajo de la Cruz, I discuss them in detail in a forthcoming monograph (Wiseman n.d. b)

The Defining Cultural Characteristics of Abajo de la Cruz

The two aspects of prehistoric material culture commonly used to define cultural relationships are structures and pottery assemblages. A third characteristic, subsistence practices, also commonly appears in such discussions—but here, subsistence is eschewed because the question is how Abajo de la Cruz relates to contemporary farming manifestations. All were farming populations, so subsistence differences are not the critical issue.

As I see it, the salient characteristics of Abajo de la Cruz architecture are: (1) the pueblo of 10 to 12 rooms; (2) rooms of about the same size and shape, but with floors at slightly differing levels due to initial excavation of shallow pits for room spaces; (3) rocks used to line the lower walls (pit sides) and to form footings (*cimientos*) for the walls; and (4) the variety of materials used to complete the walls to full height. Upper wall materials and construction techniques are mostly conjectural, as no full height walls (or equivalent quantities of collapsed construction material) were noted during excavation. The bases of most walls incorporated rocks, but one wall appears to have been built mainly of mud (or "adobe," as that term is generally used by Southwest archaeologists). Except at their bases, the walls most likely involved wood frameworks thinly coated with mud, or hides or mats or brush, or some combination of these materials. The term "jacal" is often used by archaeologists to refer to walls such as those built at Abajo. Roofs would have been built of equally light-weight materials in order to have been supported by these walls.

The pottery assemblage of Abajo is dominated by Jornada Brown, a plainware used for cooking, storage, and perhaps some service of foodstuffs. Other major but far less common types include, in order of abundance, Three Rivers Red-on-terracotta, El Paso Polychrome (including sherds classified as El Paso Brown, most or all of which represent unpainted bottom portions of polychrome vessels), and Chupadero Black-on-white. The remaining 5 percent of the Abajo pottery assemblage is made up by 14 types and wares, some of them minor, locally made variants of major types and others imports from across the U.S. Southwest and northern Chihuahua. Although we recovered very few sherds representing the various types and wares in this last group, some of them are extremely important for dating Abajo and for elucidating trade networks.

Comparison with Other Regions

The pottery assemblage from Abajo indicates an occupation during the last half of the A.D. 1200s, perhaps extending into the early 1300s. Abajo is thus contemporary with the El Paso phase of the Tularosa Basin, the middle Glencoe phase (which I define elsewhere [Wiseman n.d. a], using the Crockett Canyon site [Farwell et al. 1992] as the type site) of the eastern slopes of the Sierra Blanca, and the Lincoln phase of the Capitan-Jicarilla mountains north of Sierra Blanca.

El Paso Phase

El Paso phase architecture consists mainly of blocks of surface rooms, either in lines or enclosing plazas. Rooms vary greatly in size, but only the smallest rooms are of the size of the Abajo rooms. The walls of most El Paso rooms are mud ("adobe"), but a few examples containing rocks or even made entirely of rocks are known. The arrangement of rooms in blocks is rather haphazard, with small rooms found among both medium-size and large rooms. The long axes of some rooms are aligned with the long axis of the roomblock, while the long axes of other rooms are transverse to that axis. El Paso phase pottery assemblages are heavily dominated by El Paso Polychrome but also include a variety of other types.

In contrast, Abajo rooms are more or less equal in size, their walls include rock foundations, and the compact pueblo layout at Abajo contrasts rather strongly with that of the El Paso phase pueblos. The Abajo and El Paso phase pottery assemblages differ in important ways. The preponderance of El Paso Polychrome in El Paso phase villages contrasts strongly with the dominance of Jornada Brown at Abajo. On the whole, the architecture and pottery assemblage at Abajo do not fit the pattern for the El Paso phase.

Middle Glencoe Phase

Middle Glencoe phase structures—in fact, almost all Glencoe phase structures, regardless of sub-period—are pit houses. This fact cannot be overstated, as most researchers miss the point (e.g., Oakes 2000). True, the pit houses at some late Glencoe villages were built side by side and therefore formed what appear to be linear blocks of rooms on site maps. However, the pit houses do not share walls, an essential characteristic of pueblos. *Cimiento* foundations were used in some late structures in the Glencoe area, but are infrequent enough to suggest that such structures were built and used by single families conceivably from Corona or early Lincoln phase communities (as I discuss below). If so, these immigrant families either joined an extant Glencoe village or settled at an abandoned one.

The pottery assemblages of Glencoe phase sites, regardless of sub-period, are dominated by Jornada Brown and include all of the other major and minor types represented at Abajo. In other words, the Abajo pottery assemblage could easily be duplicated at a middle Glencoe site. However, the architecture at Abajo does not match middle Glencoe architecture.

Corona and Lincoln Phases

Jane Kelley's (1984) two-phase sequence for the northern Sierra Blanca (as far north as the village of Corona) has at least superficial cognates in the Gran Quivira country of central New Mexico. The similarities are close enough that the Corona peoples and perhaps the Lincoln peoples may represent migrants from that region.

The Corona phase, the earlier of Kelley's phases, is denoted by small, more or less square pueblo rooms consisting of walls with *cimiento* footings and, presumably, jacal superstructures. Rooms occur singly or in blocks of up to a half a dozen or more. A site may have only one such room block, or it may have many such units clustered in no particular arrangement. Socio-religious structures may occasionally be present in the form of large, circular pit structures built apart from the habitation rooms, but none has yet been excavated. The pottery assemblage is dominated by Jornada Brown, with Chupadero Black-on-white as a secondary but still major type. Other pottery types are also occasionally found on Corona sites.

The Lincoln phase developed from the Corona phase, probably about A.D. 1300. Although aspects of walls with *cimiento* foundations were initially retained, more substantial superstructures of mud or rock were built on these foundations. As a result, the pueblos are visibly mounded (to a height of 0.5 to 1.0 m or more) and contrast with the relatively flat ground surfaces at Corona phase sites. Lincoln phase habitation and storage rooms are generally of the same size and shape (small and more or less square) as Corona phase rooms, but usually form larger linear room blocks or units with enclosed plazas. Some Lincoln phase pueblos contain 100 or more rooms in a single unit. We have no data on socio-religious structures in northern Lincoln phase (Corona area) sites, but several such structures have been tested and excavated in the southern (Jicarilla-Capitan) area. These basically square structures are much larger than the habitation rooms, are quite deep (2 to 3 m), and are set apart from the room blocks. In plaza pueblo sites, these structures are usually found within the enclosed plazas.

The change from a Corona pottery assemblage to a Lincoln phase pottery assemblage involves the increasing presence and eventual dominance of indented corrugated pottery (usually Corona Corrugated), accompanied by smaller percentages of Chupadero Black-on-white and Jornada Brown. Lincoln phase sites in and around the southern Jicarilla and Capitan mountains also tend to have respectable percentages of Three Rivers Red-on-terracotta and (usually) lesser percentages of Lincoln Black-on-red. Lincoln phase sites in the vicinity of Corona lack these two types. There is also the usual wide variety of very minor but temporally important pottery types representing many of the other regions of prehistoric New Mexico and northern Chihuahua.

Most exposed Abajo walls had *cimiento* foundations, and the walls did not appear to have been full height masonry walls or even substantial adobe walls. Thus, the Abajo walls are reminiscent of those of the Corona phase, but not of the full height adobe or masonry walls of Lincoln phase pueblos. More specifically, the Abajo walls were very much like those of House Unit 46 at the Phillips site north of Capitan (Kelley 1984, Appendix 2), and of the Double Crossing site on the Rio Bonito between Lincoln and Capitan (based on personal observations during site visits in the late 1960s and 1970s). At all three sites, the wall bases (*cimientos*) consisted of rocks set on end and capped with a few layers of horizontally laid rocks. At Unit 46, the horizontal rocks spanned the width of the walls; at Abajo, some were merely facings for core and veneer walls but others, like at Unit 46, involved slab-like rocks spanning the widths of the walls. The walls exposed in the sides of looter holes at Double Crossing were clearly built with vertical rocks covered with horizontal rocks, but the tops of the foundations were not exposed to show whether the horizontal rocks spanned the widths of the walls or merely covered rock and adobe cores as at Abajo.

And how do the Phillips site Unit 46 and Abajo pottery assemblages compare? If we discount the fact that Unit 46 produced more Lincoln Black-on-red and indented corrugated than Abajo, they are virtual duplicates. Unit 46 also produced Rio Grande Glaze A Red, Ramos Polychrome, and Gila Polychrome as well as the usual Chupadero, Three Rivers, Playas, and Jornada Brown. No systematic pottery collections were made for the Double Crossing site, but I have seen both

Lincoln and Pinedale Black-on-red (the latter dating to A.D. 1275–1325 [Breternitz 1966]) at the site, as well as all of the usual accompanying types. Thus, Unit 46 and Double Crossing appear to date slightly later than Abajo. Kelley (1984, Appendix 2) assigned Unit 46 at Phillips to the early Lincoln phase. Since the architecture and pottery assemblage from Abajo are most similar to Unit 46 at Phillips and the Double Crossing site, Abajo should be assigned to the very early Lincoln phase.

If an early Lincoln phase assignment is correct for Abajo de la Cruz, it would signal the need to extend the territory of the Lincoln phase southward along the *western side* of Sierra Blanca. In contrast, Kelley (1984) originally defined the Lincoln phase for the *eastern side* of Sierra Blanca. My suggestion is supported by the Cosgrove site, at Three Rivers some 30 km north of Abajo de la Cruz. The Cosgrove site, where about nine pueblo rooms and a separate socio-religious structure were either fully excavated or tested (Cosgrove and Cosgrove 1965), evidently had full-height walls of adobe incorporating random river cobbles. The pottery assemblage included Lincoln Black-on-red plus the usual Chupadero Black-on-white, Three Rivers Red-on-terracotta, El Paso Polychrome, an indeterminate Salado polychrome, Seco Corrugated, unspecified indented corrugated, and unspecified plain brown ware. The excavated room block is the largest of the pueblo units at the site. Masonry, adobe, and possibly jacal construction techniques were noted at the other units, as were the presence of Rio Grande Glaze A Red, Playas Red Tooled, and Ramos Polychrome (Wimberly and Rogers 1977:255–267). Importantly, the Cosgrove site yielded some of the few tree-ring specimens from the Sierra Blanca country to provide dates. The 19 pieces of dated wood range from A.D. 1310vv to 1347+r, with construction indicated "shortly after A.D. 1347" (Robinson et al. 1972:89). Thus, the excavated part of the Cosgrove site meets all of the criteria for affiliation with the Lincoln phase.

Chapter 19

CONCLUSIONS

A 1972 highway project near Bent, Otero County, New Mexico resulted in the excavation of two prehistoric sites: the Bent site (LA 10835) and the Abajo de la Cruz site (LA 10832). The report on the Bent site has already appeared (Wiseman 1991). The current report presents the results of the excavation of Abajo de la Cruz, augmented by archaeological survey data from the surrounding countryside. Abajo de la Cruz (LA 10832) consisted of a 10 to 12 room pueblo, two small pit houses, and extramural remains including hearths, storage pits, construction materials borrow pits, ash deposit pits, and trash. Abajo was a single component site, but some of the rooms of the pueblo were either remodeled or added later in the occupation.

Four of the pueblo rooms were completely excavated and three others were tested. The pit houses and all of the extramural features exposed by a series of alternating two-meter wide strip zones (trenches, in effect), placed east of the pueblo, were excavated.

The project took place before the time when formal research designs were a required feature of cultural resource management (CRM) projects. However, during the planning, excavation, and analysis phases of the project, several research interests came into focus and guided the studies leading to this report. An important aspect of these interests was an after-hours, volunteer archaeological survey along the Bent section of the Rio Tularosa and the lower part of one of its major tributaries, Nogal Canyon. Those research interests and their results may be summarized as follows.

Subsurface Remains

We anticipated finding one or more pit houses at Abajo, and indeed we did. And, as we learned, those pit houses were contemporary with the pueblo. Also as expected, a large trash deposit was found immediately east of the pueblo. The trash completely filled one of the pit houses but was only the upper fill of the second one.

An unexpected surprise was the series of caliche borrow pits that partly destroyed one of the pit houses; the borrow pits were also filled with refuse. Most of these borrow pits were near the pueblo but a few smaller, trash-filled ones were found farther east. The contents of the borrow pits helped date the occupation of the pueblo and pit houses.

Two small fire pits were found just outside the north wall of the pueblo, and several rock “hearths” were found in the eastern flat area at various distances from the pueblo. These rock hearths, which seem to have been contemporary with the pueblo and pit houses, could have been small baking facilities rather than just warming and roasting facilities sometimes described as “campfires.”

Two large storage pits, located some distance east of the pueblo, lacked trash fills and could not be securely associated with the structures and other features.

Another surprise was the finding of several small, ash-filled pits dug into the caliche. All were located well away from the structures, yet presumably were associated with the main occupation of the site.

A short line of decaying vertical posts is presumed to have been part of historical use of the site.

Finally, an irregularity in the caliche substrate dubbed "the mystery pit" was also found but no function or dating could be surmised.

Age of the Site

No materials suitable for tree-ring dating were recovered from Abajo. Fragments of charred wood associated with the occupation were recovered, but no funds were available for radiocarbon dating. Thus, the occupation dates presented here are based solely on pottery. The assemblage includes several pottery types that are fairly well dated elsewhere in the Southwest, and indicates the occupation took place between ca. A.D. 1250 and 1300—perhaps instead lasting until 1315–1325. These dates are suggested by the presence of St. Johns Polychrome (or Black-on-red), Heshotauthla Polychrome (or Black-on-red), and two sherds of Lincoln Black-on-red and on the absence of Rio Grande Glaze A Red.

Suitability for Human Occupation

The project area is at the mouth of the canyon of the Rio Tularosa, where the local mountains open onto the upper bajada. Here, the setting changes are from cooler, tree-covered mountains to hotter upper desert. Living at this junction, the prehistoric inhabitants had access to a wide variety of plant and animal species. To the modern visitor, this should have been a great place to live. However, the after-hours archaeological survey along the Rio Tularosa, which spanned the physical, climatic, and biotic transition, found that the late prehistoric population (dating about A.D. 1300) consisted of just one large pueblo, five small pueblos, one pit house site, seven "field house" sites, and several special activity sites. Combined, the sites represent perhaps 150 rooms scattered along 8.5 km of the small but well-watered Rio Tularosa and its tributary, Nogal Canyon. This immediately raises the question: why were so few people living here at that time?

Initially, the answer to this question appeared to lie in several aspects of the environment, namely, the availability and quality of arable land and water. Preliminary evaluations of these and related aspects suggest that the alluvial soils and water were sufficient (in terms of both quantity and quality) for the extant population but not abundant enough to support a much larger population. There may have been two additional limiting factors: increased summer heat on the downstream end of the Rio Tularosa, and sub-irrigation of parts (or all?) of the lower stretch of Nogal Canyon, creating soils that were too wet for crops.

Perhaps there was a third limiting factor: surface water quality. This last factor is more debatable, however. Although heavily mineralized with carbonates and sulfates, the water could be (and was) consumed by three different historical groups (Native American, Hispanic American, and

“Anglos”). While the tentative conclusions reached by this brief inquiry are mixed and therefore somewhat inconclusive, these variables (and others?) should be explored more systematically at some future date.

The Site’s Cultural Affiliation and its Implications

A comparison of the architecture and pottery assemblage at Abajo de la Cruz with those in surrounding regions suggests that Abajo, taxonomically speaking, should be assigned to the early part of the Lincoln phase. In that case, the geographic extent of the Lincoln phase should be revised to include the west side of Sierra Blanca, at least as far south as the Rio Tularosa. The presence of the impressive Three Rivers Pueblo site along the Three Rivers drainage, north of the Rio Tularosa, supports this proposal.

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Appendix

CONCORDANCE OF POTTERY ANALYSIS NUMBERS AND PROVENIENCES

The analysis numbers listed below appear on sherds and in tables. The field specimen numbers are listed without the LA number prefix.

Analysis No.	Field Specimen No.	Provenience Description	Provenience Type, Comments
1	12-15	Feature 12 strip east	Overburden
2	12-3	Feature 12 strip west	Overburden
3	1-2	Feature 1 fill	Strip trench/zone
4	0-1	General surface	Site surface
5	12-5	Feature 12 fill	Between overburden and the depth at which sub-features were defined.
6			Number not assigned.
7	2-1	Feature 2 fill	Strip trench/zone
8	4-1	Feature 4 fill	Strip trench/zone
9			Number not assigned.
10	15-1	Feature 15 fill	Borrow pit
11	32-1	Feature 32 upper fill	Pueblo room
12	1-1	Feature 1 fill	Strip trench/zone
13	23-1	Feature 23 upper fill	Pueblo room
14	32-14	Feature 32 floor contact	Pueblo room
15	24-72	Feature 24, Stratum 2 fill	Pueblo room
16	24-6	Feature general fill	Pueblo room
17	25-2	Feature 25 fill	Trench outlining west wall of pueblo
18	24-10	Feature 24 floor fill	Pueblo room
19	24-8	Feature 24 test pit fill	Pueblo room
20	0-12	General surface	Site surface
21	25-8	Feature 25 fill	Trench outlining west wall of pueblo
22	17b-23	Feature 17b fill	Pueblo room
23	27-2	Feature 27 fill	Pueblo room
24	17b-25	Feature 17b floor fill	Pueblo room
25	12b-109	Feature 12b bottom fill	Borrow pit
26	24-23	Feature 24, Stratum 1 fill	Pueblo room
27	24-19	Feature 24 floor contact	Pueblo room
28	12-108	Feature 12b bottom fill	Borrow pit
29	18-4	Feature 18 fill	Extramural rock hearth
30	12-21	Feature 12 stripping	Borrow pit cluster overburden
31	13b-5	Feature 13b stripping	Extramural pit overburden
32	22-1	Feature 22 fill	Borrow pit
33	13-2	Feature 13 stripping	Extramural pits overburden
34	12e-66	Feature 12e bottom fill	Borrow pit
35	32-3	Feature 32 floor fill	Pueblo room
36	19-1	Feature 19 fill	Extramural mystery pit

Analysis No.	Field Specimen No.	Provenience Description	Provenience Type, Comments
37	12-24	Feature 12 stripping	Overburden for pit house and borrow pits
38	12c-54	Feature 12c bottom fill	Borrow pit
39	196(?)-9	Possible Feature 19 fill	Extramural mystery pit
40	13-1	Feature 13a fill	Extramural storage pit
41	18-2	Feature 18 fill	Extramural rock hearth
42	12b-51	Feature 12b bottom fill	Borrow pit
43	12d-64	Feature 12d bottom fill	Borrow pit
44	13a-6	Feature 13a fill	Extramural storage pit
45	14-4	Feature 14, in bottom	Extramural storage pit
46	12c-62	Feature 12c bottom fill	Borrow pit
47	5-7	Feature 5 fill	Strip trench/zone
48	13b-3	Feature 13b fill	Extramural storage pit
49	18-1	Feature 18 fill	Extramural rock hearth
50	12-46	Feature 12 stripping	Borrow pit cluster overburden
51	26-1	Feature 26 fill	Pueblo room
52	14-1	Feature 14 fill	Extramural storage pit
53	12a-49	Feature 12a floor fill	Pit house, 1–2 cm above floor
54	20-1	Feature 20 fill	Extramural fire pit
55	32-4	Feature 32 lower fill	Pueblo room
56	12-1	Feature 12 fill	Between overburden and depth at which sub-features were defined.
57	2-6	Feature 2 fill	Strip trench/zone
58	5-5	Feature 5 fill	Strip trench/zone
59	31-45	Feature 31 floor fill	Pueblo room, partial vessel
60	2-10	Feature 2 fill	Strip trench/zone
61	9-3	(See comments.)	Listed as Feature 9 fill but this is the wrong feature number; probably Feature 17 (room) fill.
62	31-1	Feature 31 stripping	Pueblo room, mostly looter’s backdirt
63	6-5	Feature 6 fill	Strip trench/zone
64	31-2	Feature 31 upper fill	Pueblo room
65	25-11	Feature 25 fill	Trench outlining west wall of pueblo
66	31-5	Feature 31 floor contact	Pueblo room
67	24-27	Feature 24, Stratum 3 fill	Pueblo room
68	30-1	Feature 30 fill	Excavations around line of posts
69	20-5	Feature 20 fill	Extramural fire pit
70	24-28	Feature 24, Stratum 3 fill	Pueblo room with bin in southeast corner
71	31-24	Feature 31 “sipapu” fill	Pueblo room
72	29-1	Feature 29 fill	Lowest borrow pit in borrow pit cluster
73	21-6	Feature 21 fill	Extramural fire pit
74	28-5	Feature 28 fill	Pit house
75	28-10	Feature 28 fill	Pit house (No. 1 of 2 bags; see 79)
76	31-7	Feature 31 floor contact	Pueblo room, partial vessels
77	2-4	Feature 2 fill	Strip trench/zone
78	28-1	Feature 28 stripping	Pit house overburden
79	28-10	Feature 28 fill	Pit house (No. 2 of 2 bags; see 75)

Analysis No.	Field Specimen No.	Provenience Description	Provenience Type, Comments
80	31-9	Feature 31 floor contact	Pueblo room, partial vessel
81	17-6	Feature 17 fill	Strip zone along north side of pueblo
82	12c-59	Feature 12c bottom fill	Borrow pit
83	12a-48	Feature 12a floor fill	Pit house
84	28-108	Feature 28 floor fill	Pit house, Square 3S2E
85	28-93	Feature 28 floor fill	Pit house, Square 2S3E
86	28-90	Feature 28 floor fill	Pit house, Square 2S2E
87	28-113	Feature 28 floor fill	Pit house, Square 3S3E
88	28-121	Feature 28 floor fill	Pit house, Square 4S2E
89	28-92	Feature 28 floor contact	Pit house, Square 2S2E
90	28-101	Feature 28 floor contact	Pit house, Square 2S3E
91	28-104	Feature 28 floor fill	Pit house, Square 2S4E
92	28-111	Feature 28 floor contact	Pit house, Square 3S2E
93	6-10	Feature 6 fill	Strip trench/zone
94	28-82	Feature 28 floor fill	Pit house, Square 1S2E
95	28-118	Feature 28 floor fill	Pit house, Square 3S4E
96	28-106	Feature 28 floor fill	Pit house, Square 3S1E
97	28-87	Feature 28 floor fill	Pit house, Square 1S4E
98	28-84	Feature 28 floor fill	Pit house, Square 1S3E
99			Number not assigned.
100	28-123	Feature 28 floor fill	Pit house, Square 4S3E